

EX8208 Switch Hardware Guide

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EX8208 Switch Hardware Guide

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Use this guide to install hardware and perform initial software configuration, routine maintenance, and troubleshooting for the EX8208 switch. After completing the installation and basic configuration procedures covered in this guide, refer to the Junos OS documentation for information about further software configuration.

Documentation and Release Notes

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at <https://www.juniper.net/documentation/>.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <https://www.juniper.net/books>.

Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

```
system {
  scripts {
    commit {
      file ex-script.xsl;
    }
  }
}
interfaces {
  fxp0 {
    disable;
    unit 0 {
      family inet {
        address 10.0.0.1/24;
      }
    }
  }
}
```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

```
[edit]
user@host# load merge /var/tmp/ex-script.conf
load complete
```

Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

```
commit {  
  file ex-script-snippet.xml; }
```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]  
user@host# edit system scripts  
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]  
user@host# load merge relative /var/tmp/ex-script-snippet.conf  
load complete
```

For more information about the **load** command, see [CLI Explorer](#).

Documentation Conventions

[Table 1 on page xvi](#) defines notice icons used in this guide.

Table 1: Notice Icons







Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.
	Tip	Indicates helpful information.
	Best practice	Alerts you to a recommended use or implementation.

Table 2 on page xvi defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: user@host> configure
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> show chassis alarms No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies guide names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS CLI User Guide</i> RFC 1997, <i>BGP Communities Attribute</i>

Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. The console port is labeled CONSOLE.
< > (angle brackets)	Encloses optional keywords or variables.	stub <default-metric <i>metric</i>>;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast (<i>string1</i> <i>string2</i> <i>string3</i>)
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Encloses a variable for which you can substitute one or more values.	community name members [<i>community-ids</i>]
Indentation and braces ({ })	Identifies a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	

GUI Conventions

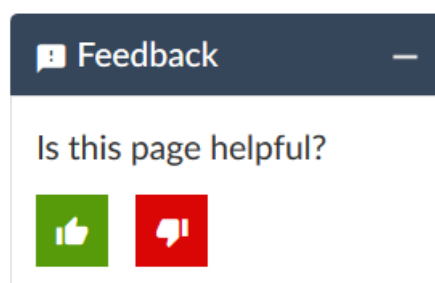
Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
Bold text like this	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel.
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select Protocols>Ospf .

Documentation Feedback

We encourage you to provide feedback so that we can improve our documentation. You can use either of the following methods:

- Online feedback system—Click TechLibrary Feedback, on the lower right of any page on the [Juniper Networks TechLibrary](#) site, and do one of the following:



- Click the thumbs-up icon if the information on the page was helpful to you.
- Click the thumbs-down icon if the information on the page was not helpful to you or if you have suggestions for improvement, and use the pop-up form to provide feedback.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active Juniper Care or Partner Support Services support contract, or are

covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <https://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <https://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <https://www.juniper.net/customers/support/>
- Search for known bugs: <https://prsearch.juniper.net/>
- Find product documentation: <https://www.juniper.net/documentation/>
- Find solutions and answer questions using our Knowledge Base: <https://kb.juniper.net/>
- Download the latest versions of software and review release notes: <https://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum: <https://www.juniper.net/company/communities/>
- Create a service request online: <https://myjuniper.juniper.net>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://entitlementsearch.juniper.net/entitlementsearch/>

Creating a Service Request with JTAC

You can create a service request with JTAC on the Web or by telephone.

- Visit <https://myjuniper.juniper.net>.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see <https://support.juniper.net/support/requesting-support/>.

1

CHAPTER

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Juniper Networks EX8208 Ethernet Switches provide high performance, scalable connectivity, and carrier-class reliability for high-density environments such as campus-aggregation and data-center networks. The EX8208 switch is a modular system that provides high availability and redundancy for all major hardware components, including Routing Engines, switch fabric, fan tray (redundant fans), and power supplies.

You can form an EX8200 Virtual Chassis by connecting individual EX8200 switches to an XRE200 External Routing Engine. A Virtual Chassis is multiple switches connected together that operate as a single network entity.

You can manage EX8208 switches using the same interfaces that you use for managing other devices running the Juniper Networks Junos operating system (Junos OS)—the command-line interface (CLI), the J-Web graphical interface, and the Network and Security Manager (NSM).

Benefits of the EX8208 Switch

Support for Virtual Chassis—EX8208 switches support Virtual Chassis technology. You can configure EX8200 switches in a Virtual Chassis and manage and operate them as a single network entity by using the XRE200 External Routing Engine.

High capacity—With a total capacity of up to 6.2 Terabits per second (Tbps), EX8208 is a powerful modular platform that delivers the performance, scalability, and high availability required for high-density data center, campus aggregation, and core switching environments.

Support for Juniper Networks Service Now solution—EX8200 switches support the Juniper Networks Service Now solution, a comprehensive set of tools that enable Juniper Networks J-Care Technical Service offerings to automate the delivery of tailored, proactive network intelligence and support services.

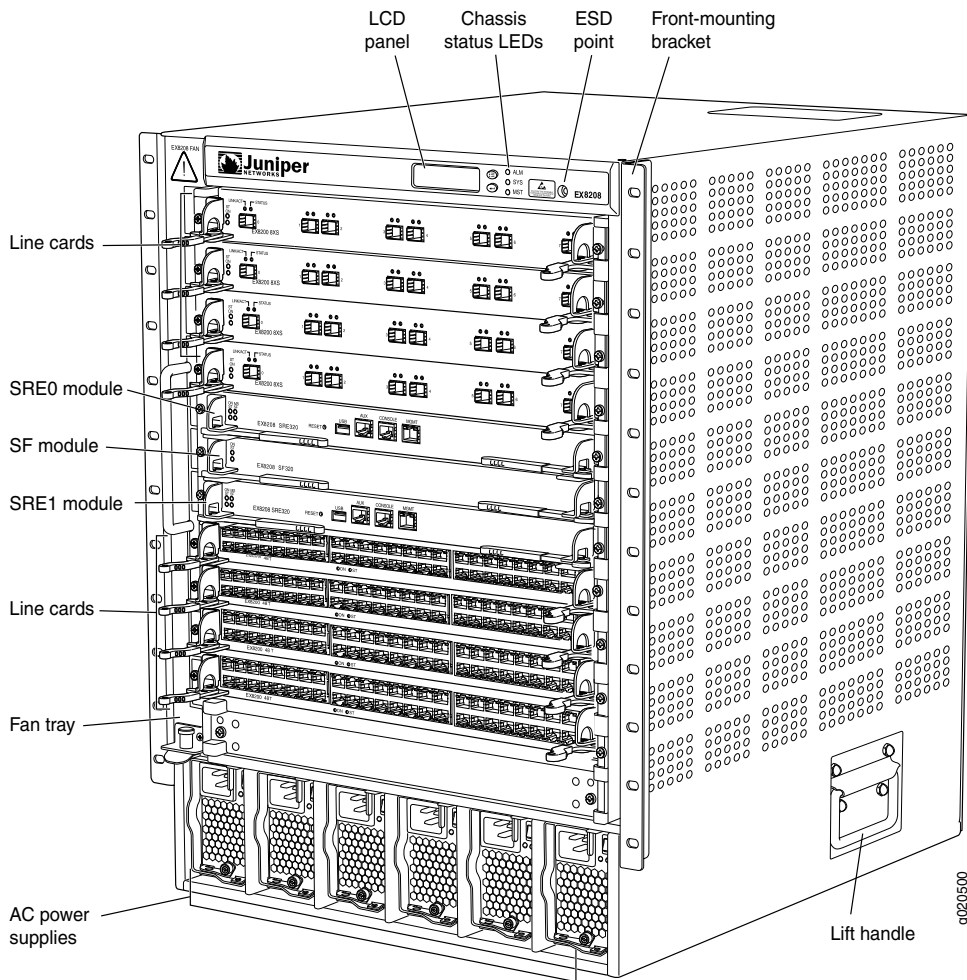
Software

The Juniper Networks EX Series Ethernet Switches run Junos OS, which provides Layer 2 and Layer 3 switching, routing, and security services. The same Junos OS code base that runs on EX Series switches also runs on all Juniper Networks M Series, MX Series, and T Series routers and SRX Series Services Gateways.

Chassis Physical Specifications, LCD Panel, and Backplane

The EX8208 switch is 14 rack units (14 U) in size (1/3 rack). Three EX8208 switches can fit in a standard 42 U rack. Each EX8208 switch is designed to optimize rack space and cabling. See [Figure 1 on page 23](#).

Figure 1: EX8208 Switch



The EX8208 switch has a chassis-level LCD panel that displays Routing Engine and switch fabric status as well as chassis components' alarm information for rapid problem identification. The LCD panel provides a user-friendly interface for performing initial switch configuration, rolling back a configuration, or restoring the switch to its default settings. See *LCD Panel in an EX8200 Switch*.

The EX8208 chassis backplane distributes the data, control, and management signals to various system components along with distributing power throughout the system.

See [“Chassis Physical Specifications of an EX8208 Switch”](#) on page 33.

Routing Engines and Switch Fabric

Switching functionality, system management, and system control functions of an EX8208 switch are performed by a Switch Fabric and Routing Engine (SRE) module. See [“Switch Fabric and Routing Engine \(SRE\) Module in an EX8208 Switch”](#) on page 78. An SRE module contains a Routing Engine and switch fabric. The SRE modules are field-replaceable units (FRUs) that are installed in the front of the chassis in

the slots labeled SRE0 and SRE1. See [“Slot Numbering for an EX8208 Switch” on page 40](#). A base configuration EX8208 switch has one SRE module. A redundant configuration EX8208 switch has a second SRE module. See [“EX8208 Switch Configurations” on page 27](#).

The Switch Fabric (SF) module, working with the SRE module, provides the necessary switching functionality to a base configuration EX8208 switch. The SF module is installed in the front of the chassis in the slot labeled SF. In a redundant configuration, the SF module provides full 2+1 switch fabric redundancy to the switch. See [“Switch Fabric \(SF\) Module in an EX8208 Switch” on page 81](#).

The EX8208 switch can also be connected to an XRE200 External Routing Engine. An XRE200 External Routing Engine is used to connect multiple EX8200 switches into a Virtual Chassis. See [XRE200 External Routing Engine Hardware Overview](#).

Line Cards

The EX8208 switch features eight horizontal line card slots and supports line rate for each line card. The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. Line cards are FRUs that can be installed in the line card slots labeled 0 through 7 on the front of the switch chassis. See [“Slot Numbering for an EX8208 Switch” on page 40](#). All line cards are hot-removable and hot-insertable.

Twelve line cards are available for EX8200 switches. The extra-scale line card models provide larger IPv4 and IPv6 route table sizes than the non-extra-scale models to store more unicast routes.

[Table 3 on page 24](#) shows the model numbers and descriptions of the line cards available for EX8200 switches.

Table 3: Line Cards Available for EX8200 Switches

Model	Description	Additional Information
EX8200-8XS	8-port SFP+ line card	“8-port SFP+ Line Card in an EX8200 Switch” on page 86
EX8200-8XS-ES	8-port SFP+ line card, extra-scale	“8-port SFP+ Line Card in an EX8200 Switch” on page 86
EX8200-40XS	40-port SFP+ line card	“40-port SFP+ Line Card in an EX8200 Switch” on page 88
EX8200-40XS-ES	40-port SFP+ line card, extra-scale	“40-port SFP+ Line Card in an EX8200 Switch” on page 88
EX8200-2XS-40P	40-port PoE+ with 4-port SFP and 2-port SFP+ line card	“EX8200-2XS-40P Line Card” on page 92

Table 3: Line Cards Available for EX8200 Switches (continued)

Model	Description	Additional Information
EX8200-2XS-40T	40-port RJ-45 with 4-port SFP and 2-port SFP+ line card	“EX8200-2XS-40T Line Card” on page 94
EX8200-48PL	48-port PoE+ 20 Gbps line card	“EX8200-48PL Line Card” on page 97
EX8200-48TL	48-port RJ-45 20 Gbps line card	“EX8200-48TL Line Card” on page 99
EX8200-48T	48-port RJ-45 line card	“48-Port RJ-45 Line Card in an EX8200 Switch” on page 103
EX8200-48T-ES	48-port RJ-45 line card, extra-scale	“48-Port RJ-45 Line Card in an EX8200 Switch” on page 103
EX8200-48F	48-port SFP line card	“48-Port SFP Line Card in an EX8200 Switch” on page 101
EX8200-48F-ES	48-port SFP line card, extra-scale	“48-Port SFP Line Card in an EX8200 Switch” on page 101

NOTE: We recommend that you do not install extra-scale line card models and non-extra-scale models in the same switch or Virtual Chassis. If you install extra-scale line cards in a switch or Virtual Chassis that has non-extra-scale models installed, the IPv4 and IPv6 route table sizes default to those of the non-extra-scale models and you will not get the benefit of the increased table sizes of the extra-scale models.

You will experience these decreased route table sizes in a Virtual Chassis even when the non-extra-scale line cards are installed in one member switch and the extra-scale line cards are installed in another member switch.

Cooling System

The cooling system in an EX8208 switch consists of a hot-removable and hot-insertable FRU fan tray. The fan tray contains 12 fans. The fan tray installs vertically on the left front of the chassis and provides side-to-side chassis cooling. See [“EX8208 Cooling System” on page 53](#).

Power Supplies

Power supplies for the EX8208 switch are fully redundant, load-sharing, and hot-removable and hot-insertable (FRUs). Each EX8208 switch chassis can hold up to six AC or DC power supplies.

[Table 4 on page 26](#) shows the details of the power supplies available for EX8208 switches.

Table 4: Power Supplies Supported on EX8208 Switches

Power Supply	Input Voltage	Output Power
2000 W AC	Low-voltage line (100-120 VAC)	1200 W
	High-voltage line (200-240 VAC)	2000 W
3000 W AC	Low-voltage line (100-120 VAC)	Not supported
	High-voltage line (200-240 VAC)	3000 W
2000 W DC	-40 VDC through -72VDC	2000 W

Only two AC power supplies (provided) are required to power on the base AC configuration switch. The redundant AC configuration ships with six AC power supplies to provide the capacity to power the system using $N+1$ or $N+N$ power redundancy. See [“AC Power Supply in an EX8200 Switch” on page 56](#) and [“EX8208 Switch Configurations” on page 27](#).

The redundant DC configuration ships with four DC power supplies. The dual inputs of the DC supplies provide direct support for $N+N$ power redundancy. The redundant configuration also provides sufficient capacity for $N+1$ redundancy in most configurations; if necessary, up to two additional DC supplies can be added to the system. See [“DC Power Supply in an EX8200 Switch” on page 70](#) and [“EX8208 Switch Configurations” on page 27](#).



CAUTION: Mixing different types of power supplies (AC and DC) in the same chassis is not supported.

SEE ALSO

| [EX8200 Virtual Chassis Overview](#)

EX8208 Switch Configurations

Table 5 on page 27 lists the seven sample hardware configurations for an EX8208 switch—base (AC), redundant (AC and DC versions), and fully loaded chassis (AC and DC versions)—and the components included in each configuration.

The switch is shipped in only four of these seven configurations: base (AC with 2000 W AC power supplies), base (AC with 3000 W AC power supplies), redundant (AC with 2000 W AC power supplies), and redundant (DC).

Table 5: EX8208 Switch Hardware Configurations

Switch Configuration	Configuration Components
Base configuration (AC with 2000 W AC power supplies)	<ul style="list-style-type: none"> ● Chassis with backplane ● One fan tray ● One Switch Fabric and Routing Engine (SRE) module ● One Switch Fabric (SF) module ● Two 2000 W AC power supplies ● Two power cords ● Eight line card cover panels ● Four power supply cover panels
Base configuration (AC with 3000 W AC power supplies)	<ul style="list-style-type: none"> ● Chassis with backplane ● One fan tray ● One Switch Fabric and Routing Engine (SRE) module ● One Switch Fabric (SF) module ● Two 3000 W AC power supplies ● Two power cords ● Eight line card cover panels ● Four power supply cover panels
Redundant configuration (AC with 2000 W AC power supplies)	<ul style="list-style-type: none"> ● Chassis with backplane ● One fan tray ● Two SRE modules ● One SF module ● Six 2000 W AC power supplies ● Six power cords ● Eight line card cover panels

Table 5: EX8208 Switch Hardware Configurations (*continued*)

Switch Configuration	Configuration Components
Redundant configuration (DC)	<ul style="list-style-type: none"> ● Chassis with backplane ● One fan tray ● Two SRE modules ● One SF module ● Four 2000 W DC power supplies ● 16 DC power cable lugs ● Eight line card cover panels
Fully loaded chassis configuration (AC with 2000 W AC power supplies)	<ul style="list-style-type: none"> ● Chassis with backplane ● One fan tray ● Two SRE modules ● One SF module ● Six 2000 W AC power supplies ● Six power cords ● Eight line cards
Fully loaded chassis configuration (AC with 3000 W AC power supplies)	<ul style="list-style-type: none"> ● Chassis with backplane ● One fan tray ● Two SRE modules ● One SF module ● Six 3000 W AC power supplies ● Six power cords ● Eight line cards
Fully loaded chassis configuration (DC)	<ul style="list-style-type: none"> ● Chassis with backplane ● One fan tray ● Two SRE modules ● One SF module ● Six 2000 W DC power supplies ● 24 DC power cable lugs ● Eight line cards

NOTE: You can install up to eight line cards (any combination of line cards) in the switch.

NOTE: Line cards are not part of the base or redundant configuration. You must order them separately.

NOTE: If you want to purchase additional power supplies (AC or DC) for your switch configuration, you must order them separately.

EX8208 Switch Hardware and CLI Terminology Mapping

This topic describes the hardware terms used in EX8208 switch documentation and the corresponding terms used in the Junos OS command line interface (CLI). See [Table 6 on page 29](#).

Table 6: CLI Equivalents of Terms Used in Documentation for EX8208 Switches

Hardware Item (CLI)	Description (CLI)	Value (CLI)	Item In Documentation	Additional Information
Chassis	EX8208	-	Switch chassis	“Chassis Physical Specifications of an EX8208 Switch” on page 33
Backplane	EX8208-BP-S	-	Backplane	“Backplane in an EX8208 Switch” on page 49

Table 6: CLI Equivalents of Terms Used in Documentation for EX8208 Switches (continued)

Hardware Item (CLI)	Description (CLI)	Value (CLI)	Item In Documentation	Additional Information
CB (n)	One of the following: <ul style="list-style-type: none"> EX8208-SRE320 EX8208-SF320 	n is a value in the range of 0–2.	The switch does not have actual control boards; see the following entries for the equivalent item on the switch:	
		Multiple line items appear in the CLI if more than one control board (CB) is installed in the chassis.		
		CB0 and CB1 are always SRE modules.	Switch Fabric and Routing Engine (SRE) module	“Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch” on page 78
	CB2 is always the SF module.	Switch Fabric (SF) module	“Switch Fabric (SF) Module in an EX8208 Switch” on page 81	

Table 6: CLI Equivalents of Terms Used in Documentation for EX8208 Switches (continued)

Hardware Item (CLI)	Description (CLI)	Value (CLI)	Item In Documentation	Additional Information
FPC (<i>n</i>)	<p>On EX8200 standalone switches:</p> <p>Abbreviated name of the Flexible PIC Concentrator (FPC)</p> <p>One of the following:</p> <ul style="list-style-type: none"> EX8200-8XS EX8200-40F EX8200-48F EX8200-48T 	<i>n</i> is a value in the range of 0–7. The value corresponds to the line card slot number in which the line card is installed.	Line card (The switch does not have actual FPCs—the line cards are the FPC equivalents on the switch.)	<ul style="list-style-type: none"> 8-port SFP+ Line Card in an EX8200 Switch on page 86 40-port SFP+ Line Card in an EX8200 Switch on page 88 48-Port SFP Line Card in an EX8200 Switch on page 101 48-Port RJ-45 Line Card in an EX8200 Switch on page 103
	<p>On EX8200 Virtual Chassis:</p> <ul style="list-style-type: none"> Slot number of the line card within the Virtual Chassis: <ul style="list-style-type: none"> FPC 0-15 FPC 16-31 	On Virtual Chassis member 0, <i>n</i> is a value in the range of 0–15 ; on member 1, <i>n</i> is a value in the range of 16–31.	Slot number of the line card within the Virtual Chassis	<ul style="list-style-type: none"> <i>Understanding Interface Naming Conventions</i> <i>Network Port Interface Names on an EX8200 Virtual Chassis</i>
Xcvr (<i>n</i>)	Abbreviated name of the transceiver	<i>n</i> is a value equivalent to the number of the port in which the transceiver is installed.	Optical transceivers	“Pluggable Transceivers Supported on EX8200 Switches” on page 128
PSU (<i>n</i>)	<p>One of the following:</p> <ul style="list-style-type: none"> EX8200-AC2K EX8200-AC3K EX8200-DC2K 	<i>n</i> is a value in the range of 0–5. The value corresponds to the power supply slot number.	AC or DC power supply	<ul style="list-style-type: none"> AC Power Supply in an EX8200 Switch on page 56 DC Power Supply in an EX8200 Switch on page 70
Fan tray	EX8208-FT	–	Fan tray	“EX8208 Cooling System” on page 53

Table 6: CLI Equivalents of Terms Used in Documentation for EX8208 Switches (*continued*)

Hardware Item (CLI)	Description (CLI)	Value (CLI)	Item In Documentation	Additional Information
LCD (<i>n</i>)	EX8200 LCD	Value of <i>n</i> is always 0.	LCD panel	<i>LCD Panel in an EX8200 Switch</i>
Plane (<i>n</i>)	<p>This field indicates:</p> <ul style="list-style-type: none"> • State of the fabric plane: <ul style="list-style-type: none"> • Active • Spare • Check State • Status of the Packet Forwarding Engine (PFE) in each fabric plane: <ul style="list-style-type: none"> • Links OK • Error 	<i>n</i> is a value in the range of 0–11.	Fabric plane	<i>show chassis fabric plane</i>
DPC (<i>n</i>)	-	<i>n</i> is a value in the range of 0–7.	The switch does not have actual Dense Port Concentrators (DPCs)—the line cards are the DPC equivalents on the switch.	<i>show chassis fabric map</i>
PIC (<i>n</i>)	-	Value of <i>n</i> is always 0.	-	<ul style="list-style-type: none"> • <i>Understanding Interface Naming Conventions</i> • <i>Network Port Interface Names on an EX8200 Virtual Chassis</i>

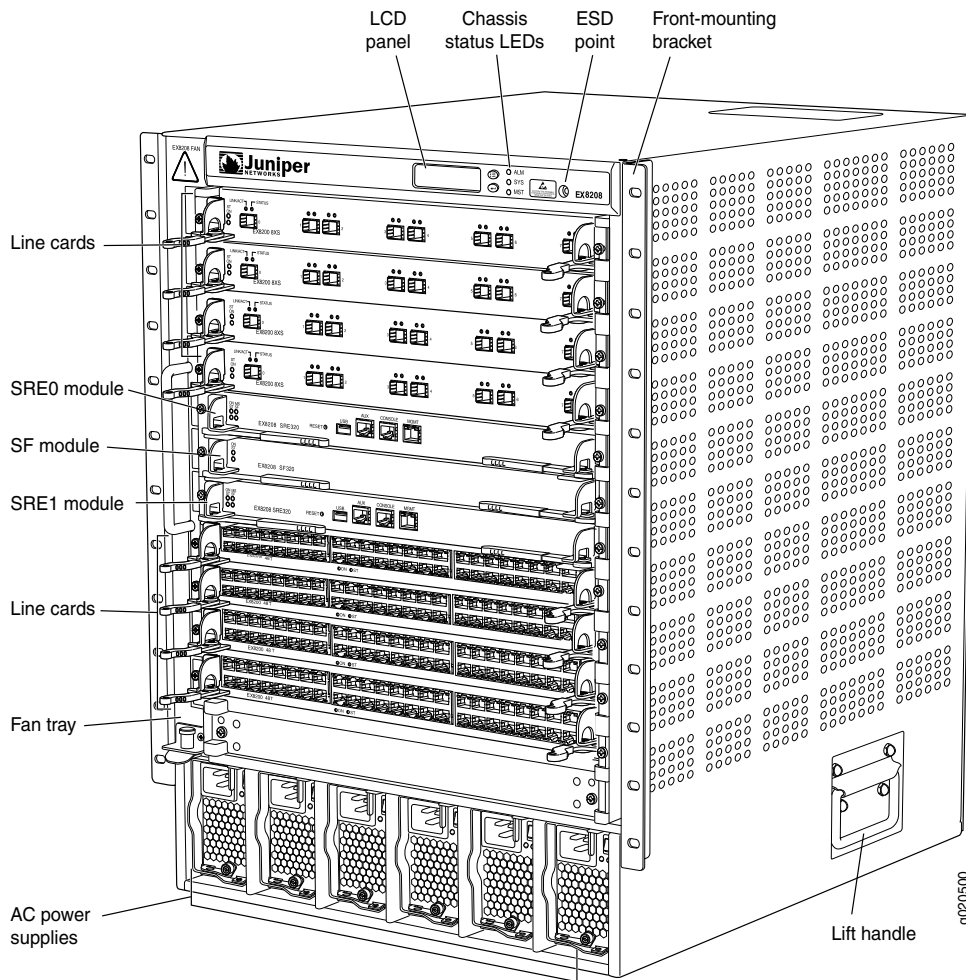
Chassis Physical Specifications of an EX8208 Switch

The EX8208 switch chassis is a rigid sheet-metal structure that houses the other switch components. [Table 7 on page 33](#) summarizes the physical specifications of the EX8208 switch chassis. See [Figure 2 on page 34](#).

Table 7: Physical Specifications of the EX8208 Switch Chassis

Description	Value
Chassis height	24.25 in. (61.6 cm)
Chassis width	<ul style="list-style-type: none"> • 17.25 in. (43.82 cm) • The outer edges of the front-mounting brackets extend the width to 19 in. (48.3 cm).
Chassis depth	<ul style="list-style-type: none"> • 20 in. (50.8 cm) • The depth from the front-mounting bracket to chassis rear is 20.69 in. (52.6 cm).
Weight	<ul style="list-style-type: none"> • Chassis with backplane: 89 lb (41 kg) • Base configuration: 149 lb (68 kg) • Redundant configuration: 187 lb (85 kg) • Fully loaded chassis: 284 lb (129 kg) <p>See “EX8208 Switch Configurations” on page 27.</p> <p>NOTE: The fully loaded chassis weight includes the heaviest line cards in all eight slots. If your switch configuration has lighter line cards, the fully loaded chassis weight will be in the 268–284 lb (122–129 kg) range.</p>

Figure 2: EX8208 Switch



NOTE: Figure 2 on page 34 shows line cards that have 2-in.-long ejector levers. An earlier version of 8-port SFP+ line card, 48-port RJ-45 line card, and 48-port SFP line card has 4-in.-long ejector levers.

You can mount an EX8200 switch on a standard 19-in. four-post rack or a standard 800-mm enclosed cabinet. Up to three EX8208 switches can be installed in a standard (42 rack unit (U)) rack provided the rack can handle their combined weight.

Lift handles are provided on either side of the switch to facilitate the handling of a chassis with only the backplane installed.



WARNING: Do not use the lift handles to lift the chassis unless the chassis is empty (that is, contains only the backplane). Failure to heed this warning can result in injury. See [“Mounting an EX8208 Switch on a Rack or Cabinet Using a Mechanical Lift” on page 157](#) or [“Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift” on page 159](#) for instructions for moving a loaded chassis.

Field-Replaceable Units in an EX8208 Switch

Field-replaceable units (FRUs) are switch components that you can replace at your site. The switch uses these types of FRUs:

- Hot-insertable and hot-removable—You can remove and replace these components without powering off the switch or disrupting the switching function.
- Hot-pluggable—You can remove and replace these components without powering off the switch, but the switching function is interrupted until you replace the component.

[Table 8 on page 35](#) lists the FRUs for the EX8208 switch and their types.

Table 8: FRUs in an EX8208 Switch

FRU	Type
Power supplies	Hot-insertable and hot-removable.
Fan tray	Hot-insertable and hot-removable.
Switch Fabric and Routing Engine (SRE) module	Redundant configuration: <ul style="list-style-type: none"> • Primary SRE module is hot-pluggable. • Backup SRE module is hot-insertable and hot-removable. Base configuration: <ul style="list-style-type: none"> • Switch must be disabled before the SRE module is removed. See “Taking the SRE Module Offline in an EX8208 Switch” on page 251. See “EX8208 Switch Configurations” on page 27 .

Table 8: FRUs in an EX8208 Switch (continued)

FRU	Type
Switch Fabric (SF) module	Redundant configuration: <ul style="list-style-type: none"> • SF module is hot-insertable and hot-removable. Base configuration: <ul style="list-style-type: none"> • We recommend that you disable the switch before removing the SF module. See “Taking the SF Module Offline in an EX8208 Switch” on page 257. See “EX8208 Switch Configurations” on page 27.
Line cards	Hot-insertable and hot-removable. We recommend that you take the line cards offline before removing them. See “Removing a Line Card from an EX8200 Switch” on page 268.
SFP and SFP+ transceivers See “Pluggable Transceivers Supported on EX8200 Switches” on page 128 for the Junos OS release in which the transceivers were introduced.	Hot-insertable and hot-removable.

NOTE: Line cards are not part of the base or redundant configuration. You must order them separately.

NOTE: If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/support/tools/updateinstallbase/> . Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.

SEE ALSO

[Line Card Model and Version Compatibility in an EX8200 Switch](#) | 84

EX8208 Chassis

IN THIS SECTION

- [Understanding EX8208 Switch Component and Functionality Redundancy | 37](#)
- [Slot Numbering for an EX8208 Switch | 40](#)
- [LCD Panel in an EX8200 Switch | 43](#)
- [Backplane in an EX8208 Switch | 49](#)
- [Chassis Status LEDs in an EX8200 Switch | 50](#)
- [Network Port LEDs in an EX8200 Switch | 51](#)

Understanding EX8208 Switch Component and Functionality Redundancy

IN THIS SECTION

- [Hardware Components That Provide Redundancy | 37](#)
- [Routing Engine and Control Redundancy | 38](#)
- [Switch Fabric Redundancy | 39](#)

The Juniper Networks EX8208 Ethernet Switch is available as a fully redundant system. A redundant EX8208 switch configuration is designed so that no single point of failure can cause the entire switch to fail. See [“EX8208 Switch Configurations” on page 27](#).

Hardware Components That Provide Redundancy

The following hardware components provide redundancy to an EX8208 switch:

- **SRE modules**—An EX8208 switch can have either one Switch Fabric and Routing Engine (SRE) module or two SRE modules. If two SRE modules are installed, one SRE module functions as the primary and the other functions as the backup. If the primary SRE module fails or is removed the backup module takes over as the primary SRE module.

When the SRE modules are configured for graceful switchover, the backup SRE module automatically synchronizes its configuration and state with those of the primary SRE module. Any update to the primary SRE module is replicated on the backup SRE module. If the backup module assumes primary role, packet forwarding continues through the switch.

- **Power supplies**—You can install up to six AC or six DC power supplies in an EX8208 switch. Each power supply connects to the backplane of the chassis, which distributes the output power produced by the power supplies to different switch components. (See [“Backplane in an EX8208 Switch” on page 49.](#)) Each power supply provides power to all the components in the switch.

An $N+1$ power configuration is required for Juniper Networks EX8200 Ethernet Switches. In an $N+1$ power configuration, if one power supply fails or is removed, the remaining power supplies continue to supply power for the entire system without interruption. If dual power feed redundancy is required, the required power configuration is $N+N$. The DC power supplies provide independent A and B power feeds so that dual power redundancy is available even in an $N+1$ power configuration. See [“AC Power Supply in an EX8200 Switch” on page 56](#) and [“DC Power Supply in an EX8200 Switch” on page 70](#).

- **Cooling system**—The cooling system in an EX8200 switch consists of a single fan tray. The fan tray contains 12 fans. Under normal operating conditions, the fans in the fan tray run at less than full speed.

The fans are controlled by two fan tray controllers. The fans are numbered 1 through 12. Fans 1 through 6 are controlled by the first fan tray controller. Fans 7 through 12 are controlled by the second fan tray controller. If one fan tray controller fails, the other fan tray controller keeps half the fans working. This allows the switch to continue to operate normally as long as the remaining fans cool the chassis sufficiently.

The fan tray continues to operate indefinitely and provides sufficient cooling even when a single fan fails provided the room temperature is within the operating range. See [“EX8208 Cooling System” on page 53](#).

Routing Engine and Control Redundancy

Each SRE module contains switch fabric circuitry, Routing Engine circuitry, and switch control and management circuitry. An EX8208 switch can have one SRE module or two SRE modules. If a switch has two SRE modules, one functions as the primary while the other functions as a backup and is in standby mode. This provides the switch with full redundancy (1+1) for Routing Engine and switch control functionality.

[Table 9 on page 39](#) shows the available slots in the EX8208 chassis and the Routing Engine and control redundancy associated with different SRE module and Switch Fabric (SF) module combinations.

Table 9: Routing Engine and Control Redundancy for EX8208 Switches

Switch Configuration	Slot SRE0	Slot SRE1	Slot SF	Routing Engine and Control Redundancy
Base configuration	SRE module	Empty	SF module	No
Base configuration	Empty	SRE module	SF module	No
User-defined configuration	SRE module	SRE module	Empty	Yes
Redundant configuration	SRE module	SRE module	SF module	Yes

Switch Fabric Redundancy

The switch fabric circuitry in an EX8208 switch is distributed across three modules—two SRE modules and one SF module. Any two of these three modules must be installed and functional to provide a working switch fabric with no redundancy. The third module, when present, provides partial redundancy (2+1) for the switching functionality, such that if any one of the two functional modules becomes nonoperational, the third module takes over.

[Table 10 on page 39](#) shows the available slots in an EX8208 chassis and the switch fabric redundancy associated with different SRE module and SF module combinations.

Table 10: Switch Fabric Redundancy for EX8208 Switches

Switch Configuration	Slot SRE0	Slot SRE1	Slot SF	Switch Fabric Redundancy
Base configuration	SRE module	Empty	SF module	No
Base configuration	Empty	SRE module	SF module	No
User-defined configuration	SRE module	SRE module	Empty	No
Redundant configuration	SRE module	SRE module	SF module	Yes

Slot Numbering for an EX8208 Switch

IN THIS SECTION

- [Slot Numbering for SRE and SF Module Slots and Line Card Slots | 40](#)
- [Slot Numbering for the Power Supply Slots | 42](#)

An EX8208 chassis accepts eight line cards, two Switch Fabric and Routing Engine (SRE) modules, one Switch Fabric (SF) module, one fan tray, and six power supplies (AC or DC). All 11 slots for the line cards and the modules run horizontally across the front of the chassis. The fan tray slot runs vertically on the left of the chassis front. The six power supply slots run vertically across the front bottom of the chassis.

Slot Numbering for SRE and SF Module Slots and Line Card Slots

[Table 11 on page 40](#) lists the slot numbers on the EX8208 chassis and the components those slots accept.

Table 11: Slot Numbering for an EX8208 Switch

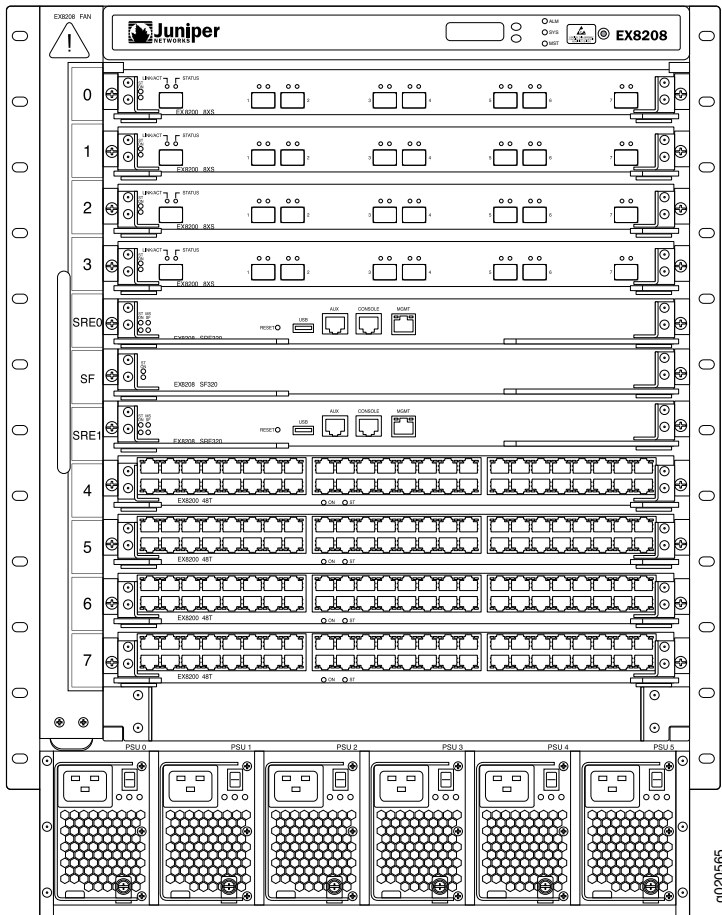
Slot Label	Components Accepted in Slot
0	Line card
1	Line card
2	Line card
3	Line card
SRE0	SRE module
SF	SF module
SRE1	SRE module
4	Line card
5	Line card
6	Line card

Table 11: Slot Numbering for an EX8208 Switch (continued)

Slot Label	Components Accepted in Slot
7	Line card

Figure 3 on page 41 shows the slot numbering, which is on the front left of the chassis.

Figure 3: Slot Numbering for an EX8208 Switch



NOTE: Figure 3 on page 41 shows line cards that have 2-in.-long ejector levers. An earlier version of 8-port SFP+ line card, 48-port RJ-45 line card, and 48-port SFP line card has 4-in.-long ejector levers.

Slots 0 through 7 accept one of the line cards available. See “Installing a Line Card in an EX8200 Switch” on page 271.

Slots SRE0 and SRE1 accept only the SRE module. You can install one SRE module or two SRE modules based on the configuration of your switch. See [“Switch Fabric and Routing Engine \(SRE\) Module in an EX8208 Switch” on page 78](#).

NOTE: We recommend that you install two SRE modules for redundancy. If you install only one SRE module, we recommend that you install it in the slot SRE0. See [“Installing an SRE Module in an EX8208 Switch” on page 255](#).

Slot SF accepts only the SF module. See [“Switch Fabric \(SF\) Module in an EX8208 Switch” on page 81](#). An EX8208 switch can have either zero SF modules or one SF module based on your switch configuration. The SF module is keyed so that it does not fit in any other slot in the chassis. See [“Installing an SF Module in an EX8208 Switch” on page 259](#).

Slot Numbering for the Power Supply Slots

The chassis has six vertical slots on its front bottom. You can install up to six power supplies (either all AC or all DC) in these slots, which are labeled PSU 0 through PSU 5 (from left to right). [Table 12 on page 42](#) lists the slot numbers for the power supplies on an EX8208 switch. See [“AC Power Supply in an EX8200 Switch” on page 56](#) and [“DC Power Supply in an EX8200 Switch” on page 70](#).



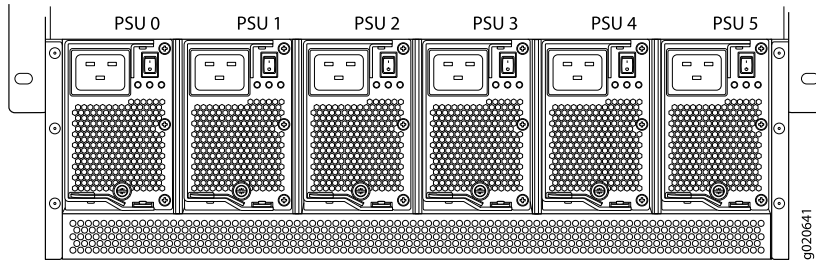
CAUTION: Mixing different types of power supplies in the same chassis is not a supported configuration.

Table 12: Slot Numbering for Power Supply Slots on an EX8208 Switch Chassis Front

Slot Label	Components Accepted in Slot
PSU 0	Power supply
PSU 1	Power supply
PSU 2	Power supply
PSU 3	Power supply
PSU 4	Power supply
PSU 5	Power supply

[Figure 4 on page 43](#) shows the slot numbering for the power supply slots in an EX8208 switch.

Figure 4: Slot Numbering for Power Supply Slots on an EX8208 Switch Chassis Front



NOTE: Power supplies can be installed in any slot. You do not have to install them in serial order. See “Installing an AC Power Supply in an EX8200 Switch” on page 240 and “Installing a DC Power Supply in an EX8200 Switch” on page 245.

LCD Panel in an EX8200 Switch

IN THIS SECTION

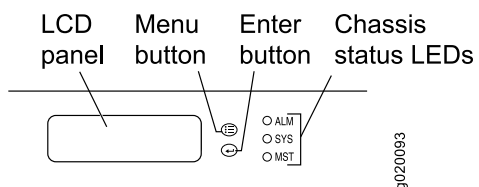
- LCD Panel Modes | 44
- LCD Panel Menus | 45

The LCD panel on the top front of the EX8200 switch chassis shows two lines of text with a maximum of 16 characters in each line. The LCD panel displays a variety of information about the switch and provides menu options to perform basic operations such as initial configuration and switch reboot.

There are two navigation buttons—**Menu** and **Enter**—to the right of the LCD panel.

See [Figure 5 on page 43](#).

Figure 5: LCD Panel in an EX8200 Switch



You can configure the second line of the LCD panel to display a custom message. If the LCD panel is configured to display a custom message, the **Menu** button and the **Enter** button are disabled. See [“Configuring the LCD Panel on EX Series Switches \(CLI Procedure\)” on page 202](#).

The LCD panel has a backlight. If the LCD panel is idle for 60 seconds, the backlight turns off. You can turn on the backlight by pressing the **Menu** or **Enter** button once. After turning on the backlight, you can toggle between the LCD menus by pressing the **Menu** button and navigate through the menu options by pressing the **Enter** button.

NOTE: The chassis viewer in the J-Web interface also displays the LCD panel. From the J-Web interface, you can view real-time status information in the LCD panel. See [“Dashboard for EX Series Switches” on page 205](#).

LCD Panel Modes

The LCD panel operates in four modes: boot, idle, status, and maintenance.

The LCD panel operates in boot mode during switch reboot.

The boot mode displays the key milestones in the switch boot process. The boot mode does not have any menu options. After the boot process is complete, the LCD panel automatically reverts to the Idle menu.

In the idle mode, line two of the Idle menu displays the Status LED modes of the network ports and the total number of alarms in the system. The number of alarms is updated every second.

The status mode allows you to get status information for the following items:

- Switch fabric in Switch Fabric and Routing Engine (SRE) modules in EX8208 switches
- Routing Engine (RE) and switch fabric in Switch Fabric (SF) module(s) in EX8216 switches
- Power supplies
- Fan tray(s) and chassis temperature
- Junos OS version installed

The maintenance mode allows you to cycle through options for configuring and troubleshooting the switch:

- System halt
- Reboot system
- Load rescue configuration
- Revert to factory configuration
- EZSetup

LCD Panel Menus

The LCD panel has three menus: Idle, Status, and Maintenance. In each of these menus, line one of the LCD panel displays the hostname of the switch. Toggle between the LCD menus by pressing the **Menu** button. Navigate through the menu options by pressing the **Enter** button.

[Table 13 on page 45](#) describes the LCD panel menu options.

Table 13: LCD Panel Menu Options for the EX8200 Switch

Menu	Description
Idle	<p>In the Idle menu:</p> <ul style="list-style-type: none"> • Press Enter to cycle through the Status LED modes, which are port status indicators: <ul style="list-style-type: none"> • ADM (enabled/disabled) • SPD (speed) • DPX (duplex) • POE (Power over Ethernet) <p>See <i>Network Port LEDs in an EX8200 Switch</i> for information on the Status LED.</p> • Press Menu to exit the Idle menu and go to the Status menu.

Table 13: LCD Panel Menu Options for the EX8200 Switch (continued)

Menu	Description
Status	<p>The Status menu has the following options:</p> <ul style="list-style-type: none"> ● Switch fabric status—Choose one of the following: <ul style="list-style-type: none"> ● Press Enter to display the status of the switch fabric in the SRE modules (SRE0 and SRE1) in EX8208 switches and the SF modules (SF) in EX8216 switches: OK, Fld (failed), ABS (absent) ● Press Menu to go to the next option in the Status menu. ● Power supply status (1)—Choose one of the following: <ul style="list-style-type: none"> ● Press Enter to display the status of power supplies 0 and 1: OK, Fld, ABS. ● Press Menu to go to the next option in the Status menu. ● Power supply status (2)—Choose one of the following: <ul style="list-style-type: none"> ● Press Enter to display the status of power supplies 2, 3, 4, and 5: OK, Fld, ABS. ● Press Menu to go to the next option in the Status menu. ● Environment status—Choose one of the following: <ul style="list-style-type: none"> ● Press Enter to display the status of the fan tray(s) and the chassis temperature: <ul style="list-style-type: none"> ● Fan tray(s) status: OK, Fld, ABS ● Chassis temperature status: OK, High, Shutdown ● Press Menu to go to the next option in the Status menu. ● Junos OS version status—Choose one of the following: <ul style="list-style-type: none"> ● Press Enter to display the version of Junos OS for EX Series switches loaded on the switch. ● Press Menu to go to the next option in the Status menu. ● EXIT STAT MENU?—Choose one of the following: <ul style="list-style-type: none"> ● Press Enter to exit the Status menu. ● Press Menu to return to the Switch fabric status option. <p>If you do not want users to use Status menu options, disable the entire menu or individual menu options. See “Configuring the LCD Panel on EX Series Switches (CLI Procedure)” on page 202.</p>

Table 13: LCD Panel Menu Options for the EX8200 Switch (continued)

Menu	Description
Maintenance	

Table 13: LCD Panel Menu Options for the EX8200 Switch (continued)

Menu	Description
	<p>The Maintenance menu has the following options:</p> <ul style="list-style-type: none"> ● SYSTEM HALT?—Choose one of the following: <ul style="list-style-type: none"> ● Press Enter to halt the primary SRE module in an EX8208 switch or to halt the primary RE module in an EX8216 switch. Press Enter again to confirm the halt. In a base configuration switch, the primary SRE or RE module will be gracefully halted but not powered off. Press Enter on your management device or power cycle the switch to bring the switch back up. In a redundant configuration, the backup SRE or RE module takes over the primary role when the primary SRE or RE module is halted. To completely halt the switch, use the request system halt other-routing-engine CLI command to halt the backup SRE or RE module before halting the primary SRE or RE module. Press Enter on your management device or power cycle the switch to bring the switch back up. See “EX8208 Switch Configurations” on page 27 or <i>EX8216 Switch Configurations</i> for information on configuration types. ● Press Menu to go to the next option in the Maintenance menu. ● SYSTEM REBOOT?—Choose one of the following: <ul style="list-style-type: none"> ● Press Enter to reboot the primary SRE or RE module. Press Enter again to confirm the reboot. ● Press Menu to go to the next option in the Maintenance menu. ● LOAD RESCUE?—Choose one of the following: <ul style="list-style-type: none"> ● Press Enter to roll back the switch to the previous valid configuration. Press Enter again to confirm the rollback. ● Press Menu to go to the next option in the Maintenance menu. ● FACTORY DEFAULT?—Choose one of the following: <ul style="list-style-type: none"> ● Press Enter to restore the switch to the factory default configuration. Press Enter again to confirm the restoration. The LCD panel flashes a success or failure message and returns to the Idle menu. ● Press Menu to go to the next option in the Maintenance menu. ● ENTER EZSETUP?—Choose one of the following: <ul style="list-style-type: none"> ● Press Enter to launch EZSetup. Press Enter again to confirm the launch. EZSetup configures DHCP and enables the J-Web user interface on the switch. The LCD panel flashes a success or failure message for approximately 10 seconds and returns to the Idle menu. ● Press Menu to go to the next option in the Maintenance menu. <p>NOTE: You can use the EZSetup option only if the switch is in the factory default configuration.</p> ● EXIT MAINT MENU?—Choose one of the following: <ul style="list-style-type: none"> ● Press Enter to exit the Maintenance menu. ● Press Menu to return to the SYSTEM HALT option.

Table 13: LCD Panel Menu Options for the EX8200 Switch (continued)

Menu	Description
	If you do not want users to use Maintenance menu options, disable the entire menu or individual menu options. See “Configuring the LCD Panel on EX Series Switches (CLI Procedure)” on page 202.

You can view the information about the LCD panel in EX8200 switches by executing the command **show chassis hardware**. It shows the version, part number, serial number, and description of the LCD panel.

SEE ALSO

[Chassis Status LEDs in an EX8200 Switch](#)

[Connecting and Configuring an EX Series Switch \(CLI Procedure\) | 194](#)

[Connecting and Configuring an EX Series Switch \(J-Web Procedure\) | 198](#)

Backplane in an EX8208 Switch

The backplane is a printed circuit board that forms the back of the line card cage. The Switch Fabric and Routing Engine (SRE) modules, Switch Fabric (SF) module, power supplies, and line cards plug into the backplane from the front of the chassis. The backplane contains an EEPROM that stores the serial number and revision level of the backplane.

The backplane performs the following functions:

- Power distribution—The backplane distributes power to all the switch components from the power supplies that plug into it.
- Control-signal connectivity—The backplane transports the control signals exchanged by system components for monitoring, control, and management purposes.
- Transfer of data between line cards and SRE modules—The backplane provides connectivity for data traffic to and from the line cards and the SRE modules.



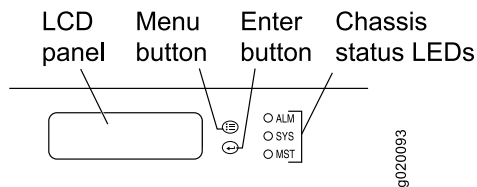
WARNING: High levels of electrical energy are distributed across the switch backplane. Do not touch the backplane connectors, or any component connected to the backplane, with any metallic object while servicing components installed in the switch.

Chassis Status LEDs in an EX8200 Switch

The top front of the chassis of an EX8200 switch has three LEDs on the right side of the LCD panel.

See [Figure 6 on page 50](#).

Figure 6: Chassis Status LEDs



[Table 14 on page 50](#) describes the chassis status LEDs in an EX8200 switch, their colors and states, and the status they indicate. You can view the colors of the three LEDs remotely through the CLI by issuing the operational mode command **show chassis lcd**.

Table 14: Chassis Status LEDs in an EX8200 Switch

LED Label (Description)	Color	State and Description
ALM (Alarm)	Unlit	No alarm.
	Red	Major alarm.
	Yellow	Minor alarm.
SYS (System)	Unlit	Switch is powered off.
	Yellow	One or more component failures are generating one or more alarms.
	Green	Switch is operating normally.
MST (Primary)	Unlit	Switch is powered off.
	Green	Primary Routing Engine is operational.

A major alarm (red) indicates a critical error condition that requires immediate action.

A minor alarm (yellow) indicates a noncritical condition that requires monitoring or maintenance. A minor alarm that is left unchecked might cause interruption in service or performance degradation.

All three LEDs can be lit simultaneously.

SEE ALSO

[Chassis Component Alarm Conditions on EX8200 Switches | 300](#)

