



Cisco CRS 4-Slot Line Card Chassis Overview

This chapter describes the Cisco CRS Carrier Routing System 4-Slot Line Card Chassis and its main components.



Note

Throughout the remainder of this guide, the Cisco CRS Carrier Routing System 4-Slot Line Card Chassis is referred to as the *Cisco CRS 4-slot* line card chassis, or simply the chassis.

The Cisco CRS 4-slot line card chassis documentation set is workflow-based. There are three core documents that describe the processes required to successfully plan for and install the chassis:

- Cisco CRS Carrier Routing System 4-Slot Line Card Chassis Site Planning Guide

Use this guide in advance of receiving the chassis to confirm that you have the needed space, tools, utilities, manpower, and so on. that are needed to perform the steps in the unpacking, moving, and securing guide and the installation guide.

- Cisco CRS Carrier Routing System 4-Slot Line Card Chassis Unpacking, Moving, and Securing Guide

This guide is included with the chassis shipment. It includes all Cisco CRS 4-slot line card chassis unpacking, moving, and securing information.

- Cisco CRS Carrier Routing System 4-Slot Line Card Chassis Installation Guide

This guide is used to initially install the chassis and describes how to remove and install field- replaceable units (FRUs).



Note

This system description is a reference document. It details the chassis, its power and cooling system, the switch fabric, and other components. No procedural steps are presented in this document.

The following sections are included:

- [System Overview, page 2](#)
- [Main Features of the Cisco CRS-1 Series 4-Slot Line Card Chassis, page 2](#)
- [Chassis Components, page 3](#)
- [Chassis Slot Numbers, page 6](#)

- [Chassis Cable Management](#) , page 7
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System Overview

The Cisco CRS router is a highly scalable routing platform designed for efficient service-provider point-of-presence (POP) evolution as the IP network grows into a multiservices network. The Cisco CRS router is currently available in 4-slot, 8-slot, 16-slot, and multishelf configurations.

The introduction of the Cisco CRS 4-slot line card chassis allows service providers to utilize the power and features of a CRS chassis, but without the space and power requirements associated with the larger versions of the chassis. The Cisco CRS 4-slot line card chassis is a mechanical enclosure that contains four slots for modular services cards (MSCs), forwarding processor (FP) cards, label switch processor (LSP) cards, and associated physical layer interface modules (PLIMs), plus four slots for the switch fabric. The MSC, FP, and LSP cards are also called line cards.

The chassis is installed in a standard external rack and contains its own power and cooling systems. The chassis also contains route processor (RP) cards that perform routing-protocol calculations. The RPs distribute forwarding tables to the line cards, provide a control path to each line card for system monitoring functions, and contain hard disks for system and error logging. RPs plug into two dedicated slots in the Cisco CRS 4-slot line card chassis.

Every Cisco CRS 4 slot line card chassis has 4 MSC slots, each with up to 140 gigabits per second (Gbps) with bi-directional forwarding capacity (4 slots x 140 Gbps x 2 directions). The router is built around a scalable, distributed three-stage Benes switch fabric and a variety of data interfaces providing a total system forwarding capacity of 1,120 Gbps (or 1.12 Tbps).

The data interfaces are contained on physical layer interface modules (PLIMs) that are mated in the Cisco CRS 4-slot line card chassis, to an associated line card. The line cards are cross-connected to each other through the switch fabric.

Main Features of the Cisco CRS-1 Series 4-Slot Line Card Chassis

The main features of the Cisco CRS-1 Series 4-slot line card chassis include:

- A highly scalable router that provides a total routing capacity of 320 Gbps of bandwidth.
- A wide range of interface speeds and types (such as OC-768, OC-192, OC-48, and 10-GE), and featuring a programmable MSC, FP, or LSP forwarding engine that provides full-featured forwarding at line-rate speeds.
- Redundancy and reliability features to allow nonstop operation, with no single points of failure in hardware or software.
- Reduced size that allows for installation in a variety of locations.

Chassis Components

This section summarizes the main components of the Cisco CRS 4-slot line card chassis. It primarily identifies the components that are considered field-replaceable units (FRUs), but where additional detail is useful, also identifies subassemblies that are not field replaceable.

The Cisco CRS 4-slot line card chassis contains the following components:

- Up to four MSC, FP, or LSP line cards and four PLIMs. A line card and a PLIM are an associated pair of cards that mate through the chassis midplane. The line card provides the forwarding engine for Layer 3 routing of user data, and the PLIM provides the physical interface and connectors for the user data.

