



Cisco ASR 14000 Series Router 8-Slot Line Card Chassis Installation Guide

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Cisco ASR 14000 Series 8-Slot Line Card Chassis Specifications A-1

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Preface

This preface explains the objectives, intended audience, and organization of the *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis Installation Guide* and describes the conventions that convey instructions and other information.

The preface contains the following sections:

- [Objective](#)
- [Audience](#)
- [Document Organization](#)
- [Document Conventions](#)
- [Related Documentation](#)
- [Changes to This Document](#)
- [Obtaining Documentation, Obtaining Support, and Security Guidelines](#)
- [Documentation Feedback](#)
- [Cisco Product Security Overview](#)
- [Obtaining Technical Assistance](#)
- [Obtaining Additional Publications and Information](#)

Objective

This installation guide describes how to install power, air circulation, line card, and external components into and remove them from a Cisco ASR (Aggregation Services Router) 14000 series 8-slot line card chassis.

Audience

This guide is for customers who are responsible for installing the line card chassis components. The reader is expected to have installed networking hardware in the past. No additional knowledge of routing or the Cisco IOS-XR software is assumed.

Document Organization

This guide contains the following chapters and appendixes:

- [Chapter 1, “Overview,”](#) introduces the various line card chassis systems and components.
- [Chapter 2, “Installing and Removing Power Components,”](#) details how to bring power to and install power components in the line card chassis, including the power distribution units and power modules.
- [Chapter 3, “Installing and Removing Air Circulation Components,”](#) describes how to install the fan trays and air filters.
- [Chapter 4, “Installing and Removing MSCs, PLIMs, and Associated Components,”](#) provides instructions on how to install various cards, including modular services cards, switch fabric cards, route processor cards, and the physical layer interface modules.
- [Chapter 5, “Installing and Removing Exterior Components,”](#) provides instructions on how to install the chassis exterior components.
- [Appendix A, “Cisco ASR 14000 Series 8-Slot Line Card Chassis Specifications,”](#) lists the specifications for the line card chassis.

Document Conventions

This guide uses the convention where the symbol ^ represents the key labeled *Control*. For example, the key combination ^z means hold down the **Control** key while you press the **z** key.

Command descriptions use these conventions:

- Examples that contain system prompts denote interactive sessions, indicating the commands that you should enter at the prompt. The system prompt indicates the current level of the EXEC command interpreter. For example, the prompt `router>` indicates that you should be at the *user* level, and the prompt `router#` indicates that you should be at the *privileged* level. Access to the privileged level usually requires a password. Refer to the related software configuration and reference documentation listed in the [“Related Documentation” section on page 5](#) for additional information.
- Commands and keywords are in **boldface** font.
- Arguments for which you supply values are in *italic* font.
- Elements in square brackets ([]) are optional.
- Alternative but required keywords are grouped in braces ({ }) and separated by vertical bars (|).

Examples use these conventions:

- Terminal sessions and sample console screen displays are in *screen* font.
- Information you enter is in **boldface screen** font.
- Nonprinting characters, such as passwords, are in angle brackets (< >).
- Default responses to system prompts are in square brackets ([]).
- Exclamation points (!) at the beginning of a line indicate a comment line.



Caution

Means *reader be careful*. You are capable of doing something that might result in equipment damage or loss of data.

**Note**

Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

**Timesaver**

Means *the described action saves time*. You can save time by performing the action described in the paragraph.

**Warning**

This warning symbol means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device. Statement 1074

Related Documentation

For complete information on the ASR 14000 series 8-slot line card chassis, see the following publications:

- *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis Installation Guide*
- *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis Site Planning Guide*
- *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis Unpacking, Mounting, and Securing Guide*
- *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis System Description*
- *Cisco ASR 14000 Series Router SIP and SPA Hardware Installation Guide*
- *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*
- *Cisco ASR 14000 Series Router Documentation Roadmap*
- *About Cisco IOS XR Software Documentation*

See the “[Obtaining Documentation, Obtaining Support, and Security Guidelines](#)” section on page 6 for information on obtaining these and other publications.

For a complete listing of available software documentation for the Cisco ASR 14000 series 8-slot line card chassis, see the About Cisco IOS XR Software Documentation, available online at:

<http://www.cisco.com/en/US/products/ps5845/index.html>

Then check the links under “Technical Documentation & Tools.”

Changes to This Document

Table 1 lists the technical changes made to this document since it was first printed.

Table 1 *Changes to This Document*

Revision	Date	Change Summary
OL-16973-01	MONTH dd, yyyy	Initial release of the document.

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Cisco.com

You can access the most current Cisco documentation at this URL:

<http://www.cisco.com/techsupport>

You can access the Cisco website at this URL:

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http://www.cisco.com/public/countries_languages.shtml

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170 West Tasman Drive
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We appreciate your comments.

Cisco Product Security Overview

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http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you can perform these tasks:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

<http://www.cisco.com/go/psirt>

If you prefer to see advisories and notices as they are updated in real time, you can access a Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed from this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

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An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.

- Nonemergencies—psirt@cisco.com

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532



Tip

We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.x through 8.x.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

The link on this page has the current PGP key ID in use.

Obtaining Technical Assistance

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Cisco Technical Support & Documentation Website

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<http://www.cisco.com/techsupport>

Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>

**Note**

Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support & Documentation website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, documentation, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:
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- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:
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<http://www.cisco.com/en/US/products/index.html>
- Networking Professionals Connection is an interactive website for networking professionals to share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:
<http://www.cisco.com/discuss/networking>
- World-class networking training is available from Cisco. You can view current offerings at this URL:
<http://www.cisco.com/en/US/learning/index.html>



CHAPTER 1

Overview

This installation guide describes how to install the power, air circulation, line card, and external components into and remove them from a Cisco ASR (Aggregation Services Router) 14000 series 8-slot line card chassis.

This chapter introduces the Cisco ASR 14000 series 8-slot line card chassis at the highest level. It contains illustrations of the front and back of the chassis, complete with callouts to each hardware component. For details on each subsystem discussed in this chapter, see *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis System Description*.

This chapter presents the following topics:

- [Chassis Overview](#)
- [Chassis Components](#)
- [Chassis Slot Numbers](#)
- [Chassis Cable Management](#)
- [Chassis Cooling System](#)
- [Chassis Power System](#)
- [Safety Guidelines](#)
- [Preventing Electrostatic Discharge](#)

Chassis Overview

The Cisco ASR 14000 series 8-slot line card chassis routing system consists of a single rack-mount chassis that contains the following system components:

- Modular services cards (MSCs), also called line cards (up to eight)
- Physical layer interface modules, or PLIMs (up to eight, one for each MSC)
- Route processor (RP) cards (up to two)
- Switch fabric cards (SFCs) (up to four)
- A chassis midplane that connects MSCs to their associated PLIMs and to switch fabric cards

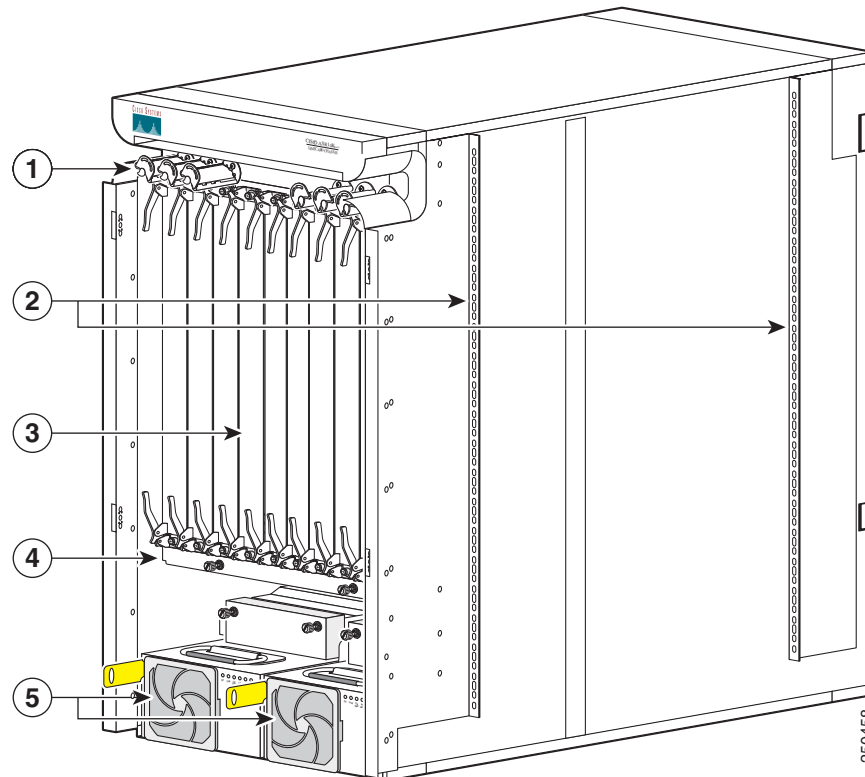
The Cisco ASR 14000 series 8-slot line card chassis has its own power and cooling subsystems.

Chassis Components

This section lists the main components of a Cisco ASR 14000 series 8-slot line card chassis. It primarily identifies the components that are considered field-replaceable units (FRUs), but where additional detail is useful identifies subassemblies that are not field replaceable.

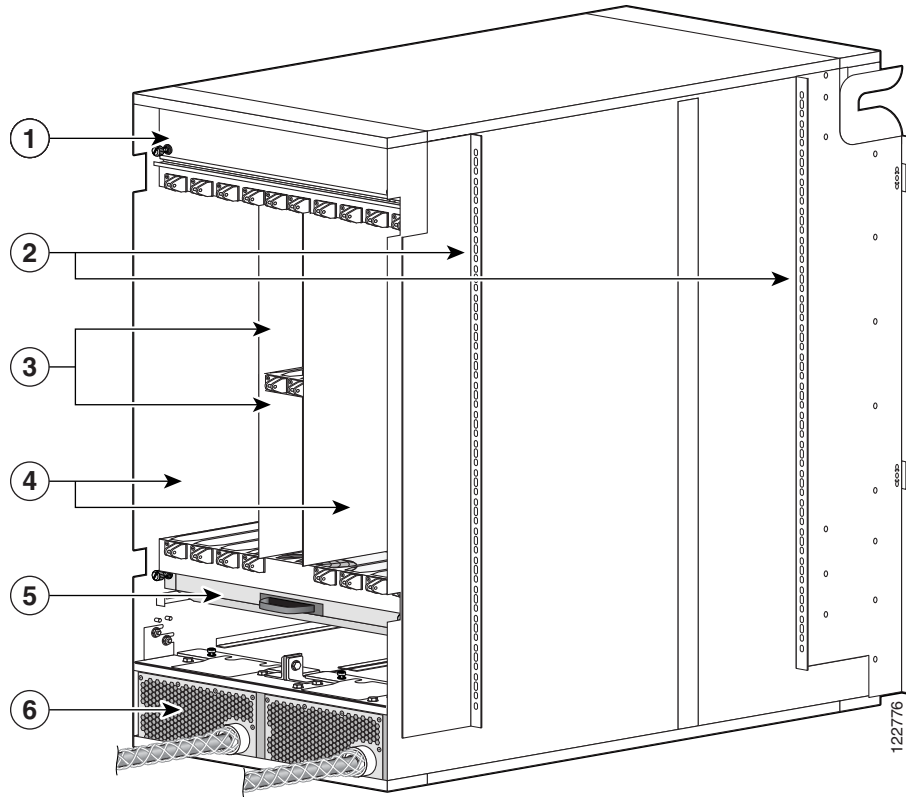
Figure 1-1 and Figure 1-2 show the line card chassis from both the front (PLIM) and rear (MSC) sides.

Figure 1-1 Front (PLIM) View of Line Card Chassis



1	Cable management bracket	4	Air filter
2	Chassis vertical mounting brackets	5	Power modules
3	PLIM and RP slots (RPs in middle 2 slots)		

Figure 1-2 Rear (MSC) View of Line Card Chassis



1	Upper fan tray (beneath cover)	4	MSC slots
2	Chassis vertical mounting brackets	5	Lower fan tray
3	Switch fabric card (half-height) slots	6	Power distribution units (PDUs)

The Cisco ASR 14000 series 8-slot line card chassis contains:

- As many as eight modular services cards (MSCs, also called line cards) and eight physical layer interface modules (PLIMs). The MSC and PLIM are an associated pair of cards that mate through the chassis midplane. The MSC provides the forwarding engine for Layer 3 routing of user data, and the PLIM provides the physical interface and connectors for the user data.

The MSC can be associated with several different PLIMs, which provide different interface speeds and technologies. The available PLIMs are:

- 1-port OC-768c/STM-256c packet-over-SONET (POS); available in short-reach (SR) optics.
- 4-port OC-192c/STM-64c POS/DPT; available in long-reach (LR), intermediate-reach (IR), short-reach (SR), and very-short-reach (VSR) options.
- OC-48c/STM-16c POS/DPT, configurable with 1 to 16 ports; available in long-reach (LR) and short-reach (SR) options. This PLIM supports pluggable optics.
- 10-Gigabit Ethernet (GE); available in long-reach (LR) optics. This PLIM supports pluggable optics, and can be configured with 1 to 8 ports.

- Cisco ASR 14000 series SPA Interface Processor-800. Occupies one physical-layer-interface-module (PLIM) slot on the Cisco ASR 14000 series 8-slot line card chassis. Supports six normal-height SPAs or three double-height SPAs or any combination in between.
- A chassis midplane that connects MSCs to their associated PLIMs. The midplane design allows an MSC to be removed from the chassis without having to disconnect the cables that are attached to the associated PLIM. The midplane distributes power, connects the MSCs to the switch fabric cards, and provides control plane interconnections. The midplane is not field replaceable by the customer.
- One or two route processor cards (RPs). The RPs provide the intelligence of the system by functioning as the Cisco ASR 14000 series 8-slot line card chassis system controller (serving as part of the control plane in multi-chassis systems) and providing route processing. Only one RP is required for system operation. For redundant operation, you can order a second RP as an option (ASR14K-RP). When two RPs are used, only one RP is active at a time. The second RP acts as a “standby” RP, serving as a backup if the active RP fails.

The RP also monitors system alarms and controls the system fans. LEDs on the front panel indicate active alarm conditions.

- Upper and lower fan trays. The fans pull cool air through the chassis. A removable air filter is located below the PLIM card cage at the front of the chassis.
- Four half-height switch fabric cards. These cards provide the three-stage Benes switch fabric for the routing system. The switch fabric performs the cross-connect function of the routing system, connecting every MSC (and its associated PLIM) with every other MSC (and its associated PLIM) in the system.

The switch fabric receives user data from one MSC and PLIM pair and performs the switching necessary to route the data to the appropriate egress MSC and PLIM pair. The switch fabric is divided into eight planes that are used to evenly distribute the traffic across the switch fabric. Each switch fabric card implements two planes of the switch fabric.

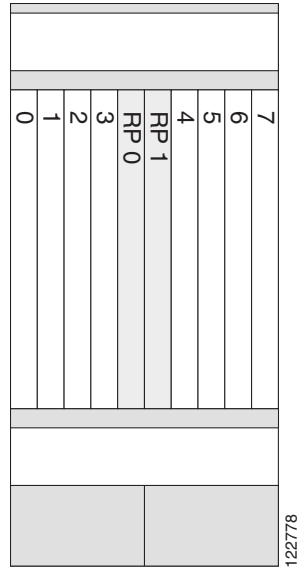
- A power system that provides redundant power to the chassis. The power system consists of two AC or DC power distribution units (PDUs) and two AC rectifier modules or two DC power entry modules (PEMs), one per PDU. Each PDU supplies input power to a rectifier or PEM, which in turn provides processed power to the chassis. Each DC and AC power module contains a removable air filter, located on the front of the module.

The PLIM side of the chassis is considered the front of the chassis, where user data cables attach to the PLIMs and cool air enters the chassis. The MSC side, which is where warm air is exhausted, is considered the rear of the chassis.

Chassis Slot Numbers

This section identifies the location and slot numbers for major cards and modules (primarily the field-replaceable units) that plug into the chassis.

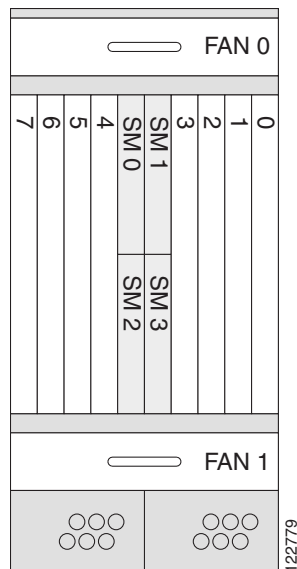
Figure 1-3 shows the slot numbering on the front (PLIM) side of the Cisco ASR 14000 series 8-slot line card chassis.

Figure 1-3 Line Card Chassis Slot Numbering—Front (PLIM) Side

As shown, the Cisco ASR 14000 series 8-slot line card chassis numbers on the PLIM side of the chassis include the card cage with:

- Eight PLIM slots: left to right, 0, 1, 2, 3 ... 4, 5, 6, 7
- Two route processor card slots, RP0 and RP1.

Figure 1-4 shows the slot numbers on the rear (MSC) side of the Cisco ASR 14000 series 8-slot line card chassis.

Figure 1-4 Line Card Chassis Slot Numbers—Rear (MSC) Side

As shown, the slot numbers on the MSC side of the chassis include:

- Fan tray
- Card cage, including:

- Eight line card slots (0, 1, 2, 3...4, 5, 6, 7)
- Four half-height switch fabric card slots (SM0, SM1, SM2, and SM3)

The MSC slot numbers are reversed from the PLIM slot numbers on the other side of the chassis. Because an MSC mates with its associated PLIM through the midplane, MSC slot 0 is on the far right side of the chassis looking at it from the rear (MSC) side.

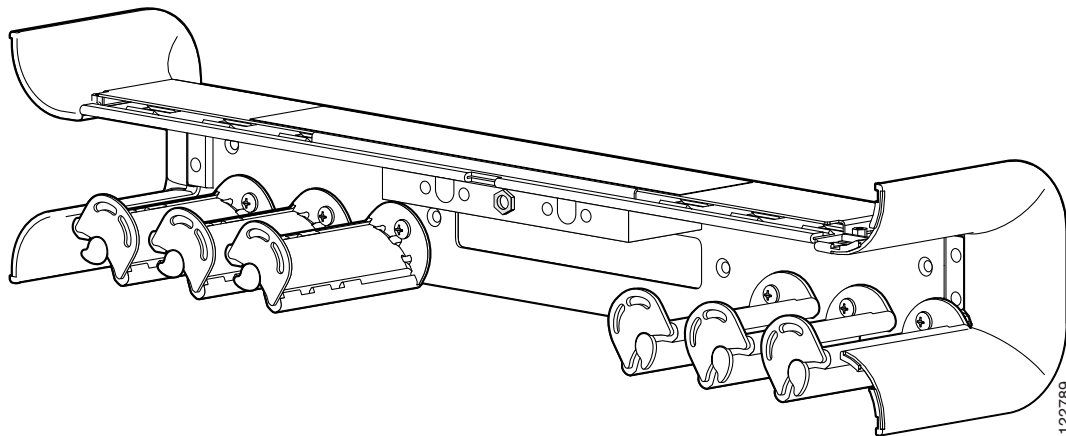
PLIM slot 0 is on the far left side of the chassis, looking at it from the front (PLIM) side. MSC slot 0 and PLIM slot 0 mate with each other through the midplane, and so do all other MSC and PLIM slots (0 through 7).

Chassis Cable Management

The Cisco ASR 14000 series 8-slot line card chassis has cable management features for the front (PLIM) side of the chassis, just above the card cage. The horizontal cable management trays have a special telescoping feature that allows them to be extended when the chassis is upgraded with higher-density cards. This extension also helps when installing the cables in the chassis.

The cable management bracket is shown in the following figure.

Figure 1-5 Cable Management Bracket



Chassis Cooling System

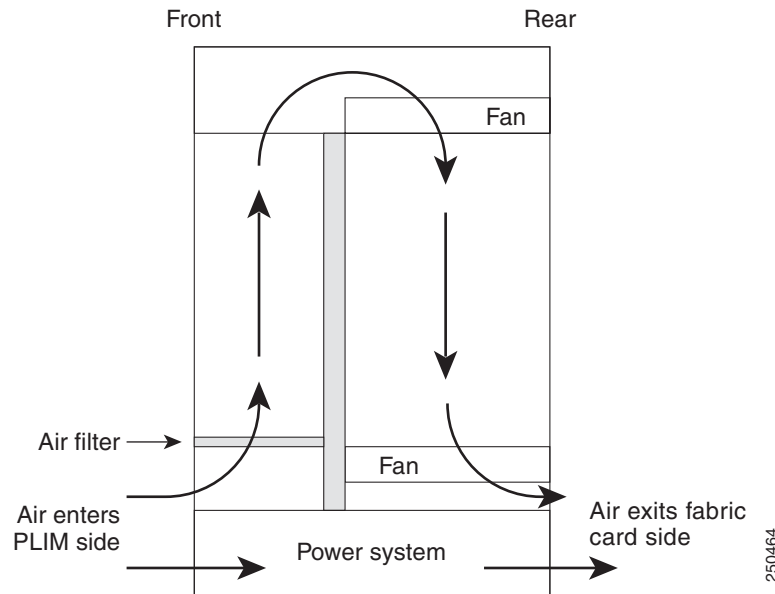
The chassis has two fan trays, each with several fans, that cool the chassis card cages. Cool air flows in at the bottom front of the chassis and flows through the chassis card cages and through the fans in the fan trays before being exhausted through the bottom rear of the chassis (see the following figure). In addition, each AC or DC power module at the bottom of the chassis has self-contained fans that pull in cool air from the front of the chassis and exhaust warm air out the rear.

A replaceable air filter is located on the front of the chassis below the PLIM card cage. Each power module also has a replaceable air filter that attaches to the module at the front (PLIM) side of the chassis. How often the air filters should be replaced depends on the facility environment. In a dirty environment, or when you start getting frequent temperature alarms, you should always check the intake grills for debris, and then check the air filters to see if they need to be replaced.

**Note**

We recommend that you check the air filters once a month. Replace a filter when you notice a significant amount of dust.

Figure 1-6 Airflow through 8-slot Cisco ASR 14000 Series 8-Slot Line Card Chassis



The Cisco ASR 14000 series 8-slot line card chassis airflow volumes are:

- Chassis airflow—Up to 900 cubic feet (25,485 liters) per minute
- Power system airflow—Up to 240 cubic feet (6,800 liters) per minute

Chassis Power System

The Cisco ASR 14000 series 8-slot line card chassis is available with AC power distribution units (PDUs) that are configured for either AC Wye 3-phase, AC Delta 3-phase, or DC wiring. Each PDU has a different Cisco part number.

AC Wye and AC Delta PDUs basically both require 220 VAC input power:

- AC Wye 3-phase wiring is typically used in Europe and countries where each phase-to-neutral voltage is approximately 220 VAC; the nominal voltage for the power module is 230 V +/- 10%, which covers the 220 and 240 voltages that are present throughout Europe.
- AC Delta 3-phase wiring is typically used in the United States, Japan, and other countries where the phase-to-neutral voltage is approximately 120 VAC and approximately 208 VAC phase to phase.

For DC PDU, there is one type for both nominal -48 VDC and -50 VDC inputs.

Safety Guidelines

Before you perform any procedure in this document, review the safety guidelines in this section to avoid injuring yourself or damaging the equipment.

The following guidelines are for your safety and to protect equipment. The guidelines do not include all hazards. Be alert.

**Note**

Review the safety warnings listed in *Regulatory Compliance and Safety Information* that are applicable to your router before installing, configuring, or troubleshooting any installed card.

- Keep the work area clear and dust-free during and after installation. Do not allow dirt or debris to enter into any laser-based components.
- Do not wear loose clothing, jewelry, or other items that could get caught in the router while working with MSCs, PLIMs, or their associated components.
- Cisco equipment operates safely when used in accordance with its specifications and product-usage instructions.

Preventing Electrostatic Discharge

Electrostatic discharge (ESD) damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. We recommend to use an ESD-preventive strap whenever you handle network equipment or one of its components.

Following are guidelines for preventing ESD damage:

- Always use an ESD-preventive wrist or ankle strap and ensure that it makes good skin contact. Connect the equipment end of the connection cord to an ESD connection socket on the router or to a bare metal surface on the chassis.
- Handle a card by its ejector levers, when applicable, or the card's metal carrier only; avoid touching the board or connector pins.
- Place a removed card board-side-up on an antistatic surface or in a static-shielding bag. If you plan to return the component to the factory, immediately place it in a static-shielding bag.
- Avoid contact between the card and clothing. The wrist strap protects the board only from ESD voltage on the body; ESD voltage on clothing can still cause damage.



CHAPTER 2

Installing and Removing Power Components

This chapter provides instructions on how to install and remove the Cisco ASR (Aggregation Services Router) 14000 series 8-slot line card chassis power components.

This chapter presents the following topics:

- [Information About Installing and Removing the Power Components](#)
- [How to Install or Remove the Power Components](#)

Information About Installing and Removing the Power Components

This section contains some general information about the power components.

- [Basic Chassis Power Details](#)
- [Supplemental Unit Bonding and Grounding Guidelines](#)
- [DC Power Systems](#)
- [AC Power Systems](#)
- [Before Powering the Chassis Up or Down](#)
- [Converting from One Power System to Another](#)

Basic Chassis Power Details

The Cisco ASR 14000 series 8-slot line card chassis can be either DC or AC powered. The chassis power system (DC or AC) provides the necessary power for chassis components. A chassis with AC input power requires 8,750 watts to power the chassis. A chassis with DC input power requires 8,000 watts to power the chassis.

For more detailed information on the two power types, see the [“DC Power Systems” section on page 2-4](#) and the [“AC Power Systems” section on page 2-8](#).

The line card chassis requires that at least the power distribution units (PDUs) and their power modules be installed to operate properly.



Tip

Be sure to install the PDUs *before* installing the power modules.

Three types of PDUs exist:

- AC Wye PDU
- AC Delta PDU
- DC PDU

AC PDUs connect to AC rectifiers, while DC PDUs connect to the DC power entry modules (PEMs). Although there are differences among the different PDU types (AC Wye, AC Delta, and DC), they are installed in the same manner. Similarly, the different power modules are also installed in the same manner. For detailed information, see the [“How to Install or Remove the Power Components” section on page 2-9](#).



Note

The PDUs arrive with the power cables preattached.



Caution

Use only one type of PDU—AC Wye, AC Delta, or DC—and its mating power module in a chassis at one time.

Precautions and Recommendations

Follow these precautions and recommendations when planning power connections to the router:

- Check the power at your site before installation and periodically after installation to ensure that you are receiving clean power. Install a power conditioner, if necessary.
- Properly ground your system to avoid damage from lightning and power surges.



Caution

To ensure electromagnetic compatibility, a Cisco router must be operated with all its power modules always installed.



Note

You must have the chassis horizontal mounting rails installed in the rack to ensure EMI compliance.