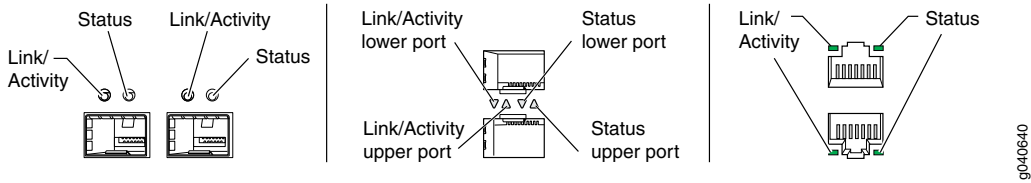
[Understand Alarm Types and Severity Levels on EX Series Switches | 299](#)

Network Port LEDs in an EX8200 Switch

Each network port on the faceplate of a line card has two LEDs. [Figure 7 on page 51](#) shows the network port LEDs on the line cards.

Figure 7: Network Port LEDs on Line Cards

Network port LEDs:



The LEDs labeled Link/Activity in [Figure 7 on page 51](#) indicate link activity.

[Table 15 on page 51](#) describes the Link/Activity LED.

Table 15: Network Port LEDs on Line Cards in an EX8200 Switch—Link/Activity LED

LED	Color	State and Description
Link/Activity	Green	<ul style="list-style-type: none"> On steadily—The port and the link are active, but there is no link activity. Blinking—The port and the link are active, and there is link activity. Off—The port is not active.

The LEDs labeled Status in [Figure 7 on page 51](#) indicate the status of one of the three port parameters. The port parameters are administrative status, speed, duplex mode, and Power over Ethernet (PoE) status.

[Table 16 on page 52](#) describes the Status LED. From the Idle menu of the LCD panel, use the **Enter** button on the LCD panel to toggle between the ADM, SPD, DPX, and POE indicators.

Table 16: Network Port LEDs on Line Cards in an EX8200 Switch—Status LED

LED	LCD Indicator	State, Color, and Description
Status	LED: ADM	<p>Indicates the administrative status (enabled or disabled). The status indicators are:</p> <ul style="list-style-type: none"> ● Green—Administrative status enabled. ● Yellow—The port is down. ● Unlit—Administrative status disabled.
	LED: SPD	<p>Indicates the speed. The speed indicators are different in the line cards.</p> <p>The speed indicators for 8-port SFP+ line cards are:</p> <ul style="list-style-type: none"> ● Unlit—Less than 10 Gbps ● Green—10 Gbps <p>The speed indicators for 40-port SFP+ line cards are:</p> <ul style="list-style-type: none"> ● Unlit—10 Mbps ● Green—Blinking—100 Mbps ● Green—On steadily—1000 Mbps or 10 Gbps <p>The speed indicators for EX8200-2XS-40P line cards are:</p> <ul style="list-style-type: none"> ● Unlit—10 Mbps ● Green—Blinking—100 Mbps ● Green—On steadily—1000 Mbps or 10 Gbps <p>The speed indicators for EX8200-2XS-40T line cards are:</p> <ul style="list-style-type: none"> ● Unlit—10 Mbps ● Green—Blinking—100 Mbps ● Green—On steadily—1000 Mbps or 10 Gbps <p>The speed indicators for EX8200-48PL line cards are:</p> <ul style="list-style-type: none"> ● Unlit—10 Mbps ● Green—Blinking—100 Mbps ● Green—On steadily—1000 Mbps <p>The speed indicators for EX8200-48TL line cards are:</p> <ul style="list-style-type: none"> ● Unlit—10 Mbps ● Green—Blinking—100 Mbps ● Green—On steadily—1000 Mbps <p>The speed indicators for 48-port SFP line cards are:</p>

Table 16: Network Port LEDs on Line Cards in an EX8200 Switch—Status LED (continued)

LED	LCD Indicator	State, Color, and Description
		<ul style="list-style-type: none"> • Unlit—10 Mbps • Green—Blinking—100 Mbps • Green—On steadily—1000 Mbps <p>The speed indicators for 48-port RJ-45 line cards are:</p> <ul style="list-style-type: none"> • Unlit—10 Mbps • Green—Blinking—100 Mbps • Green—On steadily—1000 Mbps
	LED: DPX	<p>Indicates the duplex mode. The status indicators are:</p> <ul style="list-style-type: none"> • Green—Port is set to full-duplex mode. • Unlit—Port is not set to full-duplex mode.
	LED: POE	<p>Indicates the PoE mode. The status indicators are:</p> <ul style="list-style-type: none"> • Green—PoE is enabled on the port and a device is drawing power. • Yellow—PoE is enabled on the port, but no power is drawn from the port. • Unlit—PoE is not enabled on the port.

SEE ALSO

| [Line Card LEDs in an EX8200 Switch | 105](#)

EX8208 Cooling System

IN THIS SECTION

- [Fan Tray | 54](#)
- [Airflow Direction in the EX8208 Switch Chassis | 55](#)

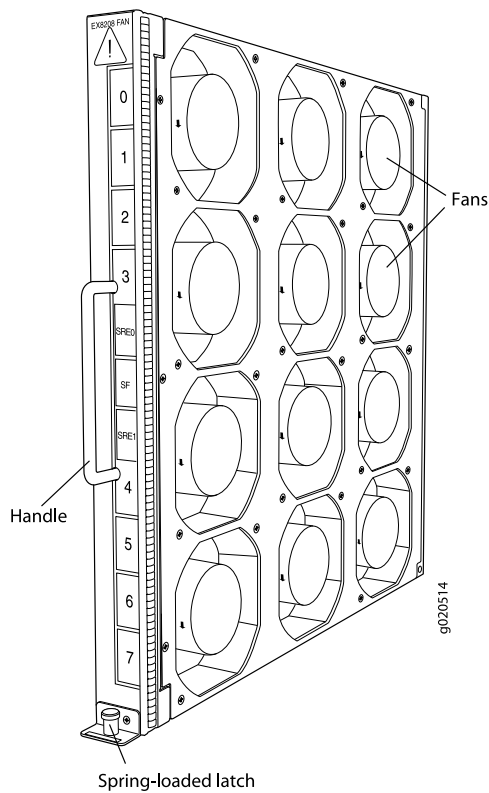
The cooling system in an EX8208 switch consists of a single fan tray.

Fan Tray

The fan tray is a hot-insertable and hot-removable field-replaceable unit (FRU). The fan tray contains 12 fans.

The fan tray installs vertically on the left side on the front of the chassis and provides side-to-side chassis cooling. A handle on the front faceplate facilitates handling of the fan tray. See [Figure 8 on page 54](#).

Figure 8: Fan Tray for an EX8208 Switch



The fan tray can be removed and replaced from the front of the chassis. The switch continues to operate for a limited time (2 minutes) during the replacement of the fan tray without thermal shutdown.

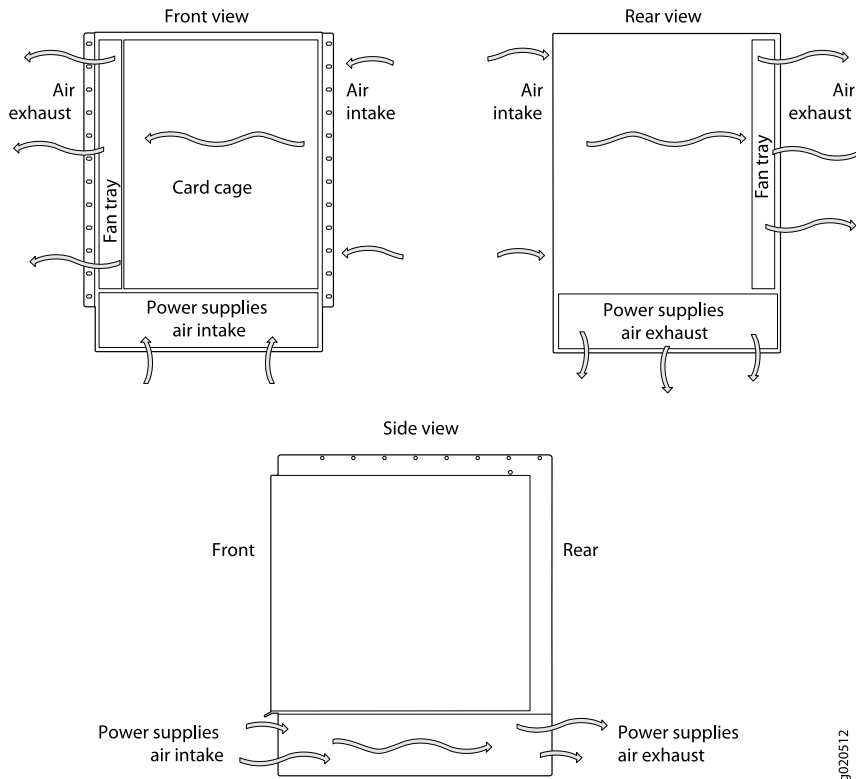


CAUTION: You must replace the fan tray within 2 minutes of removing it.

Airflow Direction in the EX8208 Switch Chassis

The air intake to cool the chassis is located on the right side of the chassis. Air is pulled into the chassis and is pushed through the line card cage towards the fan tray. Hot air exhausts from the left side of the chassis. See [Figure 9 on page 55](#).

Figure 9: Airflow Through the EX8208 Switch Chassis



The Switch Fabric and Routing Engine (SRE) module monitors the temperature of switch components. Under normal operating conditions, the fans in the fan tray run at less than full speed. The fans are controlled by two fan tray controllers. The fans are numbered 1 through 12. Fans 1 through 6 are controlled by the first fan tray controller. Fans 7 through 12 are controlled by the second fan tray controller. If one fan tray controller fails, the other fan tray controller keeps half the fans working. This allows the switch to continue to operate normally as long as the remaining fans cool the chassis sufficiently.

If a fan fails or the ambient temperature rises above the threshold 113°F (45°C), the speed of the remaining fans is automatically adjusted to keep the temperature within the acceptable range, 32°F (0°C) through 104°F (40°C).

The fan tray continues to operate indefinitely and provide sufficient cooling even when a single fan fails provided the room temperature is within the operating range. You can check the status of fans and the chassis temperature from the Environment Status option in the Status menu on the LCD panel. See *LCD Panel in an EX8200 Switch*.

You cannot replace a single fan. If one or more fans fail, you must replace the entire fan tray.



WARNING: There is no fan guard on the fans. Be careful to keep your fingers clear of moving fan blades when you are removing the fan tray.

RELATED DOCUMENTATION

[Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch](#) | 116

EX8200 Power System

IN THIS SECTION

- [AC Power Supply in an EX8200 Switch](#) | 56
- [AC Power Supply LEDs in an EX8200 Switch](#) | 63
- [AC Power Specifications for EX8200 Switches](#) | 65
- [AC Power Cord Specifications for an EX8200 Switch](#) | 66
- [DC Power Supply in an EX8200 Switch](#) | 70
- [DC Power Supply LEDs in an EX8200 Switch](#) | 72
- [DC Power Specifications for EX8200 Switches](#) | 75
- [Grounding Cable and Lug Specifications for EX8200 Switches](#) | 76

AC Power Supply in an EX8200 Switch

IN THIS SECTION

- [AC Power Supply Description](#) | 57
- [N+1 Redundancy Configuration of AC Power Supplies](#) | 59
- [N+N Redundancy Configuration of AC Power Supplies](#) | 60

EX8200 switches can use either AC or DC power supplies. This topic describes the AC power supplies in EX8200 switches.

AC Power Supply Description

The AC power supplies in EX8200 switches are hot-insertable and hot-removable field-replaceable units (FRUs).

You can install up to six AC power supplies in an EX8200 switch. Power supplies are installed at the bottom of the chassis in slots PSU 0 through PSU 5 (left to right). All power supplies are accessible from the front of the chassis.



WARNING: The switch is installed in a restricted-access location. It has a separate protective earthing terminal on the chassis that must be permanently connected to earth ground to adequately ground the chassis and protect the operator from electrical hazards.



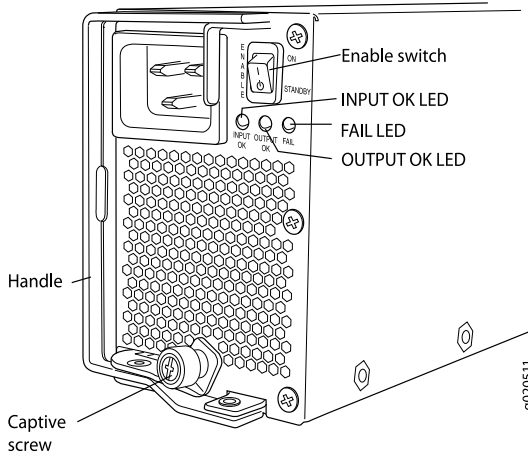
CAUTION: Before switch installation begins, ensure that a licensed electrician has attached an appropriate grounding lug to the grounding cable that you supply. Using a grounding cable with an incorrectly attached lug can damage the switch.

NOTE: All base configuration EX8200 switches are shipped with two power supplies. Cover panels are installed over the remaining four power supply slots. Additional power supplies can be added to base configuration switches as necessary.

For details about different switch configurations, see [“EX8208 Switch Configurations” on page 27](#) or [EX8216 Switch Configurations](#).

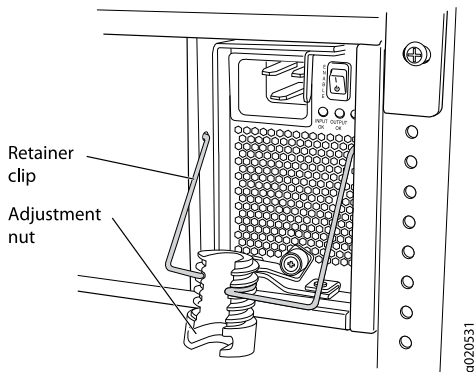
Each AC power supply weighs approximately 7 lb (3.2 kg) and has an independent 16 A rated AC inlet on the faceplate. Each inlet requires a dedicated AC power feed. Each AC power supply has a switch labeled **ENABLE**, a fan, and three LEDs on the faceplate that indicate the status of the power supply. See [Figure 10 on page 58](#).

Figure 10: AC Power Supply



Each AC power supply comes with a power cord retainer that holds the power cord in place. See [Figure 11 on page 58](#). The power cord retainer has a clip and an adjustment nut. The L-shaped ends of the clip hook into the bracket holes on each side of the AC appliance inlet on the faceplate. The adjustment nut holds the power cord in the correct position. For instructions for installing the power cord retainer, see [“Connecting AC Power to an EX8200 Switch” on page 171](#).

Figure 11: Power Cord Retainer for an AC Power Supply



Each power supply connects to the backplane in an EX8208 switch and to the midplane in an EX8216 switch. The backplane and the midplane distribute the output power produced by the power supplies to different switch components. Each AC power supply provides power to all the components in the switch.

Each power supply has its own fan and is cooled by its own internal cooling system. The airflow is from the front of the power supply to the back. Hot air exhausts from the rear of the chassis.

EX8200 switches support both 2000 W AC power supplies and 3000 W AC power supplies.

The 2000 W AC power supply supports both the low-voltage line (100–120 VAC) and the high-voltage line (200–240 VAC) AC power configurations. In both cases, the output is 52 VDC. The output power is 1200 W for low-voltage line input and 2000 W for high-voltage line input.

The 3000 W AC power supply supports only the high-voltage line input (200–240 VAC) AC power configuration. Low-voltage line input is not supported for the 3000 W AC power supplies on the EX8200 switches. The output is 52 VDC. The output power is 3000 W.

N+1 Redundancy Configuration of AC Power Supplies

N+1 redundancy configuration is required for normal operation of EX8200 switches. In an N+1 redundancy configuration, if one power supply fails or is removed, the remaining power supplies continue to supply power for the switch without interruption.

Depending on the configuration type of the switch and the input voltage, determine the number of power supplies needed (N) for a switch. Install an additional power supply to meet the required N+1 redundancy configuration. For details about different switch configurations, see [“EX8208 Switch Configurations” on page 27](#) or *EX8216 Switch Configurations*.

The tables in this section list the N+1 power requirements for different EX8200 switch configurations:

- [Table 17 on page 59](#)—Lists the N+1 power requirements of EX8208 switch configurations that use 2000 W AC power supplies.
- [Table 18 on page 60](#)—Lists the N+1 power requirements of EX8208 switch configurations that use 3000 W AC power supplies.
- [Table 19 on page 60](#)—Lists the N+1 power requirements of EX8216 switch configurations that use 2000 W AC power supplies.
- [Table 20 on page 60](#)—Lists the N+1 power requirements of EX8216 switch configurations that use 3000 W AC power supplies.

Table 17: N+1 Power Redundancy Configurations for Different EX8208 Switch Configurations Using 2000 W AC Power Supplies

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+1 Redundancy
Base	High-voltage line (200–240 VAC)	1	2
	Low-voltage line (100–120 VAC)	2	3
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	3	4
	Low-voltage line (100–120 VAC)	5	6

Table 18: N+1 Power Redundancy Configurations for Different EX8208 Switch Configurations Using 3000 W AC Power Supplies

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+1 Redundancy
Base	High-voltage line (200–240 VAC)	1	2
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	2	3

Table 19: N+1 Power Redundancy Configurations for Different EX8216 Switch Configurations Using 2000 W AC Power Supplies

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+1 Redundancy
Base	High-voltage line (200–240 VAC)	2	3
	Low-voltage line (100–120 VAC)	2	3
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	5	6
	Low-voltage line (100–120 VAC)	Not supported	Not supported

Table 20: N+1 Power Redundancy Configurations for Different EX8216 Switch Configurations Using 3000 W AC Power Supplies

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+1 Redundancy
Base	High-voltage line (200–240 VAC)	1	2
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	4	5

N+N Redundancy Configuration of AC Power Supplies

You can optionally configure your switch for N+N redundancy, in which N power supplies can be removed or can fail and the remaining N power supplies continue to supply power to the switch without interruption. A common application for N+N redundancy is to have a dual power feed for AC power supplies.

How many power supplies you require for $N+N$ redundancy depends on which Junos OS release your switch is running:

- Junos OS Release 10.1 or earlier—Use [Table 17 on page 59](#), [Table 18 on page 60](#), [Table 19 on page 60](#), or [Table 20 on page 60](#) to determine the number of power supplies needed (N). Then multiply the value of N by two.

NOTE: In Junos OS Release 10.1 or earlier, the power management feature manages switches for $N+1$ redundancy only. This means, for example, that power management raises an alarm if there is insufficient power to maintain $N+1$ redundancy, but not if there is insufficient power to maintain $N+N$ redundancy.

- Junos OS Release 10.2 or later—Use [Table 21 on page 62](#), [Table 22 on page 62](#), [Table 23 on page 62](#), or [Table 24 on page 63](#) in this section.

Starting with Junos OS Release 10.2, you can configure the power management software to manage the switch power for $N+N$ redundancy. When you configure power management for $N+N$ redundancy, power management lowers the maximum chassis power consumption by lowering the maximum fan speed. It does so to compensate for the extra power that is held in reserve in an $N+N$ configuration than in an $N+1$ configuration, because of which less power would ordinarily be available to power line cards. By reducing the maximum chassis power consumption, power management allows the switch to power more line cards.

The configuration type of the switch and the input voltage determine the number of power supplies needed (N) for the switch. You must then install additional power supplies to meet the $N+N$ redundancy configuration. For details about different switch configurations, see [“EX8208 Switch Configurations” on page 27](#) or [EX8216 Switch Configurations](#).

The tables in this section list the $N+N$ power requirements for different EX8200 switch configurations:

- [Table 21 on page 62](#)—Lists the $N+N$ power requirements of EX8208 switch configurations that use 2000 W AC power supplies.
- [Table 22 on page 62](#)—Lists the $N+N$ power requirements of EX8208 switch configurations that use 3000 W AC power supplies.
- [Table 23 on page 62](#)—Lists the $N+N$ power requirements of EX8216 switch configurations that use 2000 W AC power supplies.
- [Table 24 on page 63](#)—Lists the $N+N$ power requirements of EX8216 switch configurations that use 3000 W AC power supplies.

Table 21: N+N Power Supply Requirements for EX8208 Switch Configurations Using 2000 W AC Power Supplies (Junos OS Release 10.2 or Later Only)

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+N Redundancy
Base	High-voltage line (200–240 VAC)	1	2
	Low-voltage line (100–120 VAC)	1	2
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	3	6
	Low-voltage line (100–120 VAC)	4	Not Supported

Table 22: N+N Power Supply Requirements for EX8208 Switch Configurations Using 3000 W AC Power Supplies (Junos OS Release 10.2 or Later Only)

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+N Redundancy
Base	High-voltage line (200–240 VAC)	1	2
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	2	4

Table 23: N+N Power Supply Requirements for EX8216 Switch Configurations Using 2000 W AC Power Supplies (Junos OS Release 10.2 or Later Only)

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+N Redundancy
Base	High-voltage line (200–240 VAC)	1	2
	Low-voltage line (100–120 VAC)	2	4
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	5	Not supported
	Low-voltage line (100–120 VAC)	Not supported	Not supported

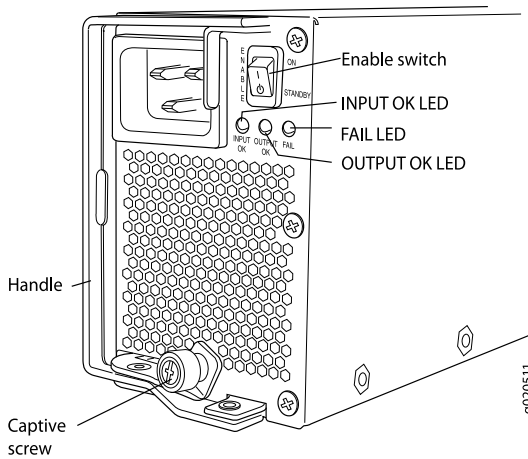
Table 24: N+N Power Supply Requirements for EX8216 Switch Configurations Using 3000 W AC Power Supplies (Junos OS Release 10.2 or Later Only)

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+N Redundancy
Base	High-voltage line (200–240 VAC)	1	2
Fully loaded with 8-port SFP+ line cards	High-voltage line (200–240 VAC)	3	6

AC Power Supply LEDs in an EX8200 Switch

An AC power supply has three LEDs on its faceplate. These LEDs display information about the status of the power supply. See [Figure 12 on page 63](#).

Figure 12: AC Power Supply LEDs on an EX8200 Switch



[Table 25 on page 64](#) describes the LEDs on an AC power supply in an EX8200 switch.

Table 25: Power Supply LEDs on EX8200 Switches

LED	State	Description
INPUT OK	Unlit	Indicates one of the following: <ul style="list-style-type: none"> • Power supply is disconnected from AC power feed. • AC power input voltage is not within normal operating range. • No AC power input.
	Green	<ul style="list-style-type: none"> • AC power input is high-voltage line (200–240 VAC).
	Yellow	<ul style="list-style-type: none"> • AC power input is low-voltage line (100–120 VAC). <p>NOTE: This LED state applies only to 2000 W AC power supplies.</p>
OUTPUT OK	Unlit	Indicates one of the following: <ul style="list-style-type: none"> • DC output voltage is not within normal operating range. • Power supply is not supplying DC power correctly.
	Green	<ul style="list-style-type: none"> • DC power output is within normal operating range.
	Yellow	<ul style="list-style-type: none"> • Power supply has been disabled internally by the system.
FAIL	Unlit	<ul style="list-style-type: none"> • Power supply is functioning normally.
	Yellow	<ul style="list-style-type: none"> • On steadily—Power supply has failed. • Blinking—Demand for output power exceeds the supply.

NOTE: If the **INPUT OK** LED and the **OUTPUT OK** LED are unlit, the AC power cord is not installed properly or the power supply has failed.

If the **INPUT OK** LED is lit and the **OUTPUT OK** LED is unlit, the AC power supply is not installed properly or the power supply has an internal failure.

If the **FAIL** LED is lit, the power supply has failed and must be replaced. If the **FAIL** LED is blinking, add a power supply to balance the power demand and supply.

AC Power Specifications for EX8200 Switches

EX8200 switches can use either AC or DC power supplies.

[Table 26 on page 65](#) lists the AC power specifications for a 2000 W power supply used in EX8200 switches.

Table 26: Power Specifications for a 2000 W AC Power Supply in an EX8200 Switch

Item	Specifications
AC input voltage	Operating range: <ul style="list-style-type: none"> • Low-voltage line—100–120 VAC • High-voltage line—200–240 VAC
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> • Low-voltage line—13.8 A • High-voltage line—12 A
AC output power	<ul style="list-style-type: none"> • Low-voltage line—1200 W • High-voltage line—2000 W

[Table 27 on page 66](#) lists the AC power specifications for a 3000 W power supply used in EX8200 switches.

Table 27: Power Specifications for a 3000 W AC Power Supply in an EX8200 Switch

Item	Specifications
AC input voltage	Operating range: <ul style="list-style-type: none"> • High-voltage line—200–240 VAC NOTE: Low-voltage line input is not supported for 3000 W AC power supplies on the EX8216 switch.
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> • High-voltage line—16 A
AC output power	<ul style="list-style-type: none"> • High-voltage line—3000 W

AC Power Cord Specifications for an EX8200 Switch

Each AC power supply has a single AC appliance inlet that requires a dedicated AC power feed. Most sites distribute power through a main conduit that leads to frame-mounted power distribution panels, one of which can be located at the top of the rack that houses the switch. An AC power cord connects each power supply to the power distribution panel.

Each detachable AC power cord is 8 feet (approximately 2.5 meters) long. The appliance coupler end of the cord inserts into the AC appliance inlet on the faceplate of the AC power supply. The coupler type is C19 as described by the International Electrotechnical Commission (IEC) standard 60320. The plug end of the power cord fits into the power source outlet that is standard for your geographical location.

NOTE: In North America, AC power cords must not exceed 15 feet (approximately 4.5 meters) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52 and Canadian Electrical Code (CEC) Section 4-010(3). The cords shipped with the switch to North America and Canada are in compliance.

Table 28 on page 67 lists the AC power cord specifications for an EX8200 switch for various countries and regions.

Table 28: AC Power Cord Specifications for an EX8200 Switch

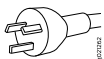
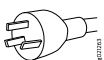
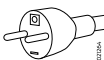
Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Argentina	250 VAC, 16 A, 50 Hz	IRAM Type RA/3/20	CBL-EX-PWR-C19-AR	No graphic available.
Australia	250 VAC, 15 A, 50 Hz	AS/NZS 3112 Type SAA/3/15	CBL-EX-PWR-C19-AU	
Brazil	250 VAC, 16 A, 50 Hz	NBR 14136: 2002 Type BR/3/20	CBL-EX-PWR-C19-BR	No graphic available.
China	250 VAC, 16 A, 50 Hz	GB 1002 Type PRC/3/16	CBL-EX-PWR-C19-CH	
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 16 A, 50 Hz	CEE (7) VII Type VIIG	CBL-EX-PWR-C19-EU	
India	250 VAC, 16 A, 50 Hz	SABS 164/1:1992 Type ZA/3	CBL-EX-PWR-C19-IN	No graphic available.

Table 28: AC Power Cord Specifications for an EX8200 Switch (continued)

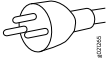

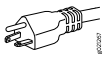

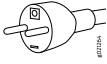
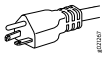

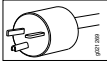


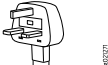
Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Israel	250 VAC, 16 A, 50 Hz	SI 32/1971 Type IL/3	CBL-EX-PWR-C19-IL	
Italy	250 VAC, 16 A, 50 Hz	CEI 23-16 Type I/3/16	CBL-EX-PWR-C19-IT	
Japan	250 VAC, 16 A, 50 Hz or 60 Hz	NEMA 6-20 Type N6/20	CBL-EX-PWR-C19-JP	
	250 VAC, 16 A, 50 Hz or 60 Hzv	NEMA L6-20P Type NEMA Locking	CBL-EX-PWR-C19-JPL (default)	
Korea	250 VAC, 16 A, 50 Hz	CEE (7) VII Type VIIG	CBL-EX-PWR-C19-KR	
North America	250 VAC, 16 A, 60 Hz	NEMA 6-20 Type N6/20	CBL-EX-PWR-C19-US	
	250 VAC, 16 A, 60 Hz	NEMA L6-20P Type NEMA Locking	CBL-EX-PWR-C19-USL (default)	
	125 VAC, 15 A, 60 Hz	NEMA 5-15 Type N5/15 NOTE: Only for use with 2000 W AC power supply.	CBL-EX-PWR-C19-US-15	No graphic available.
	125 VAC, 20 A, 60 Hz	NEMA 5-20 Type N5-20 NOTE: Only for use with 2000 W AC power supply.	CBL-EX-PWR-C19-US-20	
South Africa	250 VAC, 16 A, 50 Hz	SABS 164/1:1992 Type ZA/3	CBL-EX-PWR-C19-SA	
Switzerland	250 VAC, 16 A, 50 Hz	SEV 5934/2 Type 23G	CBL-EX-PWR-C19-SZ	No graphic available.

Table 28: AC Power Cord Specifications for an EX8200 Switch (continued)

Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Taiwan	250 VAC, 16 A, 50 Hz	NEMA L6-20P Type NEMA LOCKING	CBL-EX-PWR-C19-TW	
United Kingdom	250 VAC, 13 A, 50 Hz	BS 1363/A Type BS89/13	CBL-EX-PWR-C19-UK	



CAUTION: AC power cords for EX8200 switches are intended for use with these switches only. Do not use the cord for another product.

Power Cable Warning (Japanese)

WARNING: The attached power cable is only for this product. Do not use the cable for another product.

注意

附属の電源コードセットはこの製品専用です。
他の電気機器には使用しないでください。

g017253



CAUTION: Power cords must not block access to switch components. We recommend that you route all AC power cord cables through the power cord tray provided with the switch.



WARNING: The switch is installed in a restricted-access location. It has a separate protective earthing terminal on the chassis that must be permanently connected to earth ground to adequately ground the chassis and protect the operator from electrical hazards.

DC Power Supply in an EX8200 Switch

The DC power supplies in EX8200 switches are hot-removable and hot-insertable field-replaceable units (FRUs).

NOTE: EX8208 switches support 2000 W DC power supplies.

EX8216 switches support 3000 W DC power supplies.

You can install up to six DC power supplies in an EX8200 switch. Power supplies are installed at the bottom of the chassis in slots labeled PSU 0 through PSU 5 (left to right). See [“Slot Numbering for an EX8208 Switch” on page 40](#) and [Slot Numbering for an EX8216 Switch](#). All power supplies are accessible from the front of the chassis.



WARNING: The switch is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis. This separate protective earthing terminal must be permanently connected to earth ground.

NOTE: EX8216 switches have two protective earthing terminals provided on the chassis, one on the left side of the chassis and the other on the rear of the chassis. Only one of these protective earthing terminals needs to be permanently connected to earth ground. See [Chassis Physical Specifications of an EX8216 Switch](#) for the location of the protective earthing terminals.

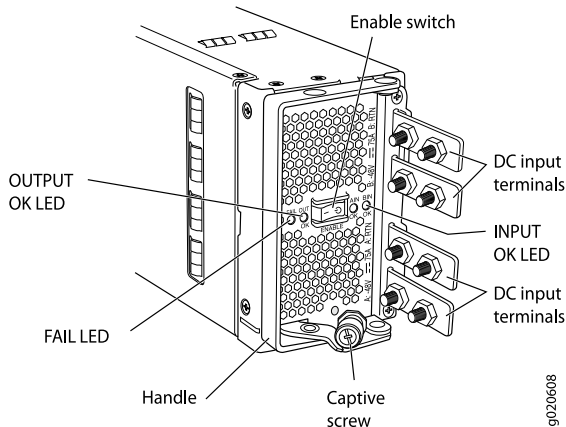
NOTE: DC power supplies are shipped only in the redundant configuration of EX8200 switches.

See [“EX8208 Switch Configurations” on page 27](#) for details about different EX8208 switch configurations.

See [EX8216 Switch Configurations](#) for details about different EX8216 switch configurations.

Each DC power supply weighs approximately 7 lb (3.2 kg) and has two independent pairs of DC input lugs (A: -48V A: RTN and B: - 48V B: RTN) on the front of the power supply. Each power supply also has an **Enable** switch, a fan, and four LEDs on the faceplate that indicate the status of the power supply. See [Figure 13 on page 71](#).

Figure 13: DC Power Supply



NOTE: A 2000 W DC power supply requires a dedicated 60 A circuit breaker for each input DC feed.

A 3000 W DC power supply requires a dedicated 100 A circuit breaker for each input DC feed.

Each DC power supply connects to the backplane in an EX8208 switch and to the midplane in an EX8216 switch. The backplane in an EX8208 switch and the midplane in an EX8216 switch distribute the output power produced by the power supplies to different switch components. Each DC power supply provides power to all the components in the switch.

The output of each 2000 W DC power supply is 52 VDC. The output power is 2000 W.

The output of each 3000 W DC power supply is 52 VDC. The output power is 3000 W.

A DC power supply works with only one input DC feed connected. It is able to deliver the full output power to all chassis components with only one DC feed connected.

Each DC power supply has its own fan and is cooled by its own internal cooling system. The airflow is from the front of the power supply to the back. Hot air exhausts from the rear of the chassis.

The minimum power configuration required by an EX8200 switch is an N+1 power configuration. In an N+1 power configuration, if one power supply fails or is removed, the remaining power supplies continue to supply power for the system without interruption.

The configuration type of the switch and the input voltage determine the number of power supplies needed (N) for a switch. You must install an additional power supply to meet the required N+1 power redundancy configuration. The DC power supplies each provide independent A and B power feeds, so that dual power feed redundancy is available even in an N+1 configuration. See [“EX8208 Switch Configurations” on page 27](#) for details about different EX8208 switch configurations. See *EX8216 Switch Configurations* for details about different EX8216 switch configurations.

The tables in this section list the N+1 power requirements of different EX8200 switch configurations:

- [Table 29 on page 72](#)—Lists the N+1 power requirements of EX8208 switch configurations that use 2000 W DC power supplies.
- [Table 30 on page 72](#)—Lists the N+1 power requirements of EX8216 switch configurations that use 3000 W DC power supplies.

Table 29: N+1 Power Redundancy Configurations for Different EX8208 Switch Configurations Using 2000 W DC Power Supplies

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+1
Base	-40 VDC through -72 VDC	1	2
Fully loaded with 8-port SFP+ line cards	-40 VDC through -72 VDC	3	4

Table 30: N+1 Power Redundancy Configurations for Different EX8216 Switch Configurations Using 3000 W DC Power Supplies

Switch Configuration	Input Voltage	Power Supplies Needed (N)	Power Supplies Needed for N+1
Base	-40 VDC through -72 VDC	1	2
Fully loaded with 8-port SFP+ line cards	-40 VDC through -72 VDC	4	5

DC Power Supply LEDs in an EX8200 Switch

A DC power supply has four LEDs on its faceplate: **FAIL**, **OUT OK**, **A IN OK**, and **B IN OK** LEDs. The text **A** or **B** next to the **OK IN** LEDs indicates which input lug the LED corresponds to. All four LEDs display information about the status of the power supply. See [Figure 14 on page 73](#).

NOTE: EX8208 switches support 2000 W DC power supplies.

EX8216 switches support 3000 W DC power supplies.

Figure 14: DC Power Supply LEDs in an EX8200 Switch

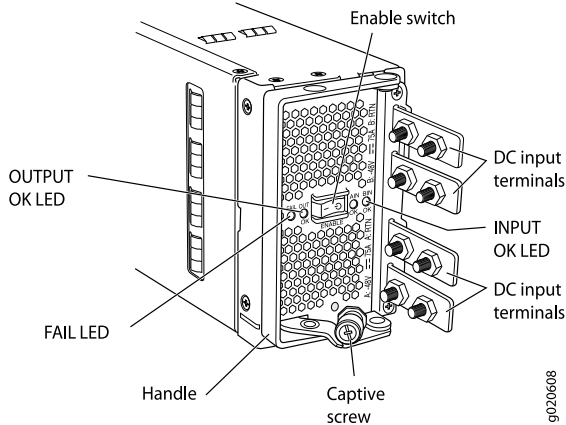


Table 31 on page 73 describes the LEDs on a DC power supply in EX8200 switches.

Table 31: DC Power Supply LEDs in EX8200 Switches

LED	State	Description
A IN OK	Unlit	Indicates one of the following: <ul style="list-style-type: none"> • Power supply is disconnected from DC power feed. • DC power input voltage is not within normal operating range (-40 VDC through -72 VDC). • No DC power input.
	Green	<ul style="list-style-type: none"> • DC power input voltage is within normal operating range (-40 VDC through -72 VDC).
	Yellow	<ul style="list-style-type: none"> • DC input is present on the terminals but either the fuse is tripped or the ORing diode is open.
	Red	<ul style="list-style-type: none"> • DC power input voltage is reversed in polarity. <p>NOTE: The DC power supply is protected against reverse polarity input for both DC input feeds.</p>

Table 31: DC Power Supply LEDs in EX8200 Switches (continued)

LED	State	Description
B IN OK	Unlit	Indicates one of the following: <ul style="list-style-type: none"> • Power supply is disconnected from DC power feed. • DC power input voltage is not within normal operating range (-40 VDC through -72 VDC). • No DC power input.
	Green	<ul style="list-style-type: none"> • DC power input voltage is within the normal operating range (-40 VDC through -72 VDC).
	Yellow	<ul style="list-style-type: none"> • DC input is present on the terminals but either the fuse is tripped or the ORing diode is open.
	Red	<ul style="list-style-type: none"> • DC power input voltage is reversed in polarity. <p>NOTE: The DC power supply is protected against reverse polarity input for both DC input feeds.</p>
OUT OK	Unlit	Indicates one of the following: <ul style="list-style-type: none"> • DC output voltage is not within normal operating range. • Power supply is not supplying DC power correctly.
	Green	<ul style="list-style-type: none"> • DC power output is within normal operating range.
	Yellow	<ul style="list-style-type: none"> • Power supply has been disabled internally by the system.
FAIL	Unlit	<ul style="list-style-type: none"> • Power supply is functioning normally.
	Yellow	<ul style="list-style-type: none"> • On steadily—Power supply has failed. • Blinking—Demand for output power exceeds the supply.

NOTE: If the **IN OK** LED and the **OUT OK** LED are unlit, the power cords are not installed properly or the power supply has failed.

If the **IN OK** LED is lit green and the **OUT OK** LED is unlit, the power supply is not installed properly or the power supply has an internal failure.

If the **FAIL** LED is lit, the power supply has failed and must be replaced. If the **FAIL** LED is blinking, add a power supply to balance the power demand and supply.

DC Power Specifications for EX8200 Switches

Table 32 on page 75 lists the power specifications for the 3000 W DC power supply used in EX8216 switches.

Table 32: Power Specifications for a 3000 W DC Power Supply Used in an EX8216 Switch

Item	Specifications
DC input voltage	<ul style="list-style-type: none"> • Minimum operating voltage: -40 VDC • Nominal operating voltage: -48 VDC • Operating voltage range: -40 VDC through -72 VDC <p>NOTE: If the input voltage from the DC power source drops below -37.5 VDC through -39.5 VDC, the switching platform automatically shuts down. During automatic shutdown, the circuit remains active. When the input voltage returns to -43 VDC through -44 VDC, the switch automatically starts up again and the system returns to normal operation within 30 minutes. No operator intervention is required.</p>
DC input current rating	75 A maximum at nominal operating voltage (-48 VDC) for each input terminal.
Output power	3000 W
Internal Fuse Protection	100 A

Table 33 on page 76 lists the power specifications for the 2000 W DC power supply used in EX8208 switches.

Table 33: Power Specifications for a 2000 W DC Power Supply Used in an EX8208 Switch

Item	Specifications
DC input voltage	<ul style="list-style-type: none"> • Minimum operating voltage: -40 VDC • Nominal operating voltage: -48 VDC • Operating voltage range: -40 VDC through -72 VDC <p>NOTE: If the input voltage from the DC power source drops below -37.5 VDC through -39.5 VDC, the switching platform automatically shuts down. During automatic shutdown, the circuit remains active. When the input voltage returns to -43 VDC through -44 VDC, the switch automatically starts up again and the system returns to normal operation within 30 minutes. No operator intervention is required.</p>
DC input current rating	50 A maximum at nominal operating voltage (-48 VDC) for each input terminal.
Output power	2000 W
Internal Fuse Protection	100 A

Grounding Cable and Lug Specifications for EX8200 Switches

To ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements, you must connect an EX Series switch to earth ground before you connect power to the switch. You must use the protective earthing terminal on the switch chassis to connect the switch to earth ground.



WARNING: The switch is installed in a restricted-access location. It has a separate protective earthing terminal on the chassis that must be permanently connected to earth ground to adequately ground the chassis and protect the operator from electrical hazards.



CAUTION: Before switch installation begins, ensure that a licensed electrician has attached an appropriate grounding lug to the grounding cable that you supply. Using a grounding cable with an incorrectly attached lug can damage the switch.

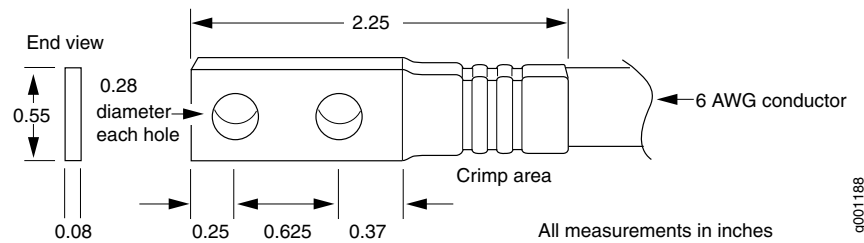
Grounding requirements for EX8200 switches:

- EX8208 switches—A pair of threaded inserts (PEM nuts) is provided on the right side toward the top rear corner of the EX8208 chassis for connecting the switch to earth ground. The grounding points fit UNC ¼-20 screws. The grounding points are spaced at 0.625 in. (15.86 mm).

The grounding cable that you provide for an EX8208 switch must be 2 AWG (33.6 mm²), minimum 60°C wire, or as permitted by the local code.

Figure 15 on page 77 shows the grounding lug that attaches to the grounding cable in an EX8208 switch.

Figure 15: Grounding Lug for an EX8208 Switch



- EX8216 switches—Two pairs of threaded inserts (PEM nuts) are provided on the EX8216 chassis for connecting the switch to earth ground. The first pair is located on the right side toward the top rear corner of the chassis. The second pair is on the rear of chassis toward the bottom right corner of the chassis. Both pairs of grounding points fit UNC ¼-20 screws. The grounding points are spaced at 0.625 in. (15.86 mm).

The grounding cable that you provide for an EX8216 switch must be 2 AWG (33.6 mm²), minimum 60°C wire, or as permitted by the local code.

NOTE: EX8216 switches have two protective earthing terminals provided on the chassis. Only one of these protective earthing terminals needs to be permanently connected to earth ground. See *Chassis Physical Specifications of an EX8216 Switch* for the location of the protective earthing terminals.

Two grounding lugs are shipped with the EX8216 switch.

EX8208 Host Subsystem

IN THIS SECTION

- Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch | 78
- SRE Module LEDs in an EX8208 Switch | 80
- Switch Fabric (SF) Module in an EX8208 Switch | 81
- SF Module LEDs in an EX8208 Switch | 82

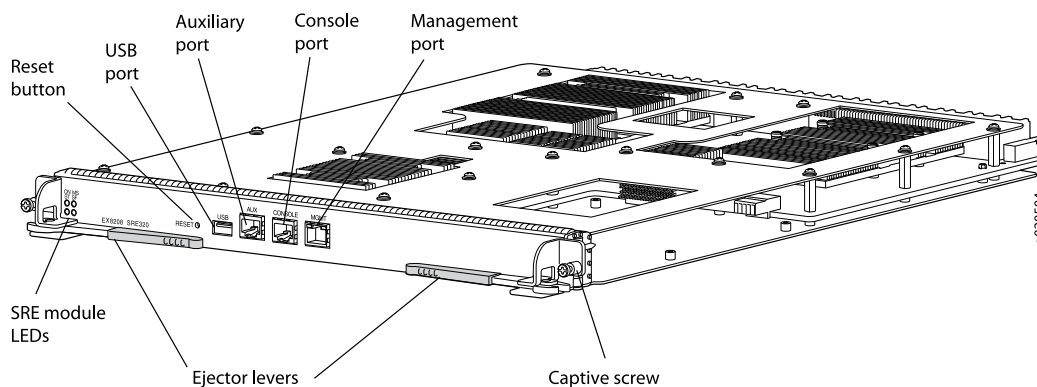
Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch

The Switch Fabric and Routing Engine (SRE) module performs switching and system management functions in an EX8208 switch. See [Figure 16 on page 78](#).

You can install one or two SRE modules in an EX8208 switch. A base configuration EX8208 switch has only one SRE module. See [“EX8208 Switch Configurations” on page 27](#). You can add a second SRE module to the configuration for Routing Engine and switch control redundancy. See [“Understanding EX8208 Switch Component and Functionality Redundancy” on page 37](#).

The SRE modules install horizontally into the front of the chassis in slots labeled SRE0 and SRE1.

Figure 16: SRE Module in an EX8208 Switch



NOTE: We recommend that you install two SRE modules for redundancy. If you install only one SRE module, we recommend that you install it in slot SRE0. See [“Slot Numbering for an EX8208 Switch” on page 40](#).

If two SRE modules are installed, one functions as the primary and the other acts as the backup. If the primary SRE module fails or is removed, the backup takes over as the primary.

If two SRE modules are installed, the backup SRE module is hot-insertable and hot-removable, but the primary SRE module is hot-pluggable. If only one SRE module is installed, you must halt the SRE module before removing it.

The SRE module provides these functions:

- Provides full fabric connectivity to all line cards installed in the chassis
- Through the switching plane, provides switching functionality to the switch
- Powers the line cards on and off
- Controls system resets and boot sequence for the switch
- Monitors and controls the fan speed, power status for various chassis components, LCD panel and chassis status LEDs

The SRE module has these components:

- SRE module LEDs—Indicate system status. See [“SRE Module LEDs in an EX8208 Switch” on page 80](#).
- Recessed reset button—Power cycles the SRE module when pressed.

Take the SRE module offline using the CLI before pressing the reset button. See [“Taking the SRE Module Offline in an EX8208 Switch” on page 251](#).

- USB port—Provides an interface through which you can install the Junos OS manually. See [“USB Port Specifications for an EX Series Switch” on page 136](#).
- Auxiliary port—This port is not enabled on the EX8200 switch. It is reserved for future use.
- Console port—Connects the SRE module to a system console through a cable with an RJ-45 connector. See [“Connect a Device to a Management Console Using an RJ-45 Connector” on page 183](#).
- Management port—Connects the SRE module through an Ethernet connection to a management LAN (or any other device that plugs into an Ethernet connection) for out-of-band management. See [“Connect a Device to a Network for Out-of-Band Management” on page 182](#).
- Ejector levers—Used for installing and removing the SRE module.
- Captive screws—Secure the SRE module in place.

SRE Module LEDs in an EX8208 Switch

Each Switch Fabric and Routing Engine (SRE) module has four LEDs on the left side of the module's front panel. See [Figure 17 on page 80](#). [Table 34 on page 80](#) describes these LEDs, their colors and states, and the status they indicate.

Figure 17: SRE Module LEDs in an EX8208 Switch

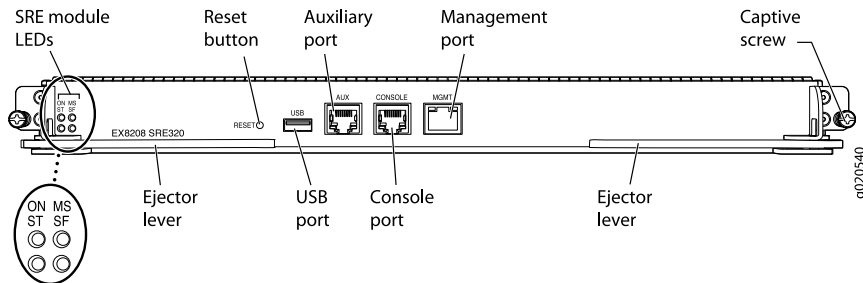


Table 34: SRE Module LEDs of an EX8208 Switch

LED Label (Description)	Color	State and Description
ON (Power On)	Green	SRE module is powered on.
	Unlit	SRE module is powered off.
ST (Status)	Green	<ul style="list-style-type: none"> On steadily—SRE module is operating normally. Blinking—SRE module is booting.
	Yellow	<ul style="list-style-type: none"> On steadily—SRE module has failed.
	Unlit	SRE module is offline.
MS (Primary)	Green	<ul style="list-style-type: none"> On steadily—SRE module is the primary. Blinking—SRE module is in standby mode. <p>NOTE: For EX8208 switches, running a Junos OS release prior to Release 10.2R1, the MS led on the backup SRE module remains unlit. To resolve this issue, upgrade the switch to Junos OS Release 10.2R1 or higher.</p>
	Unlit	SRE module is powered off.

Table 34: SRE Module LEDs of an EX8208 Switch (*continued*)

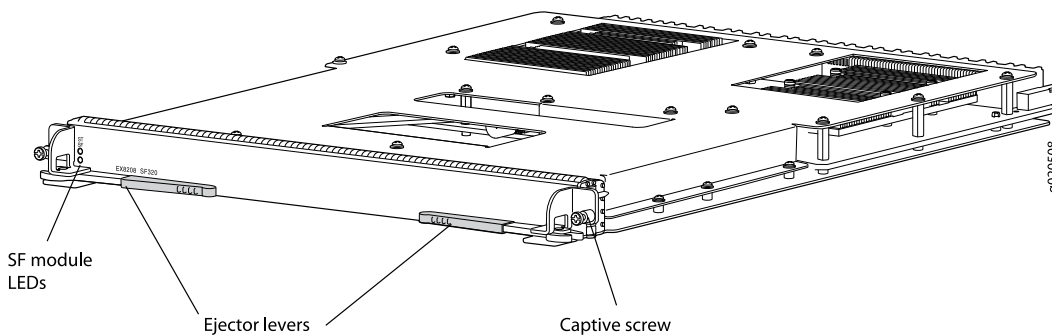
LED Label (Description)	Color	State and Description
SF (Switch Fabric)	Green	<ul style="list-style-type: none"> On steadily—Switch fabric in the SRE module is operating normally. Blinking—Switch fabric in the SRE module is in standby mode.
	Yellow	Switch fabric in the SRE module has failed.
	Unlit	SRE module is powered off.

Switch Fabric (SF) Module in an EX8208 Switch

The Switch Fabric (SF) module provides switching functionality. See [Figure 18 on page 81](#).

An EX8208 switch can have either zero SF modules or one SF module. The base configuration of an EX8208 switch includes one SF module. See [“EX8208 Switch Configurations” on page 27](#).

Figure 18: SF Module in an EX8208 Switch



The SF module can be installed only in the slot labeled SF. The SF module is keyed so that it does not fit in the other slots in the chassis. See [“Slot Numbering for an EX8208 Switch” on page 40](#).

In the base configuration, an SF module is used with a single Switch Fabric and Routing Engine (SRE) module to build a nonredundant system that provides full bandwidth. However, a base configuration EX8208 switch has no Routing Engine and switch control redundancy or switch fabric redundancy. In a base configuration, the main function of the SF module is to switch data between line cards. See [“Understanding EX8208 Switch Component and Functionality Redundancy” on page 37](#).

In a redundant configuration, an SF module is used with two SRE modules to achieve full bandwidth along with Routing Engine and switch control redundancy and switch fabric redundancy. In a redundant

configuration, the main function of the SF module is to provide a redundant switching plane for the switch. See [“Understanding EX8208 Switch Component and Functionality Redundancy”](#) on page 37.

In a redundant configuration, the SF module is hot-pluggable. However, in the base configuration, you must take the SF module offline before removing it.

The SF module contains logic that determines which SRE module is the primary. The primary SRE module controls many internal functions of the SF module.

The SF module provides these functions:

- Provide redundant data path connectivity for the switch in the redundant configuration
- Provide nonredundant data path connectivity for the switch in the base configuration

The SF module has these components:

- SF module LEDs—Indicate system status. See [“SF Module LEDs in an EX8208 Switch”](#) on page 82.
- Ejector levers—Used for installing and removing the SF module.
- Captive screws—Secure the SF module in place.

SF Module LEDs in an EX8208 Switch

The Switch Fabric (SF) module has two LEDs on the left side of the module’s front panel. See [Figure 19 on page 82](#). [Table 35 on page 83](#) describes these LEDs, their colors and states, and the status they indicate.

Figure 19: SF Module LEDs in an EX8208 Switch

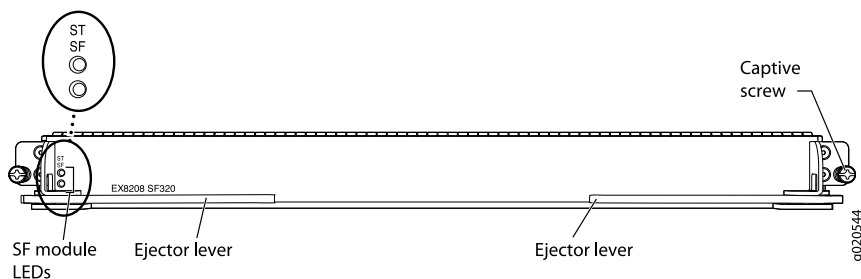


Table 35: SF Module LEDs of an EX8208 Switch

LED (Description)	Color	State and Description
ST (Status)	Green	<ul style="list-style-type: none"> On steadily—SF module is operating normally. Blinking—Waiting to be configured by the primary Switch Fabric and Routing Engine (SRE) module.
	Yellow	SF module has failed.
	Unlit	SF module is offline.
SF (Switch Fabric)	Green	<p>On steadily—Switch fabric in SF module is operating normally.</p> <p>Blinking—Switch fabric in SF module is offline.</p>
	Yellow	On steadily—Switch fabric in SF module has failed.
	Unlit	SF module is powered off.

EX8200 Line Cards

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- [Line Card Model and Version Compatibility in an EX8200 Switch | 84](#)
- [8-port SFP+ Line Card in an EX8200 Switch | 86](#)
- [40-port SFP+ Line Card in an EX8200 Switch | 88](#)
- [EX8200-2XS-40P Line Card | 92](#)
- [EX8200-2XS-40T Line Card | 94](#)
- [EX8200-48PL Line Card | 97](#)
- [EX8200-48TL Line Card | 99](#)
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Line Card Model and Version Compatibility in an EX8200 Switch

Twelve line cards are available for EX8200 switches. The extra-scale line card models, identified by the letters *ES* at the end of the model names, provide larger IPv4 and IPv6 route table than the non-extra-scale models to store more unicast routes.