A line card can be associated with several different PLIMs, which provide different interface speeds and technologies. The PLIM types that are available are as follows:

- ◦ Packet-over-SONET/SDH (POS) PLIMs
- Gigabit Ethernet PLIMs

For complete PLIM information, see the Cisco CRS Carrier Routing System Packet-over-SONET/SDH Physical Layer Interface Module Installation Note and the Cisco CRS Carrier Routing System Gigabit Ethernet Physical Layer Interface Module Installation Note.

- An optional interface solution (to PLIMs) is also available. SPA interface processors (SIPs) and shared port adapters (SPAs) can be installed instead of PLIMs. A SIP is a carrier card that is similar to a PLIM and inserts into a Cisco CRS 4-slot line card chassis slot and interconnects to an MSC like a PLIM. Unlike PLIMs, SIPs provide no network connectivity on their own. A SPA is a modular type of port adapter that inserts into a subslot of a compatible SIP carrier card to provide network connectivity and increased interface port density. A SIP can hold one or more SPAs, depending on the SIP type and the SPA size. POS/SDH and Gigabit Ethernet SPAs are available. For complete SIP and SPA information, see the Cisco CRS Carrier Routing System SIP and SPA Hardware Installation Guide.
- A chassis midplane. The midplane connects line cards to their associated PLIMs and allows a line card 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 line cards to the switch fabric cards, and provides control plane interconnections. The midplane is not field replaceable by the customer.
- Two route processor cards (RPs). The RPs provide the intelligence of the system by functioning as the Cisco CRS 4-slot line card chassis system controller and performing route processing. 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.

A Performance Route Processor (PRP) is also available for the Cisco CRS 4-slot line card chassis. Two PRPs perform the same functions as two RPs, but provide enhanced performance for both route processing and system controller functionality.

**Note**

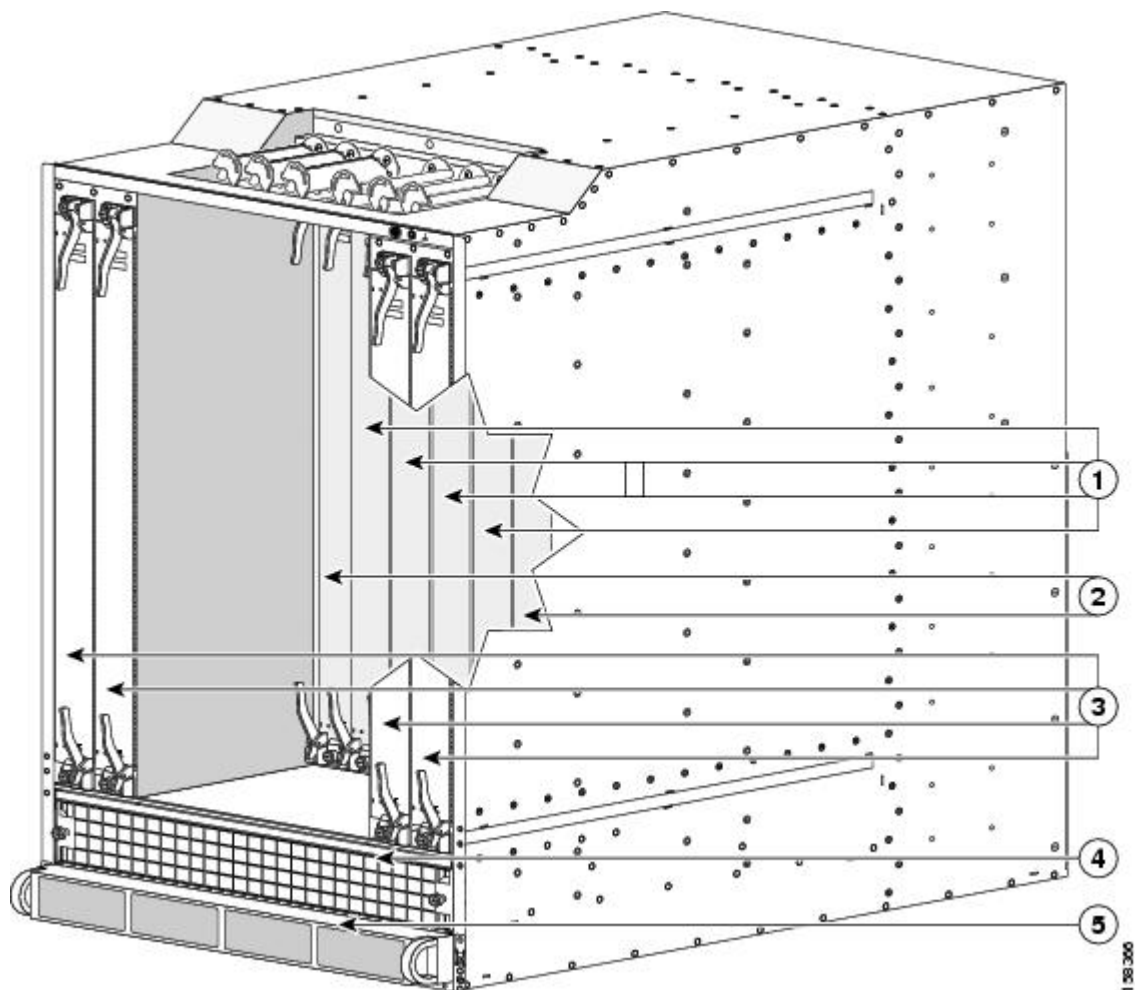
A chassis may not be populated with a mix of RP and PRP cards. Both route processor cards should be of the same type (RP or PRP).