Warning

This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

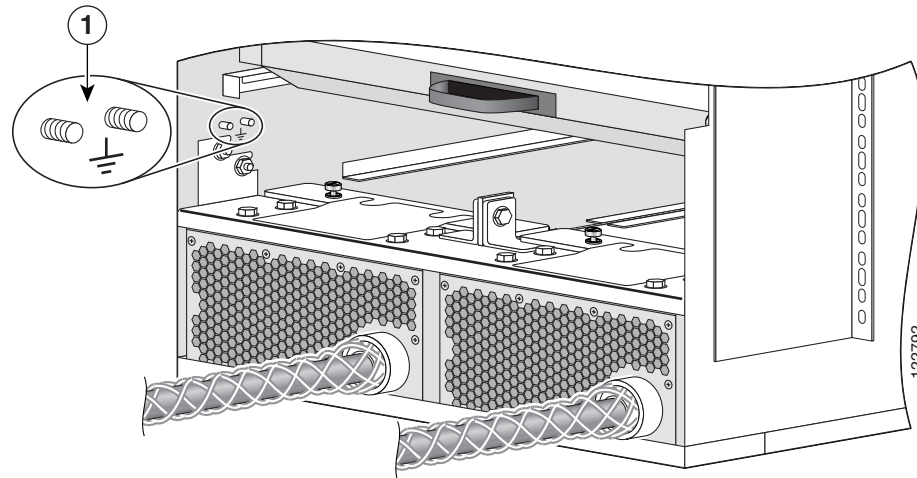
Supplemental Unit Bonding and Grounding Guidelines

Although the router chassis has a safety earth ground connection as part of the power cabling to the PDUs, the chassis includes an option that allows you to connect the central office ground system or interior equipment ground system to the supplemental bonding and grounding receptacles on the router chassis. Two threaded ground inserts are located on the fan tray door at the rear (MSC) side of the chassis (see [Figure 2-1](#)). This ground point is also called the network equipment building system (NEBS) bonding and grounding stud.

Note

These bonding and grounding receptacles satisfy the Telcordia NEBS requirements for supplemental bonding and grounding connections. If you are not installing the router in a NEBS environment, you can choose to bypass these guidelines and rely on the safety earth ground connection for the AC- and DC-input PDUs.

Figure 2-1 NEBS Bonding and Grounding Points (Rear of Chassis)



1 NEBS supplemental bonding and grounding points

If you plan to connect the routing system to a network equipment building system (NEBS)-compliant supplemental bonding and grounding system at the site, you must have the following:

- A minimum of one ground lug that has two M6 bolt holes with 0.625-inch (15.86-mm) spacing between them, and a wire receptacle large enough to accept a 6-AWG or larger multi-strand copper wire. The lug is similar to the type used for the DC-input power supply leads (see [Figure 2-3](#)). This ground lug is not available from Cisco Systems. This type of lug is available from electrical-connector vendors, such as Panduit (see [Figure 2-3](#)).
- Two M6 or equivalent hex-head bolts with locking washers (nickel-plated brass is ideal) and nuts. These bolts, locking washers, and nuts are not available from Cisco Systems; they are available from any commercial hardware vendor.
- A ground wire. Although we recommend at least 6-AWG multi-strand copper wire, the actual wire diameter and length depend on your router location and site environment. This wire is not available from Cisco Systems; it is available from any commercial cable vendor.

Caution

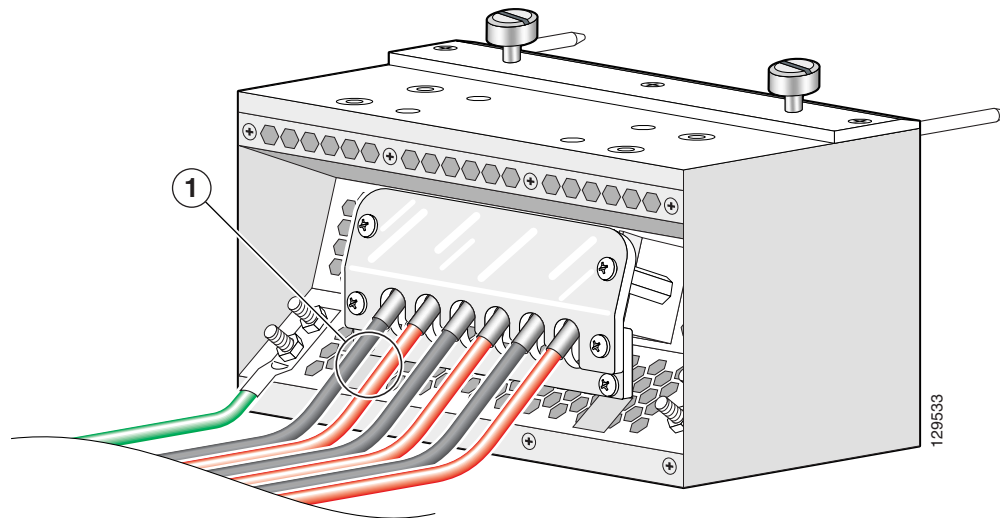
The DC Return of the Cisco ASR 14000 series 8-slot line card chassis should remain isolated from the system frame and chassis (DC-I: Isolated DC Return).

DC Power Systems

A DC-powered Cisco ASR 14000 series 8-slot line card chassis contains two DC-input power distribution units (PDUs) and two DC power entry modules (PEMs). Each DC PDU is connected to three pairs of DC power feeds and powers a single 7500-watt DC PEM that is field replaceable. Input DC power enters the PDU and is passed to the PEM, which provides power to the components in the chassis. Each PEM has its own circuit breaker.

The DC PDU is shipped with a plastic safety cover over the input terminal block (see [Figure 2-2](#)). This safety cover is in two parts, each part held on to the PDU with a Phillips screw. We recommend removing the safety cover only when wiring and unwiring the chassis. The safety cover is slotted in such a way that the wires can only come out on the bottom portion of the cover.

Figure 2-2 DC PDU with Plastic Safety Cover



1 Each set of cables (RTN and $-48\text{V}/-60\text{V}$) is a single VDC input.

Each PDU requires three DC inputs of $-48/-60$ VDC (nominal), 60-amp service. The PDU accepts input DC power in the range -40.5 to -75 VDC, and has three sets of double-stud terminals ($-48/-60\text{VDC}$ Lines and $-48/-60\text{VDC}$ Returns) for connecting to the VDC inputs.

Each DC PDU should be connected to a different central office DC power source:

- One PDU should be connected to three $-48/-60$ VDC “A” buses.
- The other PDU should be connected to three $-48/-60$ VDC “B” buses.

If DC power to a PDU fails, the other PDU provides enough power for the chassis. This 2N power redundancy enables the routing system to operate in spite of single power failure.

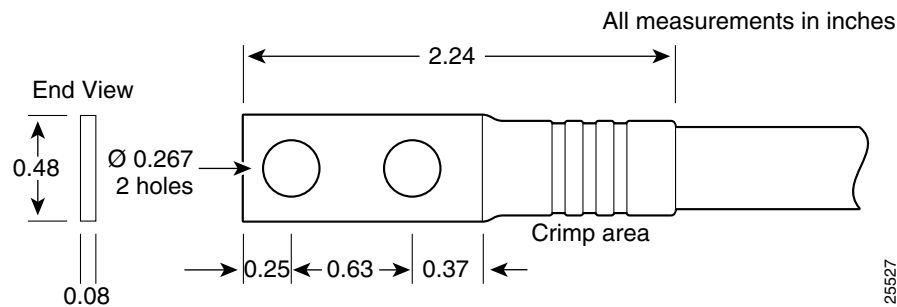
For DC power cables, we recommend that you use commensurately rated, high-strand-count copper wire cable, based on local electrical codes. These wires are not available from Cisco Systems; they are available from any commercial vendor. DC power cables must be terminated by cable lugs at the power shelf end.

Note

All six -48/-60VDC Return input wires for one chassis should have the same wire gauges and the lengths should be matched within 10% of deviation.

The grounding lugs should be dual-hole and able to fit over M6 terminal studs at 0.63 in (15.88-mm) centers (for example, Panduit part number LCD6-14A-L, or equivalent) (see [Figure 2-3](#)).

Figure 2-3 DC Power Grounding Cable Lug



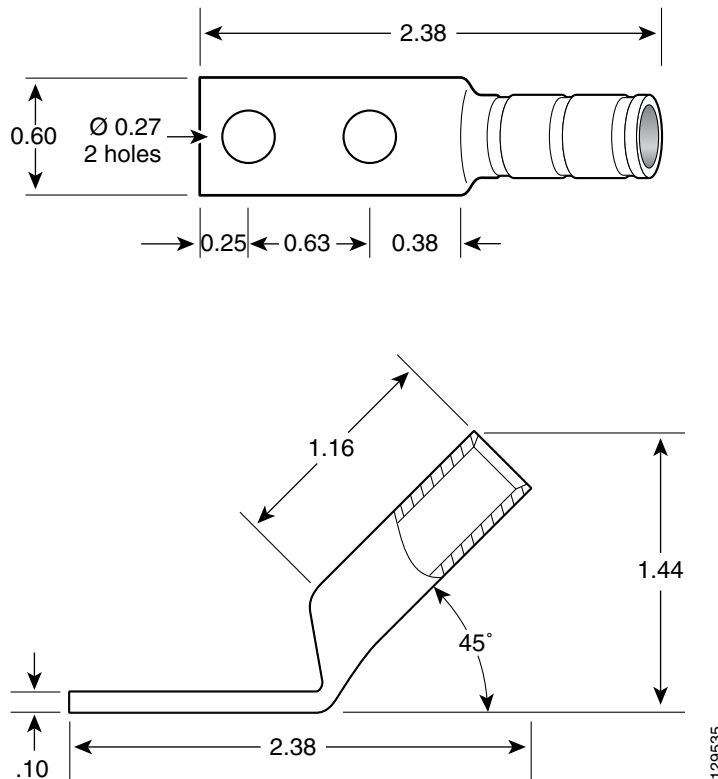
The terminal lugs (in other words, all lugs not used for grounding) should be 45-degree angled, industry-standard dual-hole compressions lugs, and able to fit over M6 terminal studs at 0.63 in (15.88-mm) centers (for example, AWG no. 2 wires, such as Panduit part number LCC2-14AH-Q or equivalent) (see [Figure 2-4](#)).

Note

The power wire and ground wire connector screws have a 20 in.-lb (2.26 N-m) torque value. The mounting screws have a 9 in.-lb (1.04 N-m) torque value.

Figure 2-4 DC Power Cable Lug

All measurements in inches

**Note**

Be sure to follow all lug insulation instructions provided by the lug manufacturer.

The color coding of the source DC power cable leads depends on the color coding of the site DC power source. Typically, green or green and yellow indicates that the cable is a ground cable. Because there is no color code standard for the source DC wiring, you must ensure that the power cables are connected to the DC-input PDU terminal studs in the proper positive (+) and negative (-) polarity.

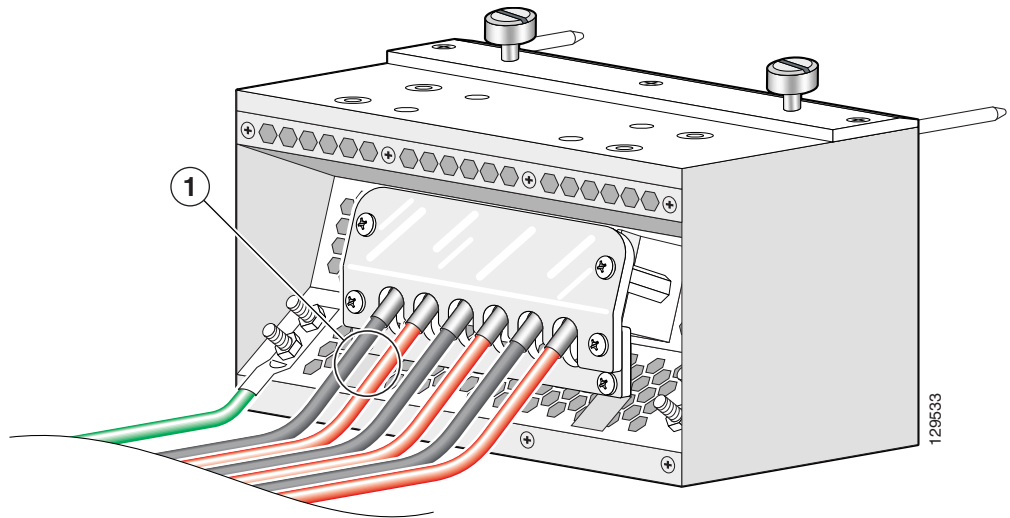
In some cases, the source DC cable leads might have a positive (+) or negative (-) label. This is a relatively safe indication of the polarity, but you must verify the polarity by measuring the voltage between the DC cable leads. When making the measurement, the positive (+) lead and negative (-) lead must always match the (+) and (-) labels on the PDU.

Caution

No damage should occur because of reverse polarity, but you should correct a reverse polarity condition immediately.

DC PDU Wiring

This section describes how to wire the DC PDU. For more detailed information on chassis DC power systems, see the [“DC Power Systems” section on page 2-4](#).

Figure 2-5 DC PDU Power Cable Connections

- 1** Each set of cables (RTN and $-48\text{V}/-60\text{V}$) is a single VDC input.

Caution

When wiring the PDU, be sure to attach the ground wire first and tighten the nuts to a torque value of 30 in-lb (3.39 N-m). When removing the wiring, be sure to remove the ground wire last.

To wire the DC PDU, follow these steps:

- Step 1** Remove the upper plastic terminal block safety cover (leave the lower safety cover in place; see [Figure 2-5](#)). Using a standard Phillips screwdriver, remove the four screws holding the upper plastic safety cover to the wiring terminal block.
- Step 2** Attach lugs to the DC-input wires. For details on lugs, see the “[DC Power Systems](#)” section on page 2-4. The wire should be sized according to local and national installation requirements. Use only copper wire.

Note

The power supply terminal block lug opening width is 0.62 inch (15.8 mm). The terminal posts are centered 0.625 inches (15.88 mm) apart and are M6-threaded. We recommend that you use an appropriately sized 45-degree angled industry standard 2-hole, standard barrel compression lug. The power supply ground studs, located below the terminal block, are also M6-threaded.

- Step 3** Using a 10-mm socket wrench, attach the ground wire to the ground wire terminal.
- Step 4** Using the wrench, attach the three negative wires (the red wires as shown in [Figure 2-5](#)) to the terminal block.
- Step 5** Using the wrench, attach the three positive wires (the black wires as shown in [Figure 2-5](#)) to the terminal block.
- Step 6** Reattach the upper plastic safety cover: with a phillips screwdriver, insert and tighten the four screws holding the cover to the wiring terminal block.

AC Power Systems

An AC-powered Cisco ASR 14000 series 8-slot line card chassis contains two AC power distribution units (PDUs) and two AC rectifier modules. Each AC PDU is connected to a 3-phase (200 to 240) input VAC power source and connects to a single 7500-watt AC rectifier module that is field replaceable. Each AC rectifier module converts input AC power to the 54.5 VDC used by the Cisco ASR 14000 series 8-slot line card chassis. Each rectifier has its own circuit breaker.

To provide 2N power redundancy for the Cisco ASR 14000 series 8-slot line card chassis, each PDU and AC rectifier pair is connected to a different AC power source. During normal operation when both power sources are operational, both PDUs and rectifiers function together to power the chassis. However, if a power source fails, the other power source provides the other PDU and rectifier pair with enough input power to power the chassis. This 2N power redundancy enables the routing system to operate despite the power failure.

Two versions of the AC PDU are available to accommodate AC input power in either the Delta or Wye configuration. Each PDU has a different Cisco part number. The PDUs are shipped with AC power cords that are 14 feet (4.3 m) long.

The AC PDUs have the following input VAC power requirements:

- AC Wye input: 3-phase, 200 to 240 VAC nominal (phase-to-neutral), 50 to 60 Hz, 16 A (International) or 20 A (North America). The PDU is rated for 14-amp service, and accepts AC input of 16 or 20 A.

The Wye power cord has a 5-pin IEC 60309 plug that is rated for 400 VAC, 16 or 20 A, (3W + N + PE). The power cord plugs into a similarly rated IEC 60309 receptacle.

- AC Delta input: 3-phase, 200 to 240 VAC nominal (phase-to-phase), 50 to 60 Hz, 30 A. The PDU is rated for 24-amp service, and accepts AC input of 30 A.

The Delta power cord has a 4-pin NEMA L15-30P plug that is rated for 250 VAC, 30 A (3W + PE). The power cord plugs into a similarly rated NEMA L15-30R locking-type receptacle.

For additional power details, see [Appendix A, “Cisco ASR 14000 Series 8-Slot Line Card Chassis Specifications,”](#) or *Cisco ASR 14000 8-Slot Line Card Chassis System Description*.

Before Powering the Chassis Up or Down

While the line card chassis does not have a single power switch that powers the entire chassis and all its components up and down, the AC rectifier or DC PEM linkage cuts power to the chassis as a whole when both power components are turned off. Most components on the chassis, such as the power modules, MSCs, PLIMs, and fan trays can be removed or installed in the chassis while it is running.

Before you can power the chassis up, you must do the following:

-
- Step 1** Install the PDUs (see the [“Installing a PDU”](#) section on page 2-10).
 - Step 2** Install the power modules (see the [“Installing a Power Module”](#) section on page 2-13).
 - Step 3** Install the route processor (RP) card (see the [“Installing an RP or DRP Card”](#) section on page 4-39).
 - Step 4** Activate your power source.
 - Step 5** Turn the power module switches to the on position.
-

To power down the chassis entirely, you must power down each of the two power modules; you move each power switch to the off position by pulling it toward you. Both power modules must be disconnected or the PDUs unplugged to de-energize the chassis completely.



Note After powering off the AC rectifier, wait a minimum of 20 seconds before powering it on again.



Note All power cords must be unplugged from wall power to fully remove power from the chassis.

Converting from One Power System to Another

To convert a Cisco ASR 14000 series 8-slot line card chassis from AC to DC power, or from DC to AC power, you must:

- Step 1** Power down the chassis completely. See the [“Before Powering the Chassis Up or Down”](#) section on page 2-8.
- Step 2** Remove the power modules. See the [“Removing a Power Module”](#) section on page 2-15.
- Step 3** Remove the PDUs. See the [“Removing a PDU”](#) section on page 2-11.
- Step 4** Install the new PDUs. See the [“Installing a PDU”](#) section on page 2-10.
If you are converting from AC to DC power, you must wire the PDU properly. See the [“DC Power Systems”](#) section on page 2-4.
- Step 5** Install the power modules. See the [“Installing a Power Module”](#) section on page 2-13.
- Step 6** Power the chassis back up. See the [“Before Powering the Chassis Up or Down”](#) section on page 2-8.



Caution Use only one type of PDU and power module, either AC or DC, in a chassis at one time.

How to Install or Remove the Power Components

This section contains the following procedures:

- [Installing a PDU](#)
- [Removing a PDU](#)
- [Installing a Power Module](#)
- [Removing a Power Module](#)



Note Although there are differences among the different PDU types (AC Wye, AC Delta, and DC), they are installed in the same manner.

**Note**

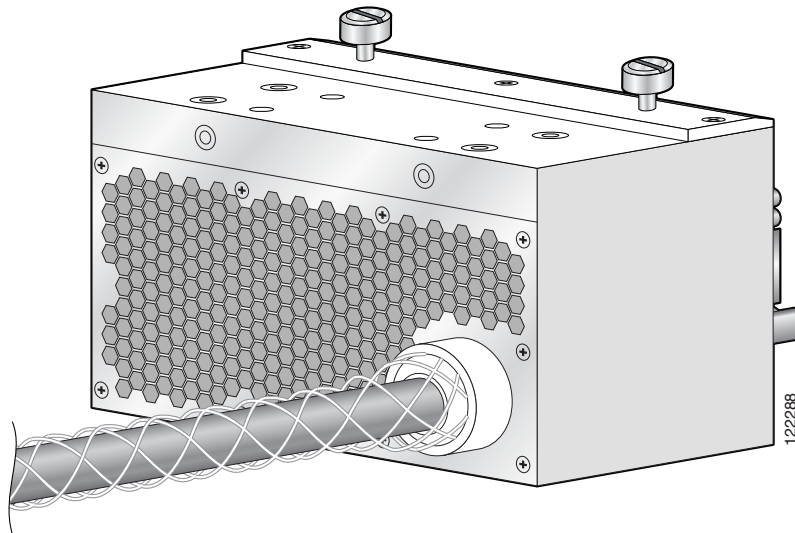
Although there are differences between the different power module types (AC and DC), they are installed in the same manner.

Installing a PDU

This section describes how to install a PDU in the Cisco ASR 14000 series 8-slot line card chassis. For information on the difference between the power types, see the [“DC Power Systems” section on page 2-4](#) and the [“AC Power Systems” section on page 2-8](#). For complete information on regulatory compliance and safety, see *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*.

The PDU is installed into the back of the chassis. After the PDU is installed, you can slide the power modules into the chassis and connect them to the PDU to provide power to the chassis (see the [“Installing a Power Module” section on page 2-13](#) for details). Although there are differences among the different PDU types (AC Wye, AC Delta, and DC), they are installed in the same manner. (Figure 2-6 shows an AC Wye PDU for reference.)

Figure 2-6 AC Wye PDU



Prerequisites

Before performing this task, remove any front cosmetic covers.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- 10-mm socket wrench
- 8-mm socket or open (box end) wrench
- PDU

[Are there comparable ASR 14000 parts and product numbers?](#)

- AC Wye PDU Cisco product number ASR14K/8-ACW-KIT=
- AC Delta PDU Cisco product number ASR14K/8-ACD-KIT=
- DC PDU Cisco product number ASR14K/8-DC-KIT=

Steps

To install a PDU, 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 (MSC) side of the chassis or a bare metal surface on the chassis.
- Step 2** Make sure that the PDU is unplugged.
- Step 3** Grasp the PDU by the side and set it carefully into place in a PDU slot on the rear (MSC) side of the chassis. Be sure to lift the PDU over the lip on the edge of the chassis, and align the guide pins on the chassis with the guide holes on the PDU.



Caution

Do not lift the PDU by the power cord—doing so can damage the PDU or the cord.

- Step 4** If needed, put the second PDU into place in the other PDU slot on the chassis.



Note

The PDU holding plate bolts to both PDUs and the side of the interior of the chassis.

- Step 5** Install the PDU holding plate.
- Slide the holding plate into place on top of the PDU, using the guide bolts on the side of the chassis to place it correctly.
 - Use the socket wrench to bolt the holding plate to the top of the PDUs with the eight 10-mm bolts (four for each PDU).
 - Use the socket wrench to bolt the holding plate to the interior of the side of the chassis with the four 8-mm bolts (two for each side)
- Step 6** Use the socket wrench to install the 8-mm center holding bolt and the 10-mm nut.
-

What to Do Next

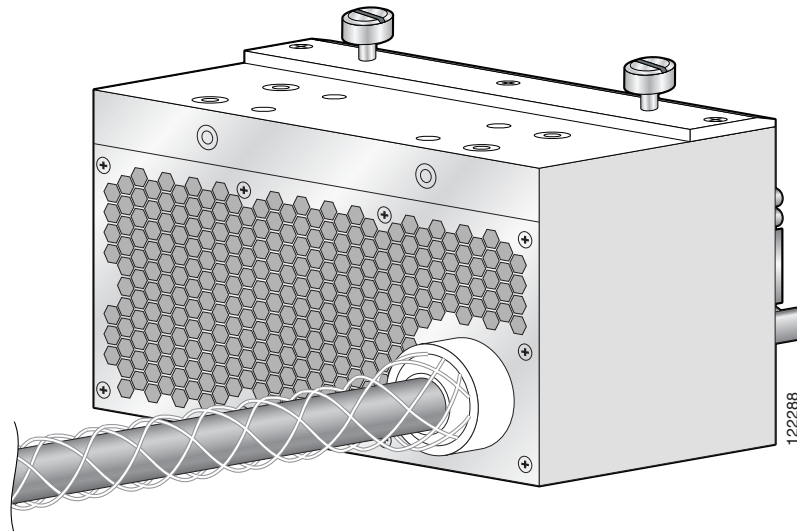
After performing this task, install the power modules (see the [“Installing a Power Module”](#) section on page 2-13), and replace any cosmetic covers.

Removing a PDU

This section describes how to remove a PDU in the Cisco ASR 14000 series 8-slot line card chassis. For information on the difference between the power types, see the [“DC Power Systems”](#) section on page 2-4 and the [“AC Power Systems”](#) section on page 2-8. For complete information on regulatory compliance and safety, see *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*.

The PDU is located at the back of the chassis. Although there are differences among the different PDU types (AC Wye, AC Delta, and DC), they are installed in the same manner (see [Figure 2-7](#), which shows an AC Wye PDU for reference).

Figure 2-7 AC Wye PDU for the 8-Slot Chassis



Prerequisites

Before performing this task, remove any front cosmetic covers, power down and remove the power modules, and unplug the PDU. See the [“Before Powering the Chassis Up or Down”](#) section on page 2-8, and the [“Removing a Power Module”](#) section on page 2-15.

If you are removing a DC PDU, see the [“DC Power Systems”](#) section on page 2-4; if you are removing an AC PDU, see the [“AC Power Systems”](#) section on page 2-8 for more information.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- 10-mm socket wrench
- 8-mm socket or open (box end) wrench

Steps

To remove an AC Wye PDU, 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 (MSC) side of the chassis or a bare metal surface on the chassis.
- Step 2** Turn the power module power switch to the off position.
- Step 3** Disconnect the PDU from the power source.

- Step 4** Remove the power module of the PDU that you are removing from the chassis (see the “[Removing a Power Module](#)” section on page 2-15).
- Step 5** On the rear (MSC) side of the chassis, use the socket wrench to remove the 8-mm center holding bolt and 8-mm nut from the PDU holding plate.
- Step 6** Remove the PDU holding plate.
- Use the socket wrench to unbolt the four 8-mm bolts (two for each side) that attach the holding plate to the interior of the side of chassis.
 - Use the socket wrench to unbolt the eight 10-mm bolts (four for each PDU) that attach the holding plate to the top of the PDUs.
 - Carefully remove the holding plate from the top of the PDUs and set it aside.
- Step 7** Grasp the PDU and lift it carefully over the lip at the back of the chassis and set it carefully aside.

Caution

Do not lift the PDU by the power cord—doing so can damage the PDU or the cord.

What to Do Next

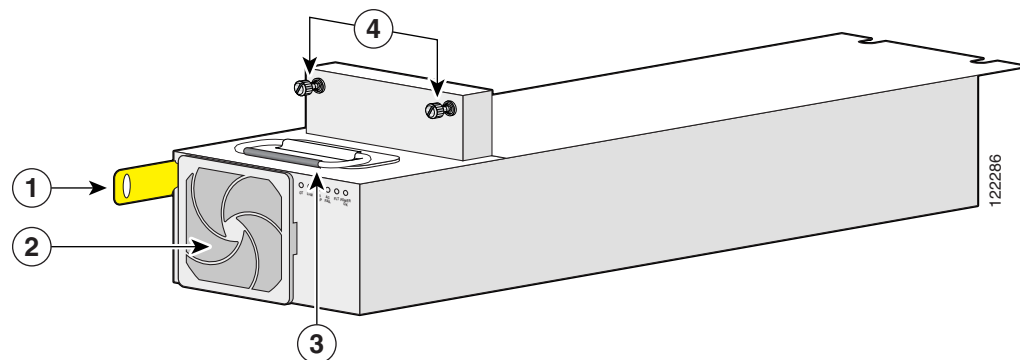
After performing this task, you may install a new PDU, if needed (see the “[Installing a PDU](#)” section on page 2-10), and replace any cosmetic covers.