[Table 36 on page 84](#) shows the model numbers, names of the line cards, the Junos OS release in which the models were released, the release in which support on EX8200 Virtual Chassis was introduced, and the release in which Virtual Chassis port (VCP) support was introduced for ports on the line card.

Table 36: Line Card Models by Junos OS Release

Model Number	Name	First Junos OS Release	Support on EX8200 Virtual Chassis	EX8200 Virtual Chassis Port (VCP) Support
EX8200-8XS	8-port SFP+ line card	9.4R1	10.4R1	10.4R1
EX8200-8XS-ES	8-port SFP+ line card, extra-scale	11.1R1	11.4R1	11.4R1
EX8200-40XS	40-port SFP+ line card	10.3R1	11.1R1	Not supported
EX8200-40XS-ES	40-port SFP+ line card, extra-scale	11.4R1	11.4R1	Not supported
EX8200-2XS-40P	40-port PoE+ with 4-port SFP and 2-port SFP+ line card	11.2R1	11.4R1	11.4R1 NOTE: VCPs supported on SFP+ transceivers only
EX8200-2XS-40T	40-port RJ-45 with 4-port SFP and 2-port SFP+ line card	11.2R1	11.4R1	11.4R1 NOTE: VCPs supported on SFP+ transceivers only
EX8200-48PL	48-port PoE+ 20 Gbps line card	11.2R1	11.4R1	Not supported
EX8200-48TL	48-port RJ-45 20 Gbps line card	11.2R1	11.4R1	Not supported
EX8200-48T	48-port RJ-45 line card	9.4R1	10.4R1	Not supported
EX8200-48T-ES	48-port RJ-45 line card, extra-scale	11.1R1	11.4R1	Not supported
EX8200-48F	48-port SFP line card	9.4R1	10.4R1	Not supported

Table 36: Line Card Models by Junos OS Release (*continued*)

Model Number	Name	First Junos OS Release	Support on EX8200 Virtual Chassis	EX8200 Virtual Chassis Port (VCP) Support
EX8200-48F-ES	48-port SFP line card, extra-scale	11.1R1	11.4R1	Not supported

[Table 37 on page 85](#) shows the model numbers, associated hardware revisions, and the required Junos OS release for the EX8200 line cards that are shipped after August 7, 2015.

Table 37: EX8200 Line Cards, Hardware Revision, and Junos OS Release

Model Number	Hardware Revision	Required Junos OS Release
EX8200-40XS-ES	750-036593 REV12 or later	For the line cards listed in this table to be operational, the EX8200 switch must be running one of the following Junos OS releases: <ul style="list-style-type: none"> • 12.3R10-S1 • 13.2X50 • 13.2X51 • 14.1X53 or later
EX8200-48F-ES	750-047322 REV03 or later	
EX8200-8XS-ES	750-047323 REV03 or later	
EX8200-48T-ES	750-047324 REV03 or later	
EX8200-40XS	750-046751 REV06 or later	
EX8200-48T	750-047327 REV03 or later	
EX8200-8XS	750-047326 REV03 or later	
EX8200-48F	750-047325 REV03 or later	

Ensure that all of the line cards in a switch are supported in the Junos OS release that you want to use.

NOTE: We recommend that you do not install extra-scale line card models and non-extra-scale models in the same switch or Virtual Chassis. If you install extra-scale line cards in a switch or Virtual Chassis that has non-extra-scale models installed, the IPv4 and IPv6 route table sizes default to those of the non-extra-scale models and you will not get the benefit of the increased table sizes of the extra-scale models.

You will experience these decreased route table sizes in a Virtual Chassis even when the non-extra-scale line cards are installed in one member switch and the extra-scale line cards are installed in another member switch.

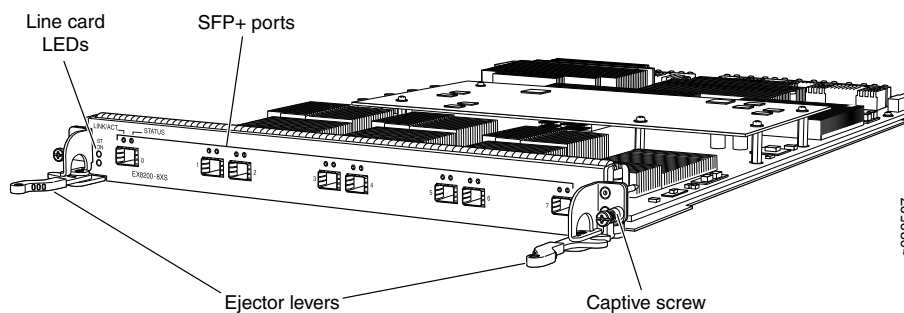
8-port SFP+ Line Card in an EX8200 Switch

IN THIS SECTION

- [Line Card Models | 87](#)
- [Line Card Components | 87](#)

The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. They are field-replaceable units (FRUs) that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions (see [Figure 20 on page 86](#)).

Figure 20: 8-port SFP+ Line Card



NOTE: Figure 20 on page 86 shows a line card that has 2-in.-long ejector levers. An earlier version of this line card has 4-in.-long ejector levers.

Line Card Models

Table 38 on page 87 shows the model numbers, descriptions of the line card models, the Junos OS release in which the models were released, the release in which support on EX8200 Virtual Chassis was introduced, and the release in which Virtual Chassis Port (VCP) support was introduced for ports on the line card.

Table 38: 8-port SFP+ Line Card Models

Model	Description	Junos OS Release Required	Support on EX8200 Virtual Chassis	EX8200 Virtual Chassis Port (VCP) Support
EX8200-8XS	8-port SFP+ line card	9.4R1 or later	10.4R1	10.4R1
EX8200-8XS-ES	Extra-scale 8-port SFP+ line card NOTE: The extra-scale model provides larger IPv4 and IPv6 route table sizes than the non-extra-scale models to store more unicast routes.	11.1R1 or later	11.4R1	11.4R1

NOTE: We recommend that you do not install extra-scale line card models and non-extra-scale models in the same switch or Virtual Chassis. If you install extra-scale line cards in a switch or Virtual Chassis that has non-extra-scale models installed, the IPv4 and IPv6 route table sizes default to those of the non-extra-scale models and you will not get the benefit of the increased table sizes of the extra-scale models.

You will experience these decreased route table sizes in a Virtual Chassis even when the non-extra-scale line cards are installed in one member switch and the extra-scale line cards are installed in another member switch.

Line Card Components

Both models of the 8-port SFP+ line card (see Figure 20 on page 86) have:

- Eight 10-gigabit SFP+ ports, which can house SFP+ transceivers

NOTE: The 10-Gigabit Ethernet ports on the 8-port SFP+ line cards are the only ports that you can configure as Virtual Chassis port (VCP) links between EX8200 member switches in an EX8200 Virtual Chassis. You cannot configure ports on any other EX8200 line cards—including the 10-Gigabit Ethernet ports on the 40-port SFP+ line cards—as VCPs. See *Setting a 10-Gigabit Ethernet Port as a Virtual Chassis Port in an EX8200 Virtual Chassis (CLI Procedure)*.

- Eight dust covers preinstalled in the network ports
- Line card status LEDs—Two status LEDs labeled ON and ST that indicate the online and status information for the line card. See [“Line Card LEDs in an EX8200 Switch” on page 105](#).
- Network port LEDs—Two LEDs per network port that indicate the link/activity and status of each port. See *Network Port LEDs in an EX8200 Switch*.

SEE ALSO

| [SFP+ Direct Attach Copper Cables for EX Series Switches | 129](#)

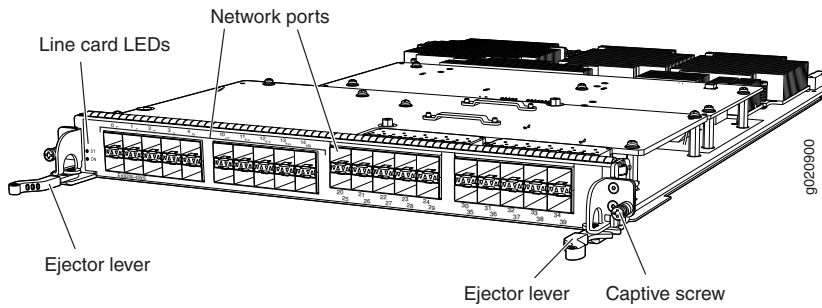
40-port SFP+ Line Card in an EX8200 Switch

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- [Line Card Models | 89](#)
- [Line Card Components | 90](#)
- [Line Card Ports | 90](#)

The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. They are field-replaceable units (FRUs) that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions. See [Figure 21 on page 89](#).

Figure 21: 40-port SFP+ Line Card



Line Card Models

Table 39 on page 89 shows the model numbers, description of the line card models, the Junos OS release in which the line card was released, the release in which support on EX8200 Virtual Chassis was introduced, and the release in which Virtual Chassis Port (VCP) support was introduced for ports on the line card.

Table 39: 40-port SFP+ Line Card Models

Model	Description	Junos OS Release Required	Support on EX8200 Virtual Chassis	EX8200 Virtual Chassis Port (VCP) Support
EX8200-40XS	40-port SFP+ line card	10.3R1 or later	11.1R1	Not supported
EX8200-40XS-ES	Extra-scale 40-port SFP+ line card NOTE: The extra-scale model provides larger IPv4 and IPv6 route table sizes than the non-extra-scale models to store more unicast routes.	11.4R1 or later	11.4R1	Not supported

NOTE: We recommend that you do not install extra-scale line card models and non-extra-scale models in the same switch or Virtual Chassis. If you install extra-scale line cards in a switch or Virtual Chassis that has non-extra-scale models installed, the IPv4 and IPv6 route table sizes default to those of the non-extra-scale models and you will not get the benefit of the increased table sizes of the extra-scale models.

You will experience these decreased route table sizes in a Virtual Chassis even when the non-extra-scale line cards are installed in one member switch and the extra-scale line cards are installed in another member switch.

Line Card Components

Both models of the 40-port SFP+ line card (see [Figure 21 on page 89](#)) have:

- 40 oversubscribed 10-gigabit SFP+ ports, which can house SFP+ or SFP transceivers
- 40 dust covers (shipped in an accessory bag)
- Line card status LEDs—Two status LEDs labeled ON and ST that indicate the online and status information for the line card. See [“Line Card LEDs in an EX8200 Switch” on page 105](#).
- Network port LEDs—Two LEDs per network port that indicate the link/activity and status of each port. See [Network Port LEDs in an EX8200 Switch](#).

Line Card Ports

The ports on the faceplate of the line card are numbered sequentially. The ports are divided into eight groups, with each group comprising five ports (see [Figure 22 on page 91](#)). [Table 40 on page 90](#) shows the port numbers on an EX8200-40XS line card and the port groups for each set of ports.

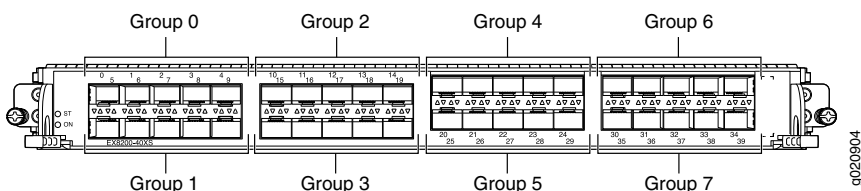
Table 40: Port Numbers and Port Groups on a 40-port SFP+ Line Card

Port Number	Group Number
0 through 4	0
5 through 9	1
10 through 14	2
15 through 19	3
20 through 24	4

Table 40: Port Numbers and Port Groups on a 40-port SFP+ Line Card (continued)

Port Number	Group Number
25 through 29	5
30 through 34	6
35 through 39	7

Figure 22: Port Numbering and Port Groups on a 40-port SFP+ Line Card



The ports in each port group share 10 gigabits of bandwidth. Thus, you can transmit up to 10 gigabits of traffic through a port group without packet drop.

The oversubscription ratios for different port groups can differ from one another; the ratios depend on the amount of traffic being transmitted through a port group.

For more information about using these ports:

- To understand how traffic is handled by oversubscribed ports, see *Understanding CoS Queues on EX8200 Line Cards That Include Oversubscribed Ports*.
- To understand how CoS queues are handled on these line cards, see *Understanding CoS Queues on EX8200 Line Cards That Include Oversubscribed Ports*.
- To see how to configure a different scheduler map for the ports in a group, see *Defining CoS Schedulers and Scheduler Maps (CLI Procedure)*.

SEE ALSO

| [Troubleshooting CoS Schedulers on a 40-port SFP+ Line Card in an EX8200 Switch](#)

EX8200-2XS-40P Line Card

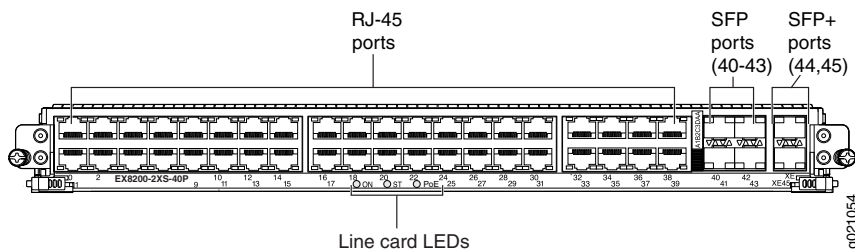
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- [Line Card Components | 93](#)
- [Line Card Ports | 93](#)

The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. They are field-replaceable units (FRUs) that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions.

The EX8200-2XS-40P (40-port PoE+ with 4-port SFP and 2-port SFP+) line card offers maximum port density for the access layer and SFP and SFP+ uplink ports for connection to the distribution layer (see [Figure 23 on page 92](#)).

Figure 23: EX8200-2XS-40P Line Card



Line Card Models

[Table 41 on page 93](#) shows the model number, description of the line card model, the Junos OS release in which the model was released, the release in which support on EX8200 Virtual Chassis was introduced, and the release in which Virtual Chassis Port (VCP) support was introduced for ports on the line card.

Table 41: EX8200-2XS-40P Line Card Models

Model	Description	Junos OS Release Required	Support on EX8200 Virtual Chassis	EX8200 Virtual Chassis Port (VCP) Support
EX8200-2XS-40P	40-port PoE+ with 4-port SFP and 2-port SFP+ line card	11.2R1 or later	11.4R1	11.4R1 NOTE: VCPs supported on SFP+ transceivers only

Line Card Components

The EX8200-2XS-40P line card (see [Figure 23 on page 92](#)) has:

- 40 oversubscribed RJ-45 ports (PoE-enabled or PoE+-enabled)
- 4 SFP uplink ports
- 2 SFP+ uplink ports
- Six dust covers (shipped in an accessory bag)
- Line card status LEDs—Three status LEDs labeled ON, ST, and PoE that indicate the online, status, and Power over Ethernet (PoE) information for the line card. See [“Line Card LEDs in an EX8200 Switch” on page 105](#).
- Network port LEDs—Two LEDs per network port that indicate the link/activity and status of each port. See [Network Port LEDs in an EX8200 Switch](#).

Line Card Ports

[Table 42 on page 93](#) shows the port number, port type, and port throughput on an EX8200-2XS-40P line card.

Table 42: Ports on the EX8200-2XS-40P Line Card

Port Number	Port Type	Throughput	Additional Information
0 through 11	Oversubscribed, RJ-45, PoE+ enabled	10/100/1000 Gigabit Ethernet	The first 12 RJ-45 ports (ports 0–11) are PoE+ enabled and support IEEE 802.3at.
12 through 39	Oversubscribed, RJ-45, PoE enabled	10/100/1000 Gigabit Ethernet	The final 28 RJ-45 ports (ports 12–39) are PoE enabled and support IEEE 802.3af.
40 through 43	SFP	Line rate	Can be used as an uplink of 1-Gigabit Ethernet fiber links in a link aggregation group (LAG).

Table 42: Ports on the EX8200-2XS-40P Line Card (continued)

Port Number	Port Type	Throughput	Additional Information
44 and 45	SFP+	Line rate	Can be used as an uplink of 10-Gigabit Ethernet fiber links in a link aggregation group (LAG).

The ports are divided into two port groups:

- The RJ-45 ports **0–19** and SFP ports **40** and **41** form one port group.
- The RJ-45 ports **20–39** and SFP ports **42** and **43** form another port group.

The ports in each group share 10 gigabits of bandwidth. The SFP ports operate at 1 gigabit bandwidth. Thus, you can transmit up to 8 gigabits of traffic through a port group when the SFP ports are active and up to 10 gigabits when the SFP ports are not active, without packet drop. The oversubscription ratios of different port groups can differ from one another; the ratios depend on the amount of traffic being transmitted through a port group.

For more information about using these ports:

- To understand how traffic is handled by oversubscribed ports, see *Understanding CoS Queues on EX8200 Line Cards That Include Oversubscribed Ports*.

SEE ALSO

| [Understanding PoE on EX Series Switches](#)

EX8200-2XS-40T Line Card

IN THIS SECTION

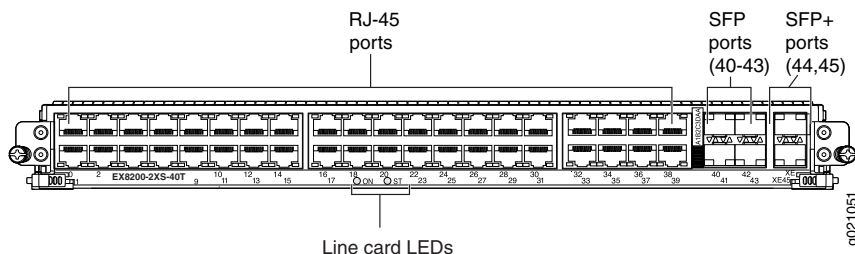
- [Line Card Models | 95](#)
- [Line Card Components | 95](#)
- [Line Card Ports | 96](#)

The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. They are field-replaceable units (FRUs) that can be installed in the line card slots on the front

of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions.

The EX8200-2XS-40T (40-port RJ-45 with 4-port SFP and 2-port SFP+) line card offers maximum port density for the access layer and SFP and SFP+ uplink ports for connection to the distribution layer (see [Figure 24 on page 95](#)).

Figure 24: EX8200-2XS-40T Line Card



Line Card Models

[Table 43 on page 95](#) shows the model number, description of the line card model, the Junos OS release in which the model was released, the release in which support on EX8200 Virtual Chassis was introduced, and the release in which Virtual Chassis Port (VCP) support was introduced for ports on the line card.

Table 43: EX8200-2XS-40T Line Card Models

Model	Description	Junos OS Release Required	Support on EX8200 Virtual Chassis	EX8200 Virtual Chassis Port (VCP) Support
EX8200-2XS-40T	40-port RJ-45 with 4-port SFP and 2-port SFP+ line card	11.2R1 or later	11.4R1	11.4R1 NOTE: VCPs supported on SFP+ transceivers only

Line Card Components

The EX8200-2XS-40T line card (see [Figure 24 on page 95](#)) has:

- 40 oversubscribed RJ-45 ports
- 4 SFP uplink ports
- 2 SFP+ uplink ports
- Six dust covers (shipped in an accessory bag)

- Line card status LEDs—Two status LEDs labeled ON and ST that indicate the online and status for the line card. See “[Line Card LEDs in an EX8200 Switch](#)” on page 105.
- Network port LEDs—Two LEDs per network port that indicate the link/activity and status of each port. See *Network Port LEDs in an EX8200 Switch*.

Line Card Ports

[Table 44 on page 96](#) shows the port number, port type, and port throughput on an EX8200-2XS-40T line card.

Table 44: Ports on the EX8200-2XS-40T Line Card

Port Number	Port Type	Throughput	Additional Information
0 through 39	Oversubscribed, RJ-45	10/100/1000 Gigabit Ethernet	
40 through 43	SFP	Line rate	Can be used as an uplink of 1-Gigabit Ethernet fiber links in a link aggregation group (LAG).
44 and 45	SFP+	Line rate	Can be used as an uplink of 10-Gigabit Ethernet fiber links in a link aggregation group (LAG).

The ports are divided into two port groups:

- The RJ-45 ports **0–19** and SFP ports **40** and **41** form one port group.
- The RJ-45 ports **20–39** and SFP ports **42** and **43** form another port group.

The ports in each group share 10 gigabits of bandwidth. The SFP ports operate at 1 gigabit bandwidth. Thus, you can transmit up to 8 gigabits of traffic through a port group when the SFP ports are active and up to 10 gigabits when the SFP ports are not active, without packet drop. The oversubscription ratios of different port groups can differ from one another; the ratios depend on the amount of traffic being transmitted through a port group.

For more information about using these ports:

- To understand how traffic is handled by oversubscribed ports, see *Understanding CoS Queues on EX8200 Line Cards That Include Oversubscribed Ports*.

EX8200-48PL Line Card

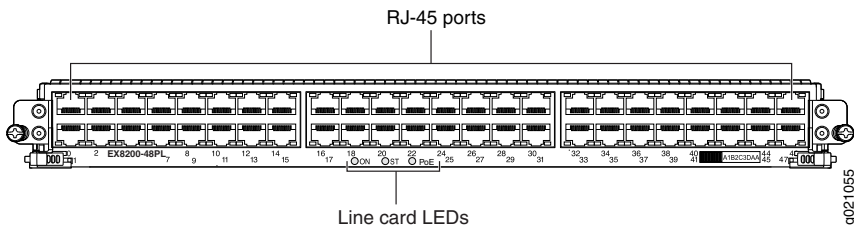
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The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. They are field-replaceable units (FRUs) that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions.

The EX8200-48PL (48-port PoE+ 20 Gbps) line card offers maximum port density for the access layer (see [Figure 25 on page 97](#)).

Figure 25: EX8200-48PL Line Card



Line Card Models

[Table 45 on page 98](#) shows the model number, description of the line card model, the Junos OS release in which the model was released, the release in which support on EX8200 Virtual Chassis was introduced, and the release in which Virtual Chassis Port (VCP) support was introduced for ports on the line card.

Table 45: EX8200-48PL Line Card Models

Model	Description	Junos OS Release Required	Support on EX8200 Virtual Chassis	EX8200 Virtual Chassis Port (VCP) Support
EX8200-48PL	48-port PoE+ 20 Gbps line card	11.2R1 or later	11.4R1	Not supported

Line Card Components

The EX8200-48PL line card (see [Figure 25 on page 97](#)) has:

- 48 oversubscribed RJ-45 ports (PoE-enabled or PoE+-enabled)
- Line card status LEDs—Three status LEDs labeled ON, ST, and Power over Ethernet (PoE) that indicate the online, status, and PoE information for the line card. See [“Line Card LEDs in an EX8200 Switch” on page 105](#).
- Network port LEDs—Two LEDs per network port that indicate the link/activity and status of each port. See [Network Port LEDs in an EX8200 Switch](#).

Line Card Ports

[Table 46 on page 98](#) shows the port number, port type, and port throughput on an EX8200-48PL line card.

Table 46: Ports on the EX8200-48PL Line Card

Port Number	Port Type	Throughput	Additional Information
0 through 11	Oversubscribed, RJ-45, PoE+-enabled	10/100/1000 Gigabit Ethernet	The first 12 RJ-45 ports (ports 0–11) are PoE+-enabled (support IEEE 802.3at)
12 through 47	Oversubscribed, RJ-45, PoE-enabled	10/100/1000 Gigabit Ethernet	The final 36 RJ-45 ports (ports 12–47) are PoE-enabled (support IEEE 802.3af)

The ports are divided into two port groups:

- The ports **0** through **23** form one port group.
- The ports **24** through **47** form another port group.

The ports in each group share 10 gigabits of bandwidth. You can transmit up to 10 gigabits of traffic through a port group without packet drop. The oversubscription ratios of different port groups can differ from one another; the ratios depend on the amount of traffic being transmitted through a port group.

For more information about using these ports:

- To understand how traffic is handled by oversubscribed ports, see *Understanding CoS Queues on EX8200 Line Cards That Include Oversubscribed Ports*.

SEE ALSO

| [Understanding PoE on EX Series Switches](#)

EX8200-48TL Line Card

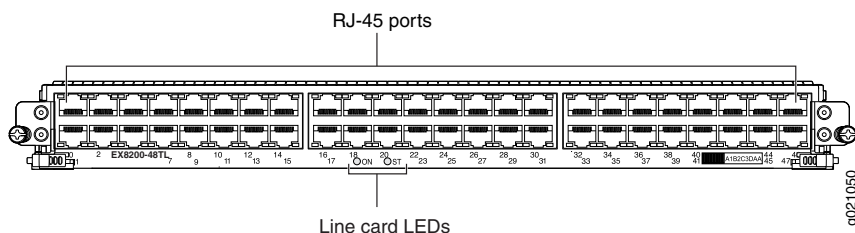
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The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. They are field-replaceable units (FRUs) that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions.

The EX8200-48TL (48-port RJ-45 20 Gbps) line card offers maximum port density for the access layer (see [Figure 26 on page 100](#)).

Figure 26: EX8200-48TL Line Card



Line Card Models

Table 47 on page 100 shows the model number, description of the line card model, the Junos OS release in which the model was released, the release in which support on EX8200 Virtual Chassis was introduced, and the release in which Virtual Chassis Port (VCP) support was introduced for ports on the line card.

Table 47: EX8200-40TL Line Card Models

Model	Description	Junos OS Release Required	Support on EX8200 Virtual Chassis	EX8200 Virtual Chassis Port (VCP) Support
EX8200-40TL	48-port RJ-45 20 Gbps line card	11.2R1 or later	11.4R1	Not supported

Line Card Components

The EX8200-40TL line card (see Figure 26 on page 100) has:

- 40 oversubscribed RJ-45 ports
- Line card status LEDs—Two status LEDs labeled ON and ST that indicate the online and status information for the line card. See “Line Card LEDs in an EX8200 Switch” on page 105.
- Network port LEDs—Two LEDs per network port that indicate the link/activity and status of each port. See *Network Port LEDs in an EX8200 Switch*.

Line Card Ports

Table 48 on page 100 shows the port number, port type, and port throughput on an EX8200-48TL line card.

Table 48: Ports on the EX8200-48PL Line Card

Port Number	Port Type	Throughput
0 through 47	Oversubscribed, RJ-45	10/100/1000 Gigabit Ethernet

The ports are divided into two port groups:

- The ports 0 through 23 form one port group.
- The ports 24 through 47 form another port group.

The ports in each group share 10 gigabits of bandwidth. You can transmit up to 10 gigabits of traffic through a port group without packet drop. The oversubscription ratios of different port groups can differ from one another; the ratios depend on the amount of traffic being transmitted through a port group.

For more information about using these ports:

- To understand how traffic is handled by oversubscribed ports, see *Understanding CoS Queues on EX8200 Line Cards That Include Oversubscribed Ports*.

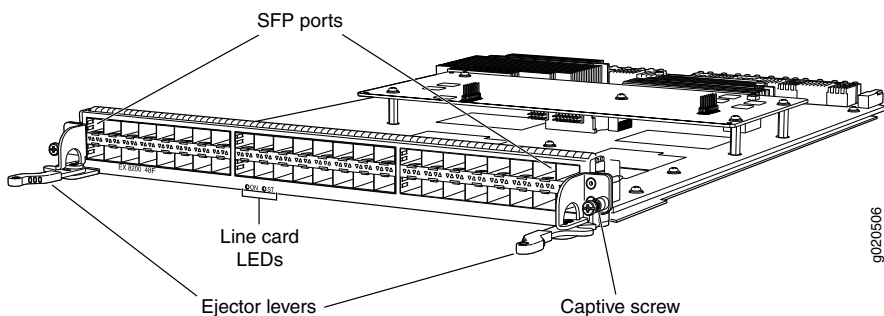
48-Port SFP Line Card in an EX8200 Switch

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- [Line Card Models | 102](#)
- [Line Card Components | 102](#)

The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. They are field-replaceable units (FRUs) that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions (see [Figure 27 on page 101](#)).

Figure 27: 48-port SFP Line Card



NOTE: [Figure 27 on page 101](#) shows a line card that has 2-in.-long ejector levers. An earlier version of this line card has 4-in.-long ejector levers.

Line Card Models

[Table 49 on page 102](#) shows the model numbers, descriptions of the line card models, the Junos OS release in which the models were released, the release in which support on EX8200 Virtual Chassis was introduced, and the release in which Virtual Chassis Port (VCP) support was introduced for ports on the line card.

Table 49: 48-port SFP Line Card Models

Model	Description	Junos OS Release Required	Support on EX8200 Virtual Chassis	EX8200 Virtual Chassis Port (VCP) Support
EX8200-48F	48-port SFP line card	9.4R1 or later	10.4R1	Not supported
EX8200-48F-ES	Extra-scale 48-port SFP line card NOTE: The extra-scale model provides larger IPv4 and IPv6 route table sizes than the non-extra-scale models to store more unicast routes.	11.1R1 or later	11.4R1	Not supported

NOTE: We recommend that you do not install extra-scale line card models and non-extra-scale models in the same switch or Virtual Chassis. If you install extra-scale line cards in a switch or Virtual Chassis that has non-extra-scale models installed, the IPv4 and IPv6 route table sizes default to those of the non-extra-scale models and you will not get the benefit of the increased table sizes of the extra-scale models.

You will experience these decreased route table sizes in a Virtual Chassis even when the non-extra-scale line cards are installed in one member switch and the extra-scale line cards are installed in another member switch.

Line Card Components

Both models of the 48-port SFP line card (see [Figure 27 on page 101](#)) have:

- 48 1-gigabit SFP ports, which can house SFP transceivers
- 48 dust covers (in an accessory bag)
- Line card status LEDs—Two status LEDs labeled ON and ST that indicate the online and status information for the line card. See [“Line Card LEDs in an EX8200 Switch” on page 105](#).
- Network port LEDs—Two LEDs per network port that indicate the link/activity and status of each port. See *Network Port LEDs in an EX8200 Switch*.

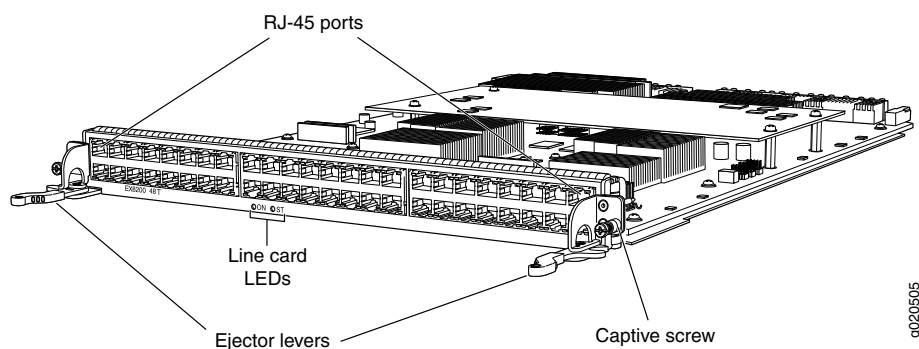
48-Port RJ-45 Line Card in an EX8200 Switch

IN THIS SECTION

- [Line Card Models | 104](#)
- [Line Card Components | 104](#)

The line cards in EX8200 switches combine a Packet Forwarding Engine and Ethernet interfaces on a single assembly. They are field-replaceable units (FRUs) that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions (see [Figure 28 on page 103](#)).

Figure 28: 48-port RJ-45 Line Card



NOTE: [Figure 28 on page 103](#) shows a line card that has 2-in.-long ejector levers. An earlier version of this line card has 4-in.-long ejector levers.

Line Card Models

Table 50 on page 104 shows the model numbers, descriptions of the line card models, the Junos OS release in which the models were released, the release in which support on EX8200 Virtual Chassis was introduced, and the release in which Virtual Chassis Port (VCP) support was introduced for ports on the line card.

Table 50: 48-port RJ-45 Line Card Models

Model	Description	Junos OS Release Required	Support on EX8200 Virtual Chassis	EX8200 Virtual Chassis Port (VCP) Support
EX8200-48T	48-port RJ-45 line card	9.4R1 or later	10.4R1	Not supported
EX8200-48T-ES	Extra-scale 48-port RJ-45 line card NOTE: The extra-scale model provides larger IPv4 and IPv6 route table sizes than the non-extra-scale models to store more unicast routes.	11.1R1 or later	11.4R1	Not supported

NOTE: We recommend that you do not install extra-scale line card models and non-extra-scale models in the same switch or Virtual Chassis. If you install extra-scale line cards in a switch or Virtual Chassis that has non-extra-scale models installed, the IPv4 and IPv6 route table sizes default to those of the non-extra-scale models and you will not get the benefit of the increased table sizes of the extra-scale models.

You will experience these decreased route table sizes in a Virtual Chassis even when the non-extra-scale line cards are installed in one member switch and the extra-scale line cards are installed in another member switch.

Line Card Components

Both models of the 48-port RJ-45 line card (see Figure 28 on page 103) have:

- 48 10/100/1000 Gigabit Ethernet RJ-45 ports
- Line card status LEDs—Two status LEDs labeled ON and ST that indicate the online and status information for the line card. See “Line Card LEDs in an EX8200 Switch” on page 105.

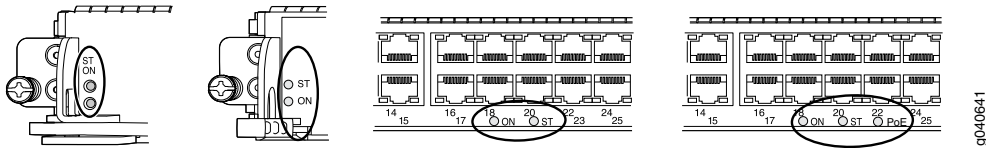
- Network port LEDs—Two LEDs per network port indicate the link/activity and status of each port. See *Network Port LEDs in an EX8200 Switch*.

Line Card LEDs in an EX8200 Switch

The line cards in EX8200 switches have two status LEDs labeled ON and ST on the faceplate (see [Figure 29 on page 105](#)) that indicate the online and status information of the line cards.

Figure 29: Line Card LEDs in an EX8200 Switch

Line card LEDs:



[Table 51 on page 105](#) describes the status LEDs on line cards for the EX8200 switch, their colors and state, and the status they indicate.

Table 51: Status LEDs on Line Cards for EX8200 Switches

LED	Color	State and Description
ON	Green	The line card is enabled/online.
	Yellow	The line card is disabled/offline.
	Unlit	There is no power being supplied to the line card.
ST	Green	<ul style="list-style-type: none"> • On steadily—The line card is functioning normally. • Blinking—The line card is booting.
	Yellow	<ul style="list-style-type: none"> • On steadily—There is a line card failure or alarm. • Blinking—The line card is in diagnostic mode.
	Unlit	The line card is disabled/offline.

Table 51: Status LEDs on Line Cards for EX8200 Switches (*continued*)

LED	Color	State and Description
POE	Green	On steadily—PoE on the line card is functioning normally.
NOTE: This LED is present only on EX8200-2XS-40P line card and EX8200-48PL line card	Yellow	On steadily—PoE is not functioning normally.
	Unlit	Line card is booting up.

SEE ALSO

| [Network Port LEDs in an EX8200 Switch](#)

2

CHAPTER

Site Planning, Preparation, and Specifications

Site Preparation Checklist for an EX8200 Switch | **108**

EX8208 Site Guidelines and Requirements | **109**

EX8200 Network Cable and Transceiver Planning | **128**

EX8200 Management Cable Specifications and Pinouts | **135**

Site Preparation Checklist for an EX8200 Switch

The checklist in [Table 52 on page 108](#) summarizes the tasks you need to perform to prepare a site for installing an EX8200 switch.

Table 52: Site Preparation Checklist

Item or Task	For More Information	Performed by	Date
Environment			
Verify that environmental factors such as temperature and humidity do not exceed switch tolerances.	“Environmental Requirements and Specifications for EX Series Switches” on page 110		
Power			
Measure distance between external power sources and switch installation site.			
Calculate the power consumption and requirements.	“AC Power Specifications for EX8200 Switches” on page 65 “DC Power Specifications for EX8200 Switches” on page 75 “Power Requirements for EX8208 Switch Components” on page 120 <i>Power Requirements for EX8216 Switch Components</i> “Calculating Power Requirements for an EX8208 Switch” on page 121 <i>Calculating Power Requirements for an EX8216 Switch</i> “Calculating the Fiber-Optic Cable Power Budget for EX Series Devices” on page 132 “Calculating the Fiber-Optic Cable Power Margin for EX Series Devices” on page 133		
Rack or Cabinet			

Table 52: Site Preparation Checklist (continued)

Item or Task	For More Information	Performed by	Date
Select the type of rack or cabinet and verify that it meets the minimum requirements for the installation of the switch.	"Rack Requirements" on page 118 "Cabinet Requirements" on page 119		
Plan rack or cabinet location, ensuring the required space clearances.	"Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch" on page 116 <i>Clearance Requirements for Airflow and Hardware Maintenance for an EX8216 Switch</i>		
Secure the rack or cabinet to the floor and building structure.			
Cables			
Plan the cable routing and management. Acquire cables and connectors: <ul style="list-style-type: none"> • Determine the number of cables needed based on your planned configuration. • Ensure that the distance between hardware components to be connected allows for cable lengths to be within the specified maximum limits. 			

EX8208 Site Guidelines and Requirements

IN THIS SECTION

- [Environmental Requirements and Specifications for EX Series Switches | 110](#)
- [General Site Guidelines | 115](#)
- [Site Electrical Wiring Guidelines | 115](#)

- Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch | 116
- Rack Requirements | 118
- Cabinet Requirements | 119
- Power Requirements for EX8208 Switch Components | 120
- Calculating Power Requirements for an EX8208 Switch | 121

Environmental Requirements and Specifications for EX Series Switches

The switch must be installed in a rack or cabinet housed in a dry, clean, well-ventilated, and temperature-controlled environment.

Ensure that these environmental guidelines are followed:

- The site must be as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the switch cooling system.
- Maintain ambient airflow for normal switch operation. If the airflow is blocked or restricted, or if the intake air is too warm, the switch might overheat, leading to the switch temperature monitor shutting down the switch to protect the hardware components.

[Table 53 on page 110](#) provides the required environmental conditions for normal switch operation.

Table 53: EX Series Switch Environmental Tolerances

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
EX2200-C	No performance degradation up to 5,000 feet (1524 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F (0° C) through 104° F (40° C) at altitudes up to 5,000 ft (1,524 m). For information about extended temperature SFP transceivers supported on EX2200 switches, see <i>Pluggable Transceivers Supported on EX2200 Switches</i> .	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.

Table 53: EX Series Switch Environmental Tolerances (continued)

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
EX2200 (except EX2200-C switches)	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F (0° C) through 113° F (45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX2300-C	No performance degradation up to 5,000 feet (1524 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F (0° C) through 104° F (40° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX2300 (except EX2300-C switches)	No performance degradation up to 13,000 feet (3962 meters) at 104° F (40° C) as per GR-63	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F (0° C) through 113° F (45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX3200	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F (0° C) through 113° F (45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX3300	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F (0° C) through 113° F (45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX3400	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F (0° C) through 113° F (45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX4200	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F (0° C) through 113° F (45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.

Table 53: EX Series Switch Environmental Tolerances (continued)

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
<p>EX4300</p> <p>The maximum thermal output for EX4300-48T is 423 BTU/hour and for EX4300-48P is 5844 BTU/hour.</p>	<p>EX4300 switches except the EX4300-48MP model— No performance degradation up to 10,000 feet (3048 meters)</p> <p>EX4300-48MP model— No performance degradation up to 6,000 feet (1829 meters)</p>	<p>EX4300 switches except the EX4300-48MP model— Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)</p> <p>EX4300-48MP model— Normal operation ensured in the relative humidity range 5% through 90% (noncondensing)</p>	<p>Normal operation ensured in the temperature range 32° F (0° C) through 113° F (45° C)</p>	<p>Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.</p>
EX4500	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F (0° C) through 113° F (45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX4550	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	<ul style="list-style-type: none"> EX4550-32F switches— Normal operation ensured in the temperature range 32° F (0° C) through 113° F (45° C) EX4550-32T switches— Normal operation is ensured in the temperature range 32° F through 104° F (40° C) 	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.

Table 53: EX Series Switch Environmental Tolerances (continued)

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
EX4600	No performance degradation to 6,562 feet (2000 meters)	<p>Normal operation ensured in the relative humidity range 5% through 90%, noncondensing</p> <ul style="list-style-type: none"> Short-term operation ensured in the relative humidity range 5% through 93%, noncondensing <p>NOTE: As defined in NEBS GR-63-CORE, Issue 4, short-term events can be up to 96 hours in duration but not more than 15 days per year.</p>	<ul style="list-style-type: none"> Normal operation ensured in the temperature range 32° F (0° C) through 113° F (45° C) Nonoperating storage temperature in shipping container: - 40° F (-40° C) through 158° F (70° C) 	Complies with Zone 4 earthquake requirements per NEBS GR-63-CORE, Issue 4.
EX4650	No performance degradation to 6,000 feet (1829 meters)	Normal operation ensured in the relative humidity range 10% through 85% (condensing)	Normal operation is ensured in the temperature range 32° F (0° C) through 104° F (40° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX6210	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation is ensured in the temperature range 32° F (0° C) through 104° F (40° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX8208	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation is ensured in the temperature range 32° F (0° C) through 104° F (40° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX8216	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation is ensured in the temperature range 32° F (0° C) through 104° F (40° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.

Table 53: EX Series Switch Environmental Tolerances (continued)

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
EX9204	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 5% through 90% (noncondensing)	Normal operation is ensured in the temperature range 32° F (0° C) through 104° F (40° C) Nonoperating storage temperature in shipping container: - 40° F (-40° C) to 158° F (70° C)	Complies with Zone 4 earthquake requirements as per GR-63.
EX9208	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 5% through 90% (noncondensing)	Normal operation is ensured in the temperature range 32° F (0° C) through 104° F (40° C) Nonoperating storage temperature in shipping container: - 40° F (-40° C) to 158° F (70° C)	Complies with Zone 4 earthquake requirements as per GR-63.
EX9214	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 5% through 90% (noncondensing)	Normal operation is ensured in the temperature range 32° F (0° C) through 104° F (40° C) Nonoperating storage temperature in shipping container: - 40° F (-40° C) through 158° F (70° C)	Complies with Zone 4 earthquake requirements as per GR-63.
EX9251 The maximum thermal output is 1705 BTU/hour (500 W).	No performance degradation up to 10,000 ft (3048 m)	Normal operation ensured in relative humidity range of 5% to 90%, noncondensing	Normal operation ensured in temperature range of 32° F (0° C) to 104° F (40° C) Nonoperating storage temperature in shipping container: - 40° F (-40° C) to 158° F (70° C)	Complies with Telcordia Technologies Zone 4 earthquake requirements

Table 53: EX Series Switch Environmental Tolerances (*continued*)

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
XRE200	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 41° F (5° C) through 104° F (40° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.

NOTE: Install EX Series switches only in restricted areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110- 16, 110- 17, and 110- 18 of the National Electrical Code, ANSI/NFPA 70.

General Site Guidelines

Efficient device operation requires proper site planning and maintenance and proper layout of the equipment, rack or cabinet (if used), and wiring closet.

To plan and create an acceptable operating environment for your device and prevent environmentally caused equipment failures:

- Keep the area around the chassis free from dust and conductive material, such as metal flakes.
- Follow prescribed airflow guidelines to ensure that the cooling system functions properly and that exhaust from other equipment does not blow into the intake vents of the device.
- Follow the prescribed electrostatic discharge (ESD) prevention procedures to prevent damaging the equipment. Static discharge can cause components to fail completely or intermittently over time.
- Install the device in a secure area, so that only authorized personnel can access the device.

Site Electrical Wiring Guidelines

Table 54 on page 116 describes the factors you must consider while planning the electrical wiring at your site.



WARNING: You must provide a properly grounded and shielded environment and use electrical surge-suppression devices.

Avertissement Vous devez établir un environnement protégé et convenablement mis à la terre et utiliser des dispositifs de parasurtension.

Table 54: Site Electrical Wiring Guidelines

Site Wiring Factor	Guidelines
Signaling limitations	<p>If your site experiences any of the following problems, consult experts in electrical surge suppression and shielding:</p> <ul style="list-style-type: none"> • Improperly installed wires cause radio frequency interference (RFI). • Damage from lightning strikes occurs when wires exceed recommended distances or pass between buildings. • Electromagnetic pulses (EMPs) caused by lightning damage unshielded conductors and electronic devices.
Radio frequency interference	<p>To reduce or eliminate RFI from your site wiring, do the following:</p> <ul style="list-style-type: none"> • Use a twisted-pair cable with a good distribution of grounding conductors. • If you must exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal when applicable.
Electromagnetic compatibility	<p>If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, seek expert advice.</p> <p>Some of the problems caused by strong sources of electromagnetic interference (EMI) are:</p> <ul style="list-style-type: none"> • Destruction of the signal drivers and receivers in the device • Electrical hazards as a result of power surges conducted over the lines into the equipment

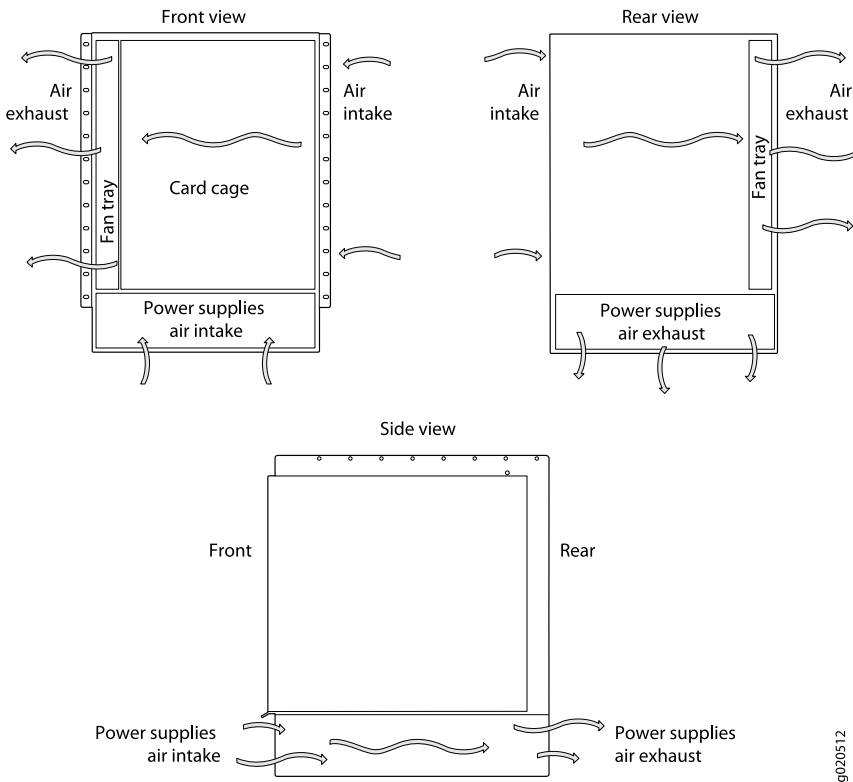
Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch

When planning the site for installing an EX8208 switch, you must allow sufficient clearance around the switch.

NOTE: To manage airflow in a hot-aisle--cold-aisle data center setup, you might want to use the customized rack solution for EX8200 switches offered by Chatsworth Products, Inc.

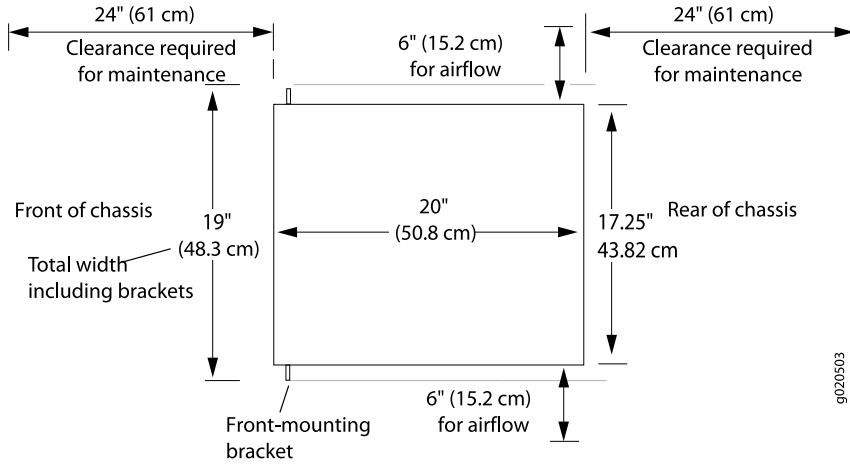
- Allow at least 6 in. (15.2 cm) of clearance on each side of the chassis. For the cooling system to function properly, the airflow around the chassis must be unrestricted. See [Figure 30 on page 117](#).

Figure 30: Airflow Through the EX8208 Switch Chassis



- If you are mounting the switch on a rack or cabinet along with other equipment, ensure that the exhaust from other equipment does not blow into the intake vents of the chassis.
- Leave at least 24 in. (61 cm) both in front of and behind the switch. Allow at least 6 in. (15.2 cm) of clearance on each side of the chassis. Leave adequate space at the front of the switch for service personnel to remove and install hardware components. NEBS GR-63 recommends that you allow at least 30 in. (76.2 cm) in front of the rack or cabinet and 24 in. (61 cm) behind the rack or cabinet. See [Figure 31 on page 118](#).

Figure 31: Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch Chassis



SEE ALSO

[EX8208 Cooling System | 53](#)

Rack Requirements

You can mount the device on two-post racks or four-post racks.

Rack requirements consist of:

- Rack type
- Mounting bracket hole spacing
- Rack size and strength
- Rack connection to the building structure

[Table 55 on page 119](#) provides the rack requirements and specifications.

Table 55: Rack Requirements and Specifications

Rack Requirement	Guidelines
Rack type	<p>You can mount the device on a rack that provides bracket holes or hole patterns spaced at 1-U (1.75 in. or 4.45 cm) increments and meets the size and strength requirements to support the weight.</p> <p>A U is the standard rack unit defined by the Electronic Components Industry Association (http://www.ecianow.org).</p>
Mounting bracket hole spacing	The holes in the mounting brackets are spaced at 1-U (1.75 in. or 4.45 cm), so that the device can be mounted in any rack that provides holes spaced at that distance.
Rack size and strength	<ul style="list-style-type: none"> • Ensure that the rack complies with the size and strength standards of a 19-in. rack as defined by the Electronic Components Industry Association (http://www.ecianow.org). • Ensure that the rack rails are spaced widely enough to accommodate the external dimensions of the device chassis. The outer edges of the front mounting brackets extend the width of the chassis to 19 in. (48.2 cm). • The rack must be strong enough to support the weight of the device. • Ensure that the spacing of rails and adjacent racks provides for proper clearance around the device and rack.
Rack connection to building structure	<ul style="list-style-type: none"> • Secure the rack to the building structure. • If your geographical area is earthquake-prone, secure the rack to the floor. • Secure the rack to the ceiling brackets as well as wall or floor brackets for maximum stability.

SEE ALSO

| [Rack-Mounting and Cabinet-Mounting Warnings](#) | 359

Cabinet Requirements

You can mount the device in a cabinet that contains a 19-in. rack.

Cabinet requirements consist of:

- Cabinet size
- Clearance requirements
- Cabinet airflow requirements

[Table 56 on page 120](#) provides the cabinet requirements and specifications.

Table 56: Cabinet Requirements and Specifications

Cabinet Requirement	Guidelines
Cabinet size	<ul style="list-style-type: none"> The minimum cabinet size is 36 in. (91.4 cm) depth. Large cabinets improve airflow and reduce chances of overheating.
Cabinet clearance	<ul style="list-style-type: none"> The outer edges of the front mounting brackets extend the width of the chassis to 19 in. (48.2 cm). The minimum total clearance inside the cabinet is 30.7 in. (78 cm) between the inside of the front door and the inside of the rear door.