- Four switch fabric cards (SFCs). These cards provide a three-stage Benes switch fabric for the system. The switch fabric receives user data from one line card and PLIM pair and performs the switching necessary to route the data to the appropriate egress line card and PLIM pair. The Cisco CRS 4-slot line card chassis contains switch fabric cards that provide all three stages of the three-stage Benes switch fabric and the four SFCs provide the chassis with a total switching capacity of 320 Gbps.
- A single AC power shelf with four AC rectifiers in each power shelf. The power shelf and AC rectifiers provide 4,000 watts of redundant input power for the chassis.
- A single DC power shelf with four DC power supplies. The DC power system provides 4,000 watts to power the chassis.
- Fan tray. The fan tray contains fans that push and pull air through the chassis. A removable air filter is located above the power shelf in the front of the chassis.

The front of the chassis contains the RPs, MSCs, FPs, LSPs, and PLIMs. This is where user data cables attach to the PLIMs and where cool air enters the chassis. The rear of the chassis contains the fan tray and the SFCs.

This figure shows the front view of the Cisco CRS 4-slot line card chassis.

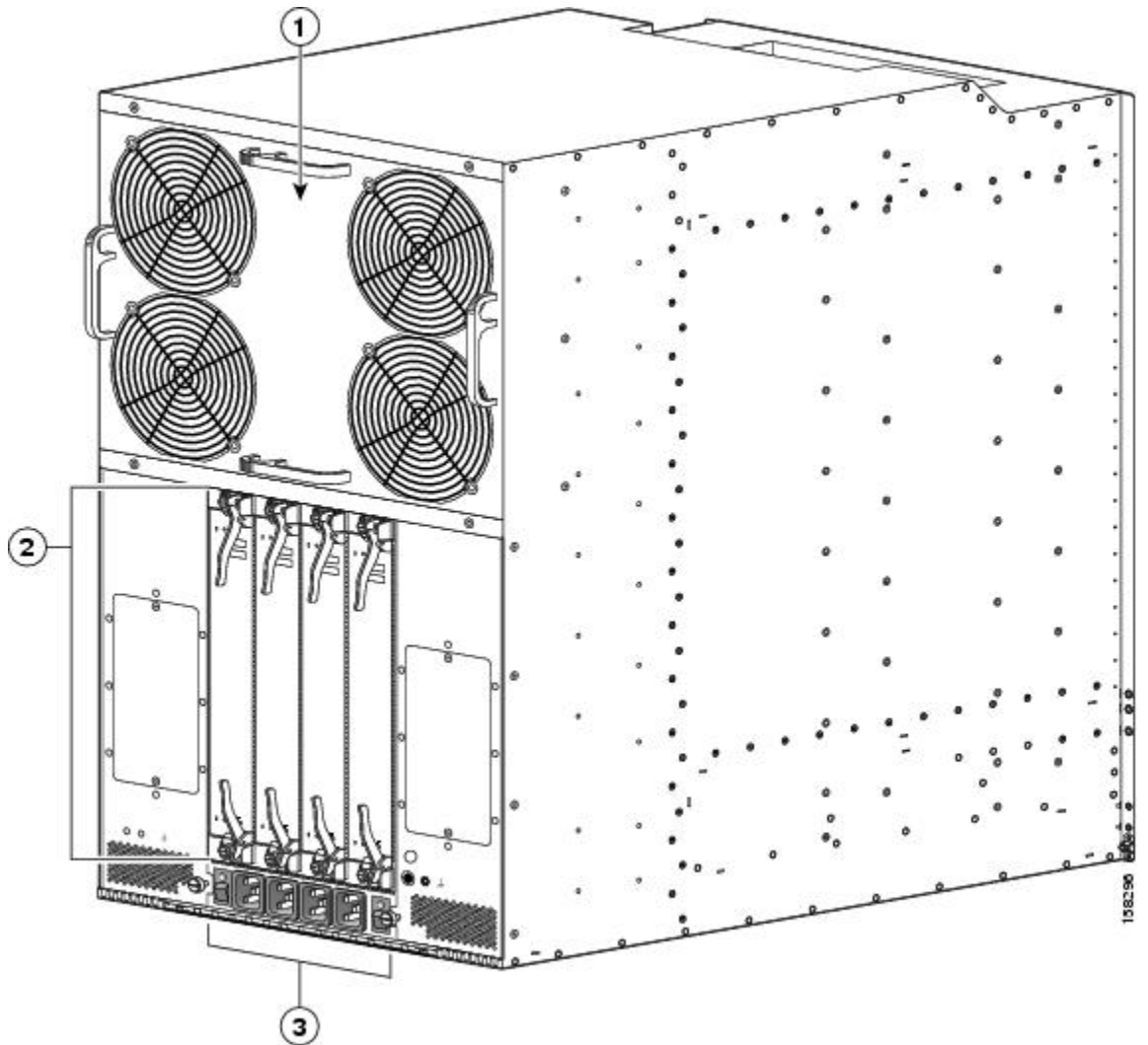
Figure 1: Cisco CRS 4-Slot Line Card Chassis (Front View)