Installing a Power Module

This section describes how to install a power module in the Cisco ASR 14000 series 8-slot line card chassis. For information on the difference between the power types, see the “[DC Power Systems](#)” section on page 2-4 and the “[AC Power Systems](#)” section on page 2-8. For complete information on regulatory compliance and safety, see *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*.

The power module is installed into the front of the chassis, and mates with the PDU that is installed on the back of the chassis (see the “[Installing a PDU](#)” section on page 2-10 for information). Although there are differences among the different power modules (AC Wye, AC Delta, and DC), they are installed in the same manner. (Figure 2-8 shows an AC Wye power rectifier for reference.)

Figure 2-8 AC Power Rectifier



1	Power switch	3	Handle
2	Module air filter	4	Captive screws

Prerequisites

Before performing this task, make sure that the PDU has been installed (see the [“Installing a PDU” section on page 2-10](#)) and remove any cosmetic covers.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Medium Phillips screwdriver
- Power module
 - ASR14KAC rectifier Cisco product number ASR14K-8-AC-RECT=
 - DC PEM Cisco product number ASR14K-8-DC-PEM=

Steps

To install a power module, 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** Make sure that the power switch is in the off position.
- Step 3** Grasp the handle on the top of the module firmly, and lift it partway up.
- Step 4** Using two hands to support and guide the power module, slide it into the chassis power bay on the front (PLIM) side of the chassis until the connector on the back of the module meets the connector on the backplane of the PDU.

Caution An AC rectifier weighs 36 lbs (13.44 kg); a DC PEM weighs 38 lbs (17.24 kg). You should use both hands when handling a power module.

- Step 5** Press the power module in firmly to seat it against the PDU.

Caution To prevent damage to the PDU-to-module connections, do not use excessive force when seating a power module to its PDU.

- Step 6** Tighten the two captive screws on the face of the power module to seat it snugly against the PDU.

- Step 7** Push the power tab at the bottom front of the module in to the on position.
-

What to Do Next

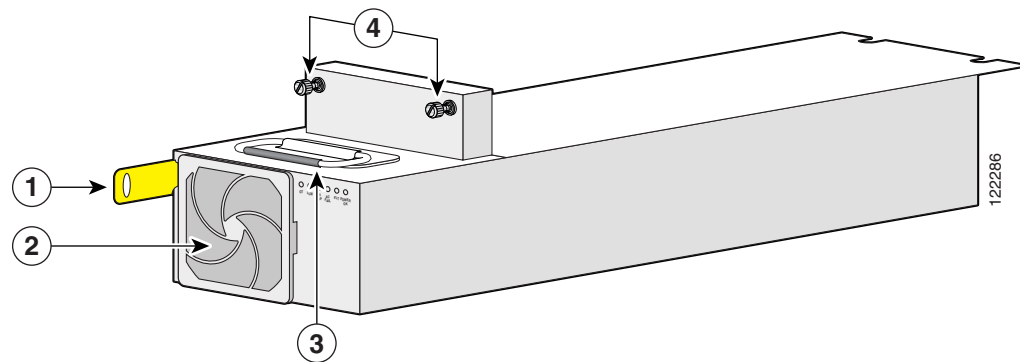
After performing this task, you may connect the PDU to the power source (see the “[DC Power Systems](#)” section on page 2-4 and the “[AC Power Systems](#)” section on page 2-8) and power up the chassis (see the “[Before Powering the Chassis Up or Down](#)” section on page 2-8).

Removing a Power Module

This section describes how to remove a power module from the Cisco ASR 14000 series 8-slot line card chassis. For information on the difference between the power types, see the “[DC Power Systems](#)” section on page 2-4 and the “[AC Power Systems](#)” section on page 2-8. For complete information on regulatory compliance and safety, see *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*.

The power module is located on the front of the chassis, and mates with the PDU that is installed on the back of the chassis (see the “[Installing a PDU](#)” section on page 2-10 for information). Although there are differences among the power modules (AC Wye, AC Delta, and DC), they are installed in the same manner. (Figure 2-9 shows an AC Wye power rectifier for reference.)

Figure 2-9 AC Power Rectifier



1	Power switch	3	Handle
2	Module air filter	4	Captive screws

Prerequisites

Before performing this task, remove any front cosmetic covers.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- Medium Phillips screwdriver

Steps

To remove a power module, 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** On the front side of the chassis, pull the power tab on the bottom front of the power module out to the off position.
 - Step 3** Use the screwdriver to loosen the two captive screws on the front of the power module.
 - Step 4** Grasp the power module handle and pull the power module halfway from the bay. Be sure to pull the module by the handle only.

Caution Take care when handling a power module that has recently been in use—it can be hot to the touch.

Caution An AC rectifier weighs 36 lbs (13.44 kg); a DC PEM weighs 38 lbs (17.24 kg). You should use both hands when handling a power module.

- Step 5** Use your free hand to support the power module while you slide the module completely from the bay, then set the module safely aside.
-

What to Do Next

After performing this task, you may install a new power module, if needed (see the [“Installing a Power Module”](#) section on page 2-13), and replace any front cosmetic covers.



CHAPTER 3

Installing and Removing Air Circulation Components

This chapter provides instructions on how to install and replace the Cisco ASR (Aggregation Services Router) 14000 series 8-slot line card chassis air circulation components.

This chapter presents the following topics:

- [About Line Card Chassis Airflow](#)
- [How to Install or Remove Air Circulation Components](#)

About Line Card Chassis Airflow

The Cisco ASR 14000 series 8-slot line card chassis has two fan trays, each with four fans, that cool the chassis card cages.

The top fan pulls air into the lower portion of the front of the chassis, up across the cards in the front of the chassis, and through the upper fan tray. Air flows out of the upper fan tray and down across all the modular service cards and switch fabric cards through the lower fan tray; air is then exhausted out the bottom of the rear of the chassis (see [Figure 3-1](#)).

In addition, each AC or DC power module at the bottom of the chassis has self-contained fans that pull in cool air from the front of the chassis and exhaust the warm air out the rear of the chassis.

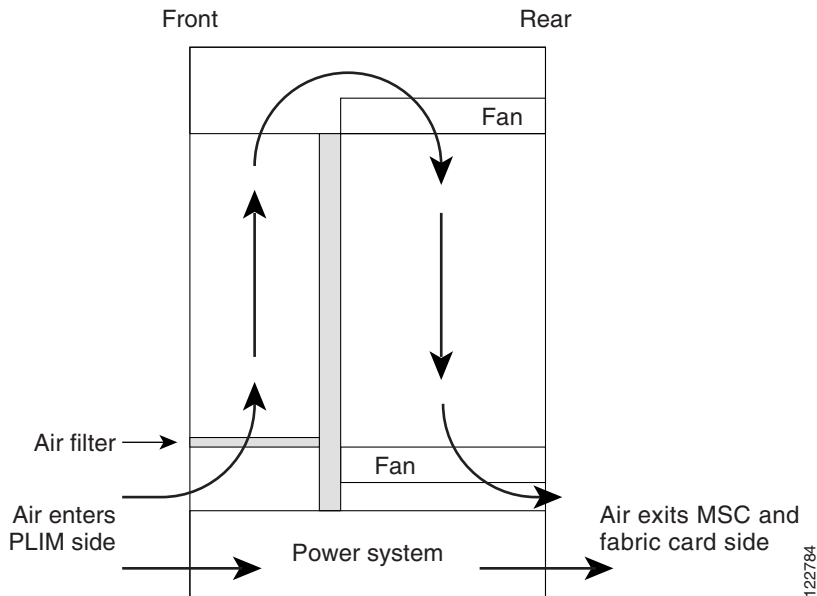
A replaceable air filter is located on the front of the chassis below the PLIM card cage. Each power module also has a replaceable air filter that attaches to the module at the front (PLIM) side of the chassis. How often the air filters should be replaced depends on the facility environment. In a dirty environment, or when you start getting frequent temperature alarms, you should always check the intake grills for debris, and then check the air filters to see if they need to be replaced.



Note

We recommend that you check the air filters once a month. Replace a filter when you notice a significant amount of dust.

Figure 3-1 Airflow through the Cisco ASR 14000 Series 8-Slot Line Card Chassis



The Cisco ASR 14000 series 8-slot line card chassis airflow volumes are:

- Chassis airflow: Up to 900 cubic feet (25,485 liters) per minute
- Power system airflow: Up to 240 cubic feet (6,800 liters) per minute

How to Install or Remove Air Circulation Components

This section contains the following procedures:

- [Installing a Lower Fan Tray](#)
- [Removing a Lower Fan Tray](#)
- [Installing an Upper Fan Tray](#)
- [Removing an Upper Fan Tray](#)
- [Installing the Chassis Air Filter](#)
- [Removing the Chassis Air Filter](#)
- [Installing a Power Module Air Filter](#)
- [Removing a Power Module Air Filter](#)

Installing a Lower Fan Tray

This section describes how to install a fan tray in the lower fan tray slot of the Cisco ASR 14000 series 8-slot line card chassis. For information on the chassis airflow and circulation, see the [“About Line Card Chassis Airflow”](#) section on page 3-1. For complete information on regulatory compliance and safety, see *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*.

A Cisco ASR 14000 series 8-slot line card chassis fan tray operates in either the upper or lower fan tray slot. Each fan tray installs into the rear (MSC) side of the chassis (see Figure 3-2). Each fan tray contains four fans.

Figure 3-2 Fan Tray



1	Captive screws	3	Fan tray handle
2	Fan tray rail		

Prerequisites

Before performing this task, you must first open the chassis doors and remove any front cover plates.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Large Phillips screwdriver
- Fan tray (Cisco product number ASR14K/8-FAN-TR=)

Steps

To install a lower fan tray, 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 (MSC) side of the chassis or a bare metal surface on the chassis.
- Step 2** Using two hands to support the fan tray, position it in front of the fan tray bay so that the rails on the sides of the fan tray are aligned with the rail guides on the interior of the chassis.



Caution A fan tray weighs approximately 19.15 pounds (8.69 kg). Use both hands when handling a fan tray.



Caution Do not set the fan tray down on the connector; doing so could damage it.

- Step 3** Slide the fan tray all the way in. Press it firmly into the chassis so that the connector on the back of the fan tray is seated firmly against the connector on the interior of the chassis.

**Caution**

To prevent damage to the chassis connector, do not use excessive force when inserting a fan tray into its bay.

Step 4 Make sure that the fan tray handle is rotated closed.

Step 5 Using the screwdriver, tighten the two captive screws (one for each side).

**Note**

All electrical and control line connections are made automatically when the connectors mate.

What to Do Next

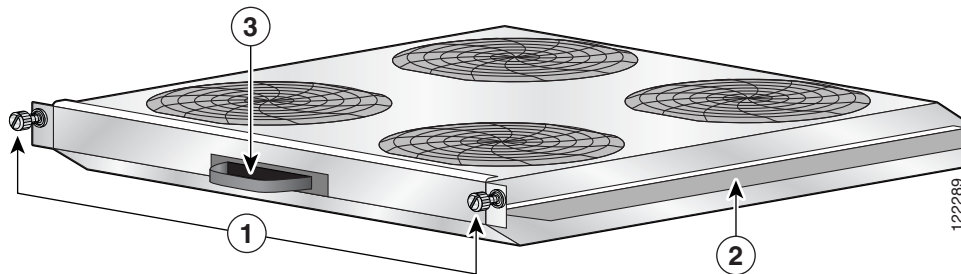
After performing this task, replace the front cover plates.

Removing a Lower Fan Tray

This section describes how to remove a fan tray from the lower fan tray slot of the Cisco ASR 14000 series 8-slot line card chassis. For information on the chassis airflow and circulation, see the [“About Line Card Chassis Airflow”](#) section on page 3-1. For complete information on regulatory compliance and safety, see *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*.

A Cisco ASR 14000 series 8-slot line card chassis fan tray operates in either the upper or lower fan tray slot. Each fan tray is installed into the rear (MSC) side of the chassis (see [Figure 3-3](#)).

Figure 3-3 Fan Tray



1	Captive screws	3	Fan tray handle
2	Fan tray rail		

Prerequisites

Before performing this task, you must first remove any front cover plates.

Required Tools and Equipment

You need the following tools to perform this task:

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

Steps

To remove a lower fan tray, 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 (MSC) side of the chassis or a bare metal surface on the chassis.

Step 2 Using the screwdriver, loosen the two captive screws on the fan tray.



Caution A fan tray weighs approximately 19.15 pounds (8.69 kg). Use both hands when handling a fan tray.

Step 3 Rotate the fan tray handle out.

Step 4 Grasp the fan tray handle and pull it straight out to disconnect the fan tray from the connector mounted on the back of the fan tray. Slide the fan tray halfway from the fan tray bay.

Step 5 Use your free hand to support the fan tray, then slide the fan tray completely from the fan tray bay.

Step 6 Set the fan tray safely aside.



Caution Do not set the fan tray down on the connector; doing so could damage it.

What to Do Next

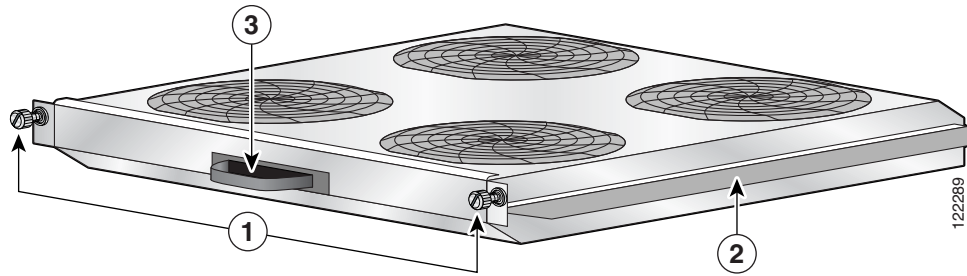
After performing this task, replace the front cover plates.

Installing an Upper Fan Tray

This section describes how to install a fan tray in the upper fan tray slot of the Cisco ASR 14000 series 8-slot line card chassis. For information on the chassis airflow and circulation, see the [“About Line Card Chassis Airflow” section on page 3-1](#). For complete information on regulatory compliance and safety, see *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*.

A Cisco ASR 14000 series 8-slot line card chassis fan tray operates in either the upper or lower fan tray slot. Each fan tray installs into the rear (MSC) side of the chassis (see [Figure 3-4](#)).

Figure 3-4 Fan Tray



1	Captive screws	3	Fan tray handle
2	Fan tray rail		

Prerequisites

Before performing this task, you must first open the chassis doors and remove any front cosmetic covers.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Large Phillips screwdriver
- Fan tray (Cisco product number ASR14K/8-FAN-TR=)

Steps

To install an upper fan tray, 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 (MSC) side of the chassis or a bare metal surface on the chassis.
- Step 2** Using the screwdriver, unscrew the two captive screws holding the fan tray bay door in place.
- Step 3** Lift the door up; you may need a second person to hold it in the open position.
- Step 4** Rotate the handle on the fan tray to the open position.
- Step 5** Using two hands to support the fan tray, position it in front of the fan tray bay so that the rails on the sides of the fan tray are aligned with the rail guides on the interior of the chassis.



Caution A fan tray weighs approximately 19.15 pounds (8.69 kg). Use both hands when handling a fan tray.

- Step 6** Slide the fan tray into the bay.
- Step 7** Slide the fan tray into the fan tray bay. Stop when the fan tray meets the chassis connector in the back of the fan tray bay.

Notice that the tray (and rail guides) drop just inside the fan tray bay door, so that the fan tray “drops” into its final position as it gets almost all the way into the chassis.

**Caution**

To prevent damage to the chassis connector, do not use excessive force when inserting a fan tray into its bay.

Step 8 Firmly push on the fan tray to seat the fan tray connector in the chassis connector.

**Note**

All electrical and control line connections are made automatically when the connectors mate.

Step 9 Rotate the fan tray handle to the closed (flush) position.

Step 10 Replace the fan tray bay door and tighten the two captive screws on the fan tray bay door.

What to Do Next

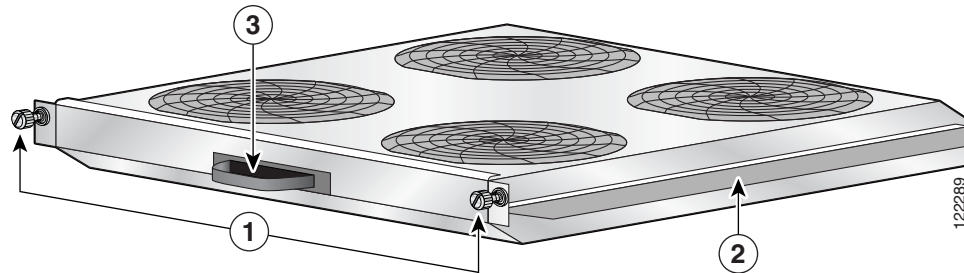
After performing this task, replace the front cover plates.

Removing an Upper Fan Tray

This section describes how to remove a fan tray from the upper fan tray slot of the Cisco ASR 14000 series 8-slot line card chassis. For information on the chassis airflow and circulation, see the [“About Line Card Chassis Airflow”](#) section on page 3-1. For complete information on regulatory compliance and safety, see *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*.

A Cisco ASR 14000 series 8-slot line card chassis fan tray operates in either the upper or lower fan tray slot. Each fan tray is installed into the rear (MSC) side of the chassis (see [Figure 3-5](#)).

Figure 3-5 Fan Tray



1	Captive screws	3	Fan tray handle
2	Fan tray rail		

Prerequisites

Before performing this task, you must first open the chassis doors and remove any front cosmetic covers.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- Large Phillips screwdriver

Steps

To remove an upper fan tray, 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 (MSC) side of the chassis or a bare metal surface on the chassis.
- Step 2** Using the screwdriver, unscrew the two captive screws holding the fan tray bay door in place.
- Step 3** Lift the door up; you may need a second person to hold it in the open position.
- Step 4** Rotate the handle on the fan tray to the open position.
- Step 5** Pull firmly and steadily on the fan tray handle to unseat it from the chassis connector, and then slide it partway from the fan tray bay.



Caution Do not pull too hard on the fan tray; too strong a pull can cause the tray to slide out too quickly, causing your hand to scrape against the fan tray door.

- Step 6** Place your hand under the fan tray to support it from beneath.



Caution A fan tray weighs approximately 19.15 pounds (8.69 kg). Use both hands when handling a fan tray.

- Step 7** Slide the fan tray from the bay and set it carefully aside.
- Step 8** Replace the fan tray bay door and tighten the two captive screws on the fan tray cover bay door.
-

What to Do Next

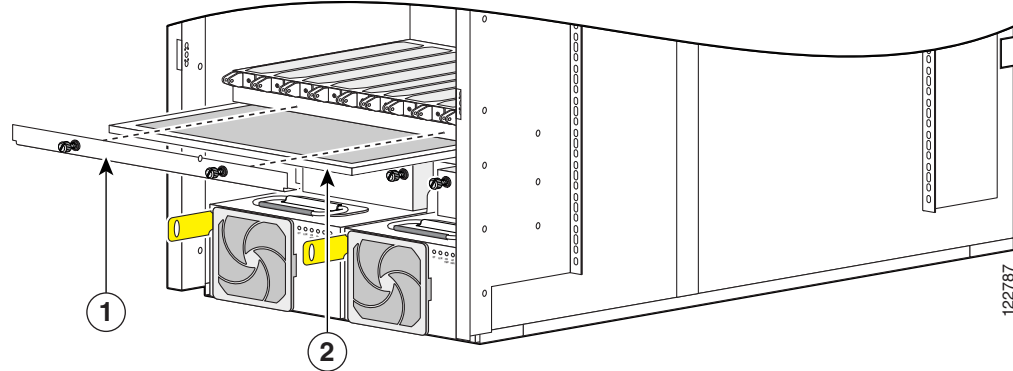
After performing this task, replace the front cover plates.

Installing the Chassis Air Filter

This section describes how to install the air filter in the Cisco ASR 14000 series 8-slot line card chassis. For further information, see the [“About Line Card Chassis Airflow”](#) section on page 3-1. For complete information on regulatory compliance and safety, see *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*.

The chassis has a serviceable air filter mounted in a slide-out tray, accessible from the rear of the chassis just above the lower fan tray. The Cisco ASR 14000 series 8-slot line card chassis air filter plugs into the front (PLIM) side of the chassis (see [Figure 3-6](#)).

Figure 3-6 Chassis Air Filter



1	Air filter cover plate (with captive screws)	2	Chassis air filter
----------	--	----------	--------------------

Prerequisites

Before performing this task, you must first remove any front cover plates.



Caution

Never operate the Cisco ASR 14000 series 8-slot line card chassis without an air filter. Doing so can damage the hardware.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Large Phillips screwdriver
- Chassis air filter (Cisco product number ASR14K-8-LCC-FILTER=)

Steps

To install the chassis air filter, 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 two hands to support the air filter, orient it so that the ridge on the front of the air filter faces outward from the front of the chassis and the wire-grid backing support is facing up.
- Step 3** Slide the air filter into the air filter slot until it is seated fully within the slot.
- Step 4** Hold the air filter cover plate in place and tighten the two captive screws on the front of the plate.

What to Do Next

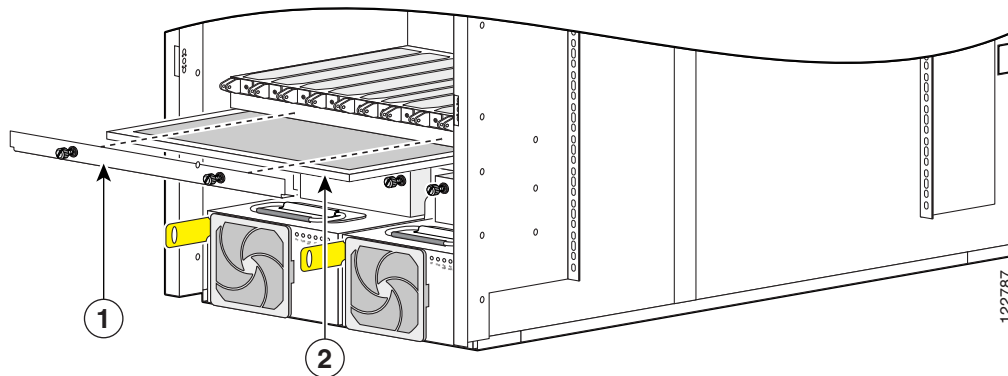
After performing this task, replace the front cover plates.

Removing the Chassis Air Filter

This section describes how to remove the air filter in the Cisco ASR 14000 series 8-slot line card chassis. For further information, see the [“About Line Card Chassis Airflow”](#) section on page 3-1. For complete information on regulatory compliance and safety, see *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*.

The chassis has a serviceable air filter mounted in a slide-out tray, accessible from the rear of the chassis just above the lower fan tray. The Cisco ASR 14000 series 8-slot line card chassis air filter plugs into the front (PLIM) side of the chassis (see [Figure 3-7](#)).

Figure 3-7 Chassis Air Filter



1	Air filter cover plate (with captive screws)	2	Chassis air filter
----------	--	----------	--------------------

Prerequisites

Before performing this task, you must first remove any front cover plates.



Caution

Never operate the Cisco ASR 14000 series 8-slot line card chassis without an air filter. Doing so can damage the hardware.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- Large Phillips screwdriver

Steps

To remove the chassis air filter, 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 two captive screws on the air filter cover faceplate.

- Step 3** Remove the cover faceplate and set it carefully aside.
- Step 4** Grasp the air filter and carefully slide it from the slot.
- Step 5** Set the air filter carefully aside.

What to Do Next

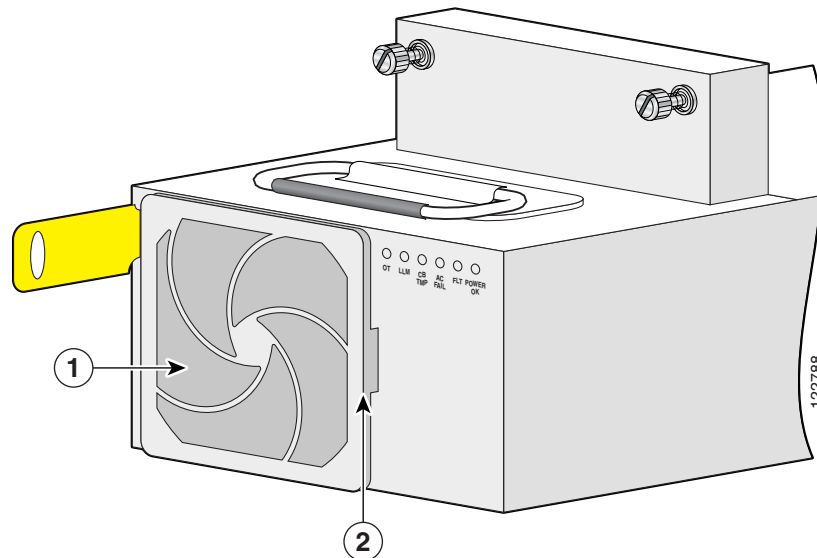
After performing this task, replace the front cover plates.

Installing a Power Module Air Filter

This section describes how to install a power module air filter for the Cisco ASR 14000 series 8-slot line card chassis. For further information, see the [“About Line Card Chassis Airflow”](#) section on page 3-1. For complete information on regulatory compliance and safety, see *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*.

Each power module has a serviceable air filter that is attached to the front of the power module and is held in place by an air filter clip-on holder. The power module air filter faces outward from the front of the chassis (see [Figure 3-8](#)).

Figure 3-8 Power Module Air Filter



1	Power module air filter	2	Air filter clip-on holder
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Prerequisites

Before performing this task, you must first remove any front cover plates.