Cabinet airflow requirements	<p>When you mount the device in a cabinet, ensure that ventilation through the cabinet is sufficient to prevent overheating.</p> <ul style="list-style-type: none"> Ensure adequate cool air supply to dissipate the thermal output of the device or devices. Ensure that the hot air exhaust of the chassis exits the cabinet without recirculating into the device. An open cabinet (without a top or doors) that employs hot air exhaust extraction from the top ensures the best airflow through the chassis. If the cabinet contains a top or doors, perforations in these elements assist with removing the hot air exhaust. Install the device in the cabinet in a way that maximizes the open space on the side of the chassis that has the hot air exhaust. Route and dress all cables to minimize the blockage of airflow to and from the chassis. Ensure that the spacing of rails and adjacent cabinets is such that there is proper clearance around the device and cabinet. A cabinet larger than the minimum required provides better airflow and reduces the chance of overheating.

Power Requirements for EX8208 Switch Components

[Table 57 on page 120](#) lists the power requirements for different hardware components of an EX8208 switch under typical voltage conditions.

Table 57: EX8208 Switch Component Power Requirements

Components	Power Requirements (Watts)
Fan tray	<ul style="list-style-type: none"> 300 W (at normal fan speed) 1100 W (at maximum fan speed)

Table 57: EX8208 Switch Component Power Requirements (continued)

Components	Power Requirements (Watts)
Switch Fabric and Routing Engine (SRE) module	200 W
Switch Fabric (SF) module	100 W
8-port SFP+ line card (including optical transceivers)	450 W
40-port SFP+ line card (including optical transceivers)	550 W
EX8200-2XS-40P line card (including optical transceivers)	387 W
EX8200-2XS-40T line card (including optical transceivers)	350 W
EX8200-48PL line card	267 W
EX8200-48TL line card	230 W
48-port SFP line card (including optical transceivers)	330 W
48-port RJ-45 line card	350 W

Calculating Power Requirements for an EX8208 Switch

Use the information in this topic to calculate power consumption, system thermal output, and number of power supplies required for different EX8208 switch configurations.

Before you begin these calculations:

- Ensure you understand the different switch configurations. See [“EX8208 Switch Configurations” on page 27](#).
- Ensure that you know the power requirements of different switch components. See [“Power Requirements for EX8208 Switch Components” on page 120](#).
- If the switch contains PoE line cards, ensure that you understand the PoE power budget requirements of each line card. See *Understanding PoE on EX Series Switches*.

This topic describes these tasks.

- [Calculating the Power Consumption of Your EX8208 Switch Configuration | 122](#)
- [Calculating System Thermal Output for Your EX8208 Switch Configuration | 124](#)
- [Calculating the Number of Power Supplies Required for Your EX8208 Switch Configuration | 124](#)

Calculating the Power Consumption of Your EX8208 Switch Configuration

Use the following procedure to determine the maximum power you need to supply to the switch. To calculate maximum system power consumption, you first determine the combined maximum internal power requirements of all the switch components and then divide this result by the power supply efficiency.

To calculate maximum system power consumption:

1. Determine the maximum power consumption of the base chassis components (that is, the components other than the line cards):
 - Use [Table 58 on page 122](#) if your switch is configured for $N+1$ power redundancy or if your switch is configured for $N+N$ power redundancy and is running Junos OS Release 10.1 or earlier.
 - Use [Table 59 on page 123](#) only if your switch is running Junos OS Release 10.2 or later and power management is configured for $N+N$ power redundancy.

NOTE: In Junos OS Release 10.2 or later, if power management is configured for $N+N$ redundancy, the maximum fan speed is lowered, reducing the chassis' maximum power consumption.

Table 58: Chassis Power Consumption for $N+1$ Configurations and for $N+N$ Configurations Running Junos OS Release 10.1 or Earlier

Chassis Component	Base Configuration	Redundant Configuration
Fan tray	1100 W	1100 W
Switch Fabric and Routing Engine (SRE) module	200 W	200 W
Second SRE module	—	200 W
Switch Fabric module	100 W	100 W
Total	1400 W	1600 W

Table 59: Chassis Power Consumption for N+N Configurations Running Junos OS Release 10.2 or Later

Chassis Component	Base Configuration	Redundant Configuration
Fan tray	700 W	700 W
SRE module	200 W	200 W
SRE module	–	200 W
SF module	100 W	100 W
Total	1000 W	1200 W

2. Calculate the maximum internal power consumption of the entire switch by adding in the power requirements of each line card.

For example, for a switch fully loaded with 8-port SFP+ line cards and using N+1 power redundancy, the maximum internal power consumption:

$$\begin{aligned}
 &= (\text{chassis watts}) + 8 (\text{8-port SFP+ line card watts}) \\
 &= (1600 \text{ W} + 8 (450 \text{ W})) \\
 &= (1600 \text{ W} + 3600 \text{ W}) \\
 &= 5200 \text{ W}
 \end{aligned}$$

For switches with PoE line cards, be sure to include the configured PoE power budget for each line card.

3. Calculate the maximum system power consumption by dividing the maximum internal power consumption by the efficiency of the power supply. This accounts for the loss of energy within the power supply.

NOTE: The efficiency of a 2000 W AC power supply is approximately 90 percent when input is high-voltage line (200–240 VAC).

The efficiency of a 2000 W AC power supply is approximately 87 percent when input is low-voltage line (100–120 VAC).

For example, for a switch fully loaded with 8-port SFP+ line cards and using N+1 power redundancy with high-voltage line input, the maximum system power consumption:

$$= (\text{maximum internal power consumption}) / (\text{power supply efficiency})$$

$$= (5200 \text{ W}) / (0.90)$$
$$= 5778 \text{ W}$$

Calculating System Thermal Output for Your EX8208 Switch Configuration

Use the following procedure to calculate the system thermal output in British thermal units (BTU) per hour for your switch configuration.

To calculate the system thermal output:

1. Determine the maximum system power consumption of your switch in watts. See [“Calculating the Power Consumption of Your EX8208 Switch Configuration” on page 122](#) for how to do so.
2. Multiply the maximum system power consumption by 3.41.

For example, for a switch fully loaded with 8-port SFP+ line cards and using $N+1$ power redundancy with high-voltage line input, the system thermal output:

$$= (\text{maximum system power consumption}) \times (3.41)$$
$$= (5778 \text{ W}) \times (3.41) =$$
$$= 19,703 \text{ BTU/hr}$$

NOTE: Using the maximum system power consumption values to calculate the system thermal output often results in overprovisioning the cooling systems. Typical power consumption is about one-third lower than these calculated values.

Calculating the Number of Power Supplies Required for Your EX8208 Switch Configuration

Use this procedure to calculate the number of power supplies required by your switch configuration. The required power configuration for EX8208 switches is $N+1$. You can optionally configure your switch for $N+N$ configuration. For example, you might want dual power feed redundancy with AC power supplies, which requires an $N+N$ configuration.

To calculate the number of power supplies required for your switch configuration:

1. Determine the power requirement of the base chassis (that is, the combined power requirements of the fan tray, SRE module or modules, and the SF module) by consulting [Table 60 on page 125](#).

The watt values shown in [Table 60 on page 125](#) are the amount of power reserved by power management for the chassis in its power budget. It uses these values when calculating used and available power and when determining whether sufficient power exists to meet N , $N+1$, or $N+N$ requirements.

Starting with Junos OS Release 10.2, when power management is configured for $N+N$ power redundancy, it reserves less power for the chassis so that more power is available for line cards.

Table 60: Power Reserved for the Chassis

	Junos OS Release 10.1 or Earlier	Junos OS Release 10.2 or Later
N+1 Configuration	1600 W	1600 W
N+N Configuration	1600 W	1200 W

NOTE: The amount of power that power management reserves for the chassis is a set value that does not vary depending on chassis components installed. The reserved power is the same for base and redundant configurations and for switches that do not have all base chassis components installed.

2. To the power reserved for the chassis, add the power requirements of the line cards.

For line card power requirements, refer to [“Power Requirements for EX8208 Switch Components” on page 120](#). Do not include the PoE power budgets for PoE line cards in this step. Use only the base power requirements for all line cards.

For example, for a switch fully loaded with 8-port SFP+ line cards and using $N+1$ power redundancy, the total power requirement:

$$\begin{aligned}
 &= \text{reserved chassis watts} + 8 \text{ (8-port SFP + line card watts)} \\
 &= 1600 \text{ W} + 8 (450) \text{ W} \\
 &= 1600 \text{ W} + 3600 \text{ W} \\
 &= 5200 \text{ W}
 \end{aligned}$$

For a switch fully loaded with 8-port SFP+ line cards, using $N+N$ power redundancy, and running Junos OS Release 10.2, the total power requirement:

$$\begin{aligned}
 &= \text{reserved chassis watts} + 8 \text{ (8-port SFP + line card watts)} \\
 &= 1200 \text{ W} + 8 (450) \text{ W}
 \end{aligned}$$

$$= 1200 \text{ W} + 3600 \text{ W}$$

$$= 4800 \text{ W}$$

3. Calculate the number of power supplies (N) required to meet the total power requirement by dividing the total power requirement by the output wattage of one power supply and then rounding up.

NOTE: If the input is high-voltage line (200–220 VAC), the output wattage of a 2000 W AC power supply is 2000 W.

If the input is low-voltage line (100–120 VAC), the output wattage of a 2000 W AC power supply is 1200 W.

For example, for a switch fully loaded with 8-port SFP+ line cards and using $N+1$ power redundancy with high-voltage line input, the required power supplies (N):

$$= (\text{total power requirement}) / (\text{output wattage of power supply})$$

$$= (5200 \text{ W}) / (2000 \text{ W})$$

$$= 2.6$$

$$= 3 \text{ (rounded up)}$$

For a switch fully loaded with 8-port SFP+ line cards, using $N+N$ power redundancy with high-voltage line input, and running Junos OS Release 10.2, the required power supplies (N):

$$= (\text{total power requirement}) / (\text{output wattage of power supply})$$

$$= (4800 \text{ W}) / (2000 \text{ W})$$

$$= 2.4$$

$$= 3 \text{ (rounded up)}$$

4. Add the number of power supplies needed to achieve the required power redundancy:

- To achieve $N+1$ power redundancy, add a single power supply.

For example, for a switch fully loaded with 8-port SFP+ line cards and using high-voltage line input, the total number of power supplies:

$$= N + 1$$

$$= 3 + 1$$

$$= 4$$

- To achieve $N+N$ power redundancy, add N power supplies.

For example, for a switch fully loaded with 8-port SFP+ line cards and using high-voltage line input, the total number of power supplies:

= $N + N$

= $3 + 3$

= 6

5. If the switch has PoE line cards:

- a. Add the configured PoE power budgets for PoE line cards to the total power requirement value that you calculated in step 2.
- b. Calculate the number of power supplies needed to meet the new total power requirement by dividing the total power requirement by the output wattage of one power supply and then rounding up.
- c. Compare this result to the $N+1$ or $N+N$ value you calculated in step 4. Use the greater of the two values to determine how many power supplies you require.

NOTE: We recommend that you maintain $N + 1$ or $N+N$ power supplies in your switch at all times. Replace failed power supplies immediately to prevent unexpected failures.

Power management raises a minor alarm if the number of online power supplies in your switch is less than the number required to maintain the configured power redundancy ($N+1$ in Junos OS Release 10.1 or earlier; $N+1$ or $N+N$ in Junos OS Release 10.2 or later). If the problem is not corrected in 5 minutes, a major alarm is issued.

Power management raises a major alarm if the number of online power supplies in your switch is less than N power supplies. If your switch is running Junos OS Release 10.1 or earlier, all line cards are powered off. If your switch is running Junos OS Release 10.2 or later, power management provides power to line cards in priority order until power is exhausted. The remaining line cards are powered off.

If a new line card is installed in an operational switch, power management does not power on the line card if the increased power demand exceeds the total available power, including redundant power. If redundant power is used to power on the line card, a minor alarm is raised, which becomes a major alarm in 5 minutes if the condition is not corrected.

Power management does not take into account PoE budget allocations when raising alarms to indicate that N , $N+1$, or $N+N$ requirements are not being met.

SEE ALSO

EX8200 Network Cable and Transceiver Planning

IN THIS SECTION

- [Pluggable Transceivers Supported on EX8200 Switches | 128](#)
- [SFP+ Direct Attach Copper Cables for EX Series Switches | 129](#)
- [Understanding EX Series Switches Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion | 131](#)
- [Calculating the Fiber-Optic Cable Power Budget for EX Series Devices | 132](#)
- [Calculating the Fiber-Optic Cable Power Margin for EX Series Devices | 133](#)

Pluggable Transceivers Supported on EX8200 Switches

The line cards on EX8200 switches support SFP and SFP+ transceivers.

- You can find the list of transceivers supported on EX8208 switches and information about those transceivers at the [Hardware Compatibility Tool page for EX8208](#).
- You can find the list of transceivers supported on EX8216 switches and information about those transceivers at the [Hardware Compatibility Tool page for EX8216](#).

NOTE: We recommend that you use only optical transceivers and optical connectors purchased from Juniper Networks with your Juniper Networks device.



CAUTION: If you face a problem running a Juniper Networks device that uses a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

The Gigabit Ethernet SFP and SFP+ transceivers installed in EX8200 switches support digital optical monitoring (DOM): You can view the diagnostic details for these transceivers by issuing the operational mode CLI command **show interfaces diagnostics optics**.

SEE ALSO

[Line Card Model and Version Compatibility in an EX8200 Switch | 84](#)

SFP+ Direct Attach Copper Cables for EX Series Switches

IN THIS SECTION

- [Cable Specifications | 130](#)
- [List of DAC Cables Supported on EX Series Switches | 130](#)
- [Standards Supported by These Cables | 131](#)

Small form-factor pluggable plus transceiver (SFP+) direct attach copper (DAC) cables, also known as Twinax cables, are suitable for in-rack connections between servers and switches. They are suitable for short distances, making them ideal for highly cost-effective networking connectivity within a rack and between adjacent racks.

NOTE: We recommend that you use only SFP+ DAC cables purchased from Juniper Networks with your Juniper Networks device.

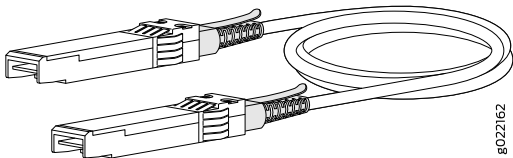


CAUTION: If you face a problem running a Juniper Networks device that uses a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

Cable Specifications

EX Series switches support SFP+ passive DAC cables. The passive Twinax cable is a straight cable with no active electronic components. EX Series switches support 1 m, 3 m, 5 m, and 7 m long SFP+ passive DAC cables. See [Figure 32 on page 130](#).

Figure 32: SFP+ Direct Attach Copper Cables for EX Series Switches



The cables are hot-removable and hot-insertable: You can remove and replace them without powering off the switch or disrupting switch functions. A cable comprises a low-voltage cable assembly that connects directly into two 10-Gigabit Ethernet ports, one at each end of the cable. The cables use high-performance integrated duplex serial data links for bidirectional communication and are designed for data rates of up to 10 Gbps.

List of DAC Cables Supported on EX Series Switches

For the list of DAC cables supported on EX Series switches and the specifications of these cables, see:

- EX2300—[Hardware Compatibility Tool page for EX2300](#)
- EX3200—[Hardware Compatibility Tool page for EX3200](#)
- EX3300—[Hardware Compatibility Tool page for EX3300](#)
- EX3400—[Hardware Compatibility Tool page for EX3400](#)
- EX4200—[Hardware Compatibility Tool page for EX4200](#)
- EX4300—[Hardware Compatibility Tool page for EX4300](#)
- EX4500—[Hardware Compatibility Tool page for EX4500](#)
- EX4550—[Hardware Compatibility Tool page for EX4550](#)
- EX4600—[Hardware Compatibility Tool page for EX4600](#)
- EX8208—[Hardware Compatibility Tool page for EX8208](#)
- EX8216—[Hardware Compatibility Tool page for EX8216](#)
- EX9251—[Hardware Compatibility Tool page for EX9251](#)
- EX9253—[Hardware Compatibility Tool page for EX9253](#)

Standards Supported by These Cables

The cables comply with the following standards:

- SFP mechanical standard SFF-843— see <ftp://ftp.seagate.com/sff/SFF-8431.PDF>.
- Electrical interface standard SFF-8432— see <ftp://ftp.seagate.com/sff/SFF-8432.PDF>.
- SFP+ Multi-Source Alliance (MSA) standards

Understanding EX Series Switches Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion

IN THIS SECTION

- [Signal Loss in Multimode and Single-Mode Fiber-Optic Cable | 131](#)
- [Attenuation and Dispersion in Fiber-Optic Cable | 132](#)

To determine the power budget and power margin needed for fiber-optic connections, you need to understand how signal loss, attenuation, and dispersion affect transmission. EX Series switches use various types of network cable, including multimode and single-mode fiber-optic cable.

Signal Loss in Multimode and Single-Mode Fiber-Optic Cable

Multimode fiber is large enough in diameter to allow rays of light to reflect internally (bounce off the walls of the fiber). Interfaces with multimode optics typically use LEDs as light sources. However, LEDs are not coherent light sources. They spray varying wavelengths of light into the multimode fiber, which reflects the light at different angles. Light rays travel in jagged lines through a multimode fiber, causing signal dispersion. When light traveling in the fiber core radiates into the fiber cladding (layers of lower refractive index material in close contact with a core material of higher refractive index), higher-order mode loss (HOL) occurs. Together, these factors reduce the transmission distance of multimode fiber compared to that of single-mode fiber.

Single-mode fiber is so small in diameter that rays of light reflect internally through one layer only. Interfaces with single-mode optics use lasers as light sources. Lasers generate a single wavelength of light, which travels in a straight line through the single-mode fiber. Compared to multimode fiber, single-mode fiber has a higher bandwidth and can carry signals for longer distances. It is consequently more expensive.

Exceeding the maximum transmission distances can result in significant signal loss, which causes unreliable transmission.

Attenuation and Dispersion in Fiber-Optic Cable

An optical data link functions correctly provided that modulated light reaching the receiver has enough power to be demodulated correctly. *Attenuation* is the reduction in strength of the light signal during transmission. Passive media components such as cables, cable splices, and connectors cause attenuation. Although attenuation is significantly lower for optical fiber than for other media, it still occurs in both multimode and single-mode transmission. An efficient optical data link must transmit enough light to overcome attenuation.

Dispersion is the spreading of the signal over time. The following two types of dispersion can affect signal transmission through an optical data link:

- Chromatic dispersion, which is the spreading of the signal over time caused by the different speeds of light rays.
- Modal dispersion, which is the spreading of the signal over time caused by the different propagation modes in the fiber.

For multimode transmission, modal dispersion, rather than chromatic dispersion or attenuation, usually limits the maximum bit rate and link length. For single-mode transmission, modal dispersion is not a factor. However, at higher bit rates and over longer distances, chromatic dispersion limits the maximum link length.

An efficient optical data link must have enough light to exceed the minimum power that the receiver requires to operate within its specifications. In addition, the total dispersion must be within the limits specified for the type of link in Telcordia Technologies document GR-253-CORE (Section 4.3) and International Telecommunications Union (ITU) document G.957.

When chromatic dispersion is at the maximum allowed, its effect can be considered as a power penalty in the power budget. The optical power budget must allow for the sum of component attenuation, power penalties (including those from dispersion), and a safety margin for unexpected losses.

Calculating the Fiber-Optic Cable Power Budget for EX Series Devices

To ensure that fiber-optic connections have sufficient power for correct operation, calculate the link's power budget when planning fiber-optic cable layout and distances to ensure that fiber-optic connections have sufficient power for correct operation. The power budget is the maximum amount of power the link can transmit. When you calculate the power budget, you use a worst-case analysis to provide a margin of error, even though all the parts of an actual system do not operate at the worst-case levels.

To calculate the worst-case estimate for fiber-optic cable power budget (P_B) for the link:

1. Determine values for the link's minimum transmitter power (P_T) and minimum receiver sensitivity (P_R). For example, here, (P_T) and (P_R) are measured in decibels, and decibels are referred to one milliwatt (dBm).

$$P_T = -15 \text{ dBm}$$

$$P_R = -28 \text{ dBm}$$

NOTE: See the specifications for your transmitter and receiver to find the minimum transmitter power and minimum receiver sensitivity.

2. Calculate the power budget (P_B) by subtracting (P_R) from (P_T):

$$-15 \text{ dBm} - (-28 \text{ dBm}) = 13 \text{ dBm}$$

Calculating the Fiber-Optic Cable Power Margin for EX Series Devices

Calculate the link's power margin when planning fiber-optic cable layout and distances to ensure that fiber-optic connections have sufficient signal power to overcome system losses and still satisfy the minimum input requirements of the receiver for the required performance level. The power margin (P_M) is the amount of power available after attenuation or link loss (LL) has been subtracted from the power budget (P_B).

When you calculate the power margin, you use a worst-case analysis to provide a margin of error, even though all the parts of an actual system do not operate at worst-case levels. A power margin (P_M) greater than zero indicates that the power budget is sufficient to operate the receiver and that it does not exceed the maximum receiver input power. This means the link will work. A (P_M) that is zero or negative indicates insufficient power to operate the receiver. See the specification for your receiver to find the maximum receiver input power.

Before calculating the power margin:

- Calculate the power budget (see [“Calculating the Fiber-Optic Cable Power Budget for EX Series Devices” on page 132](#)).

To calculate the worst-case estimate for the power margin (P_M) for the link:

1. Determine the maximum value for link loss (LL) by adding estimated values for applicable link-loss factors—for example, use the sample values for various factors as provided in [Table 61 on page 134](#) (here, the link is 2 km long and multimode, and the (P_B) is 13 dBm):

Table 61: Estimated Values for Factors Causing Link Loss

Link-Loss Factor	Estimated Link-Loss Value	Sample (LL) Calculation Values
Higher-order mode losses (HOL)	<ul style="list-style-type: none"> • Multimode—0.5 dBm • Single mode—None 	<ul style="list-style-type: none"> • 0.5 dBm • 0 dBm
Modal and chromatic dispersion	<ul style="list-style-type: none"> • Multimode—None, if product of bandwidth and distance is less than 500 MHz/km • Single mode—None 	<ul style="list-style-type: none"> • 0 dBm • 0 dBm
Connector	0.5 dBm	This example assumes 5 connectors. Loss for 5 connectors: (5) * (0.5 dBm) = 2.5 dBm
Splice	0.5 dBm	This example assumes 2 splices. Loss for two splices: (2) * (0.5 dBm) = 1 dBm
Fiber attenuation	<ul style="list-style-type: none"> • Multimode—1 dBm/km • Single mode—0.5 dBm/km 	This example assumes the link is 2 km long. Fiber attenuation for 2 km: <ul style="list-style-type: none"> • (2 km) * (1.0 dBm/km) = 2 dBm • (2 km) * (0.5 dBm/km) = 1 dBm
Clock Recovery Module (CRM)	1 dBm	1 dBm

NOTE: For information about the actual amount of signal loss caused by equipment and other factors, see your vendor documentation for that equipment.

2. Calculate the (P_M) by subtracting (LL) from (P_B):

$$P_B - LL = P_M$$

$$(13 \text{ dBm}) - (0.5 \text{ dBm [HOL]}) - ((5) * (0.5 \text{ dBm})) - ((2) * (0.5 \text{ dBm})) - ((2 \text{ km}) * (1.0 \text{ dBm/km})) - (1 \text{ dB [CRM]}) = P_M$$

$$13 \text{ dBm} - 0.5 \text{ dBm} - 2.5 \text{ dBm} - 1 \text{ dBm} - 2 \text{ dBm} - 1 \text{ dBm} = P_M$$

$$P_M = 6 \text{ dBm}$$

The calculated power margin is greater than zero, indicating that the link has sufficient power for transmission. Also, the power margin value does not exceed the maximum receiver input power. Refer to the specification for your receiver to find the maximum receiver input power.

EX8200 Management Cable Specifications and Pinouts

IN THIS SECTION

- [Management Cable Specifications | 135](#)
- [Console Port Connector Pinout Information | 136](#)
- [USB Port Specifications for an EX Series Switch | 136](#)
- [RJ-45 Management Port Connector Pinout Information | 137](#)
- [RJ-45 to DB-9 Serial Port Adapter Pinout Information | 138](#)

Management Cable Specifications

[Table 62 on page 135](#) lists the specifications for the cables that connect the console and management ports to management devices.

Table 62: Specifications of Cables to Connect to Management Devices

Ports	Cable Specifications	Receptacle	Additional Information
RJ-45 Console port	CAT5e UTP (unshielded twisted pair) cable	RJ-45	“Connect a Device to a Management Console Using an RJ-45 Connector” on page 183
Management Ethernet port	Ethernet cable with an RJ-45 connector	RJ-45	“Connect a Device to a Network for Out-of-Band Management” on page 182
Mini-USB Type-B Console port	Mini-USB cable with standard-A and Mini-USB Type-B (5-pin) connector	Mini-USB	

Console Port Connector Pinout Information

The console port on a Juniper Networks device is an RS-232 serial interface that uses an RJ-45 connector to connect to a console management device. The default baud rate for the console port is 9600 baud.

[Table 63 on page 136](#) provides the pinout information for the RJ-45 console connector.

NOTE: If your laptop or desktop PC does not have a DB-9 plug connector pin and you want to connect your laptop or desktop PC directly to a device, use a combination of the RJ-45 to DB-9 socket adapter and a USB to DB-9 plug adapter. You must provide the USB to DB-9 plug adapter.

Table 63: Console Port Connector Pinout Information

Pin	Signal	Description
1	RTS Output	Request to send
2	DTR Output	Data terminal ready
3	TxD Output	Transmit data
4	Signal Ground	Signal ground
5	Signal Ground	Signal ground
6	RxD Input	Receive data
7	CD Input	Data carrier detect
8	NC	CTS Input

USB Port Specifications for an EX Series Switch

The following Juniper Networks USB flash drives have been tested and are officially supported for the USB port on all EX Series switches:

- RE-USB-1G-S
- RE-USB-2G-S
- RE-USB-4G-S



CAUTION: Any USB memory product not listed as supported for EX Series switches has not been tested by Juniper Networks. The use of any unsupported USB memory product could expose your EX Series switch to unpredictable behavior. Juniper Networks Technical Assistance Center (JTAC) can provide only limited support for issues related to unsupported hardware. We strongly recommend that you use only supported USB flash drives.

All USB flash drives used on EX Series switches must have the following features:

- USB 2.0 or later.
- Formatted with a FAT or MS-DOS file system.
- If the switch is running Junos OS Release 9.5 or earlier, the formatting method must use a primary boot record. Microsoft Windows formatting, by default, does not use a primary boot record. See the documentation for your USB flash drive for information about how your USB flash drive is formatted.

RJ-45 Management Port Connector Pinout Information

Table 64 on page 137 provides the pinout information for the RJ-45 connector for the management port on Juniper Networks devices.

Table 64: RJ-45 Management Port Connector Pinout Information

Pin	Signal	Description
1	TRP1+	Transmit/receive data pair 1
2	TRP1–	Transmit/receive data pair 1
3	TRP2+	Transmit/receive data pair 2
4	TRP3+	Transmit/receive data pair 3
5	TRP3–	Transmit/receive data pair 3
6	TRP2–	Transmit/receive data pair 2
7	TRP4+	Transmit/receive data pair 4
8	TRP4–	Transmit/receive data pair 4

RJ-45 to DB-9 Serial Port Adapter Pinout Information

The console port is an RS-232 serial interface that uses an RJ-45 connector to connect to a management device such as a laptop or a desktop PC. If your laptop or desktop PC does not have a DB-9 plug connector pin and you want to connect your laptop or desktop PC to the device, use a combination of the RJ-45 to DB-9 socket adapter along with a USB to DB-9 plug adapter.

[Table 65 on page 138](#) provides the pinout information for the RJ-45 to DB-9 serial port adapter.

Table 65: RJ-45 to DB-9 Serial Port Adapter Pinout Information

RJ-45 Pin	Signal	DB-9 Pin	Signal
1	RTS	8	CTS
2	DTR	6	DSR
3	TxD	2	RxD
4	GND	5	GND
6	RxD	3	TxD
7	DSR	4	DTR
8	CTS	7	RTS

3

CHAPTER

Initial Installation and Configuration

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Connecting the EX8200 to the Network | **188**

Configuring Junos OS on the EX8200 | **193**

Dashboard for EX Series Switches | **205**

Unpacking and Mounting the EX8208 Switch

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- Installing Adjustable Mounting Brackets in a Rack or Cabinet for an EX8200 Switch | 148
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Unpacking an EX8200 Switch

After you prepare the installation site as described in [“Site Preparation Checklist for an EX8200 Switch”](#) on page 108, you may unpack the switch.

NOTE: The switch is maximally protected inside the shipping box. Do not unpack it until you are ready to begin installation.

Ensure that you have the following parts and tools available to unpack the EX8200 switch:

- A 7/16-in. or 11-mm open-end or socket wrench to remove the bracket bolts from the shipping pallet
- A box cutter or packing knife to slice open the tape that seals the top of the box

The switch ships in a cardboard box that has a two-layer wooden pallet base with foam cushioning between the layers. The switch chassis is bolted to the pallet base.

The EX8208 chassis ships with the Switch Fabric and Routing Engine (SRE) module(s), Switch Fabric (SF) module, fan tray, and power supplies for the configuration you ordered already installed. Any line cards ordered ship separately.

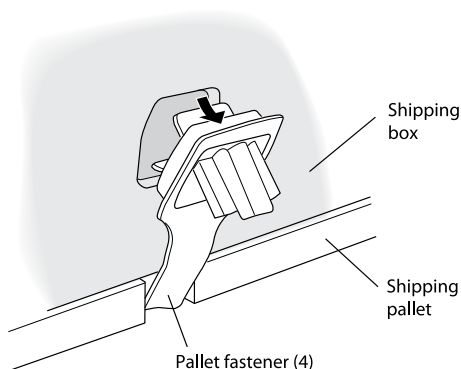
The EX8216 chassis ships with the Routing Engine (RE) module(s), SF modules, fan trays, and power supplies for the configuration you ordered already installed. Any line cards ordered ship separately.

See [“EX8208 Switch Configurations” on page 27](#) and *EX8216 Switch Configurations* for information about base configurations and redundant configurations.

To unpack the switch (see [Figure 34 on page 142](#) and [Figure 35 on page 143](#)):

1. Move the shipping box to a staging area as close to the installation site as possible. For an EX8208 switch, make sure there is enough space to remove components from the chassis if necessary (for example, if you do not have a mechanical lift to use when you install the switch). While the chassis is bolted to the pallet, you can use a forklift or pallet jack to move it.
2. Position the shipping box with the arrows pointing up.
3. Open the four pallet fasteners near the bottom of the shipping box that attach the cardboard box to the wooden pallet. To open a pallet fastener, squeeze together the two ridges (“fins”) in the depression in the latch, then slide the pallet fastener out of the cardboard box slot in which it is inserted. See [Figure 33 on page 141](#).

Figure 33: Pallet Fastener



4. Carefully slice open the tape that holds the top of the cardboard box closed and open the top of the box.
5. Remove the cardboard accessory box from the center of the foam padding.
6. Remove the foam padding from the top of the box.
7. Slide the cardboard box off the pallet.
8. Remove the plastic cover from the switch chassis.

9. Use a 7/16-in. or 11-mm open-end or socket wrench to remove the four sets of bracket bolts that secure the chassis to the shipping pallet.
10. Unpack the accessory box and lay out the contents so that they are ready for use.
11. Verify that your order includes all appropriate parts. See [“Parts Inventory \(Packing List\) for an EX8208 Switch” on page 144](#) and *Parts Inventory (Packing List) for an EX8216 Switch*.
12. Store the brackets and bolts inside the accessory box.
13. Save the shipping box, pallet, and packing materials in case you need to move or ship the switch at a later time.

Figure 34: Unpacking an EX8208 Switch

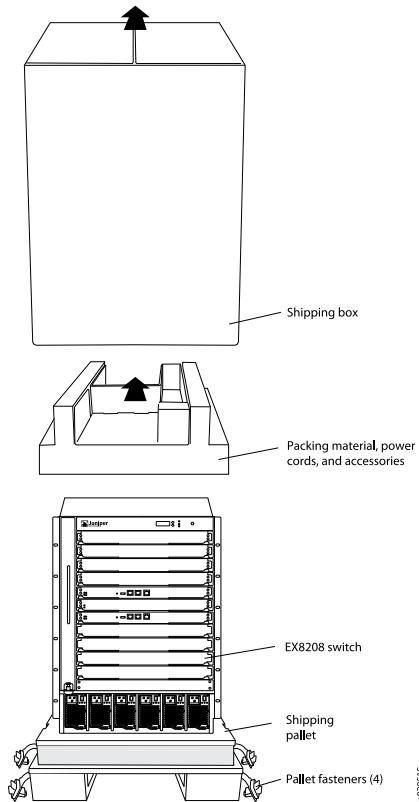
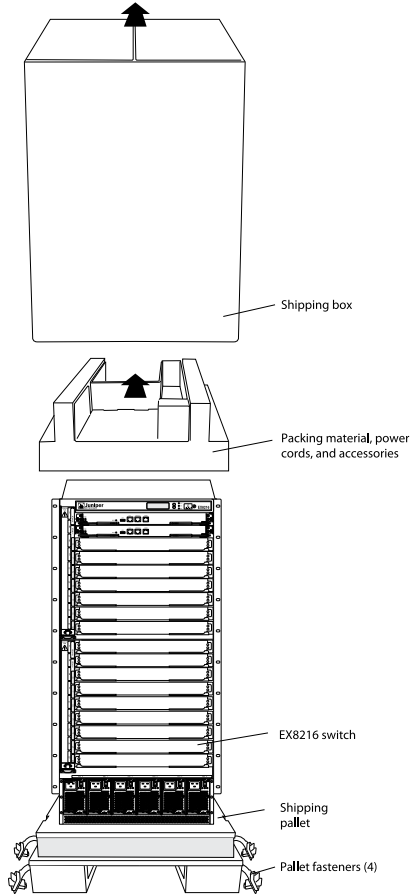


Figure 35: Unpacking an EX8216 Switch



Unpacking a Line Card Used in an EX8200 Switch

The line cards for EX8200 switches are rigid sheet-metal structures that house the line card components including network ports. The line cards are shipped in a cardboard carton, secured with foam packing material.



CAUTION: The line cards are maximally protected inside the shipping carton. Do not unpack the line cards until you are ready to install them in the switch chassis.

Before you unpack a line card:

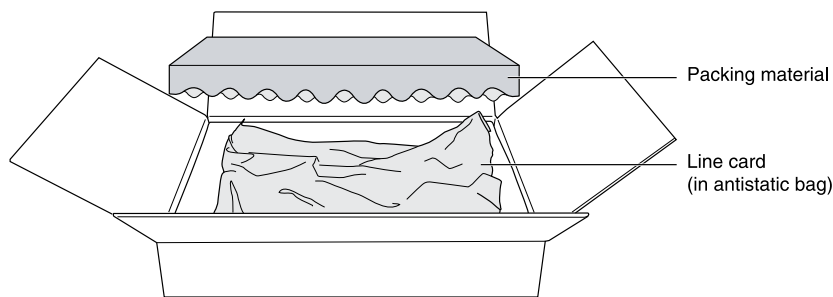
- Ensure that you have taken the necessary precautions to prevent ESD damage (see [“Prevention of Electrostatic Discharge Damage”](#) on page 381).

- Ensure that you know how to handle and store the line card (see *Handling and Storing Line Cards in EX6200 and EX8200 Switches*).

To unpack a line card (see [Figure 36 on page 144](#)):

1. Move the shipping carton to a staging area as close to the installation site as possible.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Pull out the packing material, which holds the line card in place.
5. Remove the line card from the antistatic bag.
6. Save the shipping carton and packing materials in case you need to move or ship the line card later.

Figure 36: Unpacking a Line Card Used in an EX8200 Switch



SEE ALSO

| [Packing a Line Card Used in an EX8200 Switch](#) | 344

Parts Inventory (Packing List) for an EX8208 Switch

The switch shipment includes a packing list. Check the parts you receive in the switch shipping crate against the items on the packing list. The packing list specifies the part number and description of each part in your order. The parts shipped depend on the configuration you order. See [“EX8208 Switch Configurations” on page 27](#) for more information.

If any part on the packing list is missing, contact your customer service representative or contact Juniper customer care from within the U.S. or Canada by telephone at 1-888-314-5822. For international-dial or direct-dial options in countries without toll-free numbers, see <https://www.juniper.net/support/requesting-support.html>.

NOTE: All line cards ordered are shipped separately. Line cards are not listed on the switch's packing list.

NOTE: The base configuration is available only with AC power supplies. The redundant configuration ships with either AC or DC power supplies.

Table 66 on page 145 lists the parts and their quantities in the packing list for a base configuration and a redundant configuration switch.

Table 66: Parts List for Different EX8208 Switch Configurations

Component	Base Configuration Quantity	Redundant Configuration Quantity
Chassis, including the backplane and front-mounting brackets	1	1
Switch Fabric and Routing Engine (SRE) module	1	2
Switch Fabric (SF) module	1	1
Power supplies	2 AC	6 AC or 4 DC
Power supply cords	2 (1 per power supply)	6 (1 per AC power supply)
Fan tray	1	1
Cover panels for slots without installed components	<ul style="list-style-type: none"> ● Line card cover panels: 8 ● SRE module cover panel: 1 ● Power supply cover panels: 4 	<ul style="list-style-type: none"> ● Line card cover panels: 8

Table 67 on page 146 lists the parts contained in the accessory box. The same accessories ship with both configurations of the switch.

Table 67: Accessory Box Parts List

Component	Quantity
Label, accessories contents	1
Accessory kit box	1
Documentation Roadmap	1
Left front adjustable mounting bracket	1
Right front adjustable mounting bracket	1
Rear adjustable mounting brackets	2
Screws to connect the front pieces and rear pieces of the adjustable mounting brackets for four-post rack installation. Each bracket consists of a front piece and a rear piece. Six screws connect the front-and-rear pieces of each of the two adjustable mounting brackets.	12
Power cord tray	1
Velcro tie-wraps for power cord tray	12
Power cord retainers	6
Juniper Networks Product Warranty	1
End User License Agreement	1
Juniper Compliance Form Letter, RoHS Worldwide	1
Ethernet cable, RJ-45/RJ-45, 4-pair stranded UTP, category #5	1
RJ-45 to socket DB-9 cable, to connect to the switch's console port using a management PC's serial port	1
ESD grounding strap	1

NOTE: You must provide mounting screws that are appropriate for your rack or cabinet to front-mount the chassis on a rack or a cabinet.

For two-post rack installation, you need 28 screws: 24 screws to attach the front-mounting bracket “ears” that come installed on the chassis to the front of the rack and 4 screws to install the power cord tray. (The power cord tray is mandatory for two-post rack installation.)

For four-post rack installation, you need either 40 or 44 screws: 24 screws to attach the front-mounting bracket “ears” that come installed on the chassis to the front of the rack, 16 screws to attach the adjustable mounting brackets to the rack, and 4 screws if you install the optional power cord tray.

Register Products—Mandatory to Validate SLAs

Register all new Juniper Networks hardware products and changes to an existing installed product using the Juniper Networks website to activate your hardware replacement service-level agreements (SLAs).



CAUTION: Register product serial numbers on the Juniper Networks website and update the installation base data if there is any addition or change to the installation base or if the installation base is moved. Juniper Networks will not be held accountable for not meeting the hardware replacement service-level agreement for products that do not have registered serial numbers or accurate installation base data.

Register your product(s) at <https://tools.juniper.net/svcreg/SRegSerialNum.jsp>.

Update your installation base at

<https://www.juniper.net/customers/csc/management/updateinstallbase.jsp>.

Installing and Connecting an EX8208 Switch

The EX8208 switch chassis is a rigid sheet-metal structure that houses the other hardware components such as Switch Fabric and Routing Engine (SRE) modules, a Switch Fabric (SF) module, and line cards. The switch ships in a cardboard box that has a two-layer wooden pallet base. The switch chassis is bolted to the pallet base.

To unpack an EX8208 switch, follow instructions in *Unpacking an EX8200 Switch*.

You can install an EX8208 switch in a 19-in. equipment rack or cabinet by using the front-mounting bracket attached to the chassis. To install the switch in a rack or cabinet, follow the instructions in [“Mounting an EX8208 Switch on a Rack or Cabinet Using a Mechanical Lift” on page 157](#) or [“Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift” on page 159](#).

To connect an EX8208 switch to earth ground, follow instructions in [“Connect Earth Ground to an EX Series Switch” on page 164](#).

To connect power to the switch chassis, follow instructions in [“Connecting AC Power to an EX8200 Switch” on page 171](#).

To connect and configure the switch, follow instructions in [“Connecting and Configuring an EX Series Switch \(CLI Procedure\)” on page 194](#) or [“Connecting and Configuring an EX Series Switch \(J-Web Procedure\)” on page 198](#).

To connect the switch to a network for out-of-band management, follow instructions in [“Connect a Device to a Network for Out-of-Band Management” on page 182](#). To connect the switch to a management console, follow instructions in [“Connect a Device to a Management Console Using an RJ-45 Connector” on page 183](#).

Installing Adjustable Mounting Brackets in a Rack or Cabinet for an EX8200 Switch

To mount the switch on a four-post rack or cabinet, you must first install the adjustable mounting brackets in the rack or cabinet. (The remainder of this topic uses “rack” to mean “rack or cabinet.”) The EX8200 switch comes with a four-piece set of adjustable mounting brackets that supports the chassis in the rack.

NOTE: The adjustable mounting brackets are not for installation in two-post racks.

The four adjustable mounting bracket pieces are:

- 1 left front adjustable mounting bracket. The bracket is labeled “LEFT FRONT” on the side of the bracket that faces the interior of the rack, near the holes for attaching the bracket to the rack.
- 1 right front adjustable mounting bracket. The bracket is labeled “RIGHT FRONT” on the side of the bracket that faces the interior of the rack, near the holes for attaching the bracket to the rack.
- 2 rear adjustable mounting brackets. These brackets are labeled “REAR” on the side of the bracket that faces the interior of the rack, near the holes for attaching the bracket to the rack. The rear brackets are interchangeable; you can use either of the rear brackets with the right or left front adjustable mounting bracket.

Ensure that you have the following parts and tools available to install the adjustable mounting brackets:

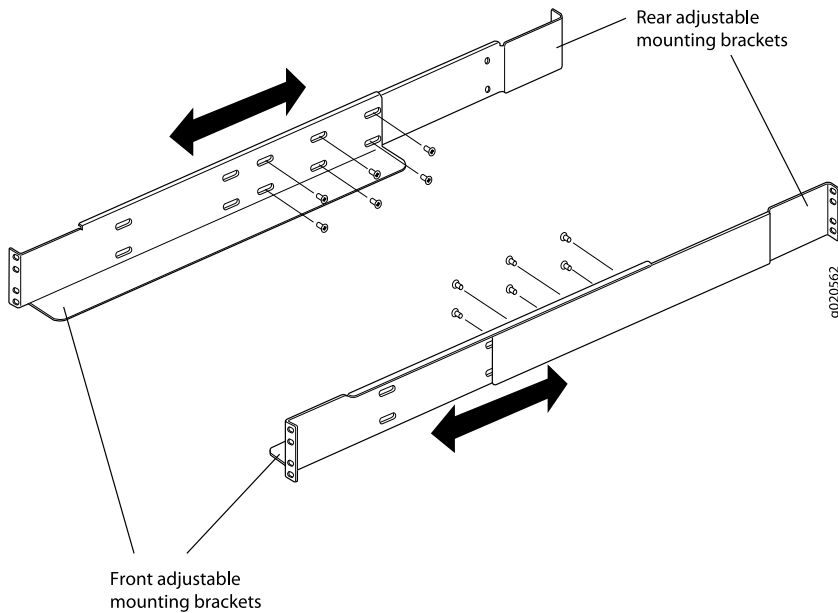
- A Phillips (+) screwdriver, number 1, 2, or 3, depending on the size of your rack mounting screws
- A Phillips (+) screwdriver, number 2 to install the screws that connect the rear and front mounting brackets
- 16 mounting screws appropriate for your rack to attach the four mounting bracket pieces to the rack

When you install the adjustable mounting brackets, the “arms” of the brackets overlap. The overlap area adjusts the total bracket length to fit three standard rack sizes: 23.62 in. (600 mm), 30 in. (762 mm), and 31.5 in. (800 mm).

To install the mounting brackets in a four-post rack (see [Figure 38 on page 151](#) and [Figure 39 on page 151](#)):

1. Remove the adjustable mounting brackets from the accessory box.
2. Decide where to position the switch in the rack. If the rack is empty, position the switch in the lowest possible location. See [“Rack Requirements” on page 118](#), and [“Cabinet Requirements” on page 119](#).
3. Position the left front adjustable mounting bracket at the desired position in the left side of the rack and line up its front screw holes with the holes in the rack. Use 4 mounting screws appropriate for your rack to attach the left front bracket to the rack.
4. Position one of the rear brackets at the left rear of the rack on the same level as the left front bracket, so that the rear bracket overlaps with the left front bracket. The screw holes for connecting the front and rear brackets should overlap. Use 4 mounting screws appropriate for your rack to attach the rear bracket to the rack.
5. Connect left front and rear brackets (see [Figure 37 on page 150](#)):
 - a. Insert 6 of the screws provided with the mounting brackets into the overlapping bracket holes.
 - b. Hand tighten the screws fully (to 12–16 in.-lb torque) using a number 2 Phillips screwdriver.

Figure 37: Adjustable Mounting Brackets for Four-Post Rack Installation



6. Position the right front adjustable mounting bracket at the desired position in the right side of the rack opposite the installed left front bracket, so that it is on the same rack level as the left bracket. If the right and left front brackets are not on the same level, the chassis will rest at an angle in the rack instead of resting flat and level. Line up the right bracket's front screw holes with the holes in the rack. Use 4 mounting screws appropriate for your rack to attach the right front bracket to the rack.
7. Position the other rear bracket at the right rear of the rack on the same level as the right front bracket, so that the rear bracket overlaps with the right front bracket. The screw holes for connecting the front and rear brackets should overlap. Use 4 mounting screws appropriate for your rack to attach the rear bracket to the rack.
8. Connect the right front and rear brackets (see [Figure 37 on page 150](#)):
 - a. Insert 6 of the screws provided with the mounting brackets into the overlapping bracket holes.
 - b. Hand tighten the screws fully (to 12–16 in.-lb torque) using a number 2 Phillips screwdriver.

Figure 38: Adjustable Mounting Brackets Installed in a Four-Post Rack (EX8208 Switch)