1	PLIM slots	2	MSC slots	3	RP slots
4	Air intake	5	Power modules (behind air filter)		

This figure shows the rear view of the chassis.

Figure 2: Cisco CRS 4-Slot Line Card Chassis (Rear View)

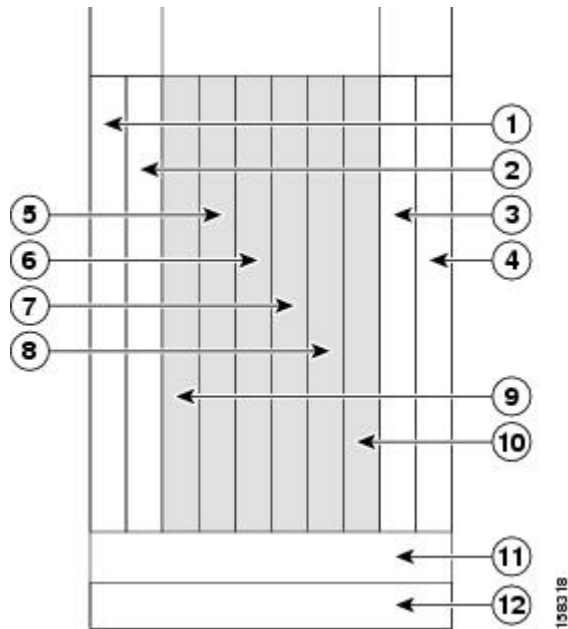


1	Fan tray	2	Switch fabric card (half-height) slots
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Chassis Slot Numbers

This section describes the location and slot numbers for cards and modules that plug into the chassis. The following shows the slot numbers on the front side of the Cisco CRS 4-slot line card chassis.

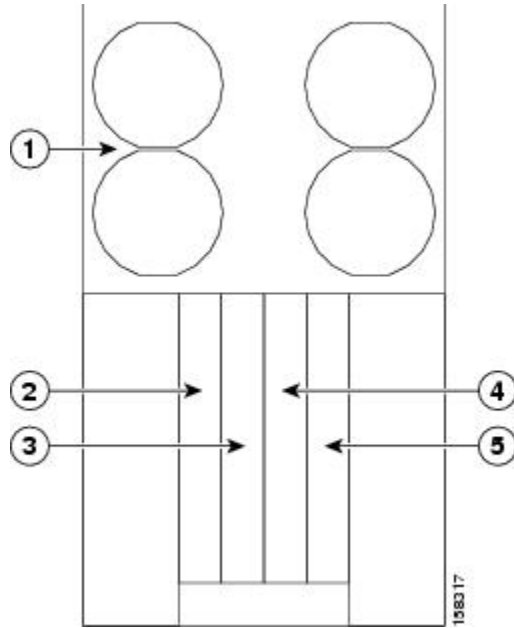
Figure 3: Cisco CRS 4-Slot Line Card Chassis Slot Numbers (Front View)



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

The following figure shows the slot numbers on the rear side of the Cisco CRS 4-slot line card chassis.