Caution

Never operate the Cisco ASR 14000 series 8-slot line card chassis without an air filter. Doing so can damage the hardware.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Medium flat-blade screwdriver
- Air filter (Cisco product number ASR14K-8-PWR-FILTER=)

Steps

To install a power module air filter, 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 screwdriver under the edge of the air filter clip-on holder.
 - Step 3** Gently pry the holder loose with the screwdriver; it should pop off easily.
 - Step 4** Place the air filter in position on the front of the power module.
 - Step 5** Place the holder in position on the front of the power module over the air filter.
 - Step 6** Press the holder firmly but gently until it snaps into place.
-

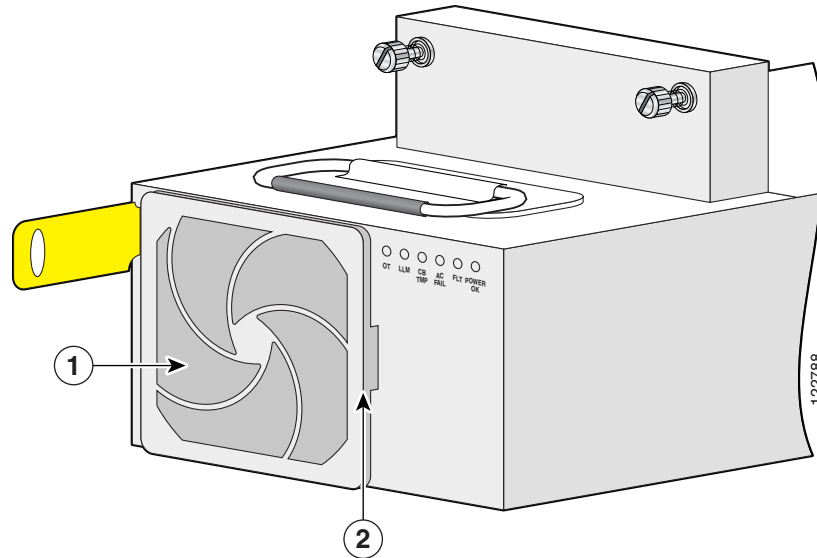
What to Do Next

After performing this task, replace the front cover plates.

Removing a Power Module Air Filter

This section describes how to remove a power module air filter. For further information, see the [“About Line Card Chassis Airflow” section on page 3-1](#). For complete information on regulatory compliance and safety, see *Regulatory Compliance and Safety Information for the Cisco ASR14000 Series Aggregation Services Router*.

Each power module has a serviceable air filter that is attached to the front of the power module and is held in place by an air filter clip-on holder. The power module air filter faces outward from the front of the chassis (see [Figure 3-9](#)).

Figure 3-9 Power Module Air Filter

1	Power module air filter	2	Air filter clip-on holder
----------	-------------------------	----------	---------------------------

Prerequisites

Before performing this task, you must first remove any front cover plates.



Caution

Never operate the Cisco ASR 14000 series 8-slot line card chassis without an air filter. Doing so can result in damage to the hardware.

Required Tools and Equipment

You need the following tools to perform this task:

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

Steps

To remove a power module air filter, 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 screwdriver under the edge of the air filter clip-on holder.
 - Step 3** Gently pry the holder loose with the screwdriver; it should pop off easily.
 - Step 4** Remove the air filter from the front of the power module and set it carefully aside.
-

What to Do Next

After performing this task, you may install a new air filter (see the [“Installing a Power Module Air Filter” section on page 3-11](#)) and replace the front cover plates.



CHAPTER 4

Installing and Removing MSCs, PLIMs, and Associated Components

This chapter provides instructions on how to install and remove the Cisco ASR (Aggregation Services Router) 14000 series 8-slot line card chassis modular services cards (MSCs), physical layer interface modules (PLIMs), and any associated components. This chapter presents the following topics:

- [Information About Installing and Removing Cards and Associated Components](#)
- [How to Install or Remove a Slot Cover](#)
- [How to Install or Remove an Impedance Carrier](#)
- [How to Install or Remove a Pillow Block](#)
- [How to Install or Remove a Switch Fabric Card](#)
- [How to Install or Remove an MSC](#)
- [How to Install or Remove an RP Card or DRP PLIM](#)
- [How to Install or Remove a PCMCIA Card](#)
- [How to Install or Remove a Physical Layer Interface Module \(PLIM\)](#)
- [How to Install or Remove a Small Form-Factor Pluggable \(SFP\) Module](#)

Information About Installing and Removing Cards and Associated Components

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

- [Guidelines and Warnings for Card Installation and Removal](#)
- [Information About Impedance Carriers and Slot Covers](#)
- [Information About Distributed Route Processors and Distributed Route Processor PLIMs](#)
- [Information About Small Form-Factor Pluggable \(SFP\) Modules](#)
- [Information About Hard Drives and PCMCIA Cards](#)
- [Information About Cable Management Brackets](#)

Guidelines and Warnings for Card Installation and Removal

This section contains the guidelines for card installation and removal.



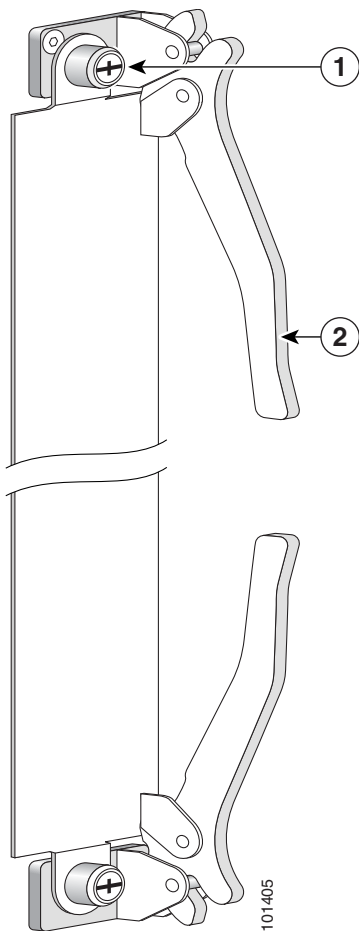
Caution

Removing more than one 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.

Online 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. 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 and PLIMs 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 or PLIM 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

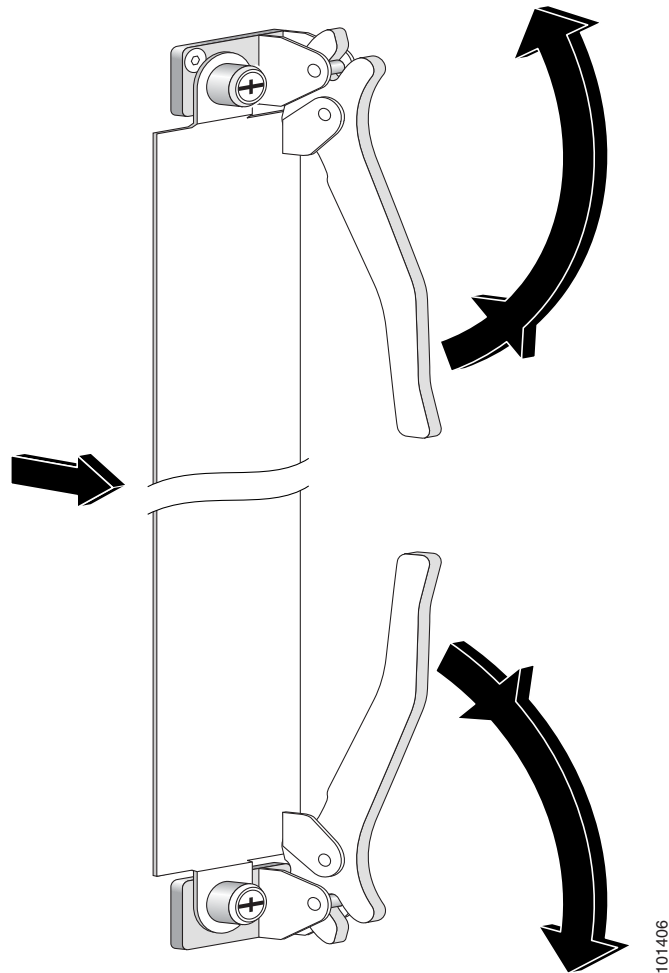


1 Captive screw

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



When shipped, every slot in the chassis contains either an impedance carrier, or is covered by a slot cover (see the [“Information About Impedance Carriers and Slot Covers”](#) section on page 4-6).



Note

While it is not critical for you to install the cards in a certain order, following the card installation recommendations in this chapter will make your installation process easier.

Figure 4-3 Line Card Chassis Slot Numbers—Front (PLIM) Side

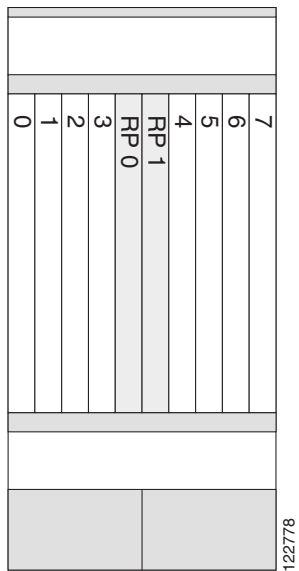
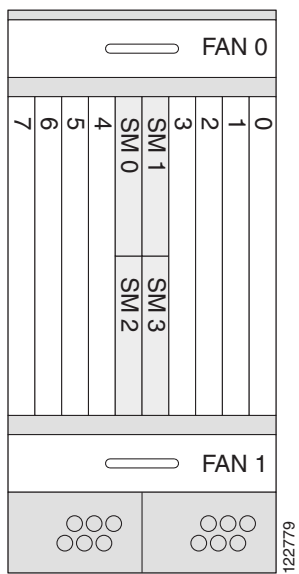


Figure 4-4 Line Card Chassis Slot Numbers—Rear (MSC) Side



Recommended Order of Card Installation

We recommend the following order when removing the impedance carriers and installing the cards in the chassis (Figure 4-3 and Figure 4-4 show the slot numbers for the Cisco ASR 14000 series 8-slot line card chassis):

Step 1 Install the RP cards first one card at a time, the left one (slot RP0) before the right one (slot RP1). Tighten the screws only after fully inserting both RP cards.



Note It is important to engage and partially tighten all screws first, before fully tightening them with a screwdriver. This action helps ensure that all parts are aligned properly in the chassis.

Step 2 Install the switch fabric cards one at a time in the same manner.

We recommend that you install fabric cards from left to right, starting from top to bottom, in this order:

- Slot SM0
- Slot SM1
- Slot SM2
- Slot SM3

Step 3 For the MSCs and PLIMs, you must remove one impedance carrier, install a functional board, and tighten the screw; then repeat the process until all cards and PLIMs have been installed.

Cautions and Recommendations

**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.

**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.

Do not operate the Cisco ASR 14000 series 8-slot line card chassis with any slots completely empty; doing so could lead to an airflow bypass condition that diverts airflow from slots containing heat-generating electronics, possibly causing thermal alarms to occur at lower-than-expected ambient temperatures.

To avoid airflow bypass, all slots should be 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.

**Tip**

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.

Information About Impedance Carriers and Slot Covers

When shipped, all slots in the chassis either contain impedance carriers or are covered by slot covers to help maintain chassis stiffness and 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 [Figure 4-5](#), [Figure 4-6 on page 4-7](#), [Figure 4-7 on page 4-8](#), and [Figure 4-8 on page 4-9](#)).

Figure 4-5 *Switch Fabric Slot (Half Height) Slot Cover*

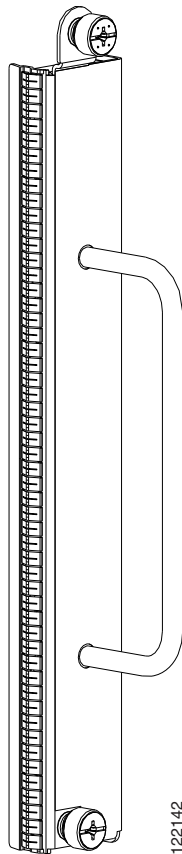


Figure 4-6 RP Slot Impedance Carrier

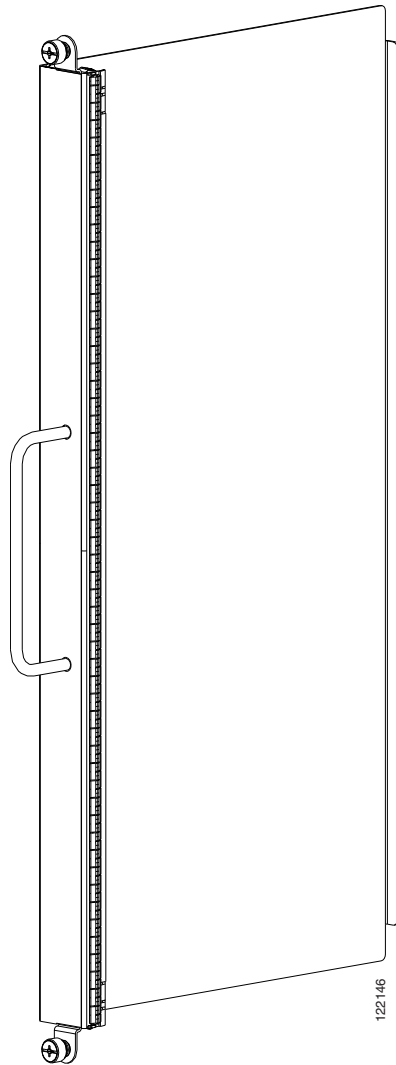
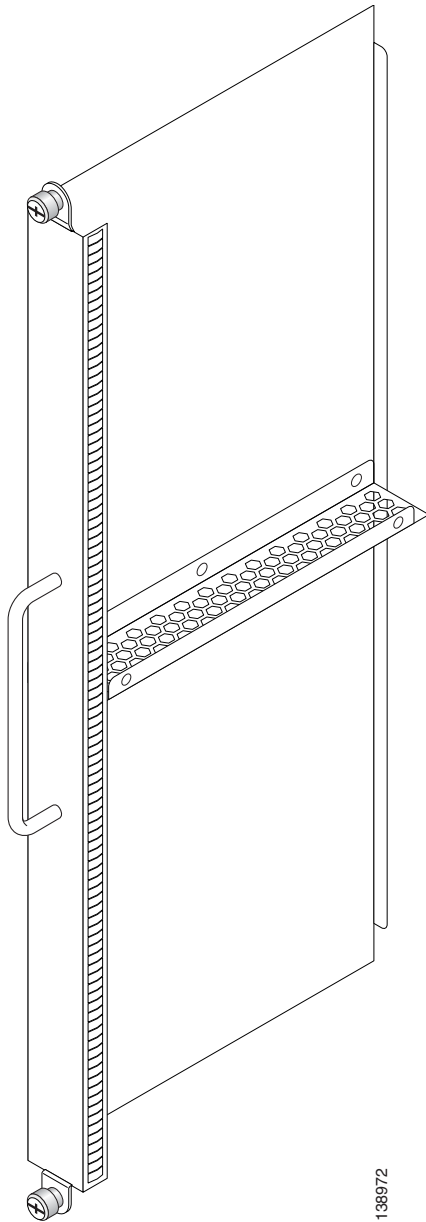
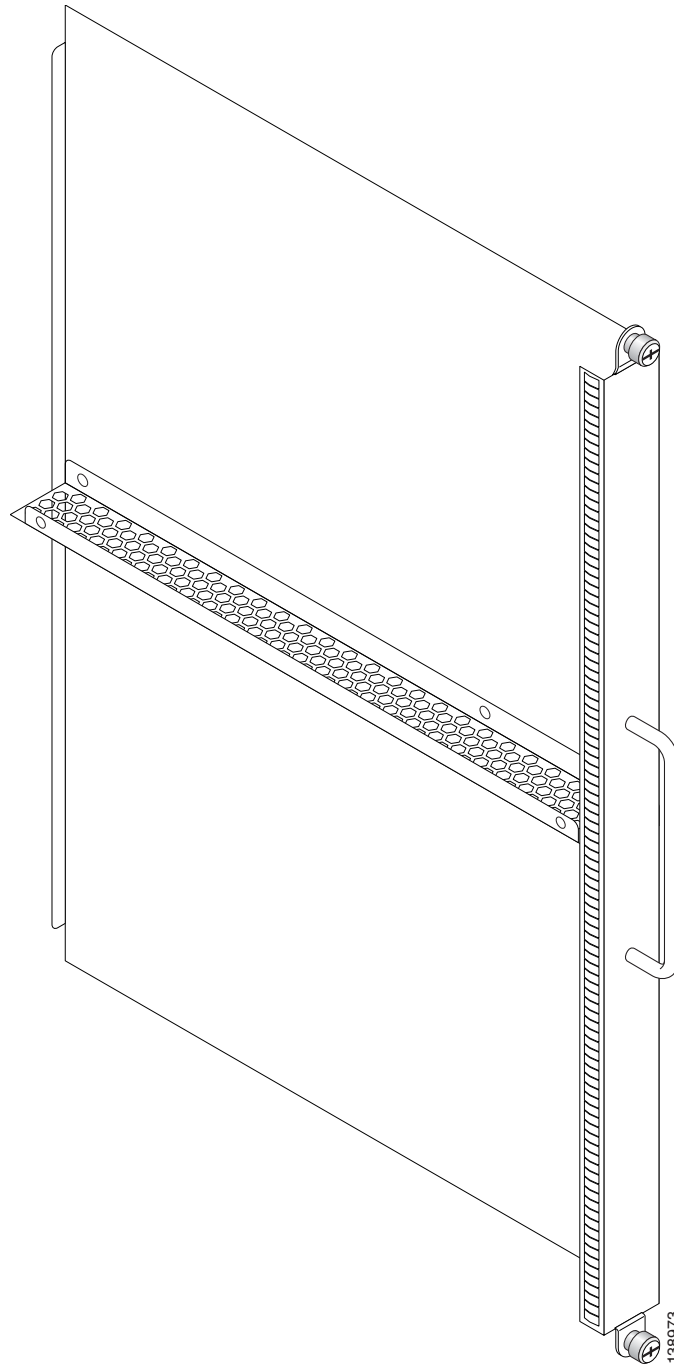


Figure 4-7 PLIM Slot Impedance Carrier



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Figure 4-8 *MSC Slot Impedance Carrier*

For further information on installing and removing the slot covers and impedance carriers, see the “Installing a Slot Cover” section on page 4-13, the “Removing a Slot Cover” section on page 4-15, the “Installing an Impedance Carrier” section on page 4-16, and the “Removing an Impedance Carrier” section on page 4-18.

Information About Distributed Route Processors and Distributed Route Processor PLIMs

The Cisco ASR 14000 series router provides distributed route processor (DRP) support through the installation of DRP PLIMs and DRP cards on the Cisco ASR 14000 series 8-slot line card chassis (see [Figure 4-9](#) and [Figure 4-10](#)). 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 4-9 DRP PLIM

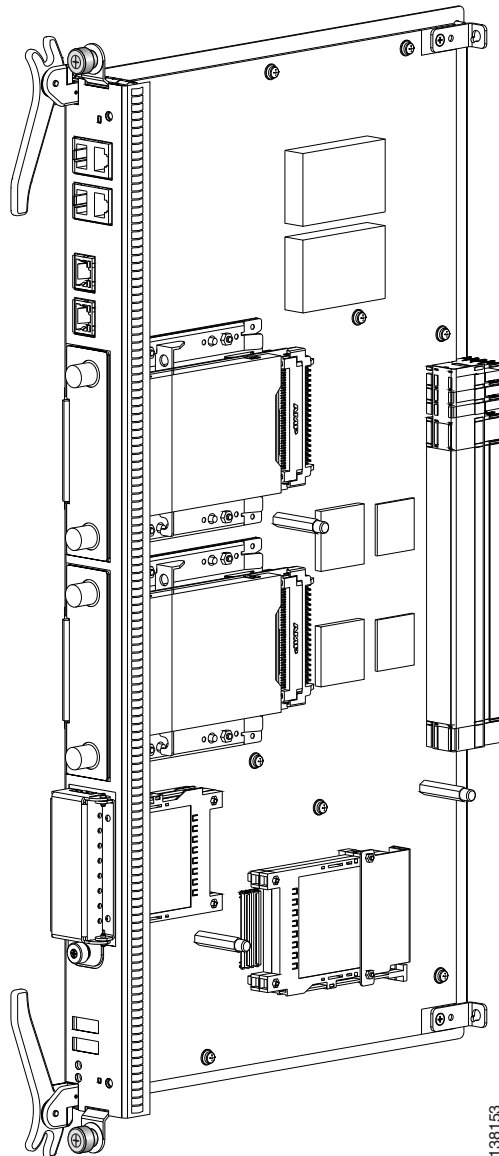
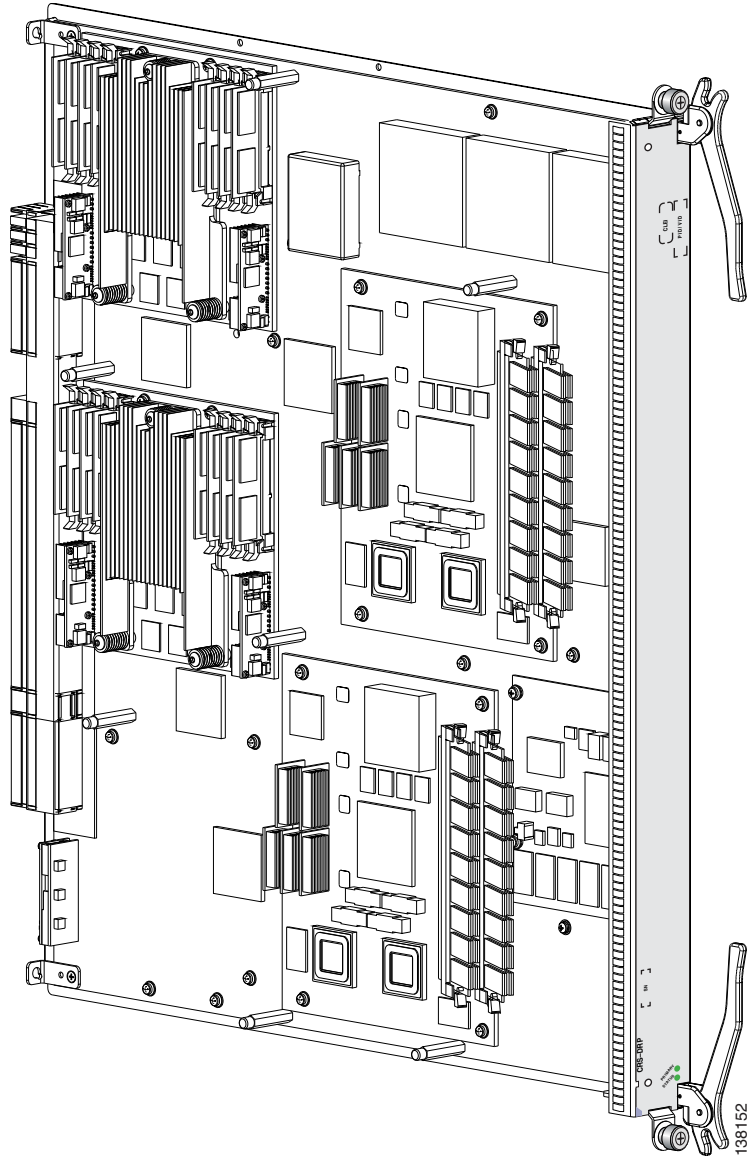


Figure 4-10 *DRP Card*

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 [“How to Install or Remove a Physical Layer Interface Module \(PLIM\)”](#) section on page 4-47 or the [“How to Install or Remove an MSC”](#) section on page 4-31 for further information.

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 [“Information About Hard Drives and PCMCIA Cards”](#) section on page 4-12. For installation or removal information, see the [“Removing an RP PCMCIA Card”](#) section on page 4-46.

Information About Small Form-Factor Pluggable (SFP) Modules

The SFP module for the 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**

Only the 16-port OC-48c/STM-16c MSC uses SFP modules.

Information About Hard Drives and PCMCIA Cards

Optional and replaceable hard drives and PCMCIA cards are available for the DRP cards.

The hard drive is an IDE hard drive used for gathering debugging information, such as core dumps from the DRPs or MSCs. 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 chassis and is optional.

**Note**

Core dumps are discoverable only through intervention with the chassis system software.

Physically, the 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 DRP 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 images and configurations by plugging in a PCMCIA flash card. The other subsystem is fixed to the DRP, not removable, and for permanent storage of configurations and images.

Information About Cable Management Brackets

The Cisco ASR 14000 series 8-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.

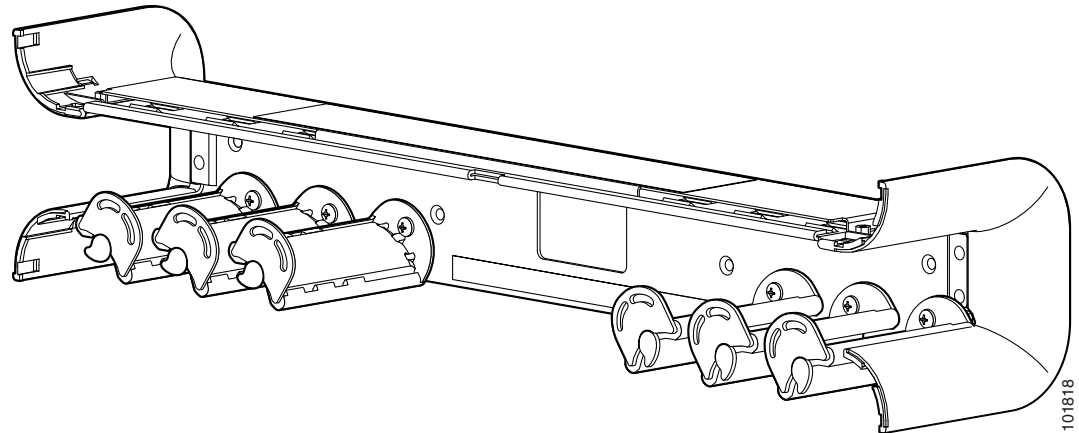
**Caution**

Excessive bending of interface cables can damage the cables.

The Cisco ASR 14000 series 8-slot line card chassis arrives preinstalled with a horizontal cable management bracket on the front of the chassis and an optional horizontal cable management bracket orderable for the rear of the chassis.

Figure 4-11 shows the chassis cable management bracket.

Figure 4-11 Cable Management Bracket



How to Install or Remove a Slot Cover

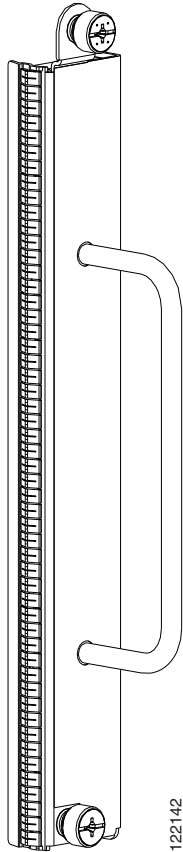
This section contains the following procedures:

- [Installing a Slot Cover](#)
- [Removing a Slot Cover](#)

Installing a Slot Cover

This section describes how to install a slot cover in the Cisco ASR 14000 series 8-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. (Figure 4-12 shows a switch fabric slot cover for reference.) For more detailed information on the slot covers, see the “[Information About Impedance Carriers and Slot Covers](#)” section on page 4-6.

Figure 4-12 Switch Fabric Slot (Half Height) Slot Cover



Prerequisites

Before performing this task, remove any cosmetic covers and ensure that the slot over which you are about to install the cover is empty. See the [“Removing an RP or DRP Card”](#) section on page 4-42 and the [“Removing a Switch Fabric Card”](#) section on page 4-28.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Large Phillips screwdriver
- Slot cover

Steps

To install a slot cover, follow these steps:

-
- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to an ESD connection socket on the rear (MSC) side or a bare metal surface on the chassis.
- Step 2** Using the handle, hold the slot cover in place over the slot.