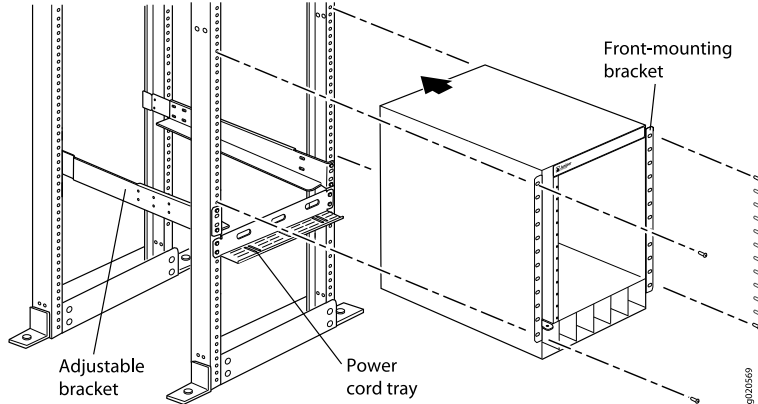
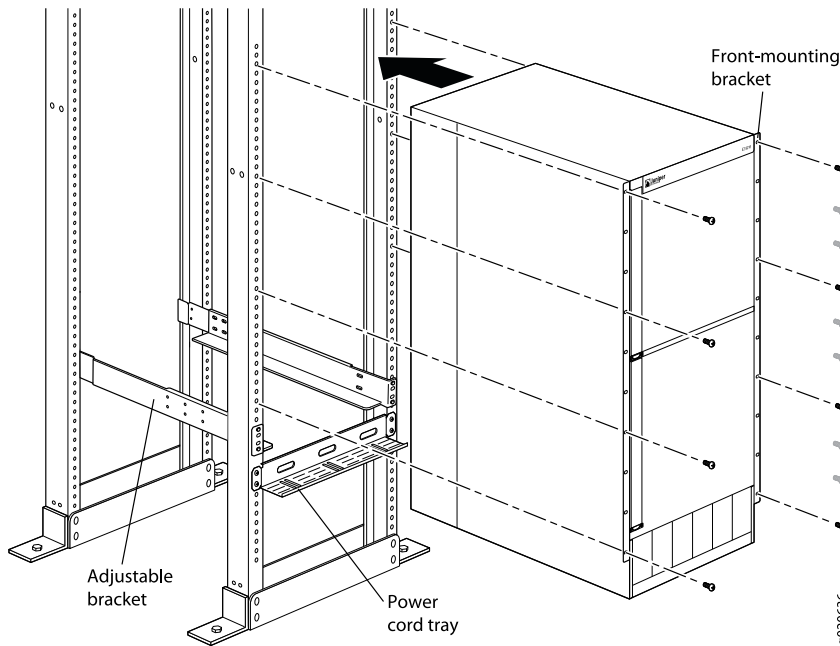


Figure 39: Adjustable Mounting Brackets Installed in a Four-Post Rack (EX8216 Switch)



Installing the Power Cord Tray in a Rack or Cabinet for an EX8200 Switch

The power cord tray is supplied with all EX8200 switches. The power cord tray is optional for four-post rack or cabinet installation but mandatory for a two-post rack or cabinet installation. (The remainder of this topic uses “rack” to mean “rack or cabinet.”) To mount an EX8208 switch in a two-post rack, you must install the power cord tray in the rack before installing the switch.

NOTE: The EX8216 switch can be installed only in a four-post rack. Installation in a two-post rack is not supported.

The power cord tray provides support for the front of the EX8208 chassis during installation of the switch in a two-post rack. The front edge of the chassis rests on the upper edge (lip) of the power cord tray.

The power cord tray provides a place to organize and tie down the power cords for the power supplies.

The power cord tray uses 1 U of rack space, so the total space occupied by an EX8208 switch chassis and power cord tray is 15 U, and the total space occupied by an EX8216 switch chassis and power cord tray is 22 U.

Ensure that you have the following tools and parts available to install the power cord tray:

- A Phillips (+) screwdriver, number 1, 2, or 3, depending on the size of your rack mounting screws
- 4 mounting screws appropriate for your rack to attach the power cord tray to the rack

To install the power cord tray (see [Figure 40 on page 153](#) and [Figure 41 on page 153](#)):

1. Remove the power cord tray from the accessory box.
2. Decide where to position the switch in the rack. If the rack is empty, choose the lowest possible location. See [“Rack Requirements” on page 118](#), and [“Cabinet Requirements” on page 119](#).

NOTE: To mount an EX8208 switch on a two-post rack, you must install the power cord tray in the rack before installing the switch. See [Figure 41 on page 153](#). Installation of an EX8216 switch in a two-post rack is not supported.

3. Position the power cord tray in the rack space immediately below the position in which you want to install the switch (in a two-post rack) or where the switch is installed (in a four-post rack) (see [Figure 40 on page 153](#)). Line up the screw holes of the power cord tray with the holes in the rack. Use 4 mounting screws appropriate for your rack to attach the power cord tray to the rack.

Figure 40: Installing the Power Cord Tray in a Four-Post Rack

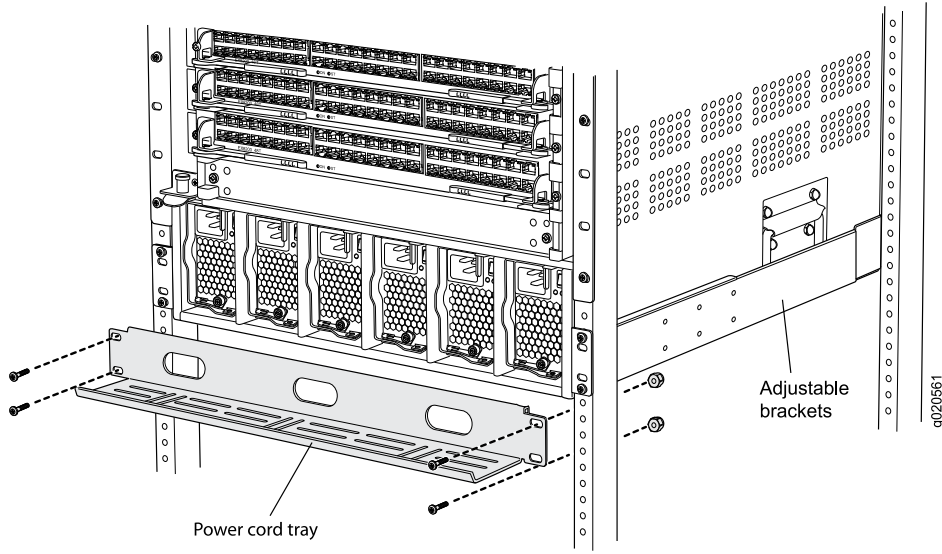
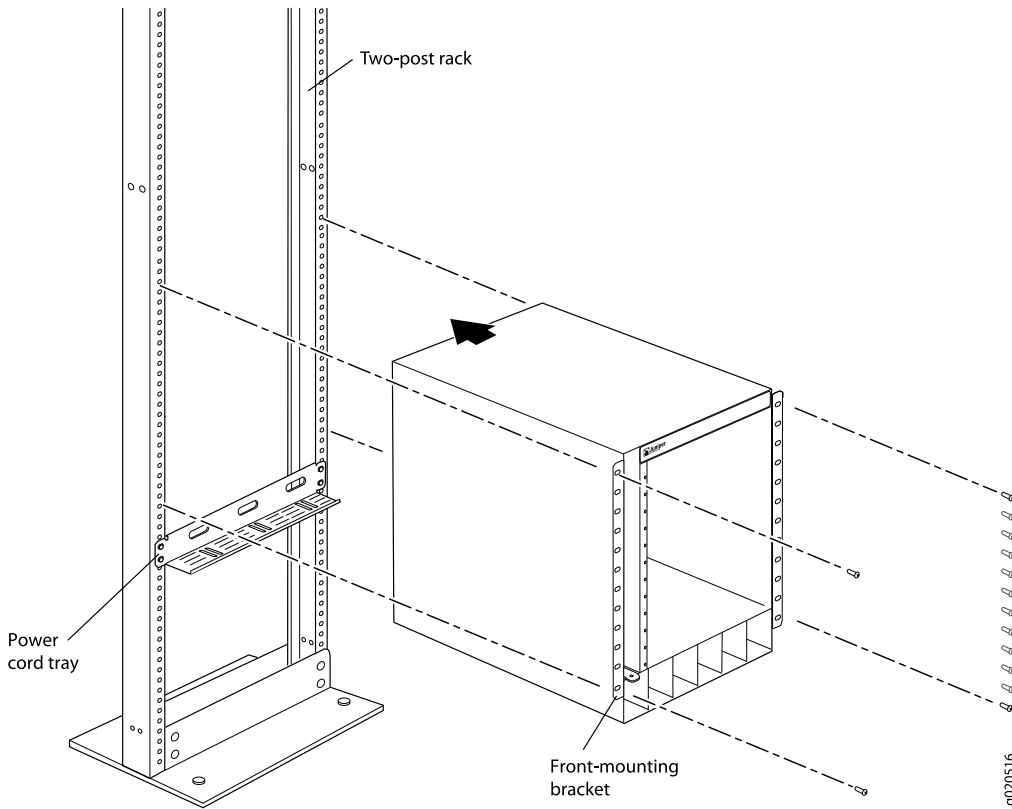


Figure 41: Power Cord Tray Installed in a Two-Post Rack



Mounting an EX8208 Switch on a Rack or Cabinet

The EX8208 switch ships installed with front-mounting brackets on the chassis for mounting the switch on a 19-in. equipment rack or cabinet. The switch also comes with adjustable mounting brackets to support it in the rack.

In a four-post rack, the switch consumes 14 U without the optional power cord tray and 15 U with the optional power cord tray. In a two-post rack, the power cord tray is mandatory. The switch with the power cord tray consumes 15 U. You can mount up to three switches on a 42 U four-post rack or on a 45 U two-post rack provided that the racks meet the strength requirements to support the combined weight of the switches.

NOTE: If you are mounting multiple switches on a rack or cabinet, mount a switch on the bottom of the rack or cabinet first and then mount the rest of the switches from bottom to top.



WARNING: If you install the switch without using a mechanical lift, at least three people must be available to lift the unloaded switch chassis (all components except the backplane removed) onto the adjustable mounting brackets (in a four-post rack or cabinet) or onto the lip of the power cord tray (in a two-post rack or cabinet).



CAUTION: Do not install line cards in the chassis until after you mount the chassis securely on a rack or cabinet.

Before mounting an EX8208 switch on a rack or cabinet:

- Verify that the site meets the requirements described in [“Site Preparation Checklist for an EX8200 Switch” on page 108](#).
- Place the rack or cabinet in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure. See [“Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch” on page 116](#) for detailed information.
- Read [“General Safety Guidelines and Warnings” on page 347](#), with particular attention to [“Chassis and Component Lifting Guidelines” on page 354](#).
- Remove the switch from the shipping box (see *Unpacking an EX8200 Switch*).

Ensure that you have the following parts and tools available to mount the switch on a rack or cabinet:

- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws, for mounting the switch on a rack or cabinet
- A Phillips (+) screwdriver, number 1, to remove the power supplies from the chassis if you are mounting the switch without using a mechanical lift
- 24 mounting screws appropriate for your rack

To mount the EX8208 switch on a rack or cabinet (see [Figure 42 on page 156](#) and [Figure 43 on page 156](#)):

1. In a four-post rack or cabinet, install the adjustable mounting brackets at the desired position (see *Installing Adjustable Mounting Brackets in a Rack or Cabinet for an EX8200 Switch*).

In a two-post rack or cabinet, install the power cord tray (see *Installing the Power Cord Tray in a Rack or Cabinet for an EX8200 Switch*). The power cord tray is optional for four-post rack installation.

2. Lift the chassis into the rack using a mechanical lift. For instructions on how to install the chassis using a mechanical lift, see [“Mounting an EX8208 Switch on a Rack or Cabinet Using a Mechanical Lift” on page 157](#).

In a four-post rack, place the chassis on the adjustable mounting brackets. In a two-post rack, place the front edge of the chassis on the lip of the power cord tray with at least three people supporting the rear of the chassis until you can bolt the chassis into the rack.

If a mechanical lift is not available, remove all components and ensure that at least three people are available to lift the empty chassis into the rack. For instructions on how to install the chassis without using a mechanical lift, see [“Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift” on page 159](#).

3. Insert 24 mounting screws appropriate for your rack (not provided) into the aligned holes. Use the appropriate Phillips (+) screwdriver to tighten the screws to the rack or cabinet rail.

Figure 42: Installing an EX8208 Switch in a Two-Post Rack

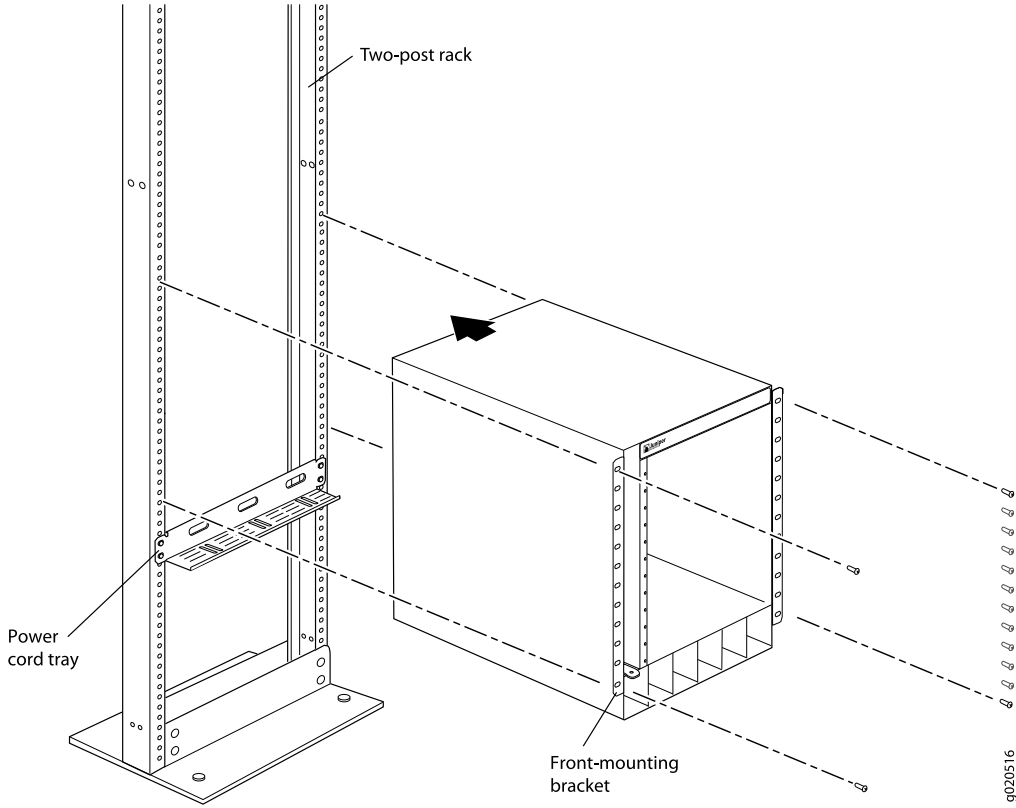
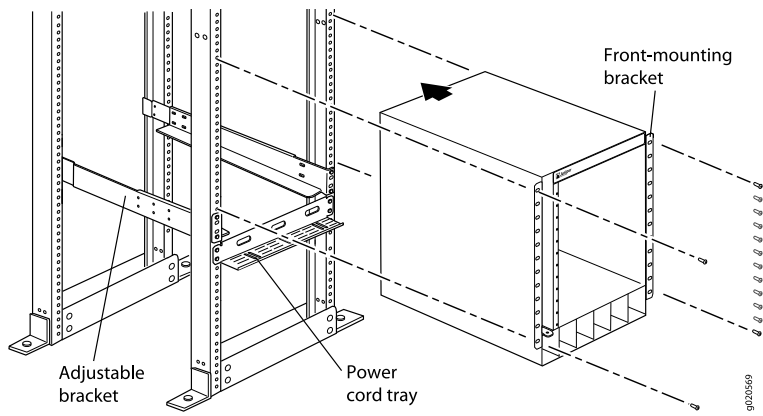


Figure 43: Installing an EX8208 Switch in a Four-Post Rack



SEE ALSO

[Connecting AC Power to an EX8200 Switch | 171](#)

Mounting an EX8208 Switch on a Rack or Cabinet Using a Mechanical Lift

Because of the switch's size and weight, we strongly recommend using a mechanical lift to install the switch.

NOTE: For instructions on installing a switch without using a mechanical lift, see [“Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift” on page 159.](#)



CAUTION: Do not install line cards in the chassis until after you mount the chassis securely on a rack or cabinet.



CAUTION: Before front-mounting the switch on a rack or cabinet, have a qualified technician verify that the rack or cabinet is strong enough to support the switch's weight and is adequately supported at the installation site.

Before you install the switch:

- Prepare the site for installation as described in [“Site Preparation Checklist for an EX8200 Switch” on page 108.](#)
- Ensure the site has adequate clearance for both airflow and hardware maintenance as described in [“Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch” on page 116.](#)
- Unpack the switch as described in *Unpacking an EX8200 Switch*.
- In a two-post rack, install the power cord tray at the desired position (see *Installing the Power Cord Tray in a Rack or Cabinet for an EX8200 Switch*). The lip of the power cord tray will support the front of the chassis when you install the switch in the two-post rack.
- In a four-post rack, install the adjustable mounting brackets at the desired position (see *Installing Adjustable Mounting Brackets in a Rack or Cabinet for an EX8200 Switch*). Optionally, you can also install the power cord tray and use it to manage the power supply cords.
- Review chassis lifting guidelines described in [“Chassis and Component Lifting Guidelines” on page 354.](#)

Ensure that you have the following parts and tools available to install the switch:

- A mechanical lift
- 24 mounting screws appropriate for your rack
- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws

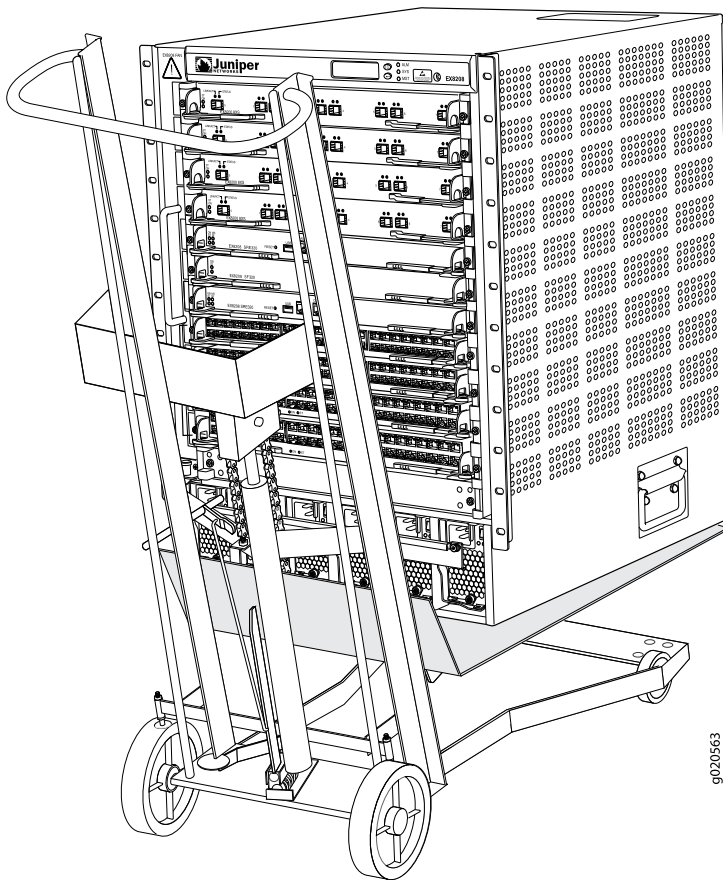


CAUTION: If you are installing more than one switch in a rack or cabinet, install the first switch at the bottom of the rack.

To install the switch using a mechanical lift (see [Figure 44 on page 158](#)):

1. Ensure that the rack or cabinet is placed in its permanent location and is secured to the building. Ensure that the installation site allows adequate clearance for both airflow and maintenance. For details, see [“Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch” on page 116](#).
2. Load the switch onto the lift, making sure it rests securely on the lift platform.

Figure 44: Installing the EX8208 Switch Chassis Using a Mechanical Lift



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3. Using the lift, position the switch in front of the rack or cabinet, centering it in front of the adjustable mounting brackets and/or power cord tray installed in the rack.

4. Lift the chassis approximately 0.75 in. (1.9 cm) above the surface of the adjustable mounting brackets/power cord tray. Position the chassis in the rack as close as possible to resting on the support that the mounting brackets and/or power cord tray provide.
5. In a four-post rack, carefully slide the switch onto the adjustable mounting brackets until the front-mounting brackets (“ears”) attached to the chassis contact the rack rails. The adjustable mounting brackets installed in the rack ensure that the holes in the front-mounting brackets align with the holes in the rack rails.

In a two-post rack, carefully slide the switch into the rack ensuring that the front bottom of the chassis rests on the lip of the power cord tray. The front-mounting brackets (“ears”) prevent the chassis from tipping too far back.
6. Move the lift away from the rack.
7. In a four-post rack, slide the chassis so that the front-mounting bracket is flush with the front of the rack.

In a two-post rack, push the bottom of the chassis so that the front-mounting bracket is flush with the front of the rack.
8. Install a mounting screw into each of the open front-mounting holes aligned with the rack, starting from the bottom.
9. Visually inspect the alignment of the switch. If the switch is installed properly in the rack, all the mounting screws on one side of the rack are aligned with the mounting screws on the opposite side and the switch is level.
10. After ensuring that the switch is aligned properly, tighten the screws.

Mounting an EX8208 Switch on a Rack or Cabinet Without Using a Mechanical Lift

If you cannot use a mechanical lift to install the switch (the preferred method), you can install it manually.



CAUTION: The chassis with only the backplane and no other components weighs approximately 89 lb (41 kg). Lifting the chassis and mounting it in a rack or cabinet requires at least three people.

The chassis has two handles. Do not lift a fully loaded chassis by the handles; make sure the chassis is empty (contains only the backplane) before you lift it. If two of the people lifting the chassis use the handles to lift it, the third person must lift from the rear of the chassis. The rear of the chassis is heavier than the front of the chassis, so when you lift the chassis by the handles, the chassis tips toward the heavier back end. The person lifting from the back must be aware of this behavior and must be braced to prevent the chassis from tipping over.

When lifting the chassis, do not grasp the switch by the blue panel at the top front of the chassis. Doing so can cause the panel to pop off of the switch.



CAUTION: Before front-mounting the switch in a rack, have a qualified technician verify that the rack is strong enough to support the switch's weight and is adequately supported at the installation site.

Before you install the switch:

1. Prepare the site for installation as described in [“Site Preparation Checklist for an EX8200 Switch” on page 108](#).
2. Ensure the site has adequate clearance for both airflow and hardware maintenance as described in [“Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch” on page 116](#).
3. Unpack the switch as described in *Unpacking an EX8200 Switch*.
4. Remove all components except the backplane from the chassis. See:
 - [Removing an SRE Module from an EX8208 Switch on page 253](#)
 - [Removing an SF Module from an EX8208 Switch on page 257](#)
 - [Removing a Line Card from an EX8200 Switch on page 268](#)
 - [Removing a Fan Tray from an EX8208 Switch on page 235](#)
 - [Removing an AC Power Supply from an EX8200 Switch on page 239](#)

5. In a two-post rack, install the power cord tray at the desired position (see *Installing the Power Cord Tray in a Rack or Cabinet for an EX8200 Switch*). The lip of the power cord tray will support the front of the chassis when you install the switch in the rack.

In a four-post rack, install the adjustable mounting brackets at the desired position (see *Installing Adjustable Mounting Brackets in a Rack or Cabinet for an EX8200 Switch*). Optionally, you can also install the power cord tray and use it to manage the power supply cords.

6. Review chassis lifting guidelines as described in [“Chassis and Component Lifting Guidelines” on page 354](#).

Ensure that you have the following parts and tools available to install the switch:

- 24 mounting screws appropriate for your rack
- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws

To install the switch in the rack or cabinet (see [Figure 46 on page 163](#) and [Figure 47 on page 163](#)):



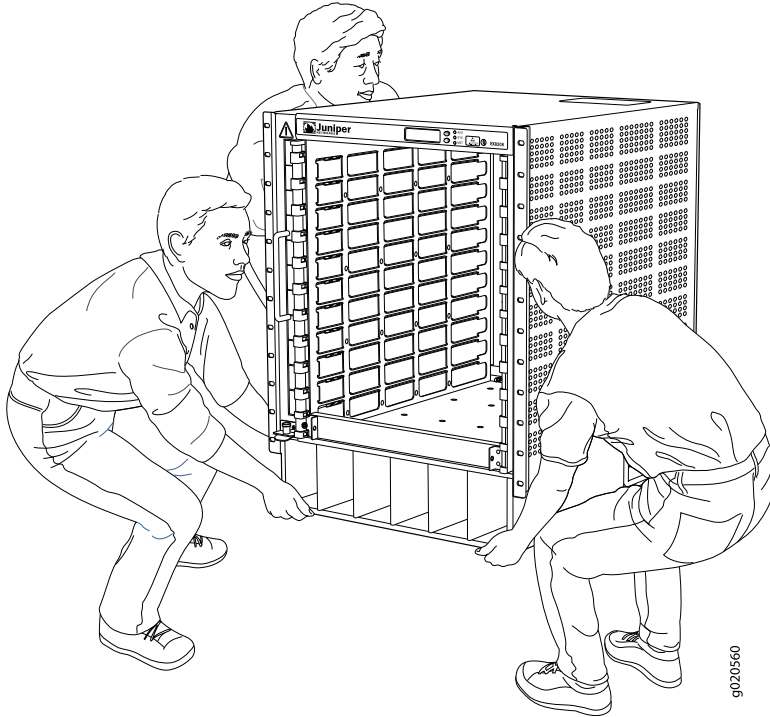
CAUTION: If you are installing more than one switch in a rack or cabinet, install the first one at the bottom of the rack. Do not attempt to install a switch manually in an upper position in a rack or cabinet.

1. Ensure that the rack or cabinet is placed in its permanent location and is secured to the building.
2. Position the switch in front of the rack or cabinet, centering it in front of the adjustable mounting brackets. Use a pallet jack if one is available.
3. With one person on each side and one person in the rear, hold the bottom of the chassis and carefully lift it onto the adjustable mounting brackets installed in a four-post rack or onto the power cord tray installed in a two-post rack. See [Figure 45 on page 162](#).



WARNING: To prevent injury, keep your back straight and lift with your legs, not your back. Do not twist your body as you lift. Balance the load evenly and be sure that your footing is firm.

Figure 45: Lifting an EX8208 Switch Chassis Without Using a Mechanical Lift



4. In a four-post rack, carefully slide the switch onto the adjustable mounting brackets until the front-mounting brackets attached to the chassis contact the rack rails. The adjustable mounting brackets ensure that the holes in the front-mounting brackets attached to the chassis align with the holes in the rack rails.

In a two-post rack, carefully slide the switch over the lip of the power cord tray and into the rack. Push the bottom of the chassis so that the front-mounting bracket is flush with the front of the rack.

5. Install a mounting screw into each of the open front-mounting holes aligned with the rack, starting from the bottom.
6. Visually inspect the alignment of the chassis. If the chassis is installed properly in the rack, all the mounting screws on one side of the rack are aligned with the mounting screws on the opposite side and the switch is level.
7. After ensuring that the switch is aligned properly, tighten the screws.

Figure 46: Installing an EX8208 Switch in a Four-Post Rack

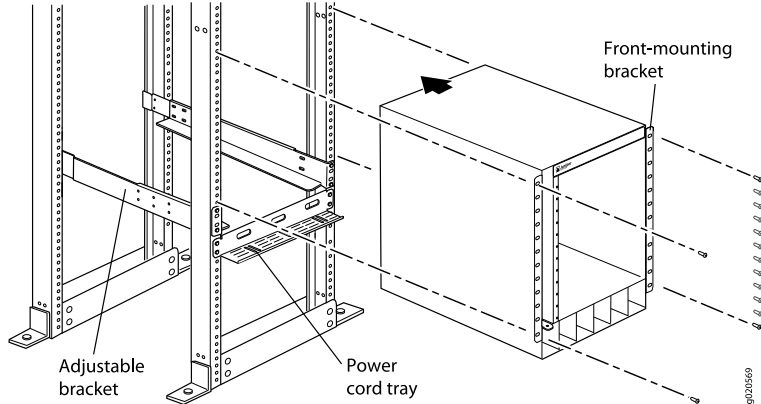
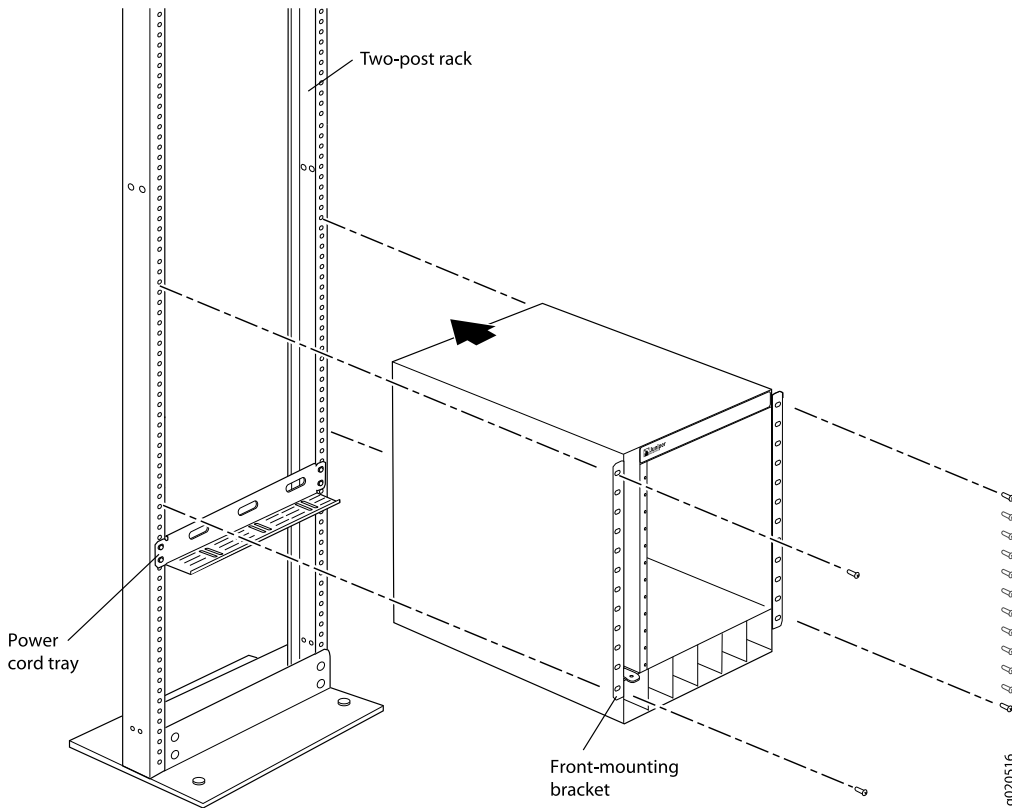


Figure 47: Installing an EX8208 Switch in a Two-Post Rack



After you install the mounting screws and securely bolt the chassis to the rack, reinstall the components in the chassis. See:

- [Installing an SRE Module in an EX8208 Switch on page 255](#)
- [Installing an SF Module in an EX8208 Switch on page 259](#)
- [Installing a Line Card in an EX8200 Switch on page 271](#)

- [Installing a Fan Tray in an EX8208 Switch on page 237](#)
- [Installing an AC Power Supply in an EX8200 Switch on page 240](#)

Connecting the EX8200 to Power

IN THIS SECTION

- [Connect Earth Ground to an EX Series Switch | 164](#)
- [Connecting AC Power to an EX8200 Switch | 171](#)
- [Connecting DC Power to an EX8200 Switch | 174](#)
- [Powering On an EX8200 Switch | 180](#)

Connect Earth Ground to an EX Series Switch

IN THIS SECTION

- [Parts and Tools Required for Connecting an EX Series Switch to Earth Ground | 165](#)
- [Special Instructions to Follow Before Connecting Earth Ground to an EX Series Switch | 169](#)
- [Connecting Earth Ground to an EX Series Switch | 170](#)

To ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements, you must connect an EX Series switch to earth ground before you connect power to the switch. You must use the protective earthing terminal on the switch chassis to connect the switch to earth ground (see [Figure 49 on page 171](#)).

You must install the EX Series switch in a restricted-access location and ensure that the chassis is always properly grounded. EX Series switches have a two-hole protective grounding terminal provided on the chassis. See [Table 68 on page 165](#) for the location of the earthing terminals on various EX Series switches. We recommend that you use the protective grounding terminal as the preferred method for grounding the chassis regardless of the power supply configuration. However, if additional grounding methods are available, you can also use those methods. For example, you can use the grounding wire in the power cord

of an AC power supply or use the grounding terminal or lug on a DC power supply. This system was tested to meet or exceed all applicable EMC regulatory requirements with the two-hole protective grounding terminal connected correctly.

Ensure that a licensed electrician has attached an appropriate grounding lug to the grounding cable you supply. Using a grounding cable with an incorrectly attached lug can damage the switch.

Parts and Tools Required for Connecting an EX Series Switch to Earth Ground

Before you begin connecting an EX Series switch to earth ground, ensure you have the parts and tools required for your switch.

[Table 68 on page 165](#) lists the earthing terminal location, grounding cable and lug specifications, and parts needed for connecting an EX Series switch to earth ground.

Table 68: Parts Required for Connecting an EX Series Switch to Earth Ground

Switch	Earthing Terminal Location	Grounding Cable Requirements	Grounding Lug Specifications	Screws and Washers	Additional Information
EX2200	Rear panel of the chassis	14 AWG (2 mm ²), minimum 90° C wire, or as permitted by the local code	Panduit LCC10-14BWL or equivalent—not provided	<ul style="list-style-type: none"> Two 10-32 x .25 in. screws with #10 split-lock washer—not provided Two #10 flat washers—not provided 	
EX2300-C	Rear panel of the chassis	14 AWG (2 mm ²), minimum 90° C wire, or as permitted by the local code	Panduit LCC10-14AW-L or equivalent—not provided	<ul style="list-style-type: none"> Two 10-32 x .25 in. screws with #10 split-lock washer—not provided Two #10 flat washers—not provided 	

Table 68: Parts Required for Connecting an EX Series Switch to Earth Ground (continued)

Switch	Earthing Terminal Location	Grounding Cable Requirements	Grounding Lug Specifications	Screws and Washers	Additional Information
EX2300	Rear panel of the chassis	<ul style="list-style-type: none"> EX2300 switches except EX2300-24MP and EX2300-48MP models—14 AWG (2 mm²), minimum 90°C wire, or as permitted by the local code EX2300-24MP and EX2300-48MP models—14-10 AWG STR (2.5-6 mm²), 12-10 AWG SOL (4-6 mm²) minimum 90°C wire, or as permitted by the local code—not provided 	<ul style="list-style-type: none"> EX2300 switches except EX2300-24MP and EX2300-48MP models—Panduit LCC10-14AW-L or equivalent—not provided EX2300-24MP and EX2300-48MP models—Panduit LCA10-10L or equivalent—not provided 	<ul style="list-style-type: none"> EX2300 switches except EX2300-24MP and EX2300-48MP models <ul style="list-style-type: none"> Two 10-32 x .25 in. screws with #10 split-lock washer—not provided Two #10 flat washers—not provided EX2300-24MP and EX2300-48MP models <ul style="list-style-type: none"> One Pan Phillips M 4 x 6 mm Nickel plated screw—provided 	
EX3200, EX3300, and EX3400	Rear panel of the chassis	14 AWG (2 mm ²), minimum 90° C wire, or as permitted by the local code	Panduit LCC10-14BWL or equivalent—not provided	<ul style="list-style-type: none"> Two 10-32 x .25 in. screws with #10 split-lock washer—not provided Two #10 flat washers—not provided 	For EX3200 Switches, see “Special Instructions to Follow Before Connecting Earth Ground to an EX Series Switch” on page 169.

Table 68: Parts Required for Connecting an EX Series Switch to Earth Ground (continued)

Switch	Earthing Terminal Location	Grounding Cable Requirements	Grounding Lug Specifications	Screws and Washers	Additional Information
EX4200, EX4500, and EX4550	Left side of the chassis	14 AWG (2 mm ²), minimum 90° C wire, or as permitted by the local code	Panduit LCC10-14BWL or equivalent— not provided	<ul style="list-style-type: none"> • Two 10-32 x .25 in. screws with #10 split-lock washer— not provided • Two #10 flat washers— not provided 	See “Special Instructions to Follow Before Connecting Earth Ground to an EX Series Switch” on page 169.
EX6210	Rear panel of the chassis (on lower left side)	The grounding cable must be the same gauge as the power feed cables and as permitted by the local code.	Panduit LCD2-14A-Q or equivalent —provided	<ul style="list-style-type: none"> • Two ¼ -20 x 0.5 in. screws with #¼” split-washer —provided • Two #¼” flat washers— provided 	
EX8208	Left side of the chassis	6 AWG (13.3 mm ²), minimum 90° C wire, or as permitted by the local code	Panduit LCD2-14A-Q or equivalent —provided	<ul style="list-style-type: none"> • Two ¼ -20 x 0.5 in. screws with #¼” split-washer —provided • Two #¼” flat washers— provided 	

Table 68: Parts Required for Connecting an EX Series Switch to Earth Ground (continued)

Switch	Earthing Terminal Location	Grounding Cable Requirements	Grounding Lug Specifications	Screws and Washers	Additional Information
EX8216	<p>Two earthing terminals:</p> <ul style="list-style-type: none"> • Left side of the chassis • Rear panel of the chassis <p>NOTE: You must use only one of the two protective earthing terminals.</p>	2 AWG (33.6 mm ²), minimum 90° C wire, or as permitted by the local code	Panduit LCD2-14A-Q or equivalent—provided	<ul style="list-style-type: none"> • Two ¼ -20 x 0.5 in. screws with #¼" split-washer—provided • Two #¼" flat washers—provided 	
EX9204, EX9208, and EX9214	Rear panel of the chassis	One 6 AWG (13.3 mm ²), minimum 90° C wire, or one that complies with the local code	Thomas& Betts LCN6-14 or equivalent—provided	<ul style="list-style-type: none"> • Two ¼ -20 x 0.5 in. screws with #¼" split-washer—provided • Two #¼" flat washers—provided 	See Grounding Cable and Lug Specifications for EX9200 Switches .
EX9251	Rear panel of the chassis	12 AWG (2.5 mm ²), minimum 90° C wire, or one that complies with the local code— not provided	Panduit LCD10-10A-L or equivalent— not provided	Two 10-32 screws— provided	See Grounding Cable and Lug Specifications for EX9200 Switches .

Table 68: Parts Required for Connecting an EX Series Switch to Earth Ground (*continued*)

Switch	Earthing Terminal Location	Grounding Cable Requirements	Grounding Lug Specifications	Screws and Washers	Additional Information
EX9253	Right side of the chassis	14-10 AWG (2-5.3 mm ²), minimum 90° C wire, or one that complies with the local code— not provided	Panduit LCD10-14B-L or equivalent— provided	Two M5 Pan Head screws— provided	

Tools required for connecting an EX Series switch to earth ground:

- An electrostatic discharge grounding strap (provided)
- A Phillips (+) number 2 screwdriver to tighten the screws.

An AC-powered EX Series switch gains additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using an AC power cord appropriate for your geographical location.

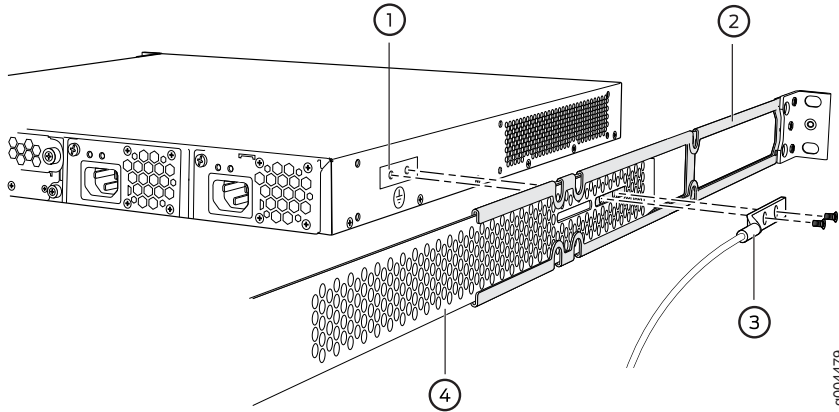
Special Instructions to Follow Before Connecting Earth Ground to an EX Series Switch

[Table 69 on page 169](#) lists the special instructions that you might need to follow before connecting earth ground to a switch.

Table 69: Special Instructions to Follow Before Connecting Earth Ground to an EX Series Switch

Switch	Special Instructions
EX3200 and EX4200	Some early variants of EX3200 and EX4200 switches for which the Juniper Networks model number on the label next to the protective earthing terminal is from 750-021xxx through 750-030xxx require 10-24x.25 in. screws.

Table 69: Special Instructions to Follow Before Connecting Earth Ground to an EX Series Switch (continued)

Switch	Special Instructions				
EX4200, EX4500, and EX4550	<p>If you plan to mount your switch on four posts of a rack or cabinet, mount your switch in the rack or cabinet before attaching the grounding lug to the switch.</p> <p>NOTE: The protective earthing terminal on switches mounted on four posts of a rack is accessible through the slot on the left rear bracket only if the rack is 27.5 in. (69.85 cm) through 30.5 in. (77.47 cm) deep for a switch mounted flush with the rack front and 29.5 in. (74.93 cm) through 32.5 in. (82.55 cm) deep for a switch mounted 2 in. (5.08 cm) recessed from the rack front. See Figure 48 on page 170.</p> <p>Figure 48: Connecting the Grounding Lug to a Switch Mounted on Four Posts of a Rack</p>  <table border="1"> <tr> <td>1—Protective earthing terminal</td> <td>3—Grounding lug</td> </tr> <tr> <td>2—Side mounting-rail</td> <td>4—Rear mounting-blade</td> </tr> </table> <p>NOTE: The brackets must be attached to the chassis before the grounding lug is attached. (The brackets are shown pulled away from the chassis so that the protective earthing terminal is seen.)</p>	1—Protective earthing terminal	3—Grounding lug	2—Side mounting-rail	4—Rear mounting-blade
1—Protective earthing terminal	3—Grounding lug				
2—Side mounting-rail	4—Rear mounting-blade				

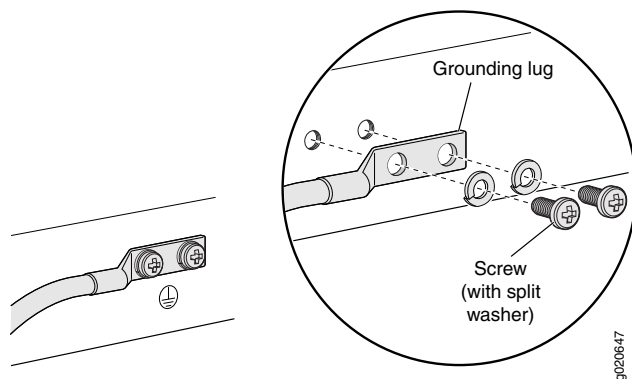
Connecting Earth Ground to an EX Series Switch

To connect earth ground to an EX Series switch:

1. Verify that a licensed electrician has attached the cable lug to the grounding cable.
2. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.

3. Attach an ESD grounding strap to your bare wrist, and connect the strap to the ESD grounding point on the switch.
4. Place the grounding lug attached to the grounding cable over the protective earthing terminal. See [Figure 49 on page 171](#).

Figure 49: Connecting a Grounding Cable to an EX Series Switch



5. Secure the grounding lug to the protective earthing terminal with the washers and screws.
6. Dress the grounding cable and ensure that it does not touch or block access to other switch components and that it does not drape where people could trip over it.

SEE ALSO

[General Safety Guidelines and Warnings | 347](#)

[Grounded Equipment Warning | 365](#)

Connecting AC Power to an EX8200 Switch

EX8200 switches can be configured with up to six AC power supplies. After you have installed at least one power supply, you can connect power to the switch.



CAUTION: Mixing different types of power supplies in the same chassis is not a supported configuration.

NOTE: Each power supply must be connected to a dedicated AC power source outlet.

Before you begin to connect power to the switch:

- Ensure you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).
- Ensure that you have connected the device chassis to earth ground, if required by your site guidelines or installation. A ground connection to the protective earthing terminal is not required for an AC-powered switch. The AC power cords provide adequate grounding when you connect the power supply in the switch to a grounded AC power outlet by using the AC power cord appropriate for your geographical location (see [“AC Power Cord Specifications for an EX8200 Switch” on page 66](#)).



CAUTION: For installations that require a separate grounding conductor to the chassis, have a licensed electrician complete this connection before you connect the switch to power. For instructions on connecting earth ground, see [“Connect Earth Ground to an EX Series Switch” on page 164](#).

- Install power supplies in the switch. See [“Installing an AC Power Supply in an EX8200 Switch” on page 240](#).

Ensure that you have the following parts and tools available to connect power to the switch:

- Electrostatic discharge (ESD) grounding strap
- Power cords appropriate for your geographical location. See [“AC Power Cord Specifications for an EX8200 Switch” on page 66](#).

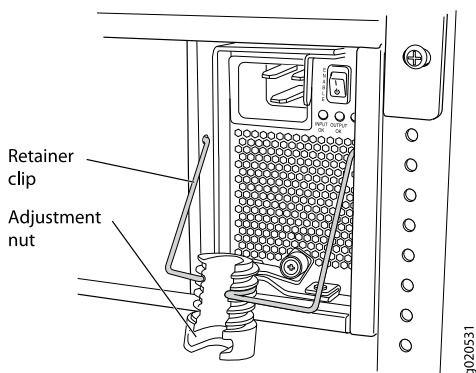


WARNING: Ensure that the power cords do not block access to switch components or drape where people can trip on them.

To connect AC power to an EX8200 switch:

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Ensure that the power supply is fully inserted and latched securely in the chassis. See [“Installing an AC Power Supply in an EX8200 Switch” on page 240.](#)
3. Flip the **Enable** switch, which is next to the appliance inlet on the power supply faceplate, to the Standby position.
4. Squeeze the two sides of the power cord retainer clip, and insert the L-shaped ends of the clip into the holes in the bracket on each side of the AC appliance inlet on the AC power supply faceplate. See [Figure 50 on page 173.](#)

Figure 50: Power Cord Retainer in an AC Power Supply



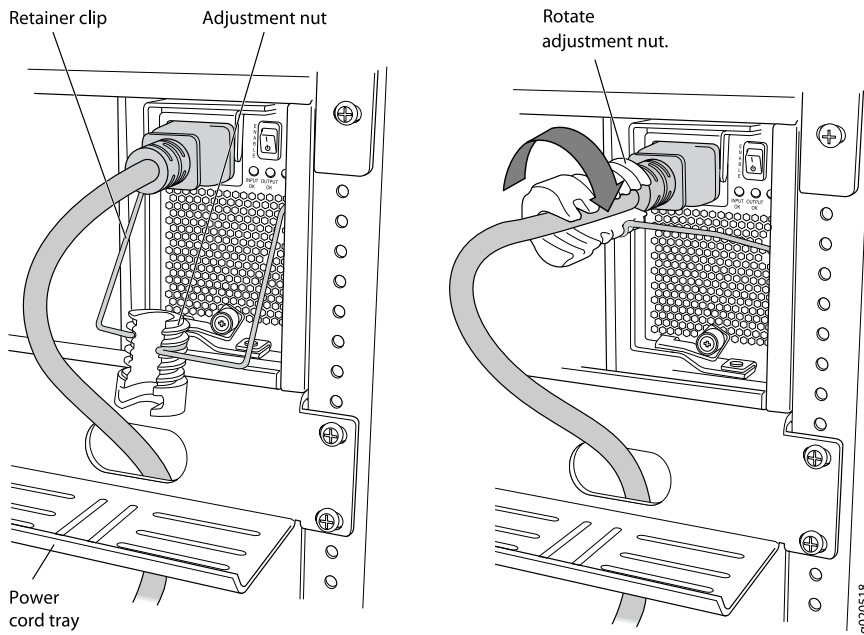
5. Locate the power cord or cords shipped with the switch; the cords have plugs appropriate for your geographical location.
6. Insert the coupler end of the power cord into the AC appliance inlet on the AC power supply faceplate.

NOTE: If the power cord tray is installed, you can thread the power cord through the power cord tray. See [Figure 51 on page 174.](#)

7. Push the cord (close to the coupler end) into the slot in the adjustment nut of the power cord retainer. Rotate the nut until it is tight against the base of the coupler and the slot in the nut is turned 90° from the top of the switch. See [Figure 51 on page 174.](#)
8. If the AC power source outlet has a power switch, set it to the OFF (0) position.

9. Insert the power cord plug into an AC power source outlet.
10. If the AC power source outlet has a power switch, set it to the ON (I) position.
11. Verify that the **INPUT OK** LED on the power supply faceplate is lit and is on steadily.
12. Repeat steps 2 through 11 for the remaining power supplies.

Figure 51: Connecting the Power Supply Cord to an EX8200 Switch



SEE ALSO

[AC Power Supply in an EX8200 Switch | 56](#)

Connecting DC Power to an EX8200 Switch

An EX8200 switch can be configured with up to six DC power supplies. After you have installed at least one power supply, you can connect power to the switch.



WARNING: Before performing DC power procedures, ensure that power is removed from the DC circuit. To ensure that all power is off, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.

NOTE: EX8208 switches support 2000 W DC power supplies.

EX8216 switches support 3000 W DC power supplies.



CAUTION: Before you connect power to the switch, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the switch (for example, by causing a short circuit).



CAUTION: Do not mix different types of power supplies in the same chassis.

Before you begin connecting DC power to an EX8200 switch:

- Ensure that you have taken the necessary precautions to prevent ESD damage (see [“Prevention of Electrostatic Discharge Damage”](#) on page 381).
- Ensure that you have connected the switch chassis to earth ground.



CAUTION: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect EX8200 switches to earth ground before you connect them to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the switch chassis to connect to earth ground. For instructions on connecting an EX8200 switch to ground using a separate grounding conductor, see [“Connect Earth Ground to an EX Series Switch”](#) on page 164.

- Install the power supply in the chassis. See [“Installing a DC Power Supply in an EX8200 Switch”](#) on page 245.

Ensure that you have the following parts and tools available to connect DC power to an EX8200 switch:

- Electrostatic discharge (ESD) grounding strap
- DC power source cables (not provided) with the cable lugs (provided) attached.

The provided cable lugs in an EX8208 switch are sized for 6 AWG (13.3 mm²) power source cables. The DC power source cables that you provide must be 6 AWG (13.3 mm²), minimum 60°C wire. We recommend that you install heat-shrink tubing insulation around the power cables and lugs.

The provided cable lugs in an EX8216 switch are sized for 2 AWG (33.6 mm²) power source cables. The DC power source cables that you provide must be 2 AWG (33.6 mm²), minimum 60°C wire. We recommend that you install heat-shrink tubing insulation around the power cables and lugs.

- 3/8 in. (9.5 mm) nut driver or socket wrench
- Phillips (+) screwdriver, number 2
- Multimeter

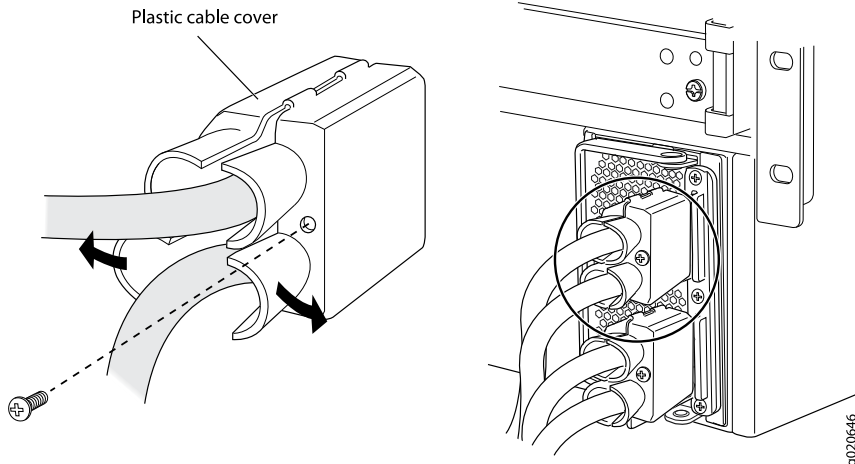
To connect DC power to an EX8200 switch:

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Flip the **Enable** switch on the power supply faceplate to the Standby position.

NOTE: It might be necessary to slide each power supply partially out of the chassis, in order to easily connect the DC power source cables to the DC power input terminals. See [“Removing a DC Power Supply from an EX8200 Switch” on page 243](#).

3. Remove the plastic cable cover from the DC power input terminals, using the number 2 Phillips (+) screwdriver to loosen the screw (see [Figure 52 on page 177](#)).

Figure 52: Removing the Plastic Cable Cover on a DC Power Supply in an EX8200 Switch



4. Remove the washers and nuts from each DC power input terminal, using the 3/8-in. (9.5 mm) nut driver or socket wrench to loosen the nuts. Leave the bolts installed on the input terminals.
5. Ensure that the power source circuit breaker is open so that the voltage across the DC power source cable leads is 0 V and that the cable leads do not become active while you are connecting DC power.
6. Verify that the DC power cables are correctly labeled before making connections to the power supply. In a typical power distribution scheme where the return is connected to chassis ground at the battery plant, you can use a multimeter to verify the resistance of the -48V and RTN DC cables to chassis ground:
 - The cable with very high resistance (indicating an open circuit) to chassis ground is negative (-) and will be installed on the -48V (input) DC power input terminal.
 - The cable with very low resistance (indicating a closed circuit) to chassis ground is positive (+) and will be installed on the RTN (return) DC power input terminal.



CAUTION: You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (-) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the DC power input terminals on each power supply.



WARNING: Ensure that the power cables do not block access to switch components or drape where people can trip on them.

NOTE: To supply sufficient power to an EX8208 switch, terminate the DC input wiring on a facility DC source that is capable of supplying a minimum of 60 A at -48 VDC.

To supply sufficient power to an EX8216 switch, terminate the DC input wiring on a facility DC source that is capable of supplying a minimum of 100 A at -48 VDC.

NOTE: A 2000 W DC power supply requires a dedicated 60 A circuit breaker for each input DC feed.

A 3000 W DC power supply requires a dedicated 100 A circuit breaker for each input DC feed.

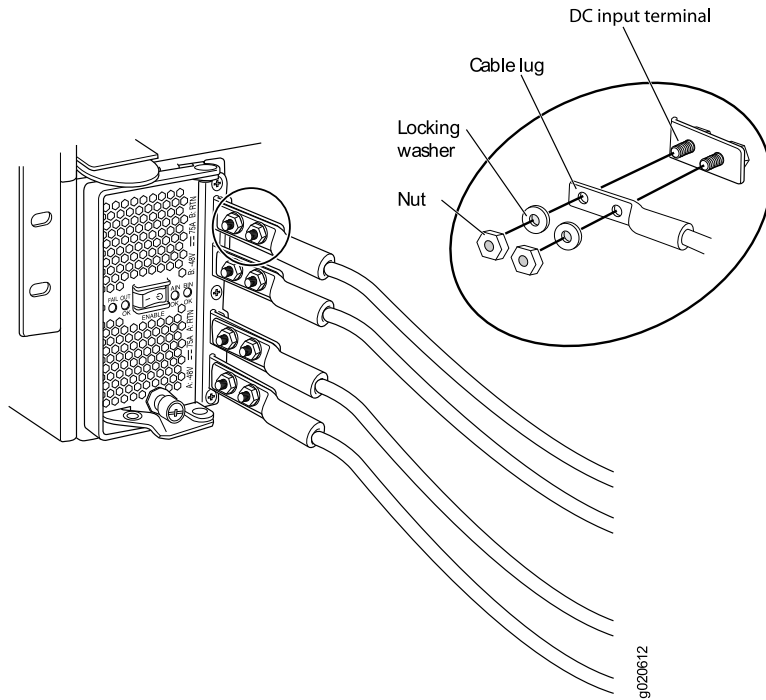
NOTE: Each power supply input feed must be connected to a dedicated DC power source outlet.

7. Install each power cable lug on the DC power input terminal, securing it first with a locking washer, then with the nut (see [Figure 53 on page 179](#)). Apply between 29 in.-lb (3.3 Nm) and 31 in.-lb (3.5 Nm) of torque to each nut. (Use the 3/8-in. [9.5 mm] nut driver or socket wrench.)
 - a. Secure each positive (+) DC source power cable lug to the RTN (return) DC power input terminal.
 - b. Secure each negative (-) DC source power cable lug to the -48V (input) DC power input terminal.

Each power supply has two independent sets of DC power input terminals (A: -48V A: RTN and B: -48V B: RTN). For feed redundancy, each power supply should be powered by dedicated power feeds derived from feed A and feed B. This configuration provides the commonly deployed A/B feed redundancy for the switch.

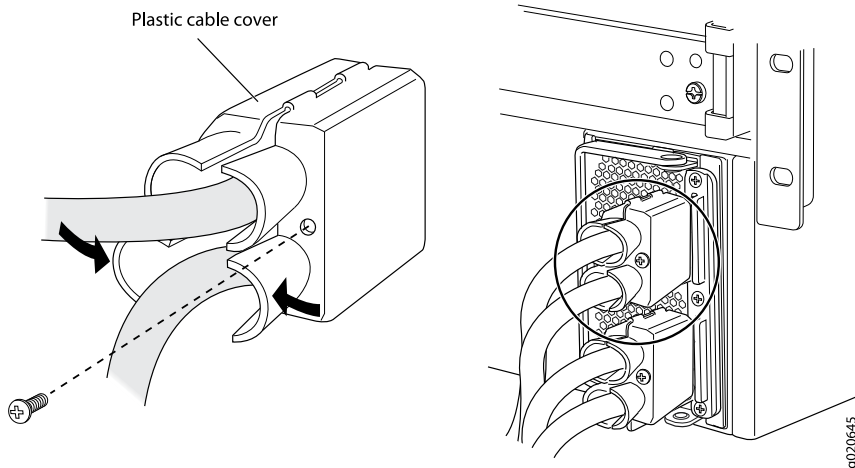
NOTE: If the power cord tray is installed, you can thread the DC power cables through the power cord tray.

Figure 53: Connecting the Power Supply Cables to an EX8200 Switch



8. Install the plastic cable cover over each set of power cables, using the number 2 Phillips (+) screwdriver to tighten the screw (see [Figure 54 on page 179](#)).

Figure 54: Installing the Plastic Cable Cover on a DC Power Supply in an EX8200 Switch



9. Ensure that the power supply is fully inserted and latched securely in the chassis. See [“Installing a DC Power Supply in an EX8200 Switch” on page 245](#).
10. Repeat Steps 2 through 9 for the remaining power supplies.

SEE ALSO

| [DC Power Supply in an EX8200 Switch](#) | 70

Powering On an EX8200 Switch

Before you power on the switch, ensure that:

- You have installed all required switch components.
- You have installed the required number of power supplies to support redundant operation for the switch configuration (see [“Calculating Power Requirements for an EX8208 Switch” on page 121](#) or [Calculating Power Requirements for an EX8216 Switch](#)).
- You understand how to protect the switch from electrostatic damage (see [“Prevention of Electrostatic Discharge Damage” on page 381](#)).

Ensure that you have the following parts and tools available to power on the switch:

- An electrostatic discharge (ESD) grounding strap.
- An external management device such as a PC.
- A cable to connect the external management device to the primary Switch Fabric and Routing Engine (SRE) module's console (CON) port or management (MGMT) port in an EX8208 switch or the primary Routing Engine (RE) module's console (CON) port or management (MGMT) port in an EX8216 switch.

For connecting a management device to the console port, see [“Connect a Device to a Management Console Using an RJ-45 Connector” on page 183](#). For connecting a management device to the management port, see [“Connect a Device to a Network for Out-of-Band Management” on page 182](#).

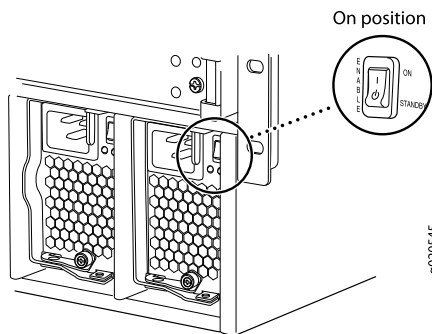
To power on the switch:

1. Attach the ESD grounding strap to your bare wrist and connect the strap to the ESD point on the chassis.
2. Connect the external management device to the primary SRE or primary RE module's management (MGMT) port.
3. Turn on the power to the external management device.
4. Ensure that the power supplies are fully inserted in the chassis and that each of their handles is flush against the faceplate.
5. Ensure that the source power cord is inserted securely into the appliance inlet for each AC power supply.

If you are using DC power supplies, ensure that the source power cables are connected to the appropriate terminal: the positive (+) source cable to the return terminal (RTN) and the negative (-) source cable to the input terminal (-48 VDC).

6. Switch on the site circuit breakers.
7. Flip a power supply's **Enable** switch to the on position (ON). See [Figure 55 on page 181](#). Observe the power supply faceplate LEDs. If the power supply is installed correctly and functioning normally, the **INPUT OK / IN OK** and **OUTPUT OK / OUT OK** LEDs light and remain constantly lit. The **FAIL** LED does not light.

Figure 55: Flip the Enable Switch to the ON position



8. Repeat Step 7 for the remaining power supplies installed in the switch.
9. On the external management device, monitor the startup process to ensure that the system boots properly.

NOTE: After you power on a power supply, wait for at least 60 seconds before you turn it off. After you power off a power supply, wait for at least 60 seconds before you turn it back on.

If the system is completely powered off when you switch on a power supply, the SRE or RE module boots as the power supply completes its startup sequence.

After you power on a power supply, it can take up to 60 seconds for status indicators such as power supply LEDs and the **show chassis** operational mode CLI command display to indicate that the power supply is functioning normally. Ignore any error indicators that might appear during the first 60 seconds.

SEE ALSO

| [Powering Off an EX8200 Switch](#) | 289

Connecting the EX8200 to External Devices

IN THIS SECTION

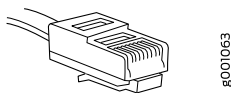
- [Connect a Device to a Network for Out-of-Band Management](#) | 182
- [Connect a Device to a Management Console Using an RJ-45 Connector](#) | 183
- [Connecting an EX8200 Switch to a Modem](#) | 184

Connect a Device to a Network for Out-of-Band Management

You can monitor and manage these devices by using a dedicated management channel. Each device has a management port to which you can connect an Ethernet cable with an RJ-45 connector. Use the management port to connect the device to the management device.

Ensure that you have an Ethernet cable that has an RJ-45 connector at either end. [Figure 56 on page 182](#) shows the RJ-45 connector of the Ethernet cable supplied with the device.

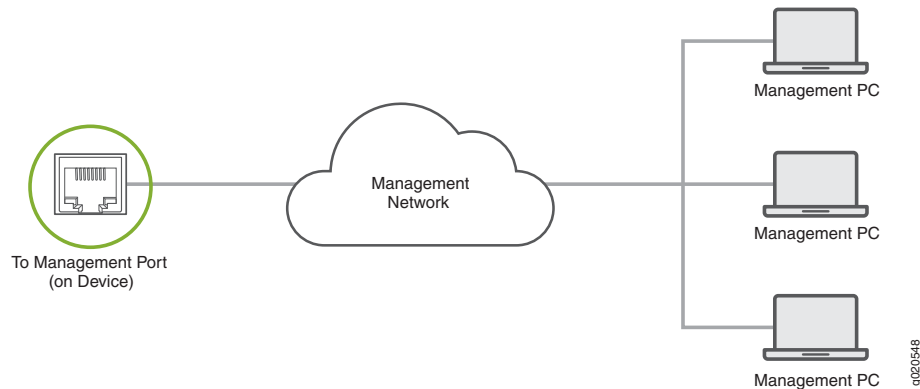
Figure 56: RJ-45 Connector on an Ethernet Cable



To connect a device to a network for out-of-band management (see [Figure 57 on page 183](#)):

1. Connect one end of the Ethernet cable to the management port on the device.
2. Connect the other end of the Ethernet cable to the management device.

Figure 57: Connect a Device to a Network for Out-of-Band Management



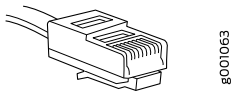
Connect a Device to a Management Console Using an RJ-45 Connector

You can configure and manage devices using a dedicated management channel. Each device has a console port which you can connect to using an Ethernet cable with an RJ-45 connector. Use the console port to connect the device to the console server or management console. The console port accepts a cable that has an RJ-45 connector.

Ensure that you have an Ethernet cable that has an RJ-45 connector at either end. One such cable and an RJ-45 to DB-9 serial port adapter are supplied with the device.

Figure 58 on page 183 shows the RJ-45 connector of the Ethernet cable.

Figure 58: RJ-45 Connector on an Ethernet Cable



NOTE: If your laptop or desktop PC does not have a DB-9 plug connector pin and you want to connect your laptop or desktop PC directly to the device, use a combination of the RJ-45 to DB-9 socket adapter supplied with the device and a USB to DB-9 plug adapter. You must provide the USB to DB-9 plug adapter.

To connect the device to a management console (see Figure 59 on page 184 and Figure 60 on page 184):

1. Connect one end of the Ethernet cable to the console port (labeled **CON**, **CONSOLE**, or **CON1**) on the device.

2. Connect the other end of the Ethernet cable to the console server (see [Figure 59 on page 184](#)) or management console (see [Figure 60 on page 184](#)).

Figure 59: Connect a Device to a Management Console Through a Console Server

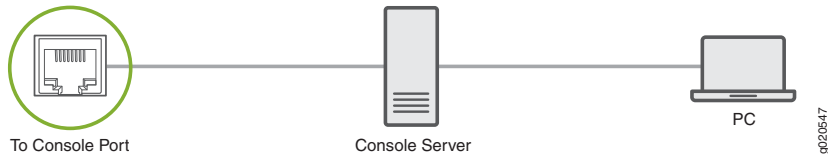


Figure 60: Connect a Device Directly to a Management Console



Connecting an EX8200 Switch to a Modem

You can connect an EX Series switch to a modem through the console port on the switch.

Before you connect the switch to a modem:

- Perform the initial setup and configuration of the switch. See [“Connecting and Configuring an EX Series Switch \(CLI Procedure\)” on page 194](#) or [“Connecting and Configuring an EX Series Switch \(J-Web Procedure\)” on page 198](#).

Ensure that you have the following parts available before you begin to connect the switch to the modem:

- A modem (not provided)
- A desktop or notebook computer (not provided)
- An RJ-45 to DB-9 adapter (provided)
- A phone cable (not provided)

- If your computer does not have a DB-9 plug connector pin, a USB to DB-9 plug adapter (not provided)
 - An adapter to connect the RS-232 DB-25 connector on the modem to the RJ-45 to DB-9 adapter on the switch (not provided)
1. [Setting the Serial Console Speed for the Switch | 185](#)
 2. [Configuring the Modem | 186](#)
 3. [Connecting the Modem to the Console Port | 187](#)

Setting the Serial Console Speed for the Switch

Before you can connect the switch to a modem, the switch's serial console speed must be set to 115200 baud.

NOTE: The default serial console speed is 9600 baud.

To change the serial console speed:

1. Power on the switch. (For EX8208 or EX8216 switch models, see [“Powering On an EX8200 Switch” on page 180](#). For EX6200 switches, see *Powering On an EX6200 Switch*) The loader script starts.

2. You are prompted with:

```
Hit [Enter] to boot immediately, or space bar for command prompt.
```

Press the Spacebar to pause the switch in the loader state (after the Junos OS has loaded on the switch but before the software starts).

The **loader>** prompt appears.

3. Set the baud rate:

```
loader> set baudrate=115200
```

Press Enter.

4. Press Enter when you see the following message:

```
Switch baud rate to 115200 bps and press Enter.
```

The **loader>** prompt reappears.

5. Save the new serial console speed:

```
loader> save
```

Press Enter. The serial console speed is now set to 115200 baud.

6. Boot the software:

```
loader> boot
```

The boot process proceeds as normal and ends with a login prompt.

Configuring the Modem

Before you connect the modem, you must configure the modem with the required port settings.

NOTE: The following procedure uses Hayes-compatible-modem commands to configure the modem. If your modem is not Hayes-compatible, see the documentation for your modem for the equivalent modem commands.

To configure the modem:

1. Connect the modem to the desktop or notebook computer.
2. Power on the modem.
3. From the computer, start your asynchronous terminal emulation application (such as Microsoft Windows HyperTerminal) and select the COM port to which the modem is connected (for example, COM1).
4. Configure the port settings shown in [Table 70 on page 186](#).

Table 70: Port Settings

Port Settings	Value
Bits per second	115200
Data bits	8
Parity	None
Stop bits	1
Flow control	None

5. In the HyperTerminal window, type **at**. Press Enter.

The modem sends an OK response to verify that it can communicate successfully with the COM port on your desktop or notebook computer.

6. To configure the modem to answer a call on the first ring, type **ats0=1** at the prompt. Press Enter.
7. To configure the modem to accept modem-control DTR signals, type **at&d1** at the prompt. Press Enter.
8. To disable flow control on the modem, type **at&k0** at the prompt. Press Enter.
9. To set the fixed serial port speed on the modem, type **at&b1** at the prompt. Press Enter.

NOTE: You must set the serial port to the fixed speed so that the modem will not adjust the serial port speed to the negotiated line speed.

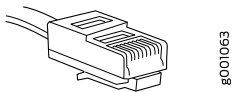
10. To save the new modem settings, type **at&w0** at the prompt. Press Enter.

The modem sends an OK message. The modem is now ready to be connected to the switch.

Connecting the Modem to the Console Port

The console port on an EX Series switch accepts a cable with an RJ-45 connector. [Figure 61 on page 187](#) shows the RJ-45 connector of the Ethernet cable supplied with the switch.

Figure 61: Ethernet Cable Connector



NOTE: If your laptop or PC does not have a DB-9 plug connector pin and you want to connect your laptop or PC directly to the switch, use a combination of the RJ-45 to DB-9 socket adapter supplied with the switch and a USB to DB-9 plug adapter. You must provide the USB to DB-9 plug adapter.

NOTE: Most modems have an RS-232 DB-25 connector. You must separately purchase an adapter to connect your modem to the RJ-45 to DB-9 adapter and Ethernet cable supplied with the switch.

To connect a modem to the console port:

1. Turn off power to the switch.
2. Turn off power to the modem.
3. Connect one end of the cable to the console port (labeled **CON** or **CONSOLE**) on the switch.
For the location of the console port on the EX Series switches:
 - See [“Switch Fabric and Routing Engine \(SRE\) Module in an EX8208 Switch”](#) on page 78.
 - See [Routing Engine \(RE\) Module in an EX8216 Switch](#).
4. Connect the other end of the cable to the RJ-45 to DB-9 serial port adapter supplied with your switch.
5. Connect the serial port adapter to the DB-9 socket to DB-25 plug adapter or other adapter appropriate for your modem.
6. Plug the modem adapter into the DB-25 connector on the modem.
7. Connect one end of the phone cable to the modem and the other end to your telephone network.
8. Turn on the power to your modem.
9. Power on the switch.

Connecting the EX8200 to the Network

IN THIS SECTION

- [Install a Transceiver | 189](#)
- [Connect a Fiber-Optic Cable | 191](#)

Install a Transceiver

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the device or disrupting the device functions.

NOTE: After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.

NOTE: We recommend that you use only optical transceivers and optical connectors purchased from Juniper Networks with your Juniper Networks device.



CAUTION: If you face a problem running a Juniper Networks device that uses a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

Before you install a transceiver in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see [“Laser and LED Safety Guidelines and Warnings” on page 367](#)).

Ensure that you have a rubber safety cap available to cover the transceiver.

[Figure 62 on page 191](#) shows how to install a QSFP+ transceiver. The procedure is the same for all types of transceivers except the QSFP28 and CFP transceivers.

To install a transceiver:



CAUTION: To prevent electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the switch.
2. Remove the transceiver from its bag.

3. Check to see whether the transceiver is covered with a rubber safety cap. If it is not, cover the transceiver with a rubber safety cap.



WARNING: Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.

4. If the port in which you want to install the transceiver is covered with a dust cover, remove the dust cover and save it in case you need to cover the port later. If you are hot-swapping a transceiver, wait for at least 10 seconds after removing the transceiver from the port before installing a new transceiver.
5. Using both hands, carefully place the transceiver in the empty port. The connectors must face the chassis.



CAUTION: Before you slide the transceiver into the port, ensure that the transceiver is aligned correctly. Misalignment might cause the pins to bend, making the transceiver unusable.

6. Slide the transceiver in gently until it is fully seated. If you are installing a CFP transceiver, tighten the captive screws on the transceiver by using your fingers.
7. Remove the rubber safety cap from the transceiver and the end of the cable, and insert the cable into the transceiver.



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.



CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

8. If there is a cable management system, arrange the cable in the cable management system to prevent the cable from dislodging or developing stress points. Secure the cable so that it does not support its

own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.

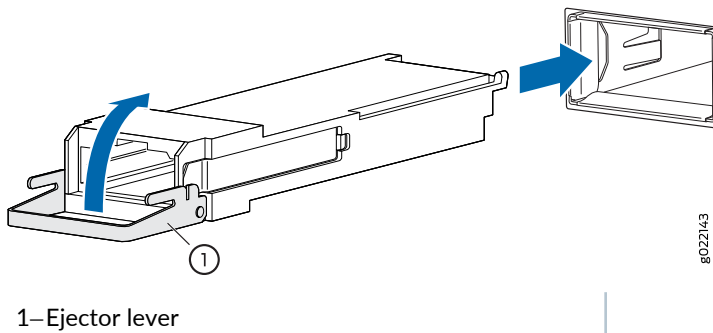


CAUTION: Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.



CAUTION: Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

Figure 62: Install a Transceiver



Connect a Fiber-Optic Cable

Before you connect a fiber-optic cable to an optical transceiver installed in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see [“Laser and LED Safety Guidelines and Warnings”](#) on page 367).

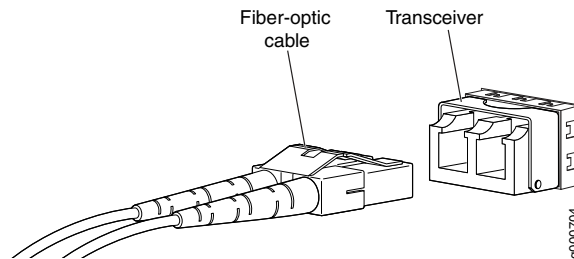
To connect a fiber-optic cable to an optical transceiver installed in a device:



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

1. If the fiber-optic cable connector is covered with a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the optical transceiver. Save the cap.
3. Insert the cable connector into the optical transceiver (see [Figure 63 on page 192](#)).

Figure 63: Connect a Fiber-Optic Cable to an Optical Transceiver Installed in a Device



4. Secure the cables so that they do not support their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.



CAUTION: Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

Configuring Junos OS on the EX8200

IN THIS SECTION

- [EX8200 Switch Default Configuration | 193](#)
- [Connecting and Configuring an EX Series Switch \(CLI Procedure\) | 194](#)
- [Connecting and Configuring an EX Series Switch \(J-Web Procedure\) | 198](#)
- [Configuring the LCD Panel on EX Series Switches \(CLI Procedure\) | 202](#)

EX8200 Switch Default Configuration

Each EX8200 switch is programmed with a factory default configuration that contains the values set for each configuration parameter when a switch is shipped. The default configuration file sets values for system parameters such as the Address Resolution Protocol (ARP) aging timer, the system log, and file messages, while also enabling the Link Layer Discovery Protocol (LLDP) protocol, the Rapid Spanning Tree Protocol (RSTP), Internet Group Management Protocol (IGMP) snooping, and storm control.

When you commit changes to the configuration, a new configuration file is created that becomes the active configuration. You can always revert to the factory default configuration. See *Reverting to the Default Factory Configuration for the EX Series Switch*.

This topic shows the factory default configuration file of an EX8200 switch.