Figure 4: 4-Slot Line Card Chassis Rear View Slot Numbers (Switch Fabric Side)



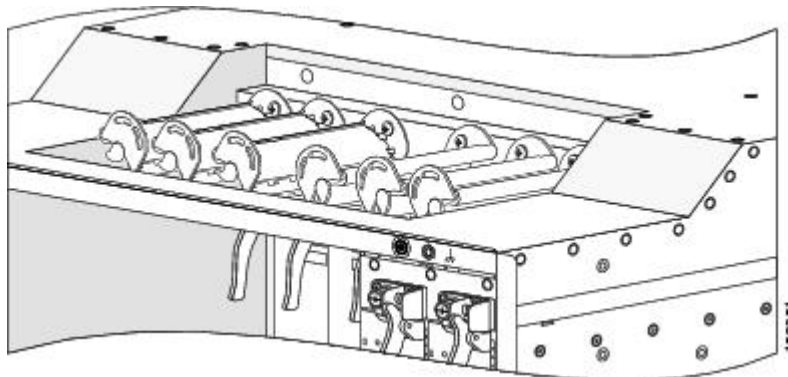
1	Fan tray (FT0)	4	Switch fabric card slot (SM1)
2	Switch fabric card slot (SM3)	5	Switch fabric card slot (SM0)
3	Switch fabric card slot (SM2)		

Chassis Cable Management

The Cisco CRS 4-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.

This figure shows the cable management bracket for the chassis.

Figure 5: Cable Management Bracket



See the Cisco CRS Carrier Routing System 4-Slot Line Card Chassis Installation Guide for detailed information about chassis cabling and cable management.

CRS Hardware Compatibility

The following table lists the compatibility of 40G CRS and 140G CRS fabric, forwarding, and line card components for the CRS 8-slot system.



Note

A router with a mix of 40G and 140G fabric cards is not a supported mode of operation. Such a mode is temporarily allowed only during the upgrade process.

See Cisco CRS-1 Carrier Routing System to Cisco CRS-3 Carrier Routing System Upgrade Guide for a detailed procedure for upgrading a 40 Gbps CRS to a 140 Gbps CRS.

Table 1: CRS Compatibility Matrix

Switch Fabric	RP/DRP	MSC/FP	PLIMS	Note
CRS-4-FC/S(40G)	RP-A (CRS-4-RP), DRP-B (CRS-DRP-B)	CRS-MSC-B	10C768-DPSK/C 10C768-ITU/C 10C768-POS-SR 4-10GE-ITU/C 8-10GBE CRS1-SIP-800 4-10GE 42-1GE 20-1GE-FLEX 2-10GE-WL-FLEX 4-10GBE-WL-XFP 8-10GBE-WL-XFP	
	RP-A (CRS-4-RP), DRP-B (CRS-DRP-B)	CRS-FP40	4-10GE 42-1GE 20-1GE-FLEX 2-10GE-WL-FLEX	

Switch Fabric	RP/DRP	MSC/FP	PLIMS	Note
CRS-4-FC140/S(140G)	RP-A (CRS-4-RP), DRP-B (CRS-DRP-B)	CRS-MSC-B	1OC768-DPSK/C 1OC768-ITU/C 1OC768-POS-SR 4-10GE-ITU/C 8-10GBE CRS1-SIP-800 4-10GE 42-1GE 20-1GE-FLEX 2-10GE-WL-FLEX 4-10GBE-WL-XFP 8-10GBE-WL-XFP	
	RP-A (CRS-4-RP), DRP-B (CRS-DRP-B)	CRS-FP40	4-10GE 42-1GE 20-1GE-FLEX 2-10GE-WL-FLEX	
	PRP (CRS-4-PRP-6G, CRS-4-PRP-12G)	CRS-MSC-140G	14X10GBE-WL-XFP 20X10GBE-WL-XFP 1x100GBE	
	PRP (CRS-4-PRP-6G, CRS-4-PRP-12G)	CRS-FP140	14X10GBE-WL-XFP 20X10GBE-WL-XFP 1x100GBE	
	PRP (CRS-4-PRP-6G, CRS-4-PRP-12G)	CRS-LSP	14X10GBE-WL-XFP 20X10GBE-WL-XFP 1x100GBE	