- Step 3** Partially tighten the four captive screws on the front panel of the slot cover (either by hand or with the screwdriver) to make sure that they are both engaged.
- Step 4** To seat the slot cover firmly in place, fully tighten the captive screws.
-

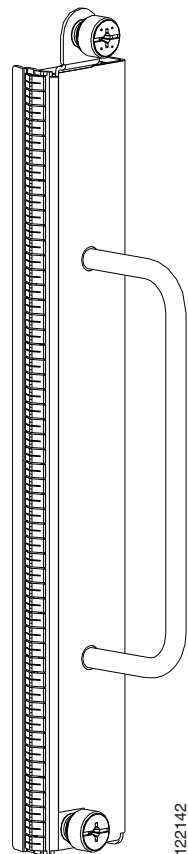
What to Do Next

After performing this task, replace any rear (MSC) side cosmetic covers.

Removing a Slot Cover

This section describes how to remove a slot cover from the Cisco ASR 14000 series 8-slot line card chassis. The chassis is shipped with slot covers over the switch fabric card and RP card slots. Both slot cover types are removed in the same manner. (Figure 4-13 shows a switch fabric slot cover for reference.) For more detailed information on the slot covers, see the “[Information About Impedance Carriers and Slot Covers](#)” section on page 4-6.

Figure 4-13 Switch Fabric Slot (Half Height) Slot Cover



Prerequisites

Before performing this task, remove any rear (MSC) side cosmetic covers.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- Large Phillips screwdriver

Steps

To remove a slot cover, follow these steps:

-
- | | |
|---------------|--|
| Step 1 | Attach the ESD-preventive wrist strap to your wrist and connect its leash to an ESD connection socket on the rear (MSC) side or a bare metal surface on the chassis. |
| Step 2 | Grasp the slot cover with one hand. |
| Step 3 | Loosen the 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” section on page 4-24](#) and the [“Installing an RP or DRP Card” section on page 4-39](#) for further details.

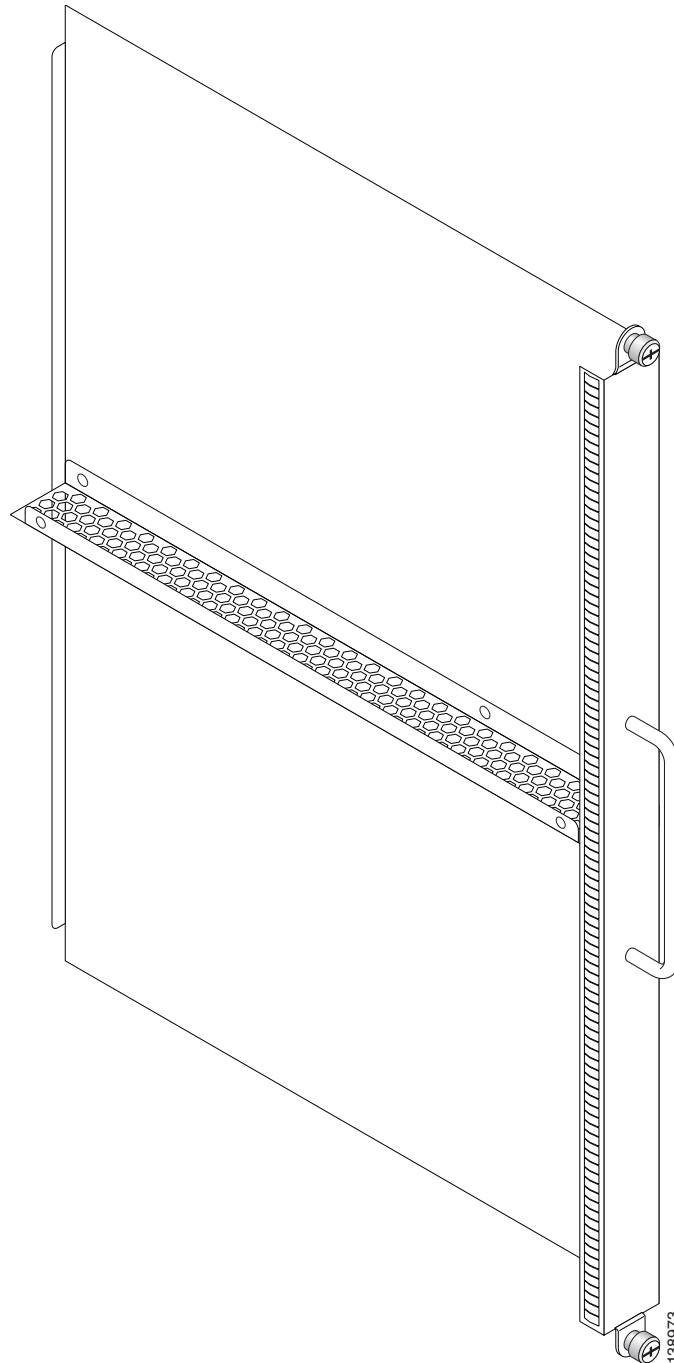
How to Install or Remove an Impedance Carrier

This section contains the following procedures:

- [Installing an Impedance Carrier](#)
- [Removing an Impedance Carrier](#)

Installing an Impedance Carrier

This section describes how to install an impedance carrier into the Cisco ASR 14000 series 8-slot line card chassis. The chassis is shipped with impedance carriers installed in the MSC and PLIM slots. Both impedance carrier types are installed in the same manner. (Figure 4-14 shows an MSC impedance carrier for reference.) For more detailed information on impedance carriers, see the [“Information About Impedance Carriers and Slot Covers” section on page 4-6](#).

Figure 4-14 *MSC Slot Impedance Carrier*

Prerequisites

Before performing this task, remove any cosmetic covers 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 [“Information About Impedance Carriers and Slot Covers”](#) section on page 4-6 and the [“Removing an MSC”](#) section on page 4-35 or the [“Removing a PLIM”](#) section on page 4-51.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Large Phillips screwdriver
- Impedance carrier (MSC impedance carrier Cisco Product number ASR14K-MSC-IMPEDANCE=; PLIM impedance carrier Cisco Product number ASR14K-INT-IMPEDANCE=)

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 an ESD connection socket on the rear (MSC) side 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** To seat the impedance carrier firmly in the slot, fully tighten the captive screws.
-

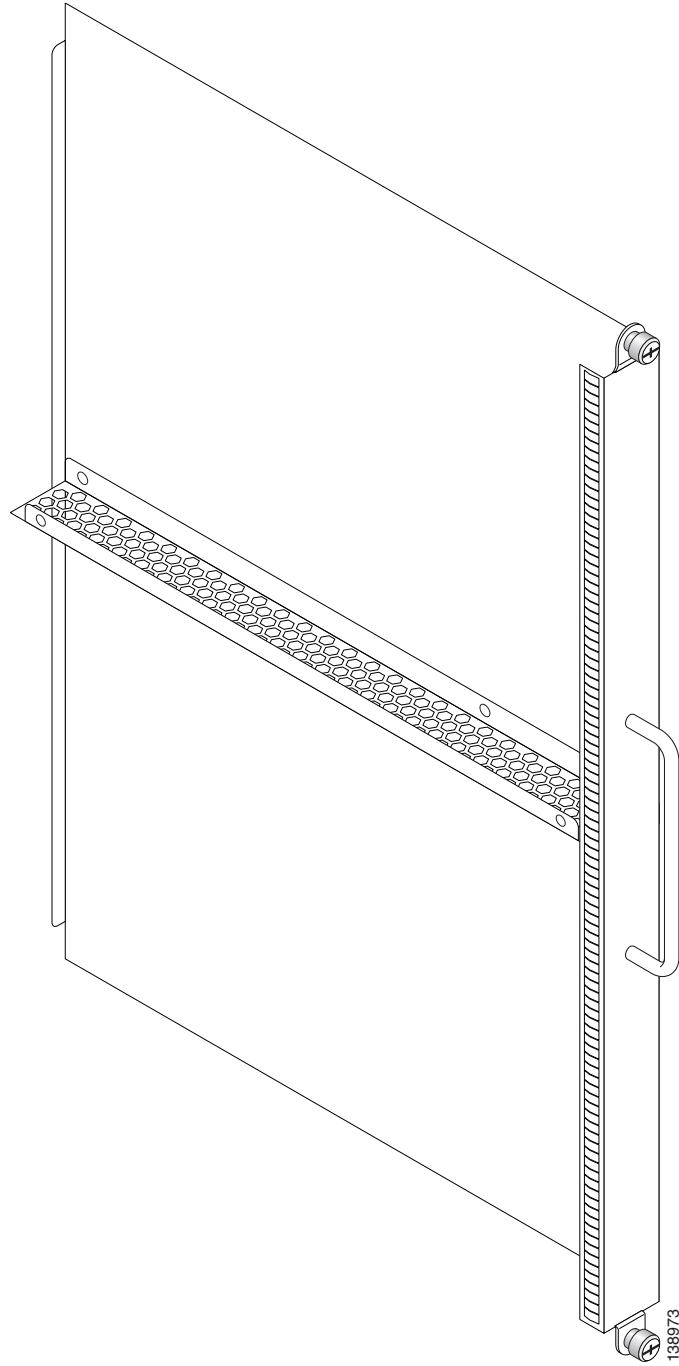
What to Do Next

After performing this task, replace any cosmetic covers.

Removing an Impedance Carrier

This section describes how to remove an impedance carrier from the Cisco ASR 14000 series 8-slot line card chassis. Both impedance carrier types are removed in the same manner. (For reference, [Figure 4-15](#) shows an MSC impedance carrier.) For more detailed information on impedance carriers, see the [“Information About Impedance Carriers and Slot Covers”](#) section on page 4-6.

Figure 4-15 *MSC Slot Impedance Carrier*



Prerequisites

Before performing this task, remove any cosmetic covers.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- Large 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 an ESD connection socket on the rear (MSC) side or a bare metal surface on the chassis.
 - Step 2** Identify the impedance carrier to be removed from the card cage.
 - Step 3** To loosen the impedance carrier from the slot, turn the two captive screws on the front panel of the card counterclockwise.
 - Step 4** Grasp the impedance carrier handle with one hand and gently pull it halfway from the slot.
 - Step 5** Place one hand under the impedance carrier to guide it.
 - Step 6** 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” section on page 4-31](#) and the [“Installing a PLIM” section on page 4-47](#) for further details.

How to Install or Remove a Pillow Block

This section contains the following procedures:

- [Installing a Pillow Block](#)
- [Removing a Pillow Block](#)

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: ASR14K-PILLBLK=) at hand.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Pillow block replacement kit (Cisco product number: ASR14K-PILLBLK=)

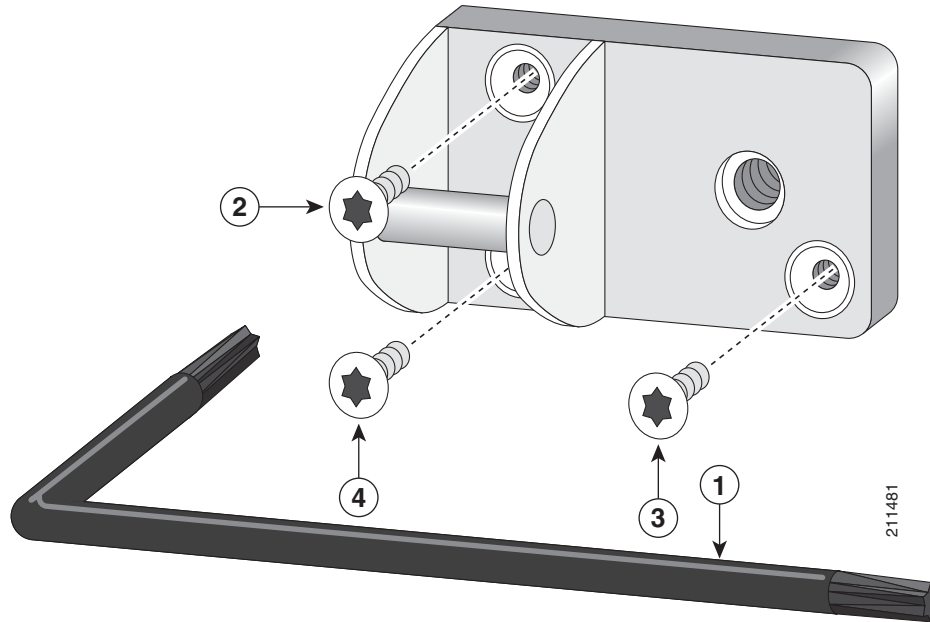
The following items are included in the ASR14K-PILLBLK= pillow block replacement kit:

- 2 replacement pillow blocks
- 6 Torx-head screws
- 1 T10 Torx screwdriver (See item 1 in [Figure 4-16](#).)

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 T10 Torx-head screws near at hand.
 - Step 4** Position the pillow block and align the screw holes.
 - Step 5** Use the T10 Torx screwdriver to install the top left screw (located above the pillow block pin). (See item number 2 in [Figure 4-16](#).)

Figure 4-16 *Installing a Pillow Block*

Step 6 Install the lower right screw (see item number 3 in [Figure 4-16](#)).

- Step 7** Install the lower left screw (located below the pillow block pin). (See item number 4 in [Figure 4-16](#).)
- 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: ASR14K-PILLBLK=) at hand.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Pillow block replacement kit (Cisco product number: ASR14K-PILLBLK=)

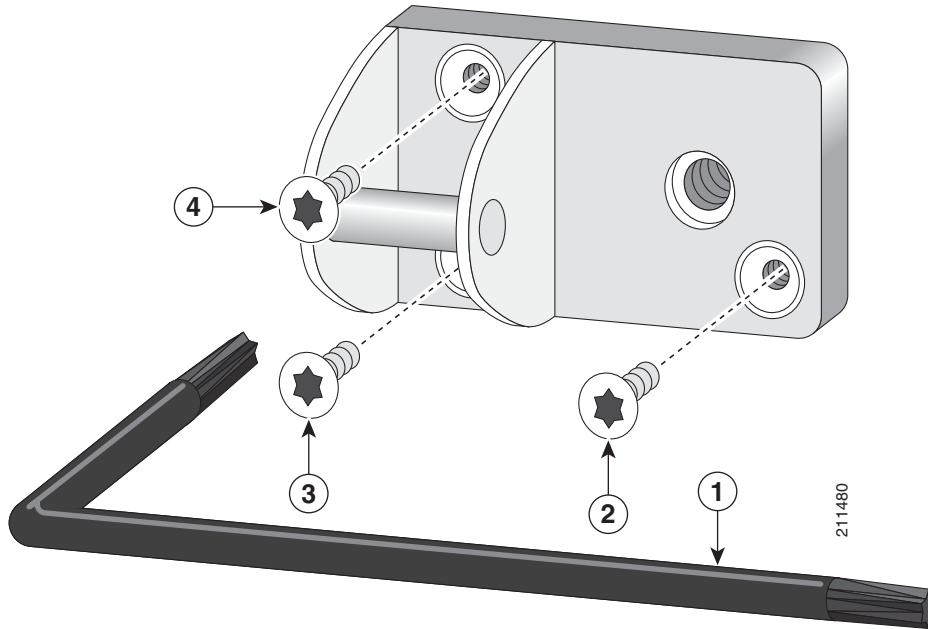
The following items are included in the ASR14K-PILLBLK= pillow block replacement kit:

- 2 replacement pillow blocks
- 6 Torx-head screws
- 1 T10 Torx screwdriver (See item 1 in [Figure 4-17](#).)

Steps

To remove a damaged 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 the T10 Torx screwdriver to remove the lower right screw. (See item number 2 in [Figure 4-17](#).)

Figure 4-17 Removing a Pillow Block

- Step 3** Remove the lower left screw (located below the pillow block pin). (See item number 3 in [Figure 4-17](#).)
- Step 4** Remove the top left screw (located above the pillow block pin). (See item number 4 in [Figure 4-17](#).)
- 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 4-21).

How to Install or Remove a Switch Fabric Card

This section contains the following procedures:

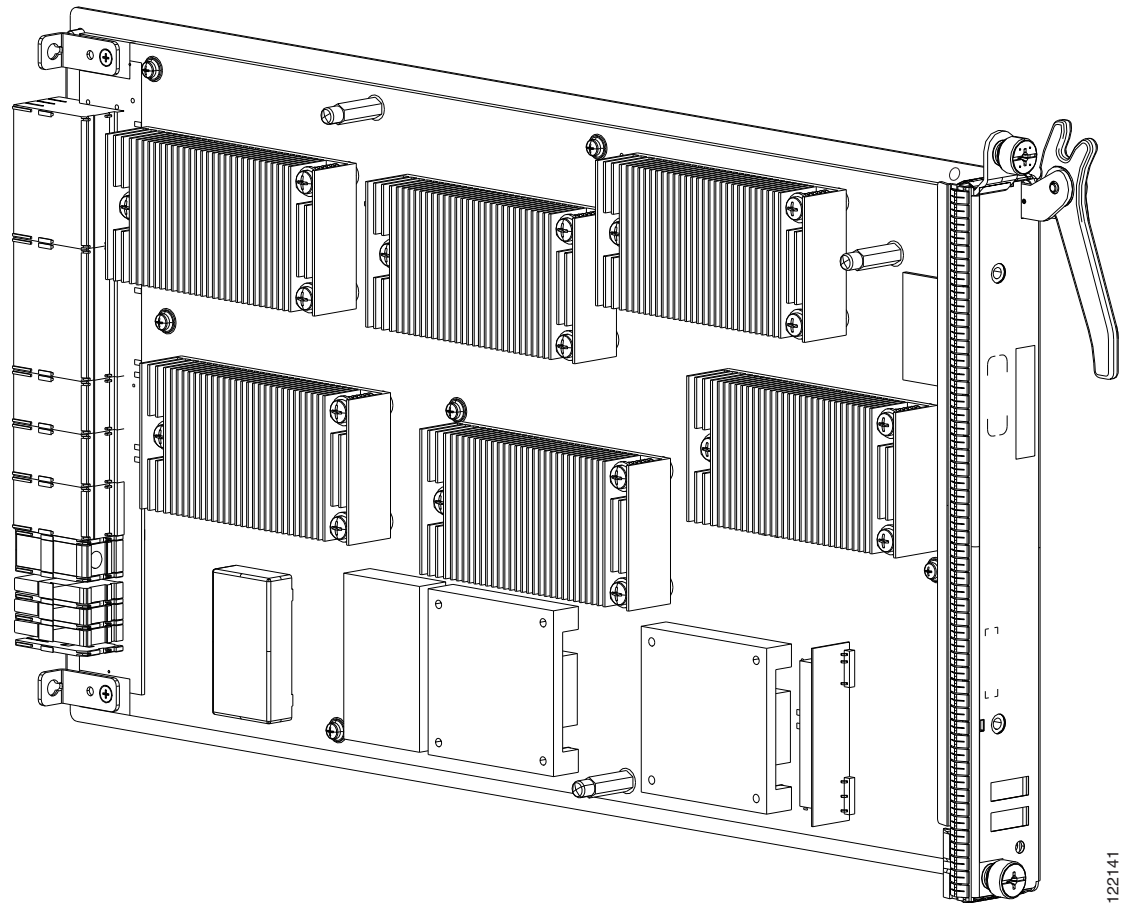
- [Installing a Switch Fabric Card](#)
- [Removing a Switch Fabric Card](#)
- [Verifying the Installation of a Switch Fabric Card](#)

Installing a Switch Fabric Card

This section describes how to install a switch fabric card in the Cisco ASR 14000 series 8-slot line card chassis. For more detailed information on the switch fabric card, see *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis System Description*.

The switch fabric card is used only in single-chassis systems. The switch fabric card does not contain any fiber-optic connectors because it is not connected to any other switch fabric modules (see [Figure 4-18](#)).

Figure 4-18 Switch Fabric Card



Prerequisites

Before performing this task, remove any front cover plates from the chassis, and remove any switch fabric card or switch fabric impedance cover from the slot in which you plan on installing the switch fabric card. See the [“Information About Impedance Carriers and Slot Covers”](#) section on page 4-6 and the [“Removing a Switch Fabric Card”](#) section on page 4-28.



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.

Required Tools and Equipment

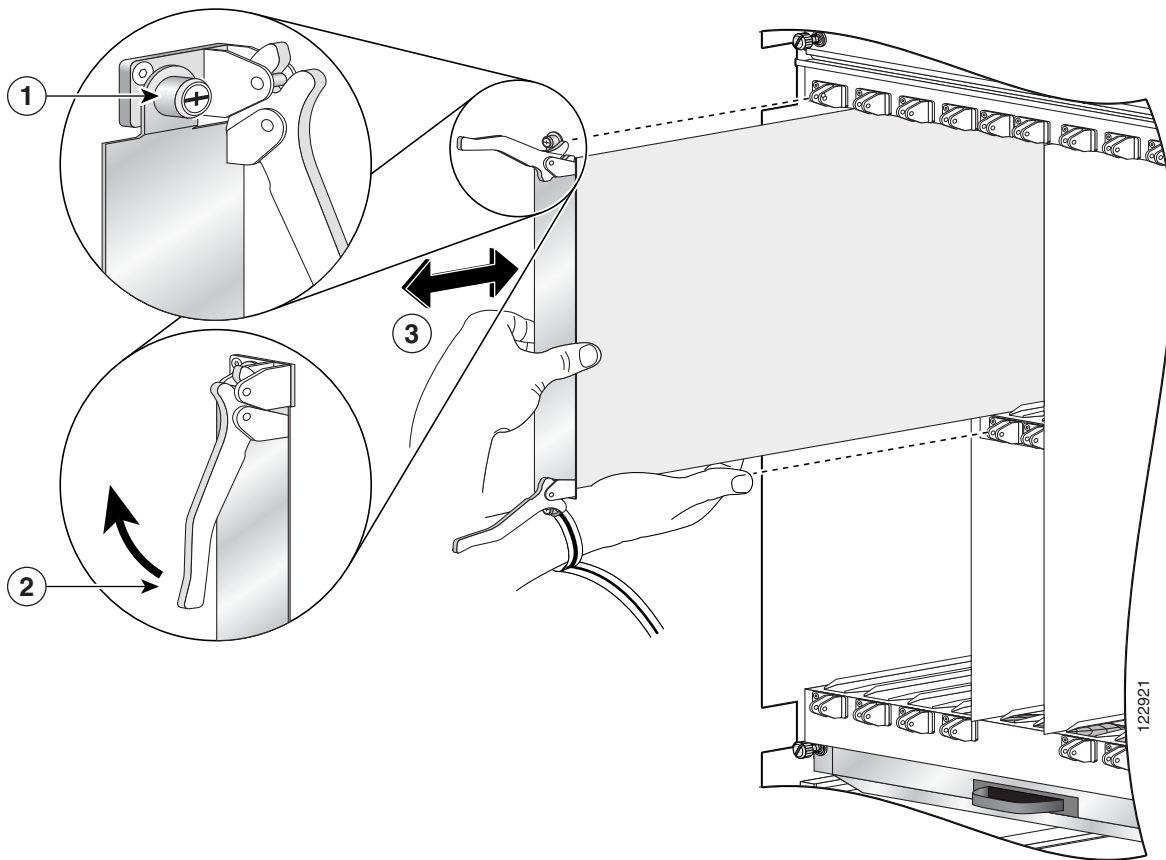
You need the following tools and part to perform this task:

- ESD-preventive wrist strap
- Large Phillips screwdriver
- Switch fabric card (Cisco Product number ASR14K-8-FC/S=)

Steps

To install a switch fabric card, see [Figure 4-19](#) and follow these steps:

Figure 4-19 Installing a Switch Fabric Card



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 an ESD connection socket on the rear (MSC) side or a bare metal surface on the chassis.

Step 2 Remove the switch fabric card from its antistatic packaging.

- Step 3** Visually inspect the connector pins on the card before you insert it into the chassis. Do not attempt to install a card with bent pins, as this may damage the chassis midplane connectors.
- 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.
- Step 5** 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.

- Step 6** 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 in. Reorient the switch fabric card, if necessary.
- Step 7** 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.



Note The insertion of the switch fabric card into the chassis may require more force than is typical of the other cards in the chassis.

- 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 may bind when you attempt to close the levers, thereby damaging or breaking one or both of them.

- 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 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 10** 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.



Tip The flange on the front panel of the card carrier should be flush against the card cage.

- Step 11** Partially tighten the two captive screws on the front panel of the card (either by hand or with the screwdriver) to make sure that they are both engaged.

- Step 12** Use the screwdriver to fully tighten the captive screws to seat the card firmly in the slot.
-

What to Do Next

After performing this task:

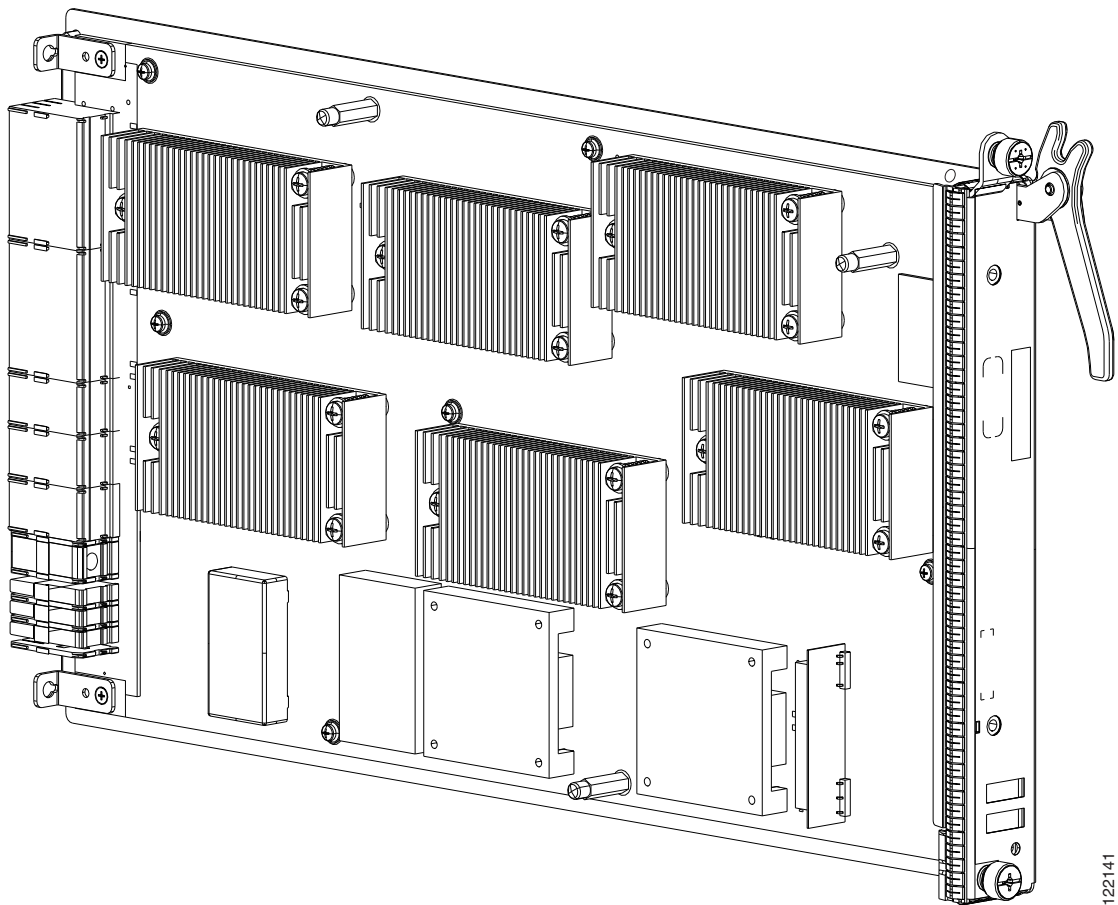
- Place the impedance carrier in an antistatic bag for storage and future use.
- Replace any front cover cosmetic plates and verify that the card has been installed properly (see the [“Verifying the Installation of a Switch Fabric Card”](#) section on page 4-30).
- If you are performing the initial installation of the system, install the MSCs (see the [“Installing an MSC”](#) section on page 4-31).

Removing a Switch Fabric Card

This section describes how to remove a switch fabric card from the Cisco ASR 14000 series 8-slot line card chassis. For more detailed information on the switch fabric card, see *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis System Description*.

The switch fabric card is used only in single-chassis systems. The switch fabric card does not contain any fiber-optic connectors because it is not connected to any other switch fabric modules (see [Figure 4-20](#)).

Figure 4-20 Switch Fabric Card



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Prerequisites

Before performing this task, remove any front cover plates.



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.

Required Tools and Equipment

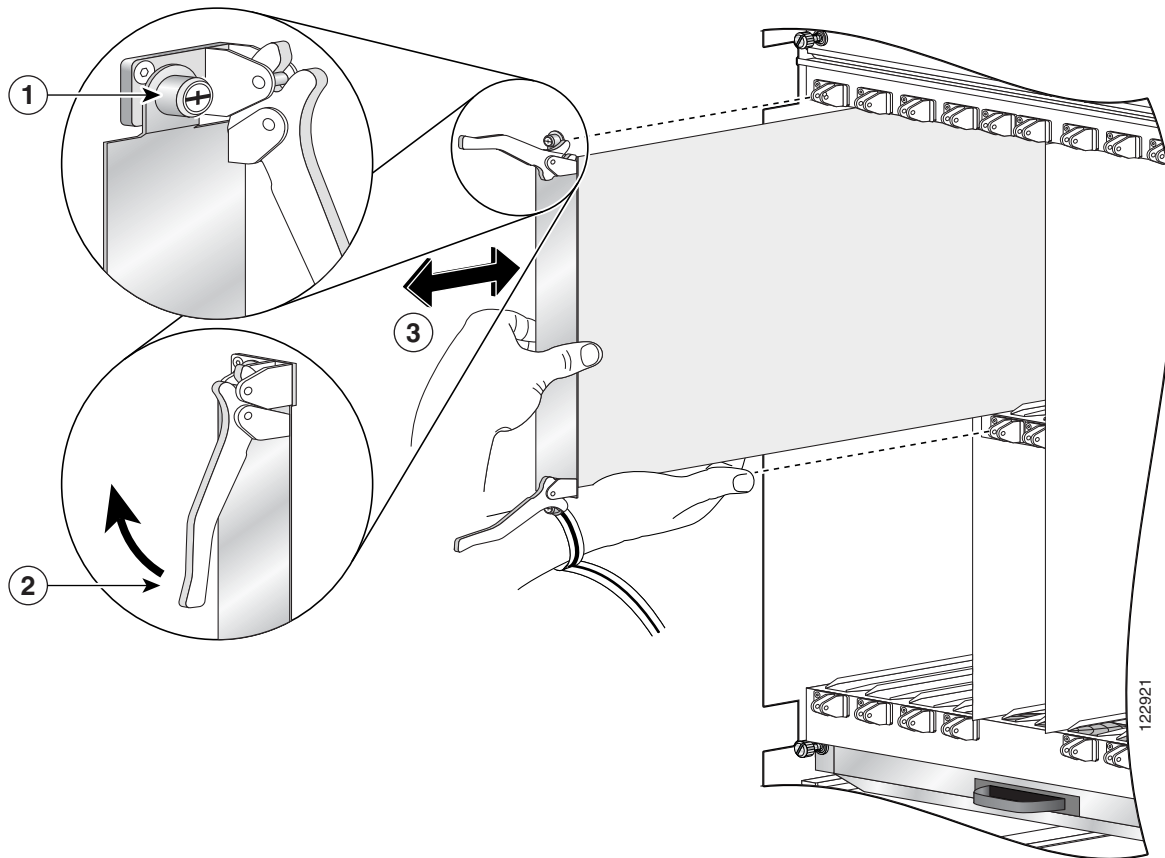
You need the following tools to perform this task:

- ESD-preventive wrist strap
- Large Phillips screwdriver

Steps

To remove a switch fabric card, see [Figure 4-21](#) and follow these steps:

Figure 4-21 Removing a Switch Fabric Card



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 an ESD connection socket on the rear (MSC) side or a bare metal surface on the chassis.
- Step 2** Identify the switch fabric card to be removed from the card cage.
- Step 3** To loosen the card from the slot, turn the two captive screws on the front panel of the card counterclockwise.
- Step 4** To unseat the card from the midplane connector, grasp the two card ejector levers and simultaneously pivot both ejector levers 90 degrees (70 degrees for a newer switch fabric card) away from the front edge of the card carrier.
- Step 5** 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.
-

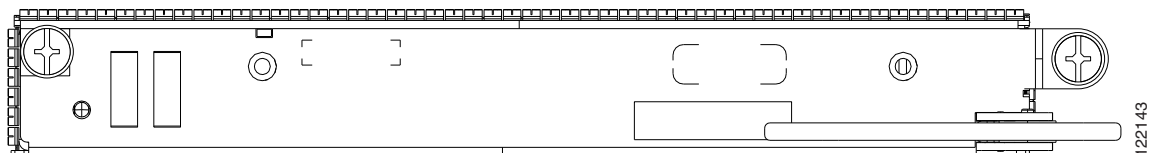
What to Do Next

After performing this task, replace any front cover plates.

Verifying the Installation of a Switch Fabric Card

This section describes how to verify that a switch fabric card has been properly installed. [Figure 4-22](#) shows the switch fabric card front panel.

Figure 4-22 Switch Fabric Card Front View



Understanding the 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.

Troubleshooting the Switch Fabric Card

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

1. Make sure that the card is seated firmly in the Cisco ASR 14000 series 8-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.
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 switch fabric card.

3. Examine the alarm LEDs on the RP 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.

Switch Fabric Card 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 turns green. If this LED is off, verify 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.

How to Install or Remove an MSC

This section contains the following procedures:

- [Installing an MSC](#)
- [Removing an MSC](#)
- [Verifying the Installation of an MSC](#)

Installing an MSC

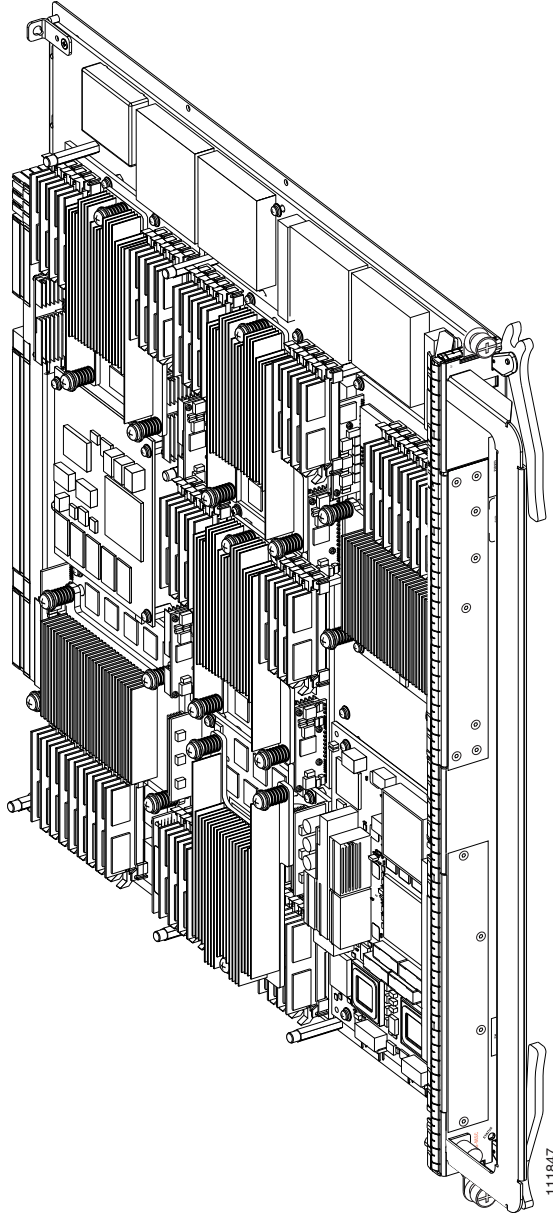
This section describes how to install an MSC in the Cisco ASR 14000 series 8-slot line card chassis. For more detailed information on the MSC, see *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis System Description*.

The MSC is a Layer 3 forwarding engine in the Cisco ASR14000 Series routing system (see [Figure 4-23](#)). An MSC can be paired with different types of physical layer interface modules (PLIMs) to provide a variety of interfaces.

There are two versions of the MSC: The original version (ASR-MSC) and Version B (ASR-MSC-B). Both versions of the card provide the same functionality.

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

Figure 4-23 Modular Services Card (ASR-MSC)

**Note**

The other version of the MSC, the ASR-MSC-B, is similar in appearance. The primary difference is the ASR-MSC-B is a flat design, instead of modular.

Prerequisites**Note**

See [Chapter 1, “Overview,”](#) for information on MSC slot types, numbers, widths, and locations.

**Caution**

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

**Caution**

Do not carry an MSC by the bracket attached to the faceplate.

Required Tools and Equipment

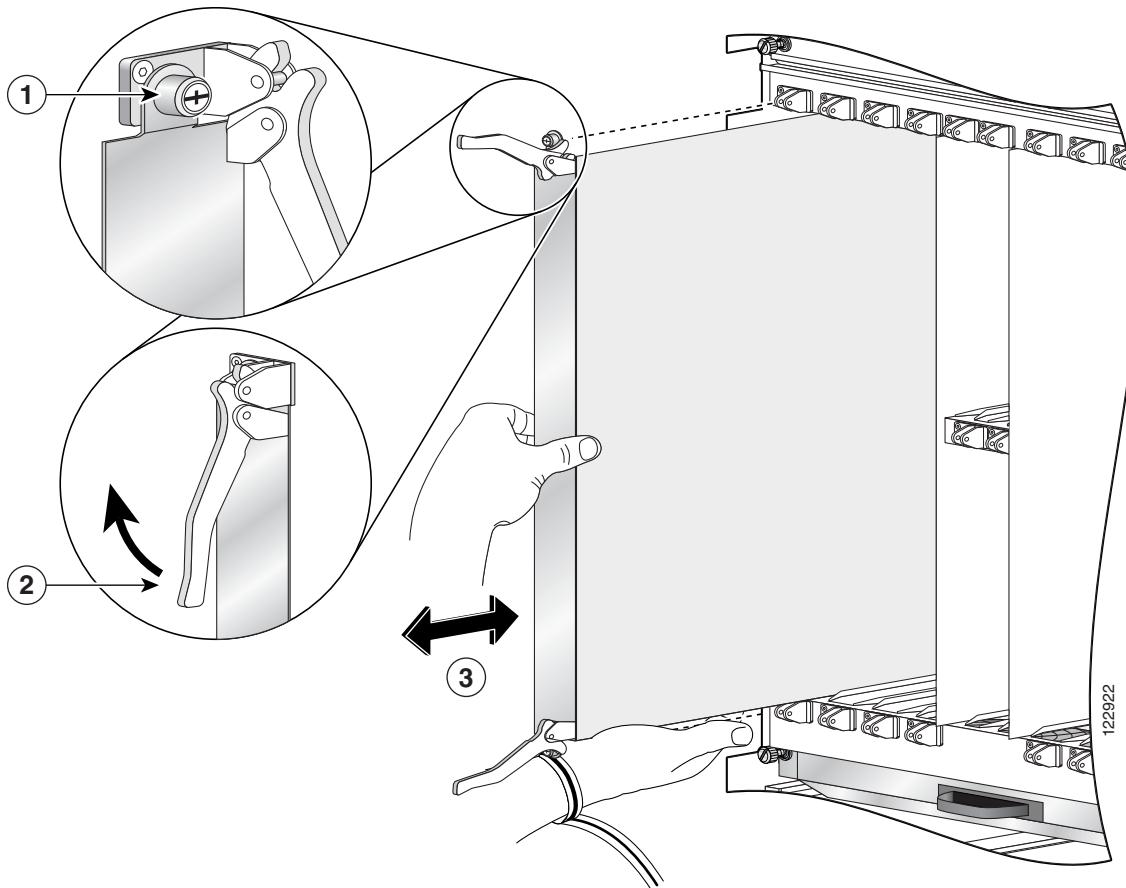
You need the following tools and part to perform this task:

- ESD-preventive strap
- Medium flat-blade or Phillips screwdriver
- MSC (Cisco product number ASR14K-MSC or ASR14K-MSC-B. See the product data sheet for ordering details.)

Steps

To install an MSC, see [Figure 4-24](#) and follow these steps:

Figure 4-24 Installing an MSC



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 an ESD connection socket on the rear (MSC) side or a bare metal surface on the chassis.

Step 2 Choose an available MSC slot for the MSC.



Caution To prevent ESD damage, handle an MSC by its ejector levers or the MSC 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 MSC at a time. Be sure to verify that each MSC is fully installed and secured before installing another card.

Step 4 Remove the MSC you are installing from its antistatic packaging.

- Step 5** Visually inspect the connector on the card before you insert it into the chassis. Do not attempt to install a card with a damaged connector, as this action may damage the chassis midplane pins.
- Step 6** Use both hands while inserting an MSC. Use one hand on the faceplate and the other hand along the base of the MSC to guide it into a slot.
- Step 7** Orient the MSC 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 MSC, if necessary.
- Step 8** Make sure that the ejector levers are oriented properly to engage with the pin as the MSC slides into the slot. Carefully slide the MSC into the slot until the ejector levers engage the catches, then *stop*.
- Step 9** Simultaneously pivot the ejector levers toward the faceplate of the MSC. Do not force the MSC; the ejector levers properly seat the MSC against the midplane.



Note If the captive screws are difficult to tighten, check to ensure that each ejector lever is properly secured to each catch and that the MSC is properly seated in the slot.

- Step 10** Partially tighten the two captive screws on the front panel of the card (either by hand or with the screwdriver) to make sure that they are both engaged.
- Step 11** Use a screwdriver to fully tighten the captive screws next to each MSC ejector lever to ensure proper EMI shielding and to prevent the MSC from becoming partially dislodged from the midplane.



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

- Step 12** Attach the bracket to the MSC; 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.
- Replace any front cover cosmetic plates and verify that the card has been installed properly (see the [“Verifying the Installation of an MSC”](#) section on page 4-38).
- If you are performing the initial installation of the system, install the RP cards (see the [“How to Install or Remove an RP Card or DRP PLIM”](#) section on page 4-39).

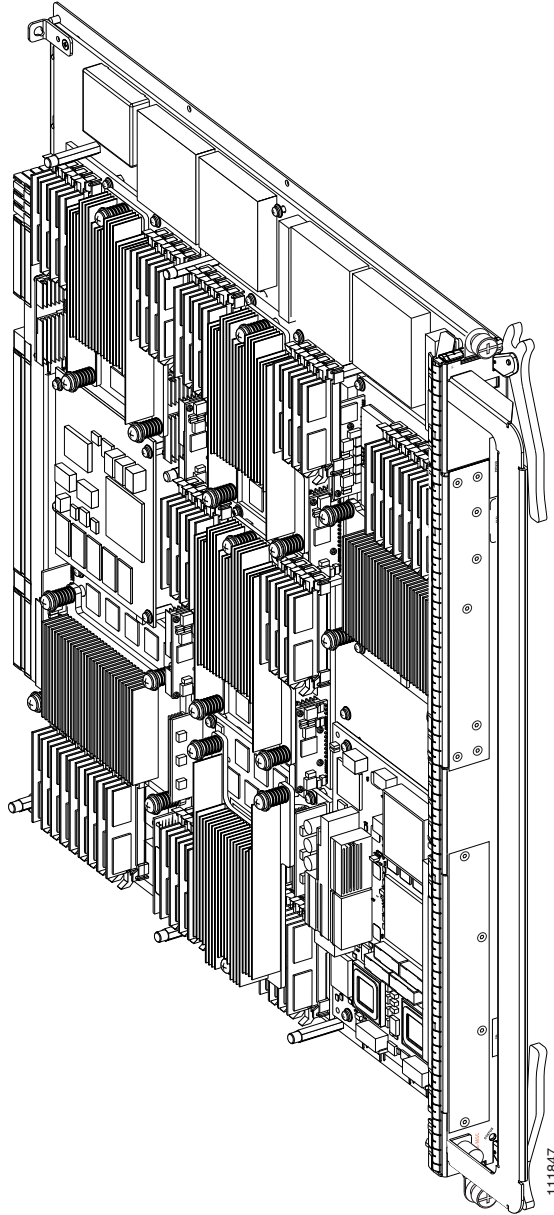
Removing an MSC

This section describes how to remove an MSC from the Cisco ASR 14000 series 8-slot line card chassis. For more detailed information on the MSC, see *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis System Description*.

The MSC is a Layer 3 forwarding engine in the Cisco ASR14000 Series routing system (see [Figure 4-25](#)). An MSC can be paired with different types of physical layer interface modules (PLIMs) to provide a variety of interfaces.

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

Figure 4-25 *Modular Services Card (ASR-MSC)*



Note

The other version of the MSC, the ASR-MSC-B, is similar in appearance. The primary difference is the ASR-MSC-B is a flat design, instead of modular.

Prerequisites



Note

For information on MSC slot types, numbers, widths, and locations see [Chapter 1, “Overview.”](#)



Caution Use the cable management bracket to slide cards from the card carrier. *Do not lift cards by the cable management bracket!* Rotate cards onto their vertical axes, then lift them from the bottom, using the cable management bracket only as an aid for balance.

Required Tools and Equipment

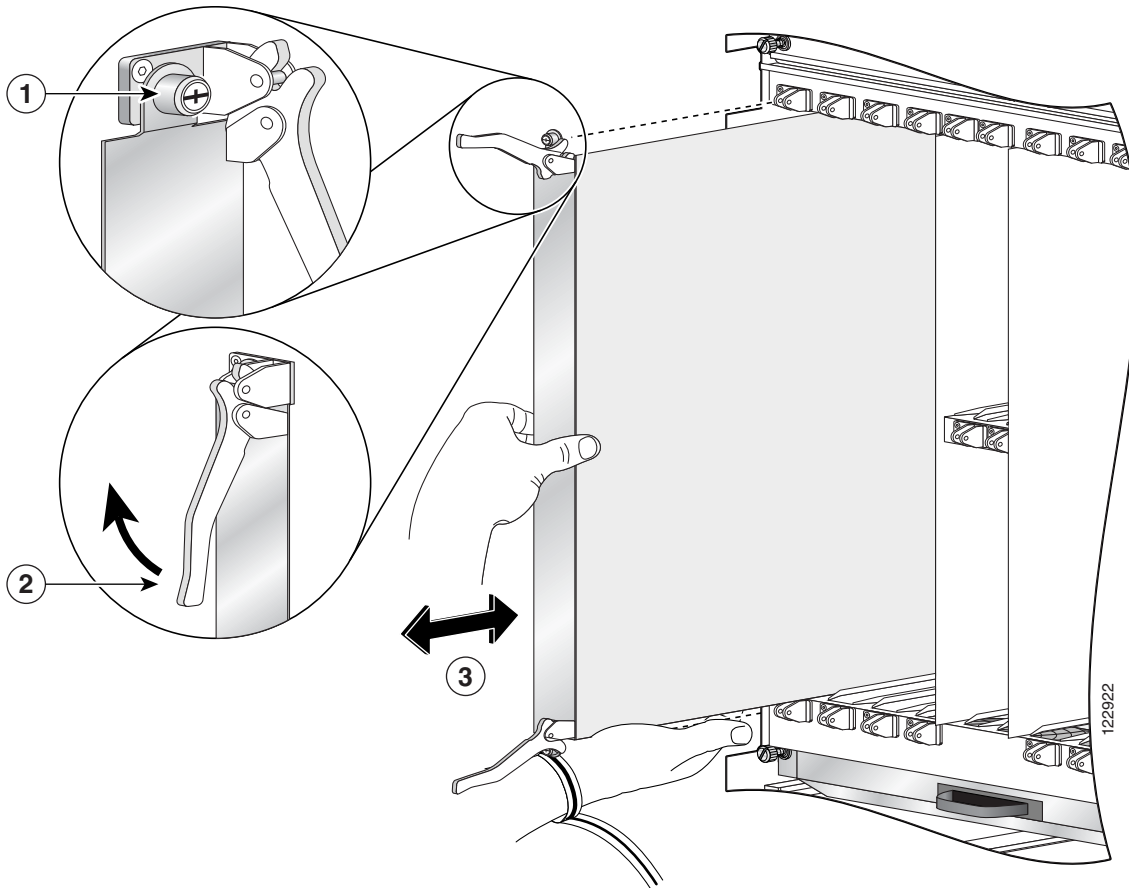
You need the following tools and part to perform this task:

- ESD-preventive strap
- Medium flat-blade or Phillips screwdriver
- Impedance carrier (Cisco Product number ASR14K-MSC-IMPEDENCE=)

Steps

To remove an MSC, see [Figure 4-26](#) and follow these steps:

Figure 4-26 Removing an MSC



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 an ESD connection socket on the rear (MSC) side or a bare metal surface on the chassis.

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



Caution To prevent ESD damage, handle an MSC by its ejector levers or the MSC 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 MSC from the midplane connectors.

Step 4 Grasp the cable management bracket and gently pull the MSC halfway from the slot.

Step 5 Move one hand under the MSC to guide it.

Avoid touching the MSC printed circuit board, components, or any connector pins. *Do not lift cards by the cable management bracket*—lift the cards from the bottom, using the cable management bracket only as an aid for balance.

Step 6 Place the removed MSC 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 MSC slot is to remain empty, install an MSC impedance carrier to keep dust from the chassis and maintain proper airflow through the MSC compartment.

Step 8 Use a screwdriver to tighten the captive screws next to each impedance carrier ejector lever to ensure proper EMI shielding and to maintain proper airflow throughout the chassis.

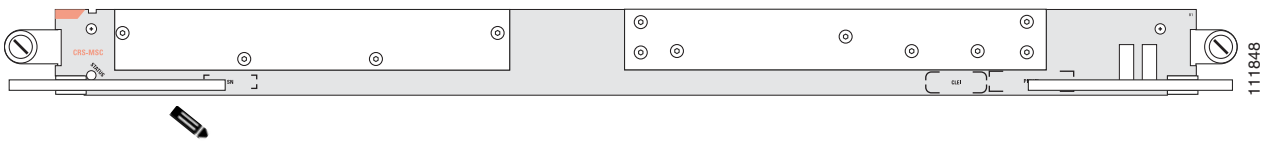
What to Do Next

If you did not place the MSC in an antistatic bag, do so now for storage and future use.

Verifying the Installation of an MSC

This section describes how to verify that an MSC has been properly installed. [Figure 4-27](#) shows the ASR-MSC front panel.

Figure 4-27 ASR-MSC Front Panel



Note

The other version of the MSC, the ASR-MSC-B, is similar in appearance. The primary difference is the ASR-MSC-B is a flat design, instead of modular.

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

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

1. Make sure that the card is seated firmly in the Cisco ASR 14000 series 8-slot line card chassis slot. One easy way to verify physical installation is to see whether the front faceplate of the MSC is even with the fronts of the other cards installed in the card cage.
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 MSC.
3. Examine the Cisco ASR 14000 series 8-slot line card chassis alarm LEDs on the RP to see if there are any active alarm conditions.
4. Examine the Cisco ASR 14000 series 8-slot line card chassis power distribution units (PDUs) to see whether the chassis, as a whole, is receiving power.

MSC Status LEDs

Use the status LEDs, located on the MSC faceplate, to verify the correct installation of the MSC:

- 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.

How to Install or Remove an RP Card or DRP PLIM

This section contains the following procedures:

- [Installing an RP or DRP Card](#)
- [Removing an RP or DRP Card](#)
- [Verifying the Installation of an RP or DRP Card](#)
- [Installing a PCMCIA Card](#)
- [Removing an RP PCMCIA Card](#)

Installing an RP or DRP Card

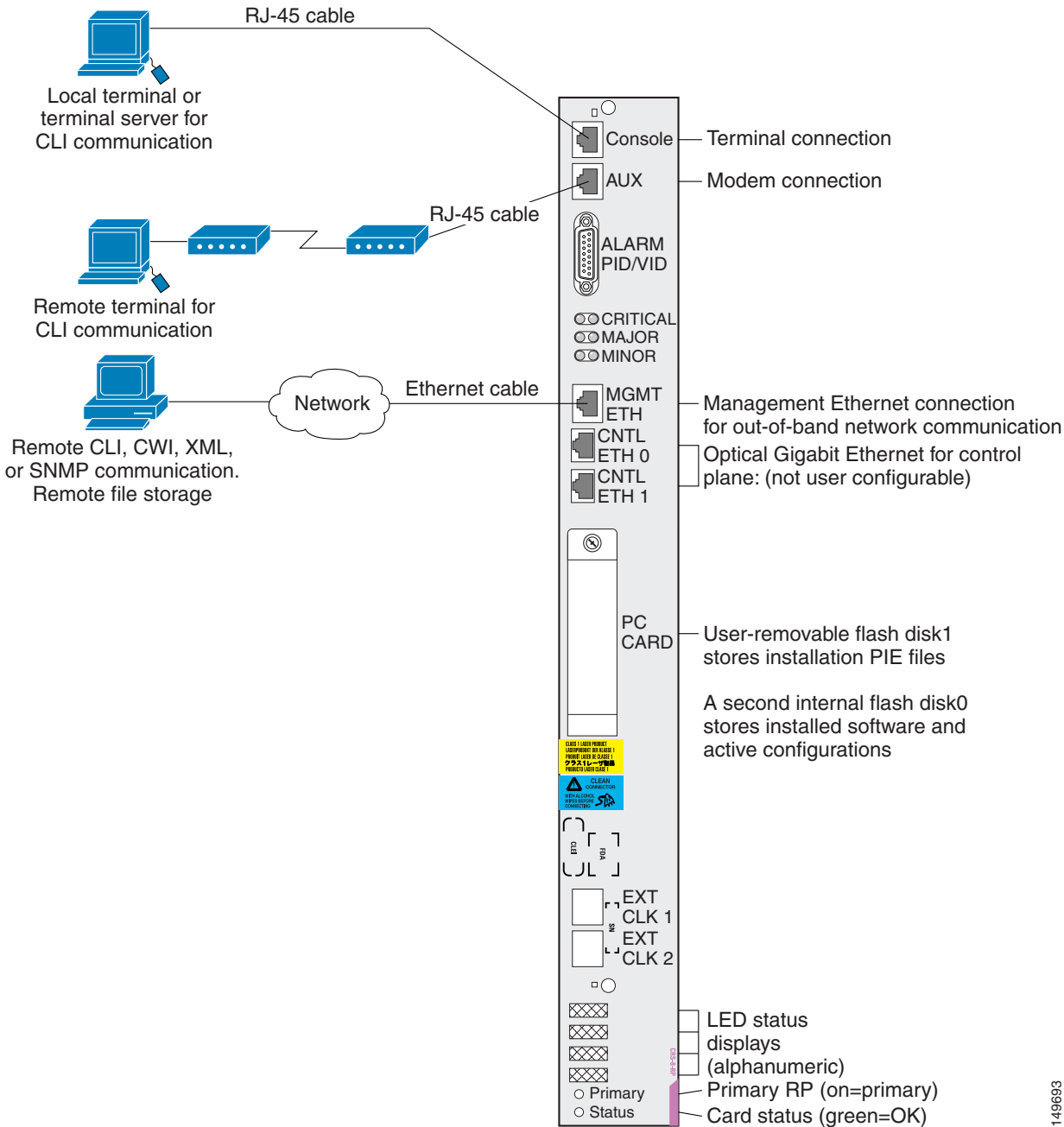
This section describes how to install a route processor (RP) or distributed route processor (DRP) card in the chassis. For more detailed information on the route processor card, see *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis System Description*.

Every Cisco ASR 14000 series 8-slot line card chassis contains two RP cards in dedicated slots on the front (PLIM) side of the chassis (see [Figure 4-28](#)).

[Are there comparable ASR 14000 parts and product numbers?](#)

**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 (ASR14K-8-RP).

Figure 4-28 Route Processor (RP) Card for the 8-Slot Chassis

149693

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 active RP, ready to assume control (this happens automatically)
- When the chassis is undergoing scheduled maintenance
- When the Cisco ASR 14000 series 8-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 and part to perform this task:

- ESD-preventive wrist strap
- Large Phillips screwdriver.
- RP or DRP card (RP card Cisco product number ASR14K-8-RP=; DRP card Cisco product number57)
- ASR14K-DRP-CPU=)

Steps

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

-
- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to an ESD connection socket on the front (PLIM) side or a bare metal surface on the chassis.
 - Step 2** Remove the card from its antistatic packaging.
 - Step 3** Visually inspect the connector pins on the card before you insert it into the chassis. Do not attempt to install a card with bent pins, as this may damage the chassis midplane connectors.
 - Step 4** Identify the card to be replaced in the card cage. Remove any cables connected to the front panel of the card.
 - Step 5** 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 6** 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 7** 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 8** 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 9** 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 may bind when you attempt to close the ejector levers, thereby damaging or breaking one or both ejector levers.

- Step 10** 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 An RP or DRP card has 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 11** 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 12** Partially tighten the two captive screws on the front panel of the card (either by hand or with the screwdriver) to make sure that they are both engaged.
- Step 13** Use the screwdriver to turn the two captive screws on the front panel of the card clockwise to seat the card firmly in the slot.
- Step 14** Reattach any cables you removed in Step 3.

What to Do Next

After performing this task:

- Place the impedance carrier in an antistatic bag for storage and future use.
- Replace any front cover cosmetic plates and verify that the card has been installed properly (see the [“Verifying the Installation of an RP or DRP Card”](#) section on page 4-43).
- If you are performing the initial installation of the system, install the PLIMs (see the [“Installing a PLIM”](#) section on page 4-47).

Removing an RP or DRP Card

This section describes how to remove a route processor (RP) or distributed route processor (DRP) card from the chassis. For more detailed information on the route processor card, see *Cisco ASR 14000 Series Aggregation Services Router 8-Slot Line Card Chassis System Description*.

Every Cisco ASR 14000 series 8-slot line card chassis contains two route processor cards in dedicated slots on the front (PLIM) side of the chassis (see [Figure 4-28](#) on page 4-40).



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 (ASR14K-8-RP).

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 ASR 14000 series 8-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 Phillips screwdriver

Steps

To remove an RP or DRP card, follow these steps:

-
- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to an ESD connection socket on the front (PLIM) side 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** 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 4** 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 5** 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.
-

What to Do Next

After performing this task, replace any front cover plates.

Verifying the Installation of an RP or DRP Card

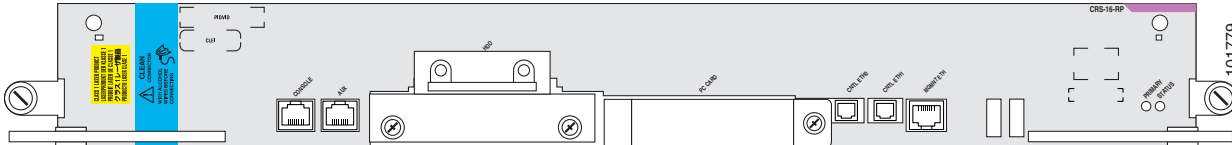
This section describes how to verify and troubleshoot the installation of a route processor (RP) or distributed route processor (DRP) card in the Cisco ASR 14000 series 8-slot line card chassis. For more detailed information on the RP card, see *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis 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 4-29 shows the RP card front panel.

Figure 4-29 RP Card Front Panel



Understanding the Alphanumeric LEDs

At one end of the faceplate, near an ejector lever, an RP 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 Card

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

1. Make sure that the card is seated firmly in the Cisco ASR 14000 series 8-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.
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 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.

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.

How to Install or Remove a PCMCIA Card

This section contains the following procedures:

- [Installing a PCMCIA Card](#)
- [Removing an RP PCMCIA Card](#)

Installing a PCMCIA Card

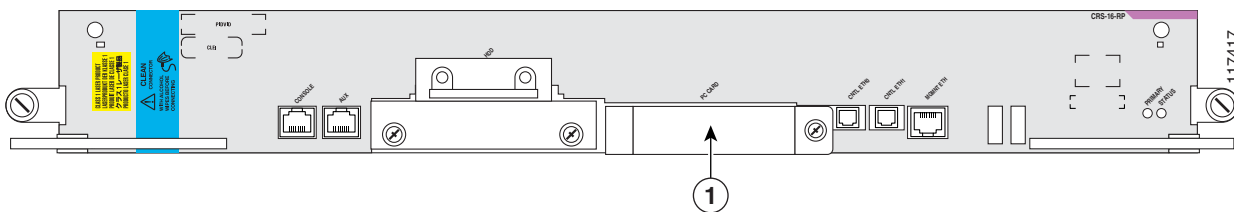
This section describes how to install a PCMCIA card in an RP or a DRP card PCMCIA slot. For more detailed information on PCMCIA cards, see the [“Information About Hard Drives and PCMCIA Cards” section on page 4-12](#), or *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis System Description*. [Figure 4-30](#) 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 disk1: can be installed in or removed from the ASR 14000 series 8-slot line card chassis route processor.

Figure 4-30 RP Card PCMCIA Slot Door



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

Prerequisites

If you are replacing a PCMCIA card, see the [“Removing an RP PCMCIA Card” section on page 4-46](#) 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 an ESD connection socket on the front (PLIM) side 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.
-

What to Do Next

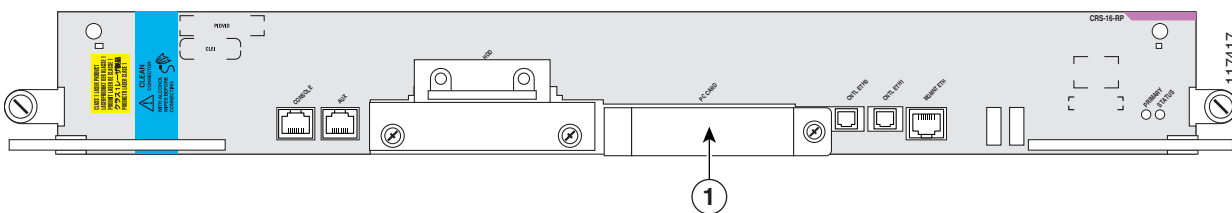
After performing this task, replace any front (PLIM) side cover plates.

Removing an RP PCMCIA Card

This section describes how to remove a PCMCIA card from an RP or a DRP card PCMCIA slot. For more detailed information on PCMCIA cards, see the [“Information About Hard Drives and PCMCIA Cards” section on page 4-12](#), or *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis System Description*.

[Figure 4-31](#) shows you the location of the PCMCIA door in the RP card faceplate. (The PCMCIA cards for the DRP are in a similar location.)

Figure 4-31 RP Card PCMCIA Slot Door



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

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 an ESD connection socket on the front (PLIM) side 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.
 - Step 4** Carefully pull out the far-left removable PCMCIA flash card.
 - Step 5** Place the removed PCMCIA card on an antistatic mat, or place it in an antistatic bag if you plan to return it to the factory.
 - Step 6** 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 4-45.

How to Install or Remove a Physical Layer Interface Module (PLIM)

This section contains the following procedures:

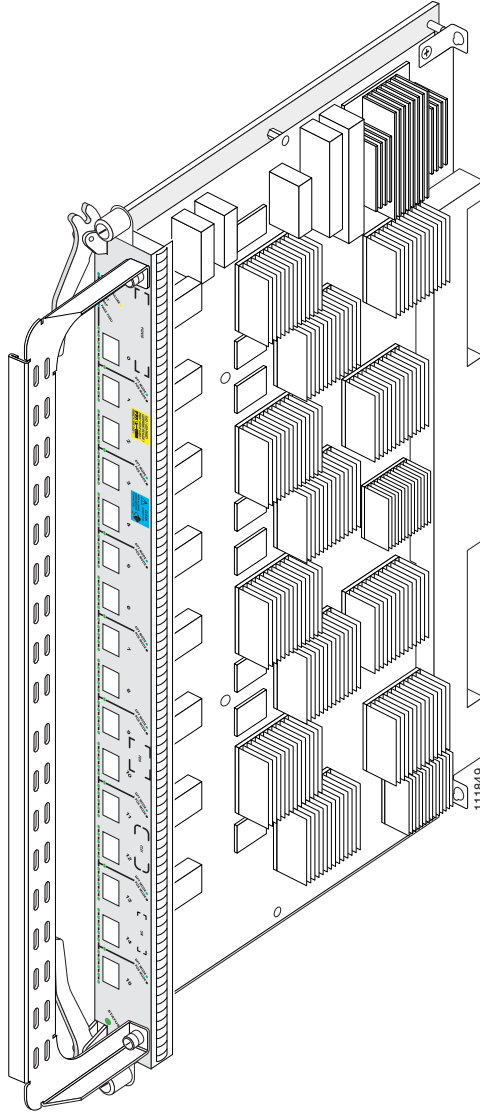
- [Installing a PLIM](#)
- [Removing a PLIM](#)
- [Verifying the Installation of a PLIM](#)

Installing a PLIM

This section describes how to install a PLIM in the Cisco ASR 14000 series 8-slot line card chassis. For more detailed information on PLIMs, see the *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis System Description*.

A physical layer interface module (PLIM) is paired with an MSC through the midplane of the chassis. A PLIM provides the ability to choose several interfaces. [Figure 4-32](#) shows a typical PLIM (in this case a 16 x OC-48c/STM-16c packet-over-SONET [POS]).

Figure 4-32 Physical Layer Interface Module (PLIM)

**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 any front cover plates.

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 PLIM, follow these steps:

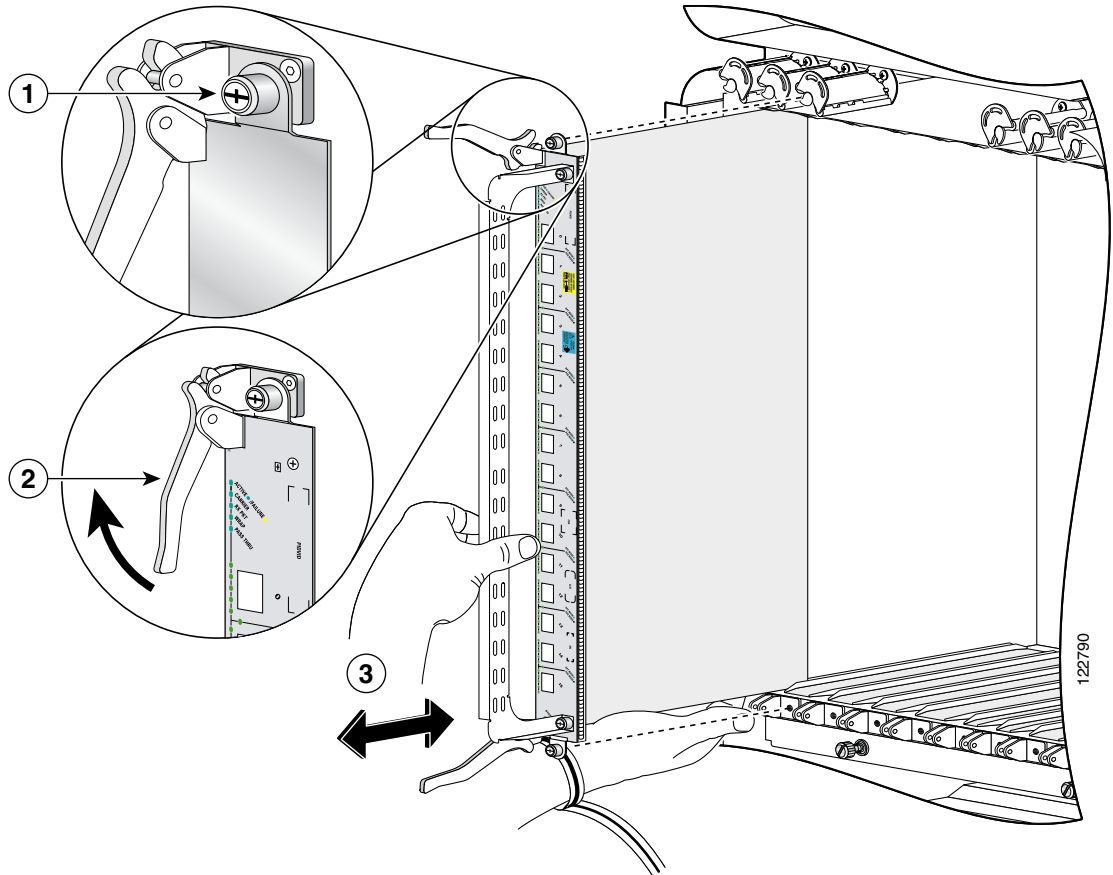
-
- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to an ESD connection socket on the front (PLIM) side or a bare metal surface on the chassis.
 - Step 2** Remove the PLIM from its antistatic packaging.
 - Step 3** Visually inspect the connector pins on the card before you insert it into the chassis. Do not attempt to install a card with bent pins, as this may damage the chassis midplane connectors.
 - Step 4** Remove the PLIM impedance carrier from the slot you need to fill and set it aside.



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 card.

- Step 5** 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 (see [Figure 4-33](#)).

Figure 4-33 Installing a PLIM



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

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 may bind when you attempt to close the ejector levers, thereby damaging or breaking one or both ejector levers.

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 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 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.

- Step 9** Partially tighten the two captive screws on the front panel of the card (either by hand or with the screwdriver) to make sure that they are both engaged.
- Step 10** Tighten the captive screws on the PLIM.



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

- Step 11** Install the SFP optical modules, if applicable (in a PLIM that uses an SFP module, such as the 16-port OC-48 PLIM).
- Step 12** Install the PLIM cable management bracket.
- Step 13** 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, replace any grilles and chassis doors.

Removing a PLIM



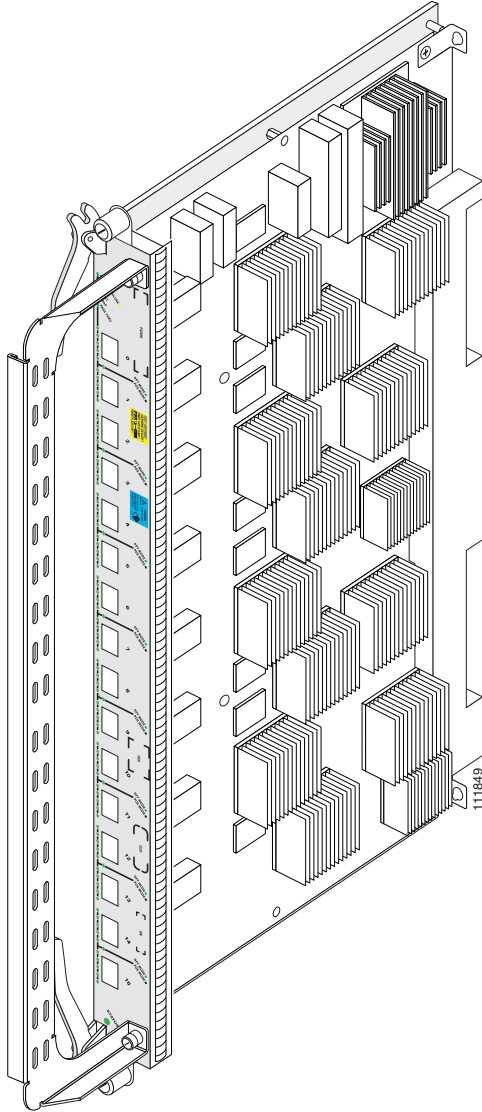
Caution

This section describes how to remove a PLIM from the Cisco ASR 14000 series 8-slot line card chassis.

The following warning applies to the removal of very-short-reach (VSR) PLIMs: The router 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 router to complete the preceding tasks before removing or installing another PLIM.

A physical layer interface module (PLIM) is paired with an MSC through the midplane of the chassis. A PLIM provides the ability to choose several interfaces. [Figure 4-34](#) shows a typical PLIM (in this case a 16 x OC-48c/STM-16c packet-over-SONET [POS]).

Figure 4-34 Physical Layer Interface Module (PLIM)



You can install a PLIM in any slot not occupied by an RP card. If you install a new MSC or PLIM, remove the impedance carrier card from the available slot.

**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.

**Note**

We strongly recommend that you use the **shutdown** command before removing a PLIM to prevent anomalies when you reinstall a new or reconfigured PLIM.

Prerequisites

Before performing this task, remove any front cover plates.

Required Tools and Equipment

You need the following tools to perform this task:

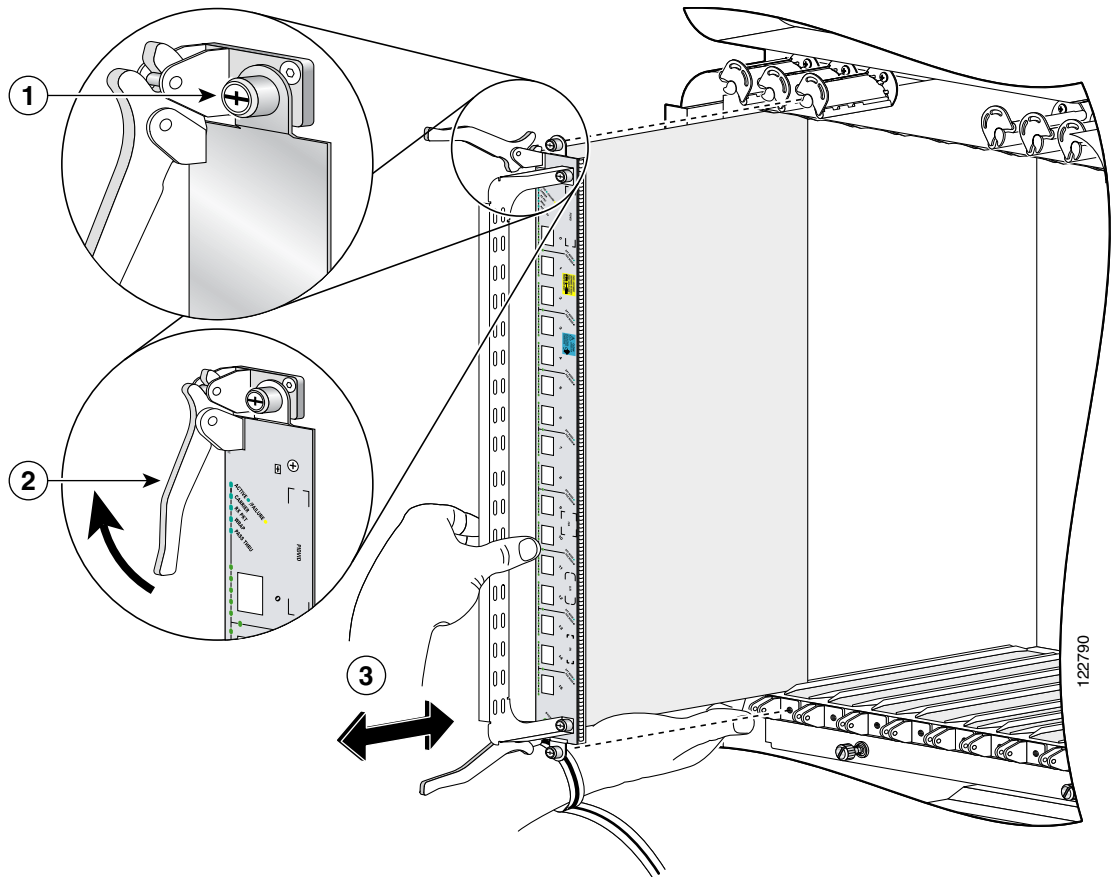
- ESD-preventive wrist strap
- Medium Phillips screwdriver

Steps

To remove a PLIM, follow these steps:

-
- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to an ESD connection socket on the front (PLIM) side 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 handle and gently pull the PLIM halfway from the slot (see [Figure 4-35](#)):

Figure 4-35 Removing a PLIM



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

Step 6 Move one hand under the PLIM to guide it. Avoid touching the PLIM printed circuit board, components, or any connector pins.



Tip Do not lift cards by the handle; lift from the bottom, using the handle 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. See the documentation for the specific PLIM for details.

What to Do Next

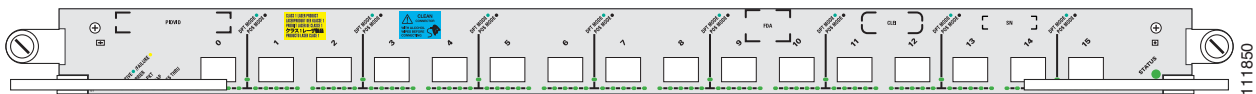
After performing this task, replace any front cover plates.

Verifying the Installation of a PLIM

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

Figure 4-36 shows the PLIM front panel (in this case a 16 x OC-48c/STM-16c packet-over-SONET [POS]).

Figure 4-36 PLIM Front Panel



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 ASR 14000 series 8-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 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.

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 MSC is installed correctly. For details on the information provided by the port-level LEDs, see the documentation specific to that PLIM.

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 “[Information About Small Form-Factor Pluggable \(SFP\) Modules](#)” section on page 4-12. 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>

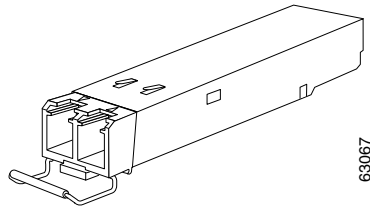
**Warning**

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 4-37](#)).

Figure 4-37 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

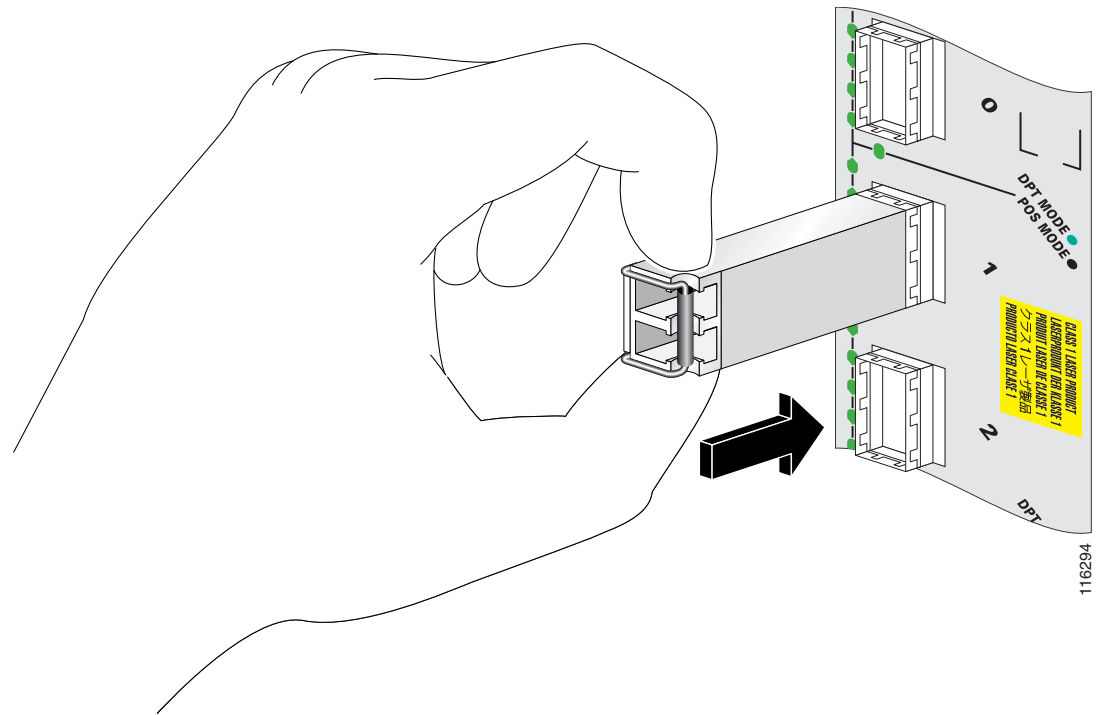
To install a bale-clasp SFP module (into a PLIM), follow these steps:

- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to an ESD connection socket on the front (PLIM) side 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 4-38](#)).



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

Figure 4-38 Installing a Bale-Clasp SFP Module into a Port



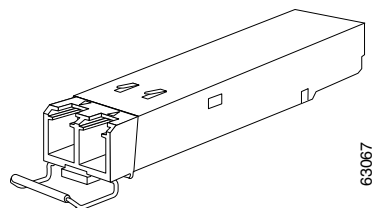
What to Do Next

After performing this task, replace any front cover plates.

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 4-39](#)).

Figure 4-39 Bale-Clasp SFP Module



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

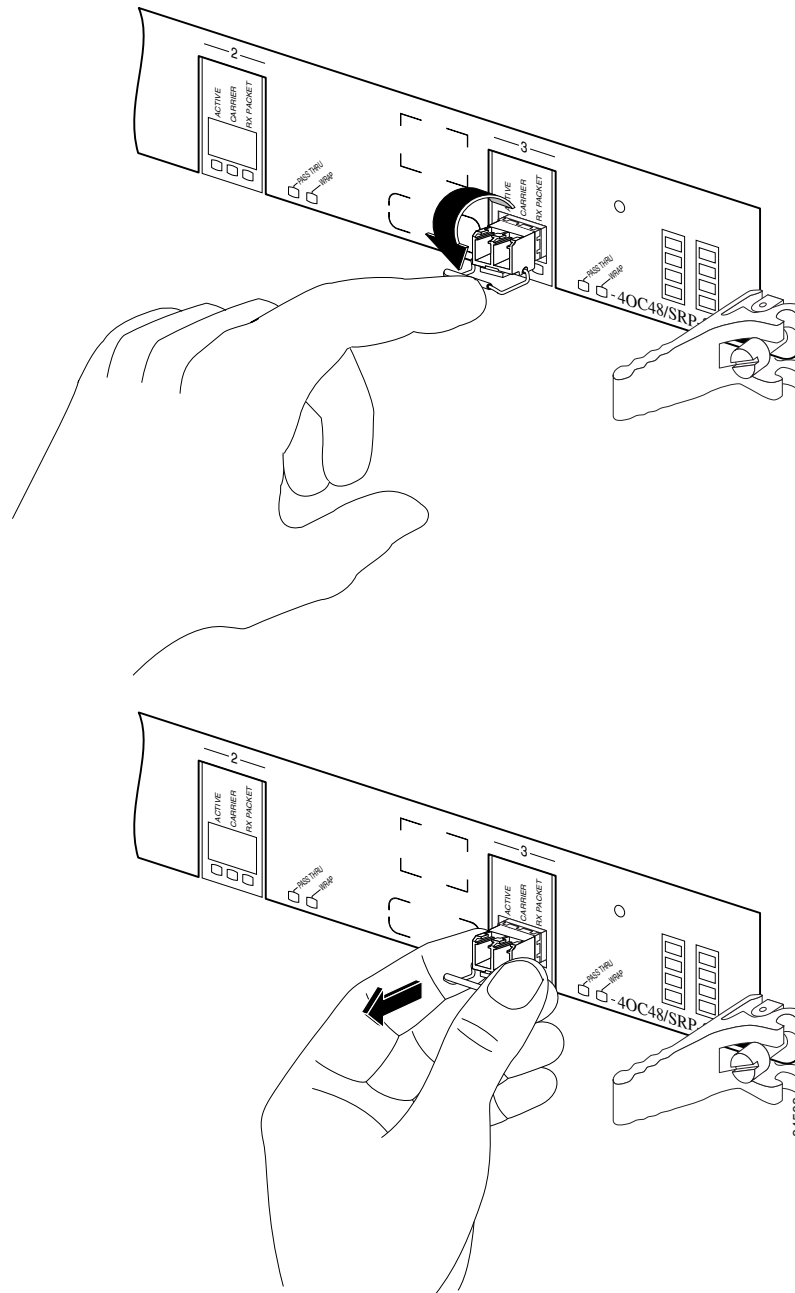
Steps

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 an ESD connection socket on the front (PLIM) side 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 4-40](#)). 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 4-40](#)).



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

Figure 4-40 Removing a Bale-Clasp SFP Module

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

What to Do Next

After performing this task, replace any front cover plates.



CHAPTER 5

Installing and Removing Exterior Components

This chapter provides instructions for installing and removing the exterior cosmetic components on the Cisco ASR (Aggregation Services Router) 14000 series 8-slot line card chassis. This chapter presents the following topics:

- [Overview of the Exterior Components](#)
- [Installing or Removing the Front Side Exterior Components](#)
- [Installing or Removing the Rear Side Exterior Components](#)

Overview of the Exterior Components

Exterior cosmetic components for the Cisco ASR 14000 series 8-slot line card chassis are not required to be installed; they are provided as optional components (except for the cable management bracket, which is preinstalled). The 8-slot line card chassis is shipped with the following exterior components:

- Cable management bracket (shipped preinstalled on the chassis)
- Inlet grille (shipped separately)

You can also install the optional exterior exhaust grille for the rear of the chassis. This exterior component for the rear of the chassis does not ship automatically with the product; it must be ordered separately.

Installing or Removing the Front Side Exterior Components

This section contains the following procedures:

- [Removing the Cable Management Bracket](#)
- [Reinstalling the Cable Management Bracket](#)
- [Installing the Inlet Grille](#)
- [Removing the Inlet Grille](#)

Removing the Cable Management Bracket

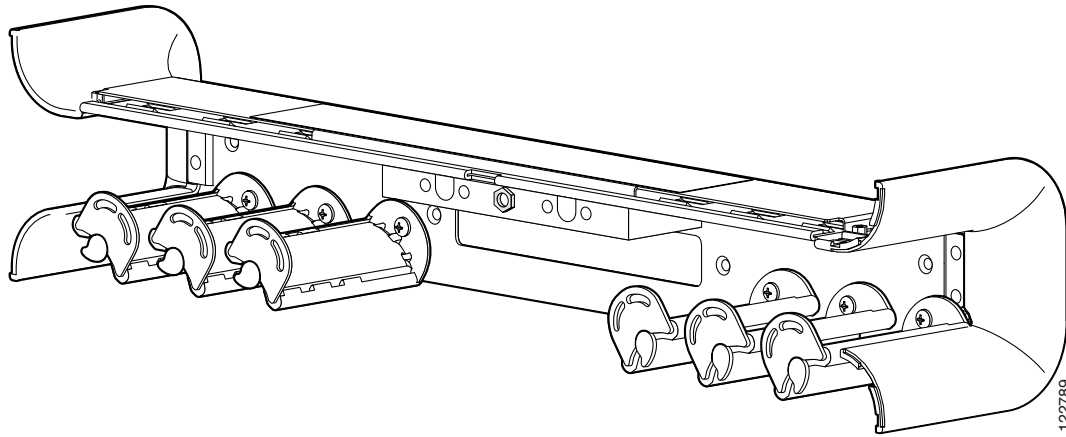
The Cisco ASR 14000 series 8-slot line card chassis arrives preinstalled with a horizontal cable management bracket on the front of the chassis and an optional horizontal cable management bracket available for the rear of the chassis. The cable management system organizes the interface cables that enter and exit the different cards, keeping them out of the way and free of sharp bends. This section describes how to remove a cable management bracket from the line card chassis.



Caution

Excessive bending of interface cables can damage the cables.

Figure 5-1 Cable Management Bracket



Prerequisites

The cable management bracket arrives preinstalled on the chassis. Remove any cables from the bracket before you begin removing it.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- Medium Phillips screwdriver
- Medium flat-blade screwdriver

Steps

To remove the cable management bracket, follow these steps:

- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to an ESD connection socket or a bare metal surface on the chassis.
- Step 2** If necessary, remove the Cisco logo bezel from the front of the chassis.
 - a.** Gently insert the flat-blade screwdriver between the edge of the bezel and the face of the chassis and pry the bezel loose.

The bezel is attached to the front of the chassis with four ball studs.

- b. Pull the bezel firmly towards you to detach it.

Step 3 Remove all screws on either side of the cable management bracket.



Tip

For ease of removal, remove the outer screws first.



Caution

Be careful not to damage the plastic bracket arms.

Step 4 Set the bracket carefully aside.

What to Do Next

You may now install a replacement cable management bracket, if necessary.

Reinstalling the Cable Management Bracket

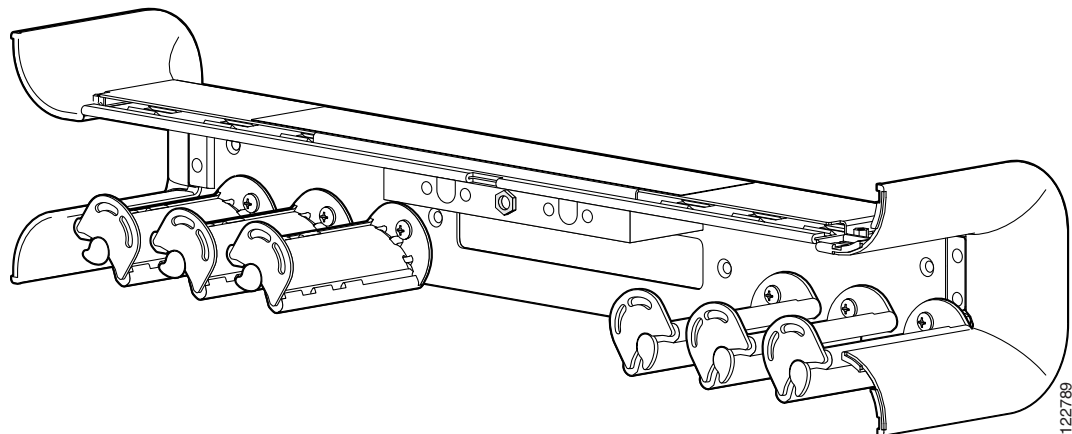
The Cisco ASR 14000 series 8-slot line card chassis arrives preinstalled with a horizontal cable management bracket on the front of the chassis and an optional horizontal cable management bracket available for the rear of the chassis. The cable management system organizes the interface cables that enter and exit the different cards, keeping them out of the way and free of sharp bends. If you need to reinstall the cable management bracket, this section describes how to install that bracket in the chassis.



Caution

Excessive bending of interface cables can damage the cables.

Figure 5-2 Cable Management Bracket



Prerequisites

Be sure that no cables impede 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 parts to perform this task:

- ESD-preventive wrist strap
- Medium Phillips screwdriver
- Medium flat-blade screwdriver
- Cable management bracket

Steps

To install a cable management bracket, follow these steps:

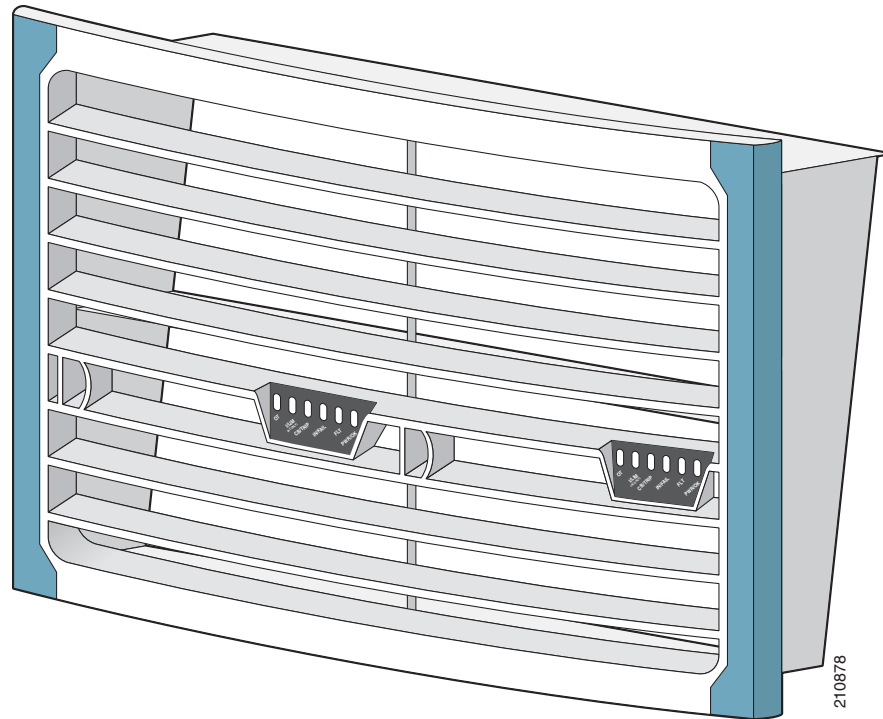
-
- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to an ESD connection socket or a bare metal surface on the chassis.
- Step 2** If necessary, remove the Cisco logo bezel from the front of the chassis.
- a. Gently insert the flat-blade screwdriver between the edge of the bezel and the face of the chassis and pry the bezel loose.
The bezel is attached to the front of the chassis with four ball studs.
 - b. Pull the bezel firmly toward you to detach it.
- Step 3** Position the cable management bracket on the chassis.
- Step 4** Insert and tighten the screws to secure the bracket to the chassis.
-  **Tip** For ease of attachment, install the inner screws first.
-
-  **Caution** Be careful not to damage the plastic bracket arms.
-
- Step 5** Reattach the logo bezel by snapping it back onto the front of the chassis.
-

What to Do Next

Use the cable management bracket to organize your cables. Then install the inlet grille as described in the next section.

Installing the Inlet Grille

This section describes how to install the inlet grille. The grille covers the power module and air intake areas at the bottom of the front (PLIM) side of the chassis, just below the card cage (see [Figure 5-3](#)).

Figure 5-3 Inlet Grille

Prerequisites

Before installing the inlet grille, you should mount the chassis in a rack and remove the rear handle pulls. See *Cisco ASR 14000 Series Router 8-Slot Line Card Chassis Unpacking, Moving, and Securing Guide*.

Required Tools and Equipment

- ESD-preventive wrist strap
- Inlet grille (Cisco product number: ASR14K-8-FRNT-GRILL=)
- Number 1 Phillips screwdriver
- Left AC rectifier power handle (Cisco product number: FABMTL,EXTENSION,PWR,L,HQ,HFR)
- Right AC rectifier power handle (Cisco product number: FABMTL,EXTENSION,PWR,R,HQ,HFR)

Steps

To install the inlet grille, follow these steps:

-
- Step 1** Remove the new inlet grille from its packaging, then set the packaging aside.
 - Step 2** Remove the AC rectifier power handles from their package.
 - Step 3** 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 4** If the old inlet grille is installed, remove the old inlet grille (see the next section, “[Removing the Inlet Grille](#)”).

- Step 5** If you are replacing the previous version of the inlet grille with the new version, remove the AC rectifier power handles that are currently installed.
- a. Use the Number 1 Phillips screwdriver to remove the two screws from each AC rectifier power handle.
 - b. Set the screws aside as you will need them to attach the new power handles.
- Step 6** Use the Number 1 Phillips screwdriver to attach the left AC rectifier power handle.
- Step 7** Use the screwdriver to attach the right AC rectifier power handle.
- Step 8** Align and insert the hooks at the bottom of the inlet grille into the cutouts at the bottom of the chassis casing on the front (PLIM) side of the chassis, just in front of the power modules.
- Step 9** Rotate the top of the inlet grille toward the chassis, and snap it into place on the ball studs.
-

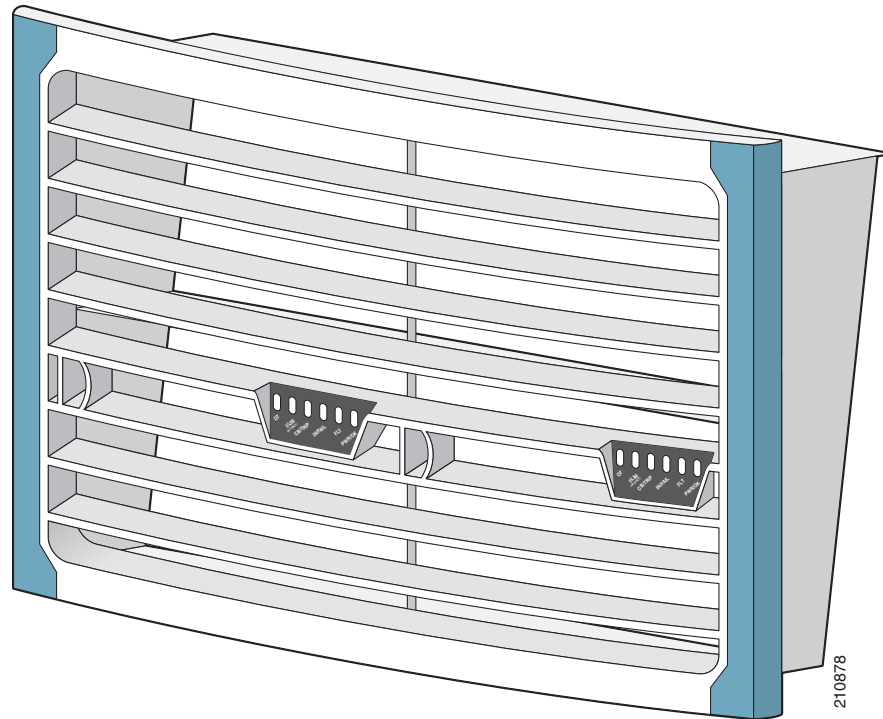
What to Do Next

After performing this task, you may power on the chassis. See the [“Before Powering the Chassis Up or Down” section on page 2-8](#).

If you are replacing the previous version of the inlet grille with the new version, you must also replace the AC rectifier power handles with the new ones provided with the new inlet grille. These new power handles are necessary because the old power handles do not extend through the newly designed inlet grille. You can do this procedure with the system still running.

Removing the Inlet Grille

This section describes how to remove the inlet grille. The grille covers the power module and air intake areas at the bottom of the front (PLIM) side of the chassis, just below the card cage (see [Figure 5-4](#)).

Figure 5-4 Inlet Grille

Prerequisites

No prerequisites exist for this task.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap

Steps

To remove the inlet grille, 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** While facing the front (PLIM) side of the chassis, firmly grasp the top outside edges of the inlet grille.
 - Step 3** Pull the top of the grille firmly away from the chassis; it loosens from the connecting ball studs.
 - Step 4** Slide the hooks at the bottom of the grille free of the cutouts at the bottom of the chassis casing.
 - Step 5** Carefully set the inlet grille aside.
-

What to Do Next

Be sure that all parts have been carefully set aside and repackaged appropriately. If you have ordered the optional cosmetic kit for the rear of the 8-slot chassis, proceed to the next section for instructions on installing those components.

Installing or Removing the Rear Side Exterior Components

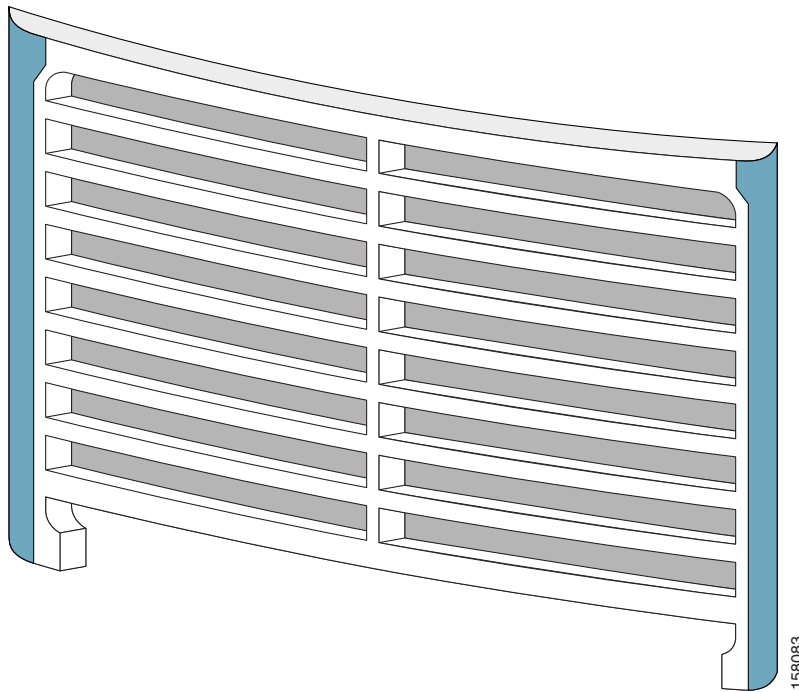
This section describes how to install or remove the optional exterior components for the rear of the Cisco ASR 14000 series 8-slot line card chassis. This section contains the following sections:

- [Installing the Exhaust Grille](#)
- [Removing the Exhaust Grille](#)

Installing the Exhaust Grille

This section describes how to install the exhaust grille. The grille covers the power module and air intake areas at the bottom of the rear side of the chassis, just below the card cage (see [Figure 5-5](#)).

Figure 5-5 Exhaust Grille



Prerequisites

No prerequisites exist for this task.

Required Tools and Equipment

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

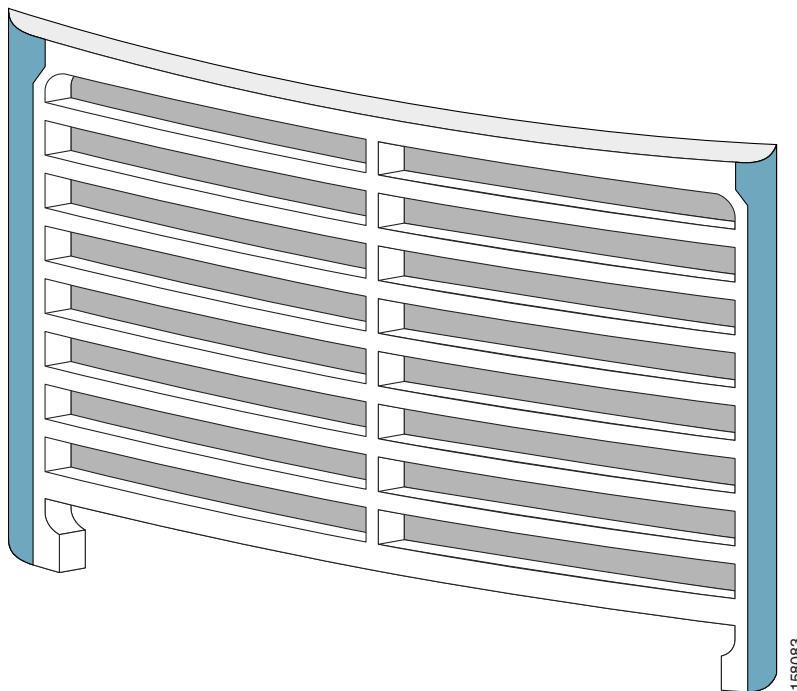
- ESD-preventive wrist strap
- Exhaust grille

Steps

To install the exhaust grille, follow these steps:

- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to an ESD connection socket on the rear side or a bare metal surface on the chassis.
- Step 2** Remove the exhaust grille from its packaging, then set the packaging aside.
- Step 3** Align and insert the hooks at the bottom of the exhaust grille into the cutouts at the bottom of the chassis casing on the rear side of the chassis, as shown in [Figure 5-6](#).

Figure 5-6 Inserting the Exhaust Grille Hooks Into the Chassis



- Step 4** Rotate the top of the exhaust grille toward the chassis, and snap it into place on the ball studs.

What to Do Next

After performing this task, you may power on the chassis. See the [“Before Powering the Chassis Up or Down”](#) section on page 2-8.

Removing the Exhaust Grille

This section describes how to remove the exhaust grille (see [Figure 5-5 on page 5-8](#)).

Prerequisites

There are no prerequisites for this task.

Required Tools and Equipment

You need the following tool to perform this task:

- ESD-preventive wrist strap

Steps

To remove the exhaust grille, follow these steps:

-
- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to an ESD connection socket on the rear side or a bare metal surface on the chassis.
 - Step 2** While facing the rear side of the chassis, firmly grasp the top outside edges of the exhaust grille.
 - Step 3** Pull the top of the grille firmly away from the chassis; it loosens from the connecting ball studs.
 - Step 4** Slide the hooks at the bottom of the grille free of the cutouts at the bottom of the chassis casing.
 - Step 5** Carefully set the exhaust grille aside.
-



APPENDIX **A**

Cisco ASR 14000 Series 8-Slot Line Card Chassis Specifications

The following table lists the specifications for the Cisco ASR (Aggregation Services Router) 14000 series 8-slot line card chassis.

Table A-1 *Cisco ASR 14000 Series 8-Slot Line Card Chassis Component and Power Specifications*

Supported Cards and Modules	8 modular services cards (MSCs) 8 physical layer interface modules (PLIMs), one for each MSC 4 switch fabric cards (SFCs) 2 route processors (RPs) 2 fan trays 1 air filter
Power Distribution Units	2 AC or 2 DC power distribution units (PDUs) (cannot mix AC and DC PDUs in the chassis)
DC PDU	Supports 1 DC power entry module (PEM)
AC PDU	Supports 1 AC rectifier module
Maximum Power Consumption	This represents total input power.
Maximum DC	8.0 kW
Maximum AC	8.75 kW (Delta or Wye 3-phase)
	Note Proper grounding is also required at the site to ensure that equipment is not damaged by lightning or power surges.
DC Power Lug Torque Ranges	
Minimum torque	20 in-lb (2.2 N-m)
Maximum torque	30 in-lb (3.3 N-m)
Power Redundancy	
DC	2N (three “A” battery plant feeds for one PDU, and three “B” battery plant feeds for the other PDU)

Table A-1 Cisco ASR 14000 Series 8-Slot Line Card Chassis Component and Power Specifications (continued)

AC (Delta or Wye 3-phase)	2N (two independent Delta or Wye 3-phase power sources required)
DC Input	
Nominal input voltage	–48 VDC North America –54 VDC Telco (RBOC) –60 VDC International (range –40.5 to –75 VDC)
Input current (PDU rated for 60 A)	56 A (nominal) 66 A at –40.5 VDC (maximum)
AC Input, Delta 3-phase	3W + PE
Input voltage	3-phase 200 to 240 VAC (nominal) (range 170 to 264 VAC, phase-to-phase)
Line frequency	50 to 60 Hz (range 47 to 63 Hz)
Recommended AC service (PDU rated for 24 A)	30 A
AC Input, Wye 3-phase	3W + N + PE
Input voltage	3-phase 200 to 240 VAC (nominal) (range 170 to 264 VAC, phase-to-neutral) (range 295 to 457 VAC, phase-to-phase)
Line frequency	50 to 60 Hz (nominal) (range 47 to 63 Hz)
Recommended AC service (PDU rated for 14 A)	16 A International 20 A North America

The following table lists the environmental specifications for the Cisco ASR 14000 series 8-slot line card chassis.

Table A-2 Cisco ASR 14000 Series 8-Slot Line Card Chassis Environmental Specifications

Description	Value
Temperature	Operating, nominal: 41° to 104°F (5° to 40°C) Operating, short-term: 23° to 122°F (–5° to 50°C) Nonoperating: –40° to 158°F (–40° to 70°C)
Humidity	Operating: 5 to 85% noncondensing Nonoperating: 5 to 90% noncondensing, short-term operation
Altitude	1 to 5,906 ft (–60 to 1,800 m) at 122°F (50°C), short-term Up to 13,123 ft (4,000 m) at 104°F (40°C) or below
Heat dissipation	27,350 BTUs/hr
External cooling requirements	2.3 tons
Acoustic noise	74 dB at 3.28 ft. (1 meter) in front of chassis (nominal reading at room temperature)

Table A-2 Cisco ASR 14000 Series 8-Slot Line Card Chassis Environmental Specifications

Description	Value
Shock	Operating: 5 to 500 Hz, 0.5g ¹ (0.1 oct/min) ² Nonoperating: 5 to 100 Hz, 1 g (0.1 oct/min) 100 to 500 Hz, 15 g (0.2 oct/min) 500 to 1000 Hz, 1.5 g (0.2 oct/min)
Vibration	Operating: 0.35 Grms ³ from 3 to 500 Hz Nonoperating: 1.0 Grms from 3 to 500 Hz

1. g = Gravity
2. oct/min = Octave per minute
3. Grms = The root mean square value of acceleration, where 1G equals 32.17 ft/sec (9.81 m/sec).



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