```
system {
  arp {
    aging-timer 5;
  }
  syslog {
    user * {
      any emergency;
    }
  }
  file messages {
    any notice;
    authorization info;
  }
  file interactive-commands {
    interactive-commands any;
  }
}
```

```
    }
  }
  commit {
    factory-settings {
      reset-chassis-lcd-menu;
    }
  }
}
protocols {
  igmp-snooping {
    vlan all;
  }
  rstp;
  lldp {
    interface all;
  }
  lldp-med {
    interface all;
  }
}
ethernet-switching-options {
  storm-control {
    interface all;
  }
}
poe {
  interface all;
}
```

SEE ALSO

| [Configuration Files Terms](#)

Connecting and Configuring an EX Series Switch (CLI Procedure)

There are two ways to connect and configure an EX Series switch: one method is through the console by using the CLI and the other is by using the J-Web interface.

NOTE: EX2200-24T-4G-DC switches do not support switch connection and configuration through the J-Web interface.

This topic describes the CLI procedure.

NOTE: To run the **ezsetup** script, the switch must have the factory-default configuration as the active configuration. If you have configured anything on the switch and want to run **ezsetup**, revert to the factory-default configuration. See *Reverting to the Default Factory Configuration for the EX Series Switch*.

Using the CLI, set the following parameter values in the console server or PC:

- Baud rate—9600
- Flow control—None
- Data—8
- Parity—None
- Stop bits—1
- DCD state—Disregard

To connect and configure the switch from the console by using the CLI:

1. Connect the console port to a laptop or PC by using the RJ-45 to DB-9 serial port adapter. An Ethernet cable that has an RJ-45 connector at either end and an RJ-45 to DB-9 serial port adapter are supplied with the switch. If your laptop doesn't have a serial port, use a serial to USB adapter.

For the location of the console port on different EX Series switches:

- See *EX2200 Switches Hardware Overview*.
- See *EX2300 Switches Hardware Overview*.
- See *Rear Panel of an EX3200 Switch*.
- See *Rear Panel of an EX3300 Switch*.
- See *Rear Panel of an EX3400 Switch*.
- See *Rear Panel of an EX4200 Switch*.
- See *EX4300 Switches Hardware Overview*
- See *Front Panel of an EX4500 Switch*.
- See *EX4550 Switches Hardware Overview*
- See *Switch Fabric and Routing Engine (SRE) Module in an EX6200 Switch*.
- See [“Switch Fabric and Routing Engine \(SRE\) Module in an EX8208 Switch” on page 78](#).
- See *Routing Engine (RE) Module in an EX8216 Switch*.

NOTE: In EX2200-C, EX2300, EX3400, EX4300, and EX4550 switches, you can also use the Mini-USB Type-B console port to connect to a laptop or PC. See *Connect an EX Series Switch to a Management Console Using the Mini-USB Type-B Console Port*.

2. At the Junos OS shell prompt **root%**, type **ezsetup**.
3. Enter the hostname. This is optional.
4. Enter the root password you want to use for the device. Reenter the root password when prompted.

5. Enable services such as SSH and Telnet.

NOTE: You will not be able to log in to the switch as the **root** user through Telnet. Root login is allowed only through SSH.

- The default option for SSH is **yes**. Select this to enable SSH.
- The default option for Telnet is **no**. Change this to **yes** to enable Telnet.

6. Use the Management Options page to select the management scenario:

NOTE: On EX2300 and EX3400 switches, you cannot create a new VLAN for management. On EX4500, EX6200, and EX8200 switches, only the out-of-band management option is available.

- *Configure in-band management.* In in-band management, you configure a network interface or an uplink module (expansion module) interface as the management interface and connect it to the management device.
In this scenario, you have the following two options:
 - Use the automatically created VLAN *default* for management—Select this option to configure all data interfaces as members of the default VLAN. Specify the management IP address and the default gateway.
 - Create a new VLAN for management—Select this option to create a management VLAN. Specify the VLAN name, VLAN ID, management IP address, and default gateway. Select the ports that must be part of this VLAN.
- *Configure out-of-band management*—Configure the management port. In out-of-band management, you use a dedicated management channel (**MGMT** port) to connect to the management device. Specify the IP address and gateway of the management interface. Use this IP address to connect to the switch.

7. Specify the SNMP read community, location, and contact to configure SNMP parameters. These parameters are optional.
8. Specify the system date and time. Select the time zone from the list. These options are optional.

9. The configured parameters are displayed. Enter **yes** to commit the configuration. The configuration is committed as the active configuration for the switch.
10. (For EX4500 switches only) Enter the operational mode command **request chassis pic-mode intraconnect** to set the PIC mode to intraconnect.

You can now log in with the CLI or the J-Web interface to continue configuring the switch. If you use the J-Web interface to continue configuring the switch, the Web session is redirected to the new management IP address. If the connection cannot be made, the J-Web interface displays instructions for starting a J-Web session.

SEE ALSO

[Connecting and Configuring an EX Series Switch \(J-Web Procedure\) | 198](#)

[Installing and Connecting an EX2200 Switch](#)

[Installing and Connecting an EX2300 Switch](#)

[Installing and Connecting an EX3200 Switch](#)

[Installing and Connecting an EX3300 Switch](#)

[Installing and Connecting an EX3400 Switch](#)

[Installing and Connecting an EX4200 Switch](#)

[Installing and Connecting an EX4300 Switch](#)

[Installing and Connecting an EX4550 Switch](#)

[Installing and Connecting an EX4500 Switch](#)

[Installing and Connecting an EX6210 Switch](#)

[Installing and Connecting an EX8208 Switch | 147](#)

[Installing and Connecting an EX8216 Switch](#)

Connecting and Configuring an EX Series Switch (J-Web Procedure)

There are two ways to connect and configure an EX Series switch: one method is through the console by using the CLI and the other is by using the J-Web interface.

Starting in Junos OS Release 19.2R1, J-Web supports EX4650 switches.

NOTE: You cannot connect to and perform initial configuration of EX2200-24T-4G-DC, EX4300-48MP, EX4300-48MP-S switches, and EX4600 switches using EZSetup procedure from the J-Web interface. For EX2200-24T-4G-DC switches, you must use EZSetup from the switch console. For EX4300-48MP, EX4300-48MP-S, and EX4600 switches, you must use the CLI procedure through the switch console.

This topic describes the J-Web procedure.

NOTE: Before you begin the configuration, enable a DHCP client on the management PC that you will connect to the switch so that the PC can obtain an IP address dynamically.

NOTE: Read the following steps before you begin the configuration. You must complete the initial configuration by using EZSetup within 10 minutes. The switch exits EZSetup after 10 minutes and reverts to the factory default configuration, and the PC loses connectivity to the switch.

- EX2200 and EX2200-C switch—The LEDs on the network ports on the front panel blink when the switch is in the initial setup mode.
- EX3200, EX3300, EX4200, EX4300 switches except EX4300-48MP and EX4300-48MP-S switches, EX4500, EX4550, EX6200, or EX8200 switch—The LCD panel displays a count-down timer when the switch is in initial setup mode.

NOTE: There is no LCD panel on EX4300-48MP and EX4300-48MP-S switches.

To connect and configure the switch by using the J-Web interface:

1. Transition the switch into initial setup mode:

- EX2200 and EX2200-C switch—Press the mode button located on the lower right corner of the front panel for 10 seconds.
- EX3200, EX3300, EX4200, EX4300 switches except EX4300-48MP and EX4300-48MP-S switches, EX4500, EX4550, EX6200, or EX8200 switch—Use the **Menu** and **Enter** buttons located to the right of the LCD panel (see [Figure 64 on page 200](#) or [Figure 65 on page 200](#)):

Figure 64: LCD Panel in an EX3200, EX4200, EX4500, EX4550, or EX8200 Switch

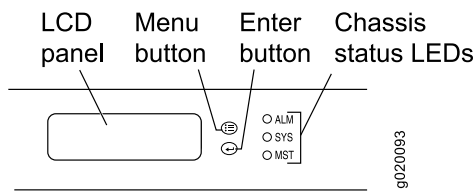
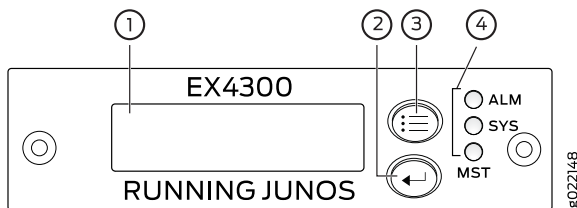


Figure 65: LCD Panel in an EX4300 Switches Except EX4300-48MP and EX4300-48MP-S Switches



1—LCD panel

3—LCD panel Menu button

2—LCD panel Enter button

4—Chassis status LEDs

1. Press the **Menu** button until you see **MAINTENANCE MENU**. Then press the **Enter** button.
2. Press **Menu** until you see **ENTER EZSetup**. Then press **Enter**.

If EZSetup does not appear as an option in the menu, select **Factory Default** to return the switch to the factory default configuration. EZSetup is displayed in the menu of standalone switches only when a switch is set to the factory default configuration.

3. Press **Enter** to confirm setup and continue with EZSetup.
2. Connect the Ethernet cable from the Ethernet port on the PC to the switch.
- EX2200, EX3200, or EX4200 switch—Connect the cable to port 0 (ge-0/0/0) on the front panel of the switch.
 - EX3300 switch—Connect the cable to the port labeled **MGMT** on the rear panel of the switch.
 - EX4300 switches except EX4300-48MP and EX4300-48MP-S switches—Connect the cable to the port labeled **MGMT** on the rear panel of the switch.

- EX4500 or EX4550 switch—Connect the cable to the port labeled **MGMT** on the front panel (LCD panel side) of the switch.
- EX4650 switches—Connect the cable to the port labeled **CON** on the rear panel of the switch.
- EX6200 switch—Connect the cable to one of the ports labeled **MGMT** on the Switch Fabric and Routing Engine (SRE) module in slot 4 or 5 in an EX6210 switch.
- EX8200 switch—Connect the cable to the port labeled **MGMT** on the Switch Fabric and Routing Engine (SRE) module in slot SRE0 in an EX8208 switch or on the Routing Engine (RE) module in slot RE0 in an EX8216 switch.

These ports are configured as the DHCP server with the default IP address, 192.168.1.1. The switch can assign an IP address to the management PC in the IP address range 192.168.1.2 through 192.168.1.253.

3. From the PC, open a Web browser, type **http://192.168.1.1** in the address field, and press **Enter**.
4. On the J-Web login page, type **root** as the username, leave the password field blank, and click **Login**.
5. On the Introduction page, click **Next**.
6. On the Basic Settings page, modify the hostname, the root password, and date and time settings:
 - Enter the hostname. This is optional.
 - Enter a password and reenter the password.
 - Specify the time zone.
 - Synchronize the date and time settings of the switch with the management PC or set them manually by selecting the appropriate option button. This is optional.

Click **Next**.

7. Use the Management Options page to select the management scenario:

NOTE: On EX2300 and EX3400 switches, you cannot create a new VLAN for management.

On EX4500, EX6210, and EX8200 switches, only the out-of-band management option is available.

- *Configure in-band management.* In in-band management, you configure a network interface or an uplink module (expansion module) interface as the management interface and connect it to the management device.

In this scenario, you have the following two options:

- Use the automatically created VLAN *default* for management—Select this option to configure all data interfaces as members of the default VLAN. Specify the management IP address and the default gateway.
 - Create a new VLAN for management—Select this option to create a management VLAN. Specify the VLAN name, VLAN ID, management IP address, and default gateway. Select the ports that must be part of this VLAN.
 - *Configure out-of-band management*—Configure the management port. In out-of-band management, you use a dedicated management channel (**MGMT** port) to connect to the management device. Specify the IP address and gateway of the management interface. Use this IP address to connect to the switch.
8. Click **Next**.
 9. On the Manage Access page, you can select options to enable Telnet, SSH, and SNMP services. For SNMP, you can configure the read community, location, and contact.
 10. Click **Next**. The Summary screen displays the configured settings.
 11. Click **Finish**. The configuration is committed as the active switch configuration.

NOTE: After the configuration is committed, the connectivity between the PC and the switch might be lost. To renew the connection, release and renew the IP address by executing the appropriate commands on the management PC or by removing and reinserting the Ethernet cable.

12. (For EX4500 switches only) In the CLI, enter the **request chassis pic-mode intraconnect** operational mode command to set the PIC mode to intraconnect.

You can now log in by using the CLI or the J-Web interface to continue configuring the switch.

If you use the J-Web interface to continue configuring the switch, the Web session is redirected to the new management IP address. If the connection cannot be made, the J-Web interface displays instructions for starting a J-Web session.

Configuring the LCD Panel on EX Series Switches (CLI Procedure)

This topic applies to hardware devices in the EX Series product family, which includes switches and the XRE200 External Routing Engine, that support the LCD panel interface.

The LCD panel on the front panel of EX Series switches displays a variety of information about the switch in the Status menu and provides the Maintenance menu to enable you to perform basic operations such as initial setup and reboot. You can disable these menus or individual menu options if you do not want switch users to use them. You can also set a custom message that will be displayed on the panel.

- [Disabling or Enabling Menus and Menu Options on the LCD Panel | 203](#)
- [Configuring a Custom Display Message | 204](#)

Disabling or Enabling Menus and Menu Options on the LCD Panel

By default, the Maintenance menu, the Status menu, and the options in those menus in the LCD panel are enabled. Users can configure and troubleshoot the switch by using the Maintenance menu and view certain details about the switch by using the Status menu.

If you do not want users to be able to use those menus or some of the menu options, you can disable the menus or individual menu options. You can reenable the menus or menu options.

Issue the **show chassis lcd menu** operational mode command to see the menus or menu options that are currently enabled.

NOTE: On some platforms, you must specify an FPC slot number in these commands. See the *lcd-menu* statement for details.

To disable a menu:

```
[edit]
```

```
user@switch# set chassis lcd-menu menu-item menu-name disable
```

To enable a menu:

```
[edit]
```

```
user@switch# delete chassis lcd-menu menu-item menu-name disable
```

To disable a menu option:

```
[edit]
```

```
user@switch# set chassis lcd-menu menu-item menu-option disable
```

To enable a menu option:

```
[edit]
```

```
user@switch# delete chassis lcd-menu menu-item menu-option disable
```

Configuring a Custom Display Message

You can configure the second line of the LCD to display a custom message temporarily for 5 minutes or permanently.

To display a custom message temporarily:

- On an EX3200 switch, a standalone EX3300 switch, a standalone EX4200 switch, a standalone EX4300 switch except EX4300-48MP and EX4300-48MP-S switches, a standalone EX4500 switch, a standalone EX4550 switch, an EX6200 switch, an EX8200 switch, or an XRE200 External Routing Engine:

```
user@switch> set chassis display message message
```

- On an EX3300, EX4200, EX4300, EX4500, or EX4550 switch in a Virtual Chassis configuration:

```
user@switch> set chassis display message message fpc-slot slot-number
```

To display a custom message permanently:

- On an EX3200 switch, a standalone EX3300 switch, a standalone EX4200 switch, a standalone EX4300 switch except EX4300-48MP and EX4300-48MP-S switches, a standalone EX4500 switch, a standalone EX4550 switch, an EX6200 switch, an EX8200 switch, or an XRE200 External Routing Engine:

```
user@switch> set chassis display message message permanent
```

- On an EX3300, EX4200, EX4300 except EX4300-48MP and EX4300-48MP-S, EX4500, or EX4550 switch in a Virtual Chassis configuration:

```
user@switch> set chassis display message message fpc-slot slot-number permanent
```

NOTE: The buttons on the LCD panel are disabled when the LCD is configured to display a custom message.

To disable the display of the custom message:

```
user@switch> clear chassis display message
```

You can view the custom message by issuing the `show chassis lcd` command.

Dashboard for EX Series Switches

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NOTE: This topic applies only to the J-Web Application package.

When you log in to the J-Web user interface, the dashboard for the Juniper Networks EX Series Ethernet Switches appears. Use the dashboard to view system information.

The Update Available window appears if there is a latest update of the J-Web Application package available on the Juniper Networks server. This window is enabled by the auto update feature of J-Web.

NOTE:

- The Update Available window will *not* appear when you log in, if you have not selected the **Check for updates automatically on every login** in the *Update Preference* section in the **Maintain > Update J-Web** side pane. By default, the *Check for update automatically on every login* is selected.
- If you choose *Update Later*, you can update to the latest J-Web Application package by clicking the orange icon next to *Update Available* on the top pane of the J-Web interface or through **Maintain > Update J-Web**.

The dashboard comprises a graphical chassis viewer and four panels.

Graphical Chassis Viewer

The Dashboard panel displays a graphical view of the chassis of a switch. In a Virtual Chassis, it displays a graphical view of each member switch.

In a Virtual Chassis, the default values are shown on the Dashboard panel when no chassis image is clicked. The panel displays the value for a switch if you click its image.

NOTE:

- If the member switch is not present, inactive, or not provisioned, you cannot expand the member switch image.

In J-Web Application package Release 14.1X53-A2, you can form a Virtual Chassis using EX4600 and EX4300 switches. When in a mixed Virtual Chassis consisting of EX4600 switches and EX4300 switches, the EX4600 switches can be the primary, backup, or in the linecard role, while the EX4300 switches must be in the linecard role.

- Starting in J-Web Application Package Release 19.2A1, J-Web supports EX4650 switches.

NOTE: For EX4650 switches, chassis viewer supports only the standalone view and does not support the Virtual Chassis configuration.

Table 71 on page 206 lists the details that are displayed on each member switch.

Table 71: Details of a Virtual Chassis Member Switch

Details	Example
Model number of the member switch	EX3300
Assigned ID that applies to the entire Virtual Chassis configuration	ID 2 NOTE: If the member switch is not provisioned, the serial number of the switch is displayed instead of its ID.
Role of the member switch	Master Possible roles are: Master, Backup, or Linecard
Status of the member switch	Prsnt Possible statuses are: Prsnt, NotPrsnt, Inactive, or Unprvsnd

The status of the member switch is displayed on the image of the switch. If the member switch appears dimmed, it means the switch is not present, is inactive, or is not provisioned in the Virtual Chassis. If the member switch does not appear dimmed, it means the switch is present and is active.

[Table 72 on page 207](#) describes the possible status of a member switch.

Table 72: Status of a Member Switch in a Virtual Chassis

If the member switch is	It appears as	It means the member switch
Present	Prsnt	Has established physical and logical connections with Virtual Chassis member switches.
Not present	dimmed and NotPrsnt	Has been disconnected from the existing Virtual Chassis.
Inactive	dimmed and Inactive	Has established physical connections, but is unable to establish logical connections.
Not provisioned	dimmed and Unprvsnd	Cannot synchronize with the existing preprovisioned Virtual Chassis.

Click **Rear View** for a graphical view of the rear panel of the switch.

Click **Preferences** to choose which panels must be displayed and set the refresh interval for chassis viewer information. Click **OK** to save your changes and return to the dashboard or click **Cancel** to return to the dashboard without saving changes.

NOTE: You can drag the various panels to different locations in the J-Web window.

System Information Panel

Table 73: System Information

Field	Description
System name	<p>Indicates the local name of the EX Series switch. The local name of the EX Series switches changes when an individual image is clicked.</p> <p>For EX4650 switches, indicates the host name of the switch. Specific host name of the EX4650 switch is displayed when you click on the individual line card.</p>
Device model	<p>Indicates the model of the EX Series switch. In a Virtual Chassis configuration, to indicate the model of a switch, click the image of that switch.</p> <p>NOTE: In a Virtual Chassis setup for an EX6210, EX8208, or EX8216 switch, the Device model field displays details of the primary Routing Engine. To view details of a member, select it.</p> <p>By default, the EX4650 switches show the model of the primary switch. When you click on the image, the model of the switch is displayed.</p>

Table 73: System Information (continued)

Field	Description
Inventory details	

Table 73: System Information (continued)

Field	Description
	<p>Indicates the following:</p> <ul style="list-style-type: none"> • For EX3200 switches; and for EX2200, EX2200-C, EX3300, EX4200, EX4300, EX4500, EX4550, and EX4600 switches that are not configured as Virtual Chassis, the value displayed in Inventory details field is always 1 FPC. FPC is a legacy term for a slot in a large Juniper Networks chassis; which simply refers to the standalone switch. • For EX2200 and EX2200-C switches configured as a Virtual Chassis, the value displayed in the Inventory details field is 1–4 FPC, with the number corresponding to the number of member switches. • For EX3300 switches configured as a Virtual Chassis, the value displayed in the Inventory details field is 1–6 FPC, with the number corresponding to the number of member switches. <p>NOTE: For Junos OS Release 14.1X53-D10 and later, EX3300 switches configured as a Virtual Chassis display the value 1–10 FPC in the Inventory details field.</p> <ul style="list-style-type: none"> • For EX4200, EX4500, EX4550, and EX4600 switches configured as a Virtual Chassis, the value displayed in the Inventory details field is 1–10 FPC, with the number corresponding to the number of member switches. • For EX4650 switches, the value displayed in Inventory details field is equal to the number of FPCs. • For EX6210 switches, the values displayed in the Inventory details field are 1–2 CB and 1–9 FPC. CB, or Control Board, refers to the SRE module. FPC refers to line cards and the FPC within the CB. • For an EX8208 switch, the values displayed in Inventory details field are 1–3 CB and 0–8 FPC. CB, or Control Board, refers to SRE and SF modules. FPC refers to line cards. • For EX8216 switches, the values displayed in Inventory details field are 1–2 CB and 0–16 FPC. CB, or Control Board, refers to RE modules and FPC refers to line cards. • For an XRE200 External Routing Engine in an EX8200 Virtual Chassis, the value displayed in Inventory details is 1 XRE. XRE refers to RE modules. For XRE200

Table 73: System Information (continued)

Field	Description
	External Routing Engines configured as a Virtual Chassis, the values displayed in Inventory details are 1–2 XRE and 0–4 LCC, where LCC refers to the EX8200 line card chassis.
Junos image	Indicates the version of the Junos OS image. In a Virtual Chassis configuration, the Junos OS image of the primary switch is displayed by default. To display the Junos OS image of a specific switch, click the image of that switch. NOTE: For EX4650 switches, the Junos OS image of the primary is displayed by default. To display the Junos OS image of a specific switch, click the image of that switch.
Boot image	Indicates the version of the boot image that is used. In a Virtual Chassis configuration, the boot image of the primary switch is displayed by default. To display the boot image of a specific switch, click the image of that switch. NOTE: For EX4650 switches, the boot image of the primary switch is displayed by default. To display the boot image of a specific switch, click the image of that switch.
Device uptime	Indicates the time since the last reboot. In a Virtual Chassis configuration, to display the uptime of the specific switch, click the image of that switch. NOTE: For EX4650 switches, click the image of the switch to display the uptime.
Last configured time	Indicates the time when the switch was last configured.

Health Status Panel

Table 74: Health Status

Field	Description
EX2200, EX2200-C, EX3200, EX3300, EX4200, and EX4300 Switches	

Table 74: Health Status (continued)

Field	Description
Memory util.	<p>Indicates the memory used in the Routing Engine. In a Virtual Chassis configuration, the memory utilization value of the primary Routing Engine is displayed.</p> <p>NOTE: In EX4300 and EX4600 Virtual Chassis, to display the Routing Engine memory utilization of the primary or backup, click the respective image. J-Web is supported on EX4600 switches only in J-Web Application package Release 14.1X53-A2.</p>
Flash	<p>Indicates the usage and capacity of internal flash memory and any external USB flash drive.</p> <p>NOTE: In EX4300 Virtual Chassis, the flash memory utilization of the primary switch is displayed by default. To display the flash memory utilization along with the internal and external flash memory utilization details for each switch or line card, mouse over individual switch or line card images.</p> <p>In EX4600 Virtual Chassis, to display the flash memory utilization along with the internal and external flash memory utilization details of each switch or line card mouse over the green-colored indicator.</p>
Temp.	<p>Indicates the chassis temperature status. Temperatures are listed in Celsius and the corresponding Fahrenheit values.</p> <p>NOTE: The Temp field is unavailable for a standalone EX2200-C switch.</p> <p>The Temp field is dynamically available for an EX2200 Virtual Chassis switch based on the model of the member clicked.</p> <p>NOTE: In EX4300 Virtual Chassis, the temperature of the primary Routing Engine is displayed by default. To display the temperature of the Routing Engine of any switch, click the image of that switch.</p> <p>In EX4600 Virtual Chassis, to display the temperature of the Routing Engine of each switch, mouse over the green-colored indicator.</p>
CPU load	<p>Indicates the average CPU usage over 15 minutes. In a Virtual Chassis configuration, on loading the primary or backup switch, the CPU load for that switch's Routing Engine is displayed by default. To display the CPU load for a specific switch's Routing Engine, click the image of that switch.</p>

Table 74: Health Status (continued)

Field	Description
Fan status	<p>Indicates the status of the fans in the fan tray. The possible values are OK, Failed, and Absent. In a Virtual Chassis configuration, the fan status of the primary switch is displayed by default. To display the fan status for any switch, click the image of that switch.</p> <p>NOTE: The Fan status field is unavailable for a standalone EX2200-C switch.</p> <p>The Fan status field is dynamically available for an EX2200 Virtual Chassis switch based on the model of the member clicked.</p> <p>In EX4600 Virtual Chassis, mouse over the fan icon to display the fan status of all the switches.</p>
EX4500 and EX4550 Switches	
Memory util.	Indicates the memory used in the Routing Engine. In a Virtual Chassis configuration, the memory utilization value of the primary Routing Engine is displayed.
Flash	Indicates the usage and capacity of internal flash memory and any external USB flash drive.
Temp.	<p>Indicates the chassis temperature status. Temperatures in the dashboard are listed in Celsius and the corresponding Fahrenheit values.</p> <p>NOTE: The Temp field is unavailable for an EX4500 switch.</p>
CPU load	Indicates the average CPU usage over 15 minutes.
Fan status	Indicates the status of the fans in the fan tray. The possible values are OK , Failed , and Absent . This field also indicates the direction of airflow of the fan tray. The possible values are Front to back and Back to front .
EX4650 Switches	
Fan status	<p>Indicates the status of the fans in the fan tray. The possible values are OK, Failed, and Absent.</p> <p>NOTE: The fans are located on the side panel of the chassis.</p>
Temp.	Indicates temperature of the sensor near to Routing Engine.
Memory util.	Indicates the memory used in the Routing Engine.
CPU load	Indicates the average CPU usage over 15 minutes.
EX6210 Switches	

Table 74: Health Status (continued)

Field	Description
Memory util.	Indicates the memory used in the primary Routing Engine. Click the backup Routing Engine to view the memory used in the backup Routing Engine.
CPU load	Indicates the average CPU usage over 15 minutes.
Flash	Indicates the usage and capacity of internal flash memory and any external USB flash drive.
Fan status	Indicates the status of the fans in the fan tray. The possible values are OK , Failed , and Absent .
EX8208 Switches	
Memory util.	Indicates the memory used in the external Routing Engine. In an EX8200 Virtual Chassis, the memory utilization value of the XRE200 External Routing Engine in the primary role is displayed. Click the XRE200 External Routing Engine in the backup role to view the memory used in the backup external Routing Engine.
CPU load	Indicates the average CPU usage over 15 minutes.
Flash	Indicates the usage and capacity of internal flash memory and any external USB flash drive.
EX8216 Switches	
Memory util.	Indicates the memory used in the external Routing Engine. In an EX8200 Virtual Chassis, the memory utilization value of the XRE200 External Routing Engine in the primary role is displayed. Click the XRE200 External Routing Engine in the backup role to view the memory used in the backup external Routing Engine.
CPU load	Indicates the average CPU usage over 15 minutes.
Flash	Indicates the usage and capacity of internal flash memory and any external USB flash drive.
XRE200 External Routing Engines	
Memory util.	Indicates the memory used in the external Routing Engine. In an EX8200 Virtual Chassis, the memory utilization value of the XRE200 External Routing Engine in the primary role is displayed. Click the backup XRE200 External Routing Engine to view the memory used in backup external Routing Engine.
CPU load	Indicates the average CPU usage over 15 minutes.
Flash	Indicates the usage and capacity of internal flash memory and any external USB flash drive.

Table 74: Health Status (*continued*)

Field	Description
Fan Status	Indicates the status of the fans in the fan tray. The possible values are OK , Failed , and Absent .

Capacity Utilization Panel

Table 75: Capacity Utilization

Field	Description
Number of active ports	Indicates the number of active ports in the switch. Configured Virtual Chassis ports (VCPs) are considered as active ports.
Total number of ports	Indicates the number of ports in the switch. NOTE: In EX3300 and EX4600 Virtual Chassis, the total number of ports of all of the switches is displayed. NOTE: For EX4650 switches, on loading the switch, the consolidated values for all the FPCs are displayed by default.
Used-up MAC-Table entries	Indicates the number of MAC table entries.
Supported MAC-Table entries	Indicates the maximum number of MAC table entries permitted. NOTE: For EX4650 switches, the supported maximum number of MAC table entries are 288000.
Number of VLANs configured	Indicates the number of VLANs configured. NOTE: Only tagged VLANs are counted.
Number of VLANs supported	Indicates the maximum number of VLANs supported. NOTE: For EX4650 switches, the supported maximum number of VLANs are 4094.

Alarms Panel

Displays information about the last five alarms raised in the system. For example, if there are 5 major alarms, then details of all 5 major alarms are displayed. If there are 4 major alarms and 3 minor alarms, then details of the 4 major alarms and 1 minor alarm are displayed. Major alarms are displayed in red and minor alarms are displayed in yellow.

In an EX8200 Virtual Chassis, the top 5 alarms for the primary external Routing Engine are displayed by default. If you select an EX8200 member switch of the Virtual Chassis, the top 5 alarms for that member switch are displayed.

File System Usage

To display the file system storage details of a switch in the backup or line card role, click the image of that switch.

For EX4650 switches, the directory, space used, and the file type details are displayed. By default, primary switch file system storage details are displayed. When you click the image, line card switch file system storage details are displayed.

Chassis Viewer

Click the **Rear View** button to see the back of the chassis image. Click the **Front View** button to see the front of the chassis image. In a Virtual Chassis configuration, the **Rear View** button is disabled if the switch is not selected.

NOTE: For EX4650 switches, chassis viewer supports only the standalone view and does not support Virtual Chassis configuration.

- [Table 76 on page 217](#)—Describes the chassis viewer for EX2200 switches.
- [Table 77 on page 217](#)—Describes the chassis viewer for EX2200-C switches.
- [Table 78 on page 218](#)—Describes the chassis viewer for EX3200, EX3300, and EX4200 switches.
- [Table 79 on page 220](#)—Describes the chassis viewer for EX4300 switches.
- [Table 80 on page 222](#)—Describes the chassis viewer for EX4500 switches.
- [Table 81 on page 223](#)—Describes the chassis viewer for EX4550 switches.

- [Table 82 on page 225](#)—Describes the chassis viewer for EX4600 switches.
- [Table 83 on page 226](#)—Describes the chassis viewer for EX4650 switches.
- [Table 84 on page 227](#)—Describes the chassis viewer for EX6210 switches.
- [Table 85 on page 228](#)—Describes the chassis viewer for EX8208 switches.
- [Table 86 on page 229](#)—Describes the chassis viewer for EX8216 switches.
- [Table 87 on page 231](#)—Describes the chassis viewer for the XRE200 External Routing Engines.

Table 76: Chassis Viewer for EX2200 Switches

Field	Description
Front View	
Interface status	<p>In the image, the following colors denote the interface status:</p> <ul style="list-style-type: none"> • Green—Interface is up and operational. • Yellow—Interface is up but is nonoperational. • Gray—Interface is down and nonoperational. <p>Mouse over the interface (port) to view more information.</p>
Rear View	
Management (me0) port	The management port is used to connect the switch to a management device for out-of-band management.
Console port	The console port is used to connect the switch to a management console or to a console server. (You might do this for initial switch configuration.)
USB port	<p>Indicates the USB port for the switch.</p> <p>NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch.</p>
Fan tray	Mouse over the fan tray icon to display name, status, and description information.
Power supply	Mouse over the power outlet icon to display name, status, and description information.

Table 77: Chassis Viewer for EX2200-C Switches

Field	Description
Front View	

Table 77: Chassis Viewer for EX2200-C Switches (continued)

Field	Description
Interface status	<p>In the image, the following colors denote the interface status:</p> <ul style="list-style-type: none"> • Green—Interface is up and operational. • Yellow—Interface is up but is nonoperational. • Gray—Interface is down and nonoperational. <p>Mouse over the interface (port) to view more information.</p>
Management (me0) port	The management port is used to connect the switch to a management device for out-of-band management.
Console port	The console port is used to connect the switch to a management console or to a console server. (You might do this for initial switch configuration.)
USB port	<p>Indicates the USB port for the switch.</p> <p>NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch.</p>
Rear View	
Power supply	Mouse over the power outlet icon to display name, status, and description information.

Table 78: Chassis Viewer for EX3200, EX3300, and EX4200 Switches

Field	Description
Front View	

Table 78: Chassis Viewer for EX3200, EX3300, and EX4200 Switches (continued)

Field	Description
Interface status	<p>In the image, the following colors denote the interface status:</p> <ul style="list-style-type: none"> • Green—Interface is up and operational. • Yellow—Interface is up but is nonoperational. • Gray—Interface is down and nonoperational. <p>Mouse over the interface (port) to view more information.</p> <p>For a Virtual Chassis configuration, select the switch to view the interface status.</p> <p>If an SFP+ uplink module is installed in the switch, mouse over the port icon to display whether the module is configured to operate in 1-gigabit mode or in 10-gigabit mode. If the module is configured to operate in 1-gigabit mode, the tool tip information is displayed for all 4 ports. If the module is configured to operate in 10-gigabit mode, the tool tip information is displayed only for 2 ports.</p> <p>On an EX3300 switch with the 4x GE/XE SFP+ module, mouse over the port icon to display whether the module is configured to operate in 1-gigabit mode or 10-gigabit mode.</p> <p>For SFP, SFP+, and XFP ports, the interfaces appear dimmed if no transceiver is inserted. The chassis viewer displays Transceiver not plugged-in when you mouse over the port icon.</p>
LCD panel	LCD panel configured for the LEDs on the ports. Mouse over the icon to view the current character display.

Rear View of the EX3200 Switch

Management (me0) port	The management port is used to connect the switch to a management device for out-of-band management.
Console port	The console port is used to connect the switch to a management console or to a console server. (You might do this for initial switch configuration.)
USB port	Indicates the USB port for the switch. NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch.
Fan tray	Mouse over the fan tray icon to display name, status, and description information.
Power supply	Mouse over the power supply icon to display name, status, and description information.

Rear View of the EX3300 and EX4200 Switch

Table 78: Chassis Viewer for EX3200, EX3300, and EX4200 Switches (continued)

Field	Description
Fan tray	Mouse over the fan tray icon to display name, status, and description information. For a Virtual Chassis, the status of the fans of the selected member switch is displayed.
Virtual Chassis port	Displayed only when EX4200 switches are configured as a Virtual Chassis. The following colors denote the Virtual Chassis port (VCP) status: <ul style="list-style-type: none"> • Green—VCP is up and operational. • Yellow—VCP is up but is nonoperational. • Gray—VCP is down and nonoperational.
USB port	Indicates the USB port for the switch. NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch.
Management (me0) port	The management port is used to connect the switch to a management device for out-of-band management.
Console port	The console port is used to connect the switch to a management console or to a console server. (You might do this for initial switch configuration.)
Power supplies	Mouse over the power supply icons to display name, status, and description information.

Table 79: Chassis Viewer for EX4300 Switches

Field	Description
Front View	
Interface status	In the image, the colors listed below denote the interface status for both copper and fiber media type of ports: <ul style="list-style-type: none"> • Green—Interface is up and operational. • Yellow—Interface is up but is nonoperational. • Gray—Interface is down and nonoperational. Mouse over the interface (port) to view more information.
LCD panel	LCD panel configured for the LEDs on the ports. Mouse over the icon to view the current character display.
Mini USB console	The mini console port is used to connect the switch to the management console.

Table 79: Chassis Viewer for EX4300 Switches (*continued*)

Field	Description
PIC 2 slot	<p>You can install an uplink module in the PIC 2 slot. Mouse over the ports in the module to view the details of the ports in module.</p> <p>24-port and 48-port EX4300 switches support the 4-port 10-Gigabit SFP+ uplink module.</p> <p>EX4300-32F switches support the 2-port 40-Gigabit QSFP+ uplink module and the 8-port 10-Gigabit SFP+ uplink module.</p> <p>When you install a transceiver in the port, the following colors denote the interface status:</p> <ul style="list-style-type: none"> • Green—Interface is up and operational. • Yellow—Interface is up but is not operational. • Gray—Interface is down and not operational.

NOTE: In EX4300 switches the LEDs are seen in the front panel, these are not active.

Rear View of the EX4300 Switch

Management port	The management port is used to connect the switch to a management device for out-of-band management.
Console port	The Console port (RJ-45) is used to connect the switch to a management console or to a console server.
USB port	<p>Indicates the USB port for the switch.</p> <p>NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch.</p>
Fan tray	Mouse over the fan tray icons to display name, status, and description information.
Power supplies	Mouse over the power supply icons to display name, status, and description information.

Table 79: Chassis Viewer for EX4300 Switches (continued)

Field	Description
PIC 1 slot	<p>The rear panel of a 24-port and a 48-port EX4300 switch has four (built-in) 40-Gigabit QSFP+ ports, and the rear panel of an EX4300-32F switch has two (built-in) 40-Gigabit QSFP+ ports, in which you can install QSFP+ transceivers. Mouse over the ports to view the details of the ports.</p> <p>After you install a transceiver in the port, the following colors denote the interface status:</p> <ul style="list-style-type: none"> • Green—Interface is up and operational. • Yellow—Interface is up but is not operational. • Gray—Interface is down and not operational. <p>For QSFP+ ports, the interfaces appear dimmed if no transceiver is inserted. The chassis viewer displays Transceiver not plugged in when you mouse over the port.</p> <p>When a QSFP+ port is configured as a Virtual Chassis Port (VCP), the following colors denote the VCP status:</p> <ul style="list-style-type: none"> • Green—VCP is up and operational. • Yellow—VCP is up but is not operational. • Gray—VCP is down and not operational.

Table 80: Chassis Viewer for EX4500 Switches

Field	Description
Front View	
Interface status	<p>In the image, the colors listed below denote the interface status:</p> <ul style="list-style-type: none"> • Green—Interface is up and operational. • Yellow—Interface is up but is nonoperational. • Gray—Interface is down and nonoperational. <p>Mouse over the interface (port) to view more information.</p> <p>For a Virtual Chassis configuration, select the switch to view the interface status.</p> <p>If an SFP+ uplink module is installed in the switch, mouse over the interface (ports) on the module for more information.</p> <p>For SFP and SFP+ ports, the interfaces appear dimmed if no transceiver is inserted. The chassis viewer displays Transceiver not plugged-in when you mouse over the port icon.</p>
LCD panel	LCD panel configured for the LEDs on the ports. Mouse over the icon to view the current character display.

Table 80: Chassis Viewer for EX4500 Switches (*continued*)

Field	Description
Console port	The console port is used to connect the switch to a management console or to a console server.
Management (me0) port	The management port is used to connect the switch to a management device for out-of-band management. Use this port for initial switch configuration.
USB port	Indicates the USB port for the switch. NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch.

Rear View of the EX4500 Switch

Fan tray	Mouse over the fan tray icon to display status of the fans and airflow direction information. For a Virtual Chassis, the status of the fans of the selected member switch is displayed.
Virtual Chassis port	Displayed only when switches are configured as a Virtual Chassis. The colors listed below denote the Virtual Chassis port (VCP) status: <ul style="list-style-type: none"> • Green—VCP is up and operational. • Yellow—VCP is up but is nonoperational. • Gray—VCP is down and nonoperational.
Power supplies	Mouse over the power supply icons to display name, status, and description information.
Intraconnect module	Mouse over the module to display details of the intraconnect module. The intraconnect module helps the switch achieve line rate on all its ports.
Virtual Chassis module	Mouse over to display details of the switches in the Virtual Chassis configuration.

Table 81: Chassis Viewer for EX4550 Switches

Field	Description
Front View	

Table 81: Chassis Viewer for EX4550 Switches (*continued*)

Field	Description
Interface status	<p>In the image, the colors listed below denote the interface status:</p> <ul style="list-style-type: none"> • Green—Interface is up and operational. • Yellow—Interface is up but is nonoperational. • Gray—Interface is down and nonoperational. <p>Mouse over the interface (port) to view more information.</p> <p>For a Virtual Chassis configuration, select the switch to view the interface status.</p> <p>If an expansion module or a Virtual Chassis module is installed in the switch, mouse over the interface (ports) on the module for more information.</p> <p>On an EX4550-32F switch, for SFP and SFP+ ports, the interfaces appear dimmed if no transceiver is inserted. The chassis viewer displays Transceiver (1G/10G) not plugged in when you mouse over the port icon.</p>
LCD panel	LCD panel configured for the LEDs on the ports. Mouse over the icon to view the current character display.
Console port	The console port is used to connect the switch to a management console or to a console server.
Mini Console port	The mini console port is used to connect the switch to the management console.
Management (me0) port	The management port is used to connect the switch to a management device for out-of-band management. Use this port for initial switch configuration.
PIC1 slot	You can insert an uplink module or a Virtual Chassis module in the PIC1 slot. Mouse over to display the details of the module inserted (uplink or Virtual Chassis).
USB port	<p>Indicates the USB port for the switch.</p> <p>NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch.</p>
Rear View of the EX4550 Switch	
Fan tray	Mouse over the fan tray icon to display the status of the fans and airflow direction information. For a Virtual Chassis, the status of the fans of the selected member switch is displayed.

Table 81: Chassis Viewer for EX4550 Switches (*continued*)

Field	Description
Virtual Chassis port	<p>Displayed only when switches are configured as a Virtual Chassis. In the image, the colors listed below denote the Virtual Chassis port (VCP) status:</p> <ul style="list-style-type: none"> ● Green—VCP is up and operational. ● Yellow—VCP is up but is nonoperational. ● Gray—VCP is down and nonoperational.
Power supplies	Mouse over the power supply icons to display name, status, and description information.
PIC2 slot	You can insert an uplink module or a Virtual Chassis module into the PIC2 slot. Mouse over to display the details of the module inserted (uplink or Virtual Chassis).

Table 82: Chassis Viewer for EX4600 Switches

Field	Description
Front View	
NOTE: J-Web is supported on EX4600 switches only in J-Web Application package Release 14.1X53-A2.	
Interface status	<p>In the image, the colors listed below denote the interface status for both copper and fiber media type of ports:</p> <ul style="list-style-type: none"> ● Green—Interface is up and operational. ● Yellow—Interface is up but is nonoperational. ● Gray—Interface is down and nonoperational. <p>Mouse over the interface (port) to view more information.</p>
PIC 1 and PIC 2 slots	<p>You can install an expansion module in the PIC 1 and PIC 2 slots. If you have installed an expansion module, mouse over the ports in the module to view the details of the ports in module.</p> <p>When you install a transceiver in the port, the following colors denote the interface status:</p> <ul style="list-style-type: none"> ● Green—Interface is up and operational. ● Yellow—Interface is up but is not operational. ● Gray—Interface is down and not operational.

Table 82: Chassis Viewer for EX4600 Switches (*continued*)

Field	Description
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NOTE:

- In EX4600 switches the LEDs are seen in the front panel; these are not active.
- In EX4600 switches there is no LCD panel.

Rear View of the EX4600 Switch

Management port	The management ports (RJ-45 and SFP) is used to connect the switch to a management device for out-of-band management.
Console port	The Console port (RJ-45) is used to connect the switch to a management console or to a console server.
USB port	Indicates the USB port for the switch. NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch.
Fan tray	Mouse over the fan tray icons to display name, status, and description information.
Power supplies	Mouse over the power supply icons to display name, status, and description information.

Table 83: Chassis Viewer for EX4650 Switches

Field	Description
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Front View

SFP28 and QSFP28 Ports	Displays 48 small form-factor pluggable (SFP28) ports and eight 100-Gbps quad small form-factor pluggable (QSFP28) ports. Mouse over the interface (port) to view more information.
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Rear View

Management port	The management port (em0) is used to connect the switch to a management device for out-of-band management.
Virtual Chassis ports	Not supported.
Console port	The Console port (RJ-45) is used to connect the switch to a management console or to a console server.

Table 83: Chassis Viewer for EX4650 Switches (continued)

Field	Description
USB port	Indicates the USB port for the switch. NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch.
Fan Tray	Mouse over the fan tray icons to display name, status, and description information.
Power supply	Mouse over the power supply icon to display name, status, and description information.

Table 84: Chassis Viewer for EX6210 Switches

Field	Description
Front View	
Temperature	Mouse over the temperature icon to display the temperature of the CB or line card.
Interface status	<p>Select the CB or line card.</p> <p>In the image, the colors listed below denote the interface status:</p> <ul style="list-style-type: none"> • Green—Interface is up and operational. • Yellow—Interface is up but is nonoperational. • Gray—Interface is down and nonoperational. <p>Mouse over the interface (port) to view more information.</p> <p>You can view status for the following ports on the SRE module:</p> <ul style="list-style-type: none"> • USB port—Indicates the USB port for the switch. NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch. • Management (me0) port—The management port is used to connect the switch to a management device for out-of-band management. There are 2 management ports: fiber and copper. The same status is displayed for both the me0 ports. • Console port—The console port is used to connect the switch to a management console or to a console server. (You might do this for initial switch configuration.) <p>CBs support 4 SFP+ uplink ports. Mouse over the interface on the CB for more information.</p> <p>For SFP and SFP+ ports, the interfaces appear dimmed if no transceiver is inserted. The chassis viewer displays Transceiver not plugged-in when you mouse over the port icon.</p>

Table 84: Chassis Viewer for EX6210 Switches (*continued*)

Field	Description
Power supplies	Mouse over the power supply icons to display name, status, and description information.
LCD panel	LCD panel configured for the LEDs on the ports. Mouse over the icon to view the current character display of the primary Routing Engine. The EX6210 switch has 2 LCD panels, one for each Routing Engine. The backup Routing Engine LCD displays Backup .

Rear View of the EX6210 Switch

Fan tray	Mouse over the fan tray icon to display information regarding the cooling fans.
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Table 85: Chassis Viewer for EX8208 Switches

Field	Description
Front View	
Interface status	<p>In the image, click any line card, SRE module, or SF module to view the front view of the selected component. In the image, the colors listed below denote the interface status:</p> <ul style="list-style-type: none"> • Green—Interface is up and operational. • Yellow—Interface is up but is nonoperational. • Gray—Interface is down and nonoperational. <p>Mouse over the interface (port) to view more information.</p> <p>You can view status for the following ports on the SRE module:</p> <ul style="list-style-type: none"> • USB port—Indicates the USB port for the switch. <p>NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch.</p> <ul style="list-style-type: none"> • Auxiliary port—This port is unavailable. • Management (me0) port—The management port is used to connect the switch to a management device for out-of-band management. • Console port—The console port is used to connect the switch to a management console or to a console server. (You might do this for initial switch configuration.) <p>Because the SF module has no ports, no status information is displayed.</p>

Table 85: Chassis Viewer for EX8208 Switches (continued)

Field	Description
Slot numbers	Slots on the switch are labeled, from the top of the switch down: <ul style="list-style-type: none"> • 0–3 (line cards) • SRE0, SF, SRE1 (SRE and SF modules) • 4–7 (line cards)
Temperature	The active slots contain a gray temperature icon. Mouse over the icon to display temperature information for the slot.
Fan status	Mouse over the fan tray icon to display name, status, and description information.
Power supplies	Mouse over the power supply icons to display name, status, and description information.
LCD panel	LCD panel configured for the LEDs on the ports. Mouse over the icon to view the current character display.
Rear View	The EX8208 switch does not have any components on the rear of the chassis.

Table 86: Chassis Viewer for EX8216 Switches

Field	Description
Front View	

Table 86: Chassis Viewer for EX8216 Switches (continued)

Field	Description
Interface status	<p>In the image, click any line card or RE module to display the front view of the selected component. In the image, the colors listed below denote the interface status:</p> <ul style="list-style-type: none"> ● Green—Interface is up and operational. ● Yellow—Interface is up but is nonoperational. ● Gray—Interface is down and nonoperational. <p>Mouse over the interface (port) to view more information.</p> <p>You can view status for the following ports on the RE module:</p> <ul style="list-style-type: none"> ● USB port—Indicates the USB port for the switch. <p>NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch.</p> <ul style="list-style-type: none"> ● Auxiliary port—This port is unavailable. ● Management (me0) port—The management port is used to connect the switch to a management device for out-of-band management. ● Console port—The console port is used to connect the switch to a management console or to a console server. (You might do this for initial switch configuration.)
Slot numbers	<p>Slots on the switch are labeled, from the top of the switch down:</p> <ul style="list-style-type: none"> ● RE0 (RE module) ● RE1 (RE module) ● 0–15 (line cards)
Temperature	<p>The active slots contain a gray temperature icon. Mouse over the icon to display temperature information for the slot.</p>
Fan status	<p>Mouse over the fan tray icon to display consolidated information about the fans.</p>
Power supplies	<p>Mouse over the power supply icons to display name, status, and description information.</p>
LCD panel	<p>LCD panel configured for the LEDs on the ports. Mouse over the icon to view the current character display.</p>
Rear View	
SF modules	<p>Mouse over the SF module icons in their respective slots to display information. Slots are numbered SF7–SF0, from left to right.</p>

Table 87: Chassis Viewer for XRE200 External Routing Engines

Field	Description
Front View	
Interface status	<p>In the image, the colors listed below denote the interface status:</p> <ul style="list-style-type: none"> • Green—Interface is up and operational. • Yellow—Interface is up but is nonoperational. • Gray—Interface is down and nonoperational. <p>Mouse over the interface (port) to view more information.</p> <p>For a Virtual Chassis configuration, select the switch to view the interface status.</p>
Console port	The console port is used to connect the switch to a management console or to a console server.
Management (me0) port	The management port is used to connect the switch to a management device for out-of-band management. Use this port for initial switch configuration.
Virtual Chassis port	<p>In the image, the colors listed below denote the Virtual Chassis port (VCP) status:</p> <ul style="list-style-type: none"> • Green—VCP is up and operational. • Yellow—VCP is up but is nonoperational. • Gray—VCP is down and nonoperational. <p>Mouse over the interface (port) to view more information.</p>
LCD panel	LCD panel configured for the LEDs on the ports. Mouse over the icon to view the current character display.
Temperature	The active slots contain a gray temperature icon. Mouse over the icon to display temperature information for the slot.
USB port	<p>Indicates the USB port for the switch.</p> <p>NOTE: We recommend that you use USB flash drives purchased from Juniper Networks for your EX Series switch.</p>
PIC1 slot	You can install a Virtual Chassis module in the PIC1 slot. Mouse over the Virtual Chassis ports to display the port status details.
PIC2 slot	You can install a Virtual Chassis module in the PIC2 slot. Mouse over the Virtual Chassis ports to display the port status details.

Table 87: Chassis Viewer for XRE200 External Routing Engines (*continued*)

Field	Description
Rear View of the XRE200 External Routing Engine	
Fan modules	Mouse over the fan modules to display status of the fans and airflow direction information. For a Virtual Chassis, the status of the fans of the selected member switch is displayed.
Power supplies	Mouse over the power supply icons to display name, status, and description information.

Release History Table

Release	Description
19.2A1	Starting in J-Web Application Package Release 19.2A1, J-Web supports EX4650 switches.
14.1X53-D10	For Junos OS Release 14.1X53-D10 and later, EX3300 switches configured as a Virtual Chassis display the value 1-10 FPC in the Inventory details field.
14.1X53-A2	In J-Web Application package Release 14.1X53-A2, you can form a Virtual Chassis using EX4600 and EX4300 switches.
14.1X53-A2	J-Web is supported on EX4600 switches only in J-Web Application package Release 14.1X53-A2.

RELATED DOCUMENTATION

J-Web User Interface for EX Series Switches Overview

EX2200 Switches Hardware Overview

EX2300 Switches Hardware Overview

EX3200 Switches Hardware Overview

EX3300 Switches Hardware Overview

EX4200 Switches Hardware Overview

EX4300 Switches Hardware Overview

EX4500 Switches Hardware Overview

EX6210 Switch Hardware Overview

[EX8208 Switch Hardware Overview](#) | 21

EX8216 Switch Hardware Overview

[Check Active Alarms with the J-Web Interface](#) | **311**

XRE200 External Routing Engine Hardware Guide

4

CHAPTER

Maintaining Components

Maintaining the EX8208 Cooling System | **235**

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Removing an EX8208 from a Rack or Cabinet | **288**

Removing a Battery from an EX8208 Switch for Recycling | **296**

Maintaining the EX8208 Cooling System

IN THIS SECTION

- [Removing a Fan Tray from an EX8208 Switch | 235](#)
- [Installing a Fan Tray in an EX8208 Switch | 237](#)

Removing a Fan Tray from an EX8208 Switch

An EX8208 switch has a single, field-replaceable fan tray. The fan tray is a hot-removable and hot-insertable field-replaceable unit (FRU); you can remove and replace the fan tray while the switch is running without turning off power to the switch or disrupting switching functions.



CAUTION: Do not remove the fan tray unless you have a replacement fan tray available.

The fan tray is installed vertically on the left side on the front of the chassis.

Before you remove a fan tray:

- Ensure you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).

Ensure that you have the following parts and tools available to remove a fan tray from an EX8208 switch chassis:

- Electrostatic discharge (ESD) grounding strap
- Replacement fan tray



CAUTION: The fan tray can be removed and replaced while the switch is operating. However, the fan tray must be replaced within 2 minutes of removing the fan tray to prevent overheating of the chassis.

To remove a fan tray from an EX8208 switch chassis (see [Figure 66 on page 236](#)):

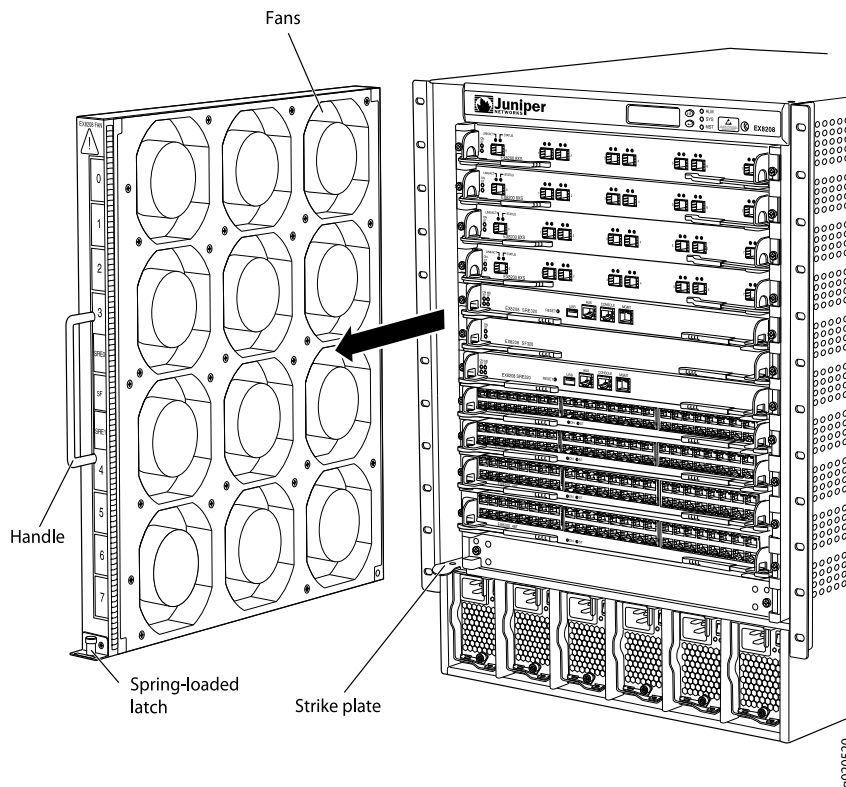
1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Pull the spring-loaded latch, located at the base of the fan tray, upwards until the latch is completely free from the corresponding hole on the strike plate.
3. Hold the handle of the fan tray with one hand while holding the latch up with the other. Pull firmly on the handle to slide the fan tray about 5 in. (13 cm) out of the chassis.



WARNING: There is no fan guard on the fans. Be careful to keep your fingers clear of the moving fan blades when you are removing the fan tray. To avoid injury, do not touch the fans with your hands or any tools as you slide the fan tray out of the chassis—the fans might still be spinning.

4. Wait for approximately 15 seconds to allow all the fans to stop spinning.
5. Release the latch and use that hand to support the weight of the fan tray. Slide the fan tray completely out of the chassis.

Figure 66: Removing a Fan Tray from an EX8208 Switch



Installing a Fan Tray in an EX8208 Switch

An EX8208 switch has a single, field-replaceable fan tray. The fan tray is a hot-insertable and hot-removable field-replaceable unit (FRU); you can remove and replace the fan tray while the switch is running without turning off power to the switch or disrupting switching functions.

The fan tray installs vertically on the left side on the front of the chassis. A handle on the front faceplate facilitates handling of the fan tray. There is a spring-loaded latch on the base of the fan tray that is used to latch the fan tray into the chassis.

Before you begin to install a fan tray:

- Ensure you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).

Ensure that you have the following parts and tools available to install a fan tray in an EX8208 switch:

- Electrostatic discharge (ESD) grounding strap



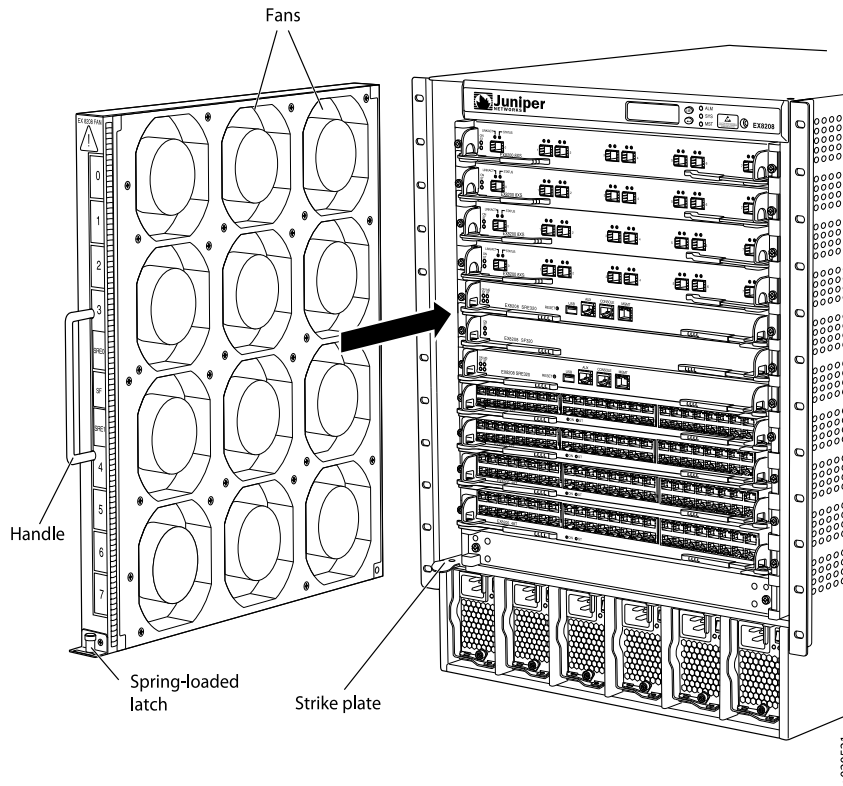
CAUTION: The fan tray can be removed and replaced while the switch is operating. However, the fan tray must be replaced within 2 minutes of removing the fan tray to prevent the chassis from overheating.

To install a fan tray in an EX8208 switch (see [Figure 67 on page 238](#)):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Hold the handle of the fan tray with one hand and support the weight of the tray with the other hand. Align the tray with the fan tray guides on the fan tray slot. Slide in the fan tray until it is fully seated in the chassis.

You will hear a distinct click sound when the spring-loaded latch locks into the corresponding hole on the strike plate below the fan tray. The latch must be fully engaged in the corresponding hole for the fan tray to be securely installed.

Figure 67: Installing a Fan Tray in an EX8208 Switch



Maintaining the EX8200 Power System

IN THIS SECTION

- [Removing an AC Power Supply from an EX8200 Switch | 239](#)
- [Installing an AC Power Supply in an EX8200 Switch | 240](#)
- [Removing a DC Power Supply from an EX8200 Switch | 243](#)
- [Installing a DC Power Supply in an EX8200 Switch | 245](#)

Removing an AC Power Supply from an EX8200 Switch

The AC power supply in an EX8200 switch is a hot-removable and hot-insertable field-replaceable unit (FRU). You remove AC power supplies from the front of the chassis.



CAUTION: Before you remove a power supply, ensure that you have power supplies sufficient to power the switch left in the chassis. See [“Calculating Power Requirements for an EX8208 Switch” on page 121](#) or *Calculating Power Requirements for an EX8216 Switch*.

Before you remove an AC power supply from the switch:

- Ensure you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).

Ensure that you have the following parts and tools available to remove an AC power supply from an EX8200 switch chassis:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1
- Replacement power supply or a cover panel for the power supply slot



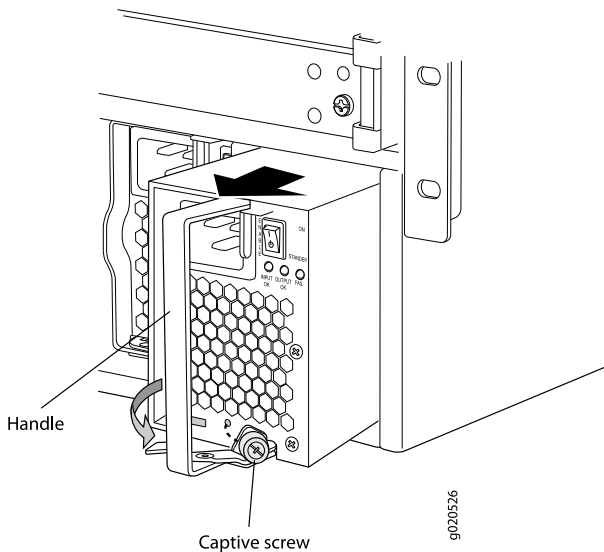
CAUTION: Do not leave the power supply slot empty for a long time while the switch is operational. Either replace the power supply promptly or install a cover panel over the empty slot.

To remove an AC power supply from an EX8200 switch (see [Figure 68 on page 240](#)):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Flip the **Enable** switch next to the appliance inlet on the power supply to the Standby position.
3. Disconnect power from the switch by performing one of the two following tasks:
 - If the AC power source outlet has a power switch, set it to the OFF position.
 - If the AC power source outlet does not have a power switch, gently pull the plug end of the power cord connected to the power source outlet out of the outlet.
4. Remove the power cord from the AC appliance inlet on the AC power supply faceplate.

5. Turn the adjustment nut of the power cord retainer counterclockwise till you can see the power cord. Pull the power cord from the slot in the adjustment nut.
6. Squeeze the two sides of the power cord retainer clip, and pull the L-shaped ends of the clip from the holes on each side of the AC appliance inlet to completely remove the power retainer clip.
7. Unscrew the captive screw counterclockwise using the Phillips (+) screwdriver, number 1.
8. Pull the captive screw away from the faceplate of the power supply to release the latch.
9. Pull the handle away from the faceplate of the power supply until it is perpendicular to the faceplate.
10. Taking care not to touch power supply components, pins, leads, or solder connections, place one hand under the power supply to support it. Grasp the power supply handle with your other hand and pull the power supply completely out of the chassis.
11. If you are not replacing the power supply, install the cover panel over the slot, using the Phillips (+) screwdriver to tighten the screw on the side of the cover panel.

Figure 68: Removing an AC Power Supply from an EX8200 Switch



Installing an AC Power Supply in an EX8200 Switch

The AC power supply in an EX8200 switch is a hot-insertable and hot-removable field-replaceable unit (FRU). Up to six AC power supplies can be installed in an EX8200 switch. All AC power supplies install in

the front of the chassis in the slots provided at the bottom. See [“Slot Numbering for an EX8208 Switch” on page 40](#) and [Slot Numbering for an EX8216 Switch](#).

Before you install an AC power supply in the switch:

- Ensure you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).

Ensure that you have the following parts and tools available to install an AC power supply in an EX8200 switch chassis:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1

NOTE: Each AC power supply must be connected to a dedicated AC power source outlet.

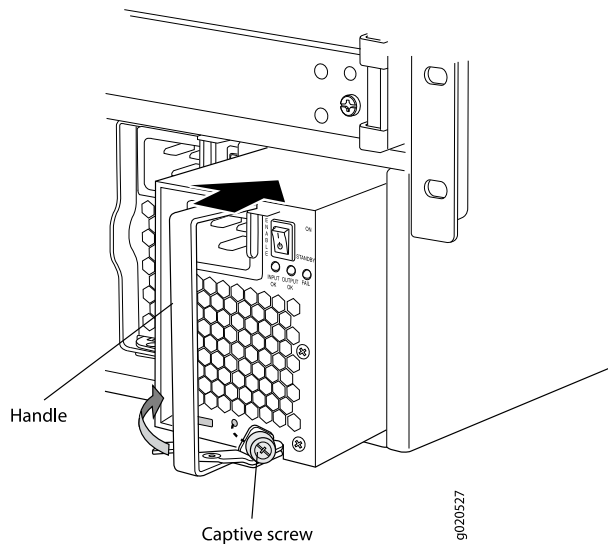
To install an AC power supply in an EX8200 switch (see [Figure 69 on page 242](#)):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. If the power supply slot has a cover panel on it, unscrew the screw on the side of the cover panel in the counterclockwise direction using the Phillips (+) screwdriver, number 1, and remove the cover panel. Save the cover panel for later use.
3. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.
4. Flip the **Enable** switch next to the appliance inlet on the power supply to the Standby position.
5. Unscrew the captive screw in the counterclockwise direction using the Phillips (+) screwdriver, number 1.
6. Pull the captive screw away from the faceplate of the power supply to release the latch.
7. Pull the handle away from the faceplate of the power supply until it is perpendicular to the faceplate.

NOTE: Power supplies can be installed in any slot. You do not have to install the power supplies in serial order.

8. Using both hands, place the power supply in the power supply slot on the front of the switch. Slide the power supply straight into the chassis until the power supply is fully seated in the slot. Ensure the power supply faceplate is flush with any adjacent power supply faceplates or power supply cover panels.
9. Push the handle towards the faceplate of the power supply until it is flush against the faceplate.
10. Push the captive screw into the power supply faceplate. Ensure that the screw is seated inside the corresponding hole on the faceplate.
11. Tighten the captive screw by turning it clockwise using the Phillips (+) screwdriver, number 1. When the screw is completely tight, the latch locks into the switch chassis.

Figure 69: Installing an AC Power Supply in an EX8200 Switch



SEE ALSO

[Calculating Power Requirements for an EX8208 Switch | 121](#)

[Calculating Power Requirements for an EX8216 Switch](#)

[AC Power Supply in an EX8200 Switch | 56](#)

Removing a DC Power Supply from an EX8200 Switch

The DC power supply in an EX8200 switch is a hot-removable and hot-insertable field-replaceable unit (FRU). You remove DC power supplies from the front of the chassis.

NOTE: EX8208 switches support 2000 W DC power supplies.

EX8216 switches support 3000 W DC power supplies.



CAUTION: Before you remove a power supply, ensure that you have power supplies sufficient to power the switch left in the chassis. See [“Calculating Power Requirements for an EX8208 Switch” on page 121](#) and *Calculating Power Requirements for an EX8216 Switch*.

Before you remove a DC power supply from the switch:

- Ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).

Ensure that you have the following parts and tools available to remove a DC power supply from an EX8200 switch chassis:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1
- Phillips (+) screwdriver, number 2
- 3/8 in. (9.5 mm) nut driver or socket wrench
- Replacement power supply or cover panel for the power supply slot

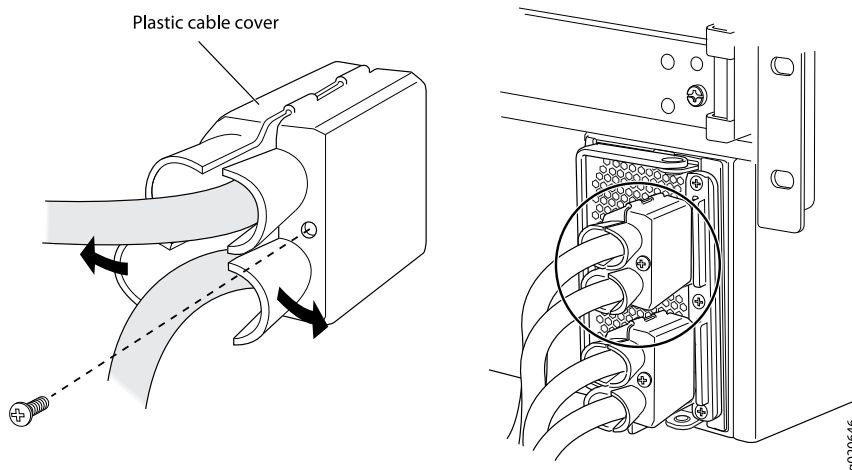


CAUTION: Do not leave the power supply slot empty for a long time while the switch is operational. Either replace the power supply unit promptly or install a cover panel over the empty slot.

To remove a DC power supply from an EX8200 switch (see [Figure 71 on page 245](#)):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Make sure that the voltage across the DC power source cables leads is 0 V and that there is no chance that the cables might become active during the removal process.
3. Flip the **Enable** switch on the power supply to the Standby position.
4. Unscrew the screw counterclockwise using the Phillips (+) screwdriver, number 2, on each of the plastic cable covers that shield the input terminal studs.
5. Remove the plastic cable covers from both pairs of input terminal studs. See [Figure 70 on page 244](#).

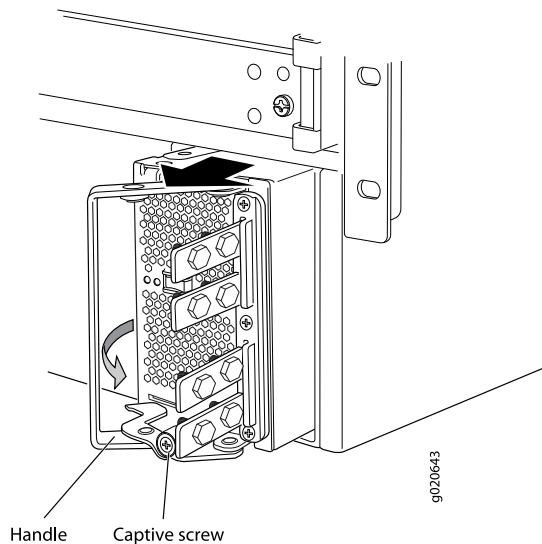
Figure 70: Remove the Plastic Cable Cover



6. Unscrew the nuts counterclockwise using the 3/8 in. (9.5 mm) nut driver or socket wrench from the input terminal studs.
7. Remove the cable lugs and washers from the input terminal studs.
8. Unscrew the captive screw counterclockwise using the Phillips (+) screwdriver, number 1.
9. Pull the captive screw away from the faceplate of the power supply to release the latch.
10. Pull the handle away from the faceplate of the power supply until it is perpendicular to the faceplate.

11. Taking care not to touch power supply components, pins, leads, or solder connections, place one hand under the power supply to support it. Grasp the power supply handle with your other hand and pull the power supply completely out of the chassis.
12. If you are not replacing the power supply, install the cover panel over the slot, using the Phillips (+) screwdriver to tighten the screw on the side of the cover panel.

Figure 71: Removing a DC Power Supply from an EX8200 Switch



Installing a DC Power Supply in an EX8200 Switch

The DC power supply in an EX8200 switch is a hot-removable and hot-insertable field-replaceable unit (FRU). Up to six DC power supplies can be installed in an EX8200 switch. All DC power supplies install in the front of the chassis in the slots provided at the bottom. See [“Slot Numbering for an EX8208 Switch” on page 40](#) and [Slot Numbering for an EX8216 Switch](#).

NOTE: EX8208 switches support 2000 W DC power supplies.

EX8216 switches support 3000 W DC power supplies.

Before you install a DC power supply in the switch:

- Ensure you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).

Ensure that you have the following parts and tools available to install a DC power supply in an EX8200 switch chassis:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1

To install a DC power supply in an EX8200 switch (see [Figure 72 on page 247](#)):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. If the power supply slot has a cover panel on it, unscrew the screw on the side of the cover panel in the counterclockwise direction using the Phillips (+) screwdriver, number 1, and remove the cover panel. Save the cover panel for later use.
3. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.
4. Flip the **Enable** switch on the power supply to the Standby position.
5. Unscrew the captive screw in the counterclockwise direction using the Phillips (+) screwdriver, number 1.
6. Pull the captive screw away from the faceplate of the power supply to release the latch.
7. Pull the handle away from the faceplate of the power supply until it is perpendicular to the faceplate.

NOTE: Power supplies can be installed in any slot. You do not have to install the power supplies in serial order.

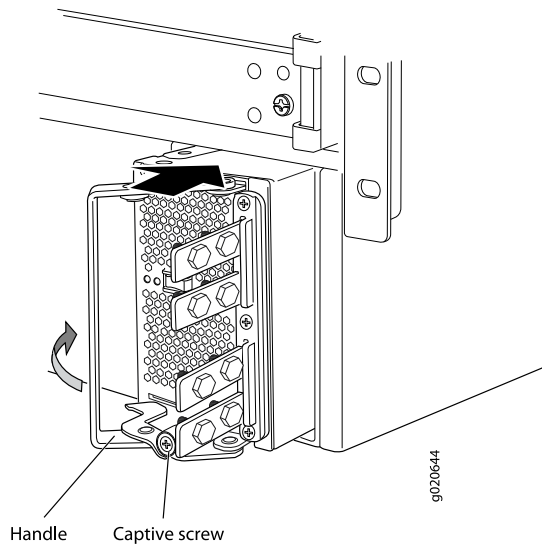
8. Using both hands, place the power supply in the power supply slot on the front of the switch. Slide the power supply straight into the chassis until the power supply is fully seated in the slot. Ensure the power supply faceplate is flush with any adjacent power supply faceplates or power supply cover panels.
9. Push the handle towards the faceplate of the power supply until it is flush against the faceplate.

10. Push the captive screw into the power supply faceplate. Ensure that the screw is seated inside the corresponding hole on the faceplate.

11. Tighten the captive screw by turning it clockwise using the Phillips (+) screwdriver, number 1. When the screw is completely tight, the latch locks into the switch chassis.

To connect power to a DC power supply, see [“Connecting DC Power to an EX8200 Switch” on page 174](#)

Figure 72: Installing a DC Power Supply in an EX8200 Switch



SEE ALSO

[DC Power Supply in an EX8200 Switch | 70](#)

Maintaining the EX8200 Power Cord Tray

IN THIS SECTION

- [Removing the Power Cord Tray from a Rack or Cabinet for an EX8200 Switch | 248](#)
- [Installing the Power Cord Tray in a Rack or Cabinet for an EX8200 Switch | 248](#)

Removing the Power Cord Tray from a Rack or Cabinet for an EX8200 Switch

You can remove the power cord tray from a rack or cabinet. (The remainder of this topic uses “rack” to mean “rack or cabinet.”)

In two-post rack installations, we recommend that you do not remove the power cord tray unless you are also removing the switch and that you remove the switch before you remove the power cord tray.

NOTE: The EX8216 switch can be installed only in a four-post rack. Installation in a two-post rack is not supported.

If you remove the power cord tray before removing the EX8208 switch from a two-post rack, there is no support for the underside of the switch. This creates a problem if and when you need to remove the switch, because the chassis has no support once you remove the screws that hold the front-mounting brackets to the rack. In a four-post rack this is not an issue because the switch rests on the adjustable mounting brackets.

Before you begin to remove the power cord tray:

- Ensure no power cables are resting on or threaded through the power cord tray.
- Remove the switch if the switch and power cord tray are installed on a two-post rack. See [“Removing an EX8208 Switch from a Rack or Cabinet” on page 290](#).

Ensure that you have the following parts and tools available to remove the power cord tray:

- A Phillips (+) screwdriver, number 1, 2, or 3, depending on the size of your rack mounting screws

To remove the power cord tray:

1. Use the appropriate Phillips (+) screwdriver to remove the four mounting screws that hold the power cord tray in the rack.
2. Remove the power cord tray and store it in the original switch accessory box for later use.

Installing the Power Cord Tray in a Rack or Cabinet for an EX8200 Switch

The power cord tray is supplied with all EX8200 switches. The power cord tray is optional for four-post rack or cabinet installation but mandatory for a two-post rack or cabinet installation. (The remainder of

this topic uses “rack” to mean “rack or cabinet.”) To mount an EX8208 switch in a two-post rack, you must install the power cord tray in the rack before installing the switch.

NOTE: The EX8216 switch can be installed only in a four-post rack. Installation in a two-post rack is not supported.

The power cord tray provides support for the front of the EX8208 chassis during installation of the switch in a two-post rack. The front edge of the chassis rests on the upper edge (lip) of the power cord tray.

The power cord tray provides a place to organize and tie down the power cords for the power supplies.

The power cord tray uses 1 U of rack space, so the total space occupied by an EX8208 switch chassis and power cord tray is 15 U, and the total space occupied by an EX8216 switch chassis and power cord tray is 22 U.

Ensure that you have the following tools and parts available to install the power cord tray:

- A Phillips (+) screwdriver, number 1, 2, or 3, depending on the size of your rack mounting screws
- 4 mounting screws appropriate for your rack to attach the power cord tray to the rack

To install the power cord tray (see [Figure 40 on page 153](#) and [Figure 41 on page 153](#)):

1. Remove the power cord tray from the accessory box.
2. Decide where to position the switch in the rack. If the rack is empty, choose the lowest possible location. See [“Rack Requirements” on page 118](#), and [“Cabinet Requirements” on page 119](#).

NOTE: To mount an EX8208 switch on a two-post rack, you must install the power cord tray in the rack before installing the switch. See [Figure 41 on page 153](#). Installation of an EX8216 switch in a two-post rack is not supported.

3. Position the power cord tray in the rack space immediately below the position in which you want to install the switch (in a two-post rack) or where the switch is installed (in a four-post rack) (see [Figure 40 on page 153](#)). Line up the screw holes of the power cord tray with the holes in the rack. Use 4 mounting screws appropriate for your rack to attach the power cord tray to the rack.

Figure 73: Installing the Power Cord Tray in a Four-Post Rack

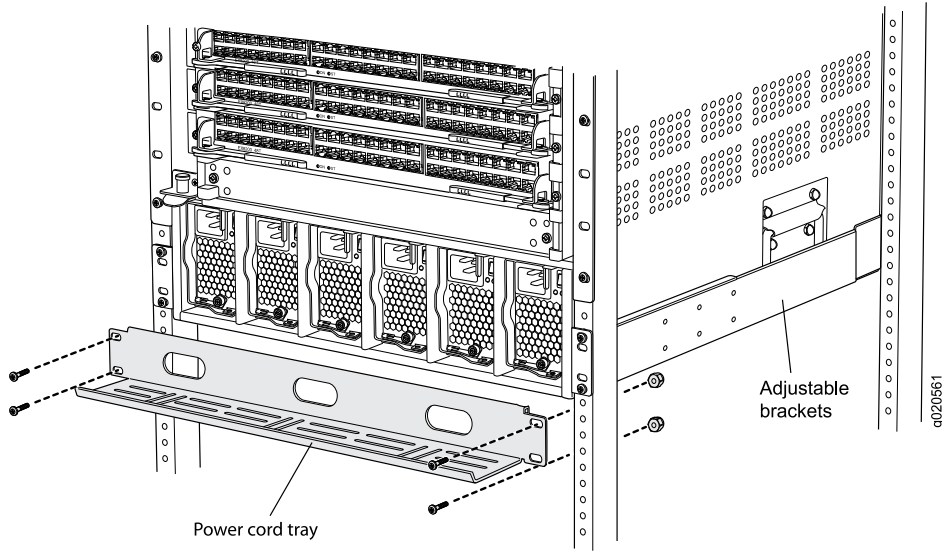
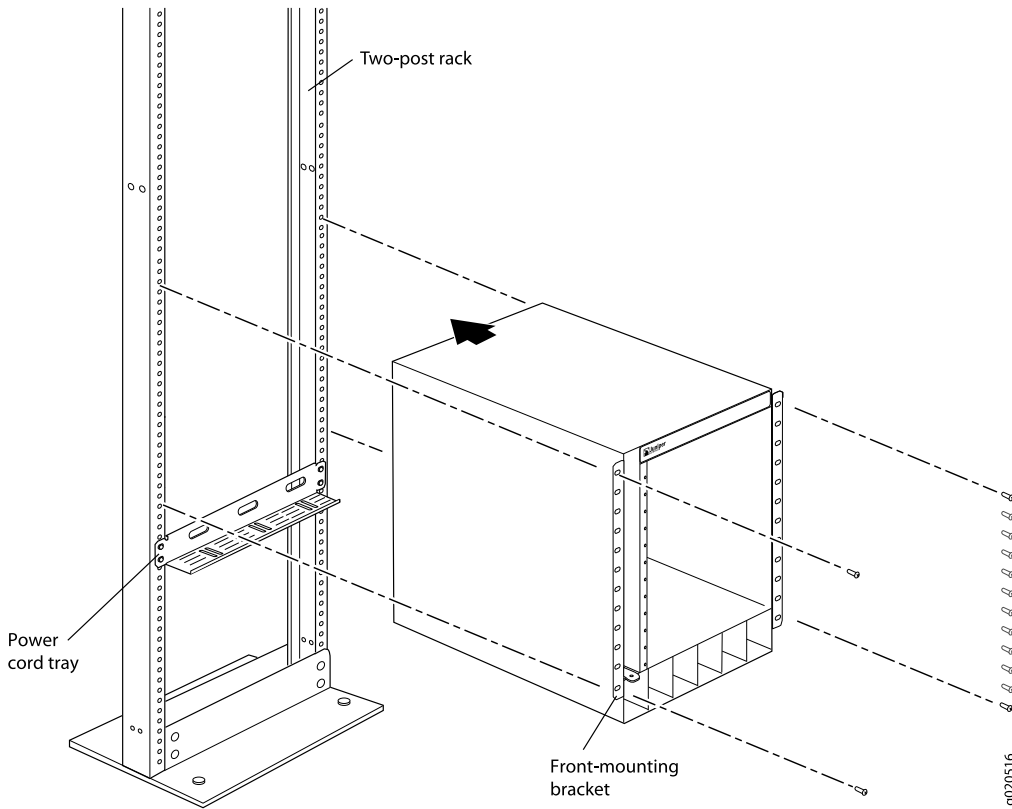


Figure 74: Power Cord Tray Installed in a Two-Post Rack



Maintaining the EX8208 Host Subsystem

IN THIS SECTION

- [Taking the SRE Module Offline in an EX8208 Switch | 251](#)
- [Removing an SRE Module from an EX8208 Switch | 253](#)
- [Installing an SRE Module in an EX8208 Switch | 255](#)
- [Taking the SF Module Offline in an EX8208 Switch | 257](#)
- [Removing an SF Module from an EX8208 Switch | 257](#)
- [Installing an SF Module in an EX8208 Switch | 259](#)

Taking the SRE Module Offline in an EX8208 Switch

IN THIS SECTION

- [Taking an SRE Module Offline in a Switch with Redundant SRE Modules | 251](#)
- [Taking an SRE Module Offline in a Switch With One SRE Module | 252](#)

Before removing a Switch Fabric and Routing Engine (SRE) module from an EX8208 switch, take the module offline.

The SRE module performs switching and system management functions in an EX8208 switch. Your switch can have either one or two SRE modules.

Taking an SRE Module Offline in a Switch with Redundant SRE Modules

To take an SRE module offline in a switch with two SRE modules:

1. Determine whether the SRE module is the primary or backup using one of these methods:
 - Look at the **MS** (primary) LED on the SRE module faceplate. If the **MS** LED is lit steady green, the SRE module is the primary. If it is blinking green, the SRE module is the backup.

- Issue the following CLI command:

```
user@switch> show chassis routing-engine
Routing Engine status:
Slot 0: Current state Master
Election priority Master (default) ...
```

2. If the SRE module that you want to remove is the primary, make it the backup module:

```
user@switch> request chassis routing-engine master switch
```

3. From the primary, halt the other Routing Engine:

```
user@switch> request system halt other-routing-engine
```

4. Wait a minute or two for the Routing Engine to halt before proceeding. If you are using a console connection, you will see a message when the system is halted. If the Routing Engine has not yet halted, the following step returns an error.

5. Take the SRE module offline:

```
user@switch> request chassis cb offline slot slot-number
```

where *slot-number* is either **0** (slot SRE0) or **1** (slot SRE1).

6. (Optional) Confirm that the SRE module is offline:

```
user@switch> show chassis environment cb
```

If the state field in the command output shows that the module is offline, then it is safe to remove the SRE module.

Taking an SRE Module Offline in a Switch With One SRE Module

To take the SRE module offline:

1. Connect to the console port on the SRE module.
2. From the console, halt the SRE module:

```
user@switch> request system halt
```

The RE module is gracefully halted but not powered off.

When a message appears confirming that the operating system has halted, it is safe to remove the SRE module. The Routing Engine might take up to 5 minutes to gracefully halt.

Removing an SRE Module from an EX8208 Switch

You must remove the Switch Fabric and Routing Engine (SRE) module from the EX8208 switch chassis if you need to replace the module or if you need to remove switch components before moving the chassis without using a mechanical lift.



CAUTION: Do not lift the SRE module by holding the ejector levers. The levers cannot support the weight of the module. Lifting the module by the levers might bend the levers. Bent levers will prevent the SRE module from being properly seated in the chassis.

Before you begin to remove an SRE module:

- Ensure you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).

Ensure that you have the following parts and tools available to remove an SRE module:

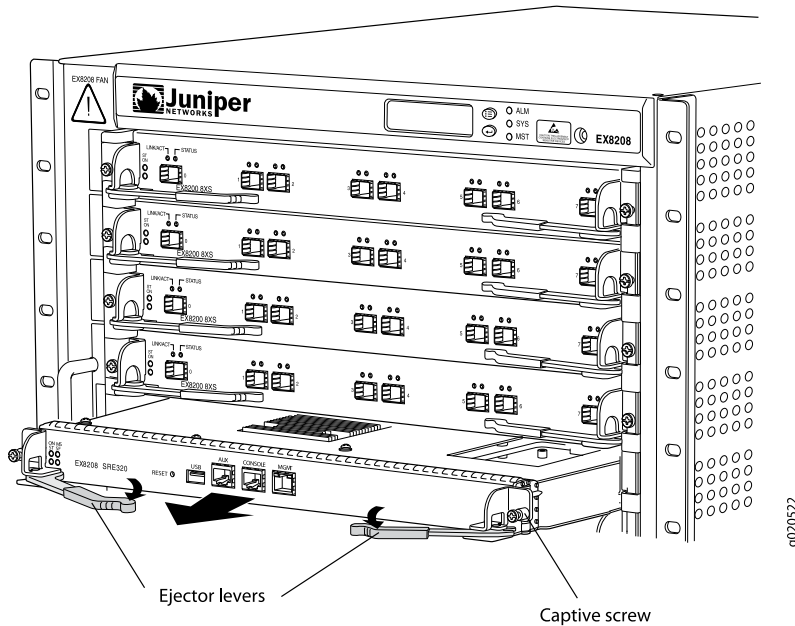
- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 2
- Antistatic bag or antistatic mat
- Replacement SRE module or cover panel for the SRE module slot

To remove an SRE module from an EX8208 switch (see [Figure 75 on page 254](#)):

1. Take the SRE module offline. See [“Taking the SRE Module Offline in an EX8208 Switch” on page 251](#).
2. Attach the antistatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
3. Place the antistatic bag or antistatic mat on a flat, stable surface.
4. Loosen the screws on each side of the SRE module by turning them counterclockwise using the screwdriver until they are completely unseated.

5. Pull both the ejector levers outwards, away from the faceplate of the SRE module, until they go no further. This action causes the SRE module to slide out of the chassis slightly.
6. Grasp the ejector levers and pull the SRE module out to about halfway.
7. Taking care not to touch the leads, pins, or solder connections, place one hand underneath the SRE module to support it and slide it completely out of the chassis.
8. Place the SRE module in the antistatic bag or on the antistatic mat.
9. If you are not replacing the SRE module, place the cover panel over the empty slot, insert the screws through the holes on each side of the cover panel, and tighten the screws with the screwdriver.

Figure 75: Removing an SRE Module from an EX8208 Switch



SEE ALSO

[Switch Fabric and Routing Engine \(SRE\) Module in an EX8208 Switch | 78](#)

Installing an SRE Module in an EX8208 Switch

You can install either one or two Switch Fabric and Routing Engine (SRE) modules in an EX8208 switch. The SRE modules install horizontally in the front of the chassis in the slots labeled SRE0 and SRE1.

NOTE: We recommend that you install two SRE modules for redundancy. If you install only one SRE module, we recommend that you install it in the slot SRE0.



CAUTION: Do not lift the SRE module by holding the ejector levers. The levers cannot support the weight of the module. Lifting the modules by the levers might bend the levers, and the bent levers will prevent the SRE module from being properly seated in the chassis.

Before you begin installing an SRE module in an EX8208 switch:

- Ensure you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).

Ensure that you have the following parts and tools available to install an SRE module:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 2

To install an SRE module in an EX8208 switch (see [Figure 76 on page 256](#)):

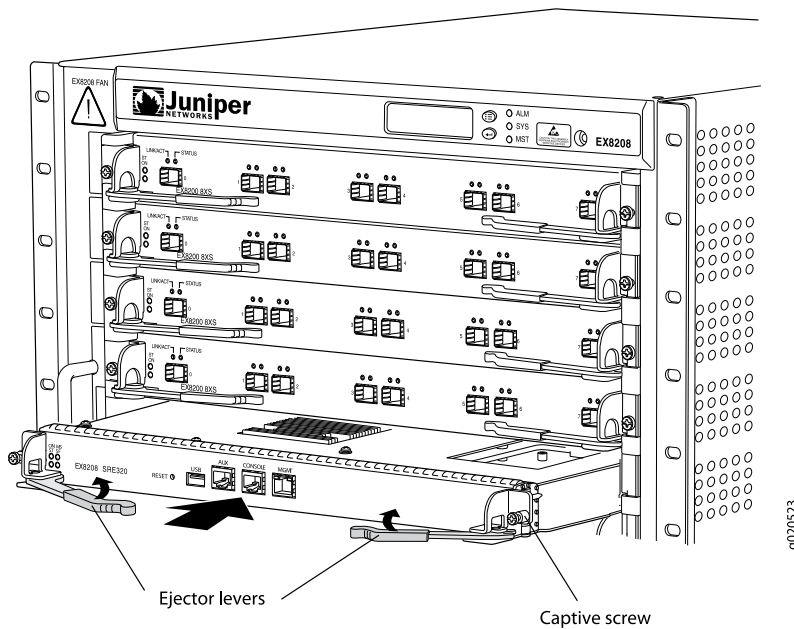
1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
2. Taking care not to touch the leads, pins, or solder connections, pull the SRE module out from the bag.
3. Pull both the ejector levers outward, away from the faceplate of the SRE module, until they go no further.
4. If the slot has a cover panel on it, unscrew the two screws on either side of the cover panel counterclockwise using the Phillips (+) screwdriver, number 2. Remove the cover panel. Save the cover panel for later use.
5. Carefully align the sides of the SRE module with the guides inside the chassis.

6. Ensuring that the SRE module is correctly aligned, carefully slide it into the chassis until you feel resistance.
7. Push both the ejector levers towards the faceplate of the SRE module until the levers are flush against the faceplate and are fully engaged.
8. Tighten the screws, one on each side of the SRE module, by turning them clockwise using the Phillips (+) screwdriver, number 2. Ensure that the SRE module is fully seated in the chassis. It must be fully seated in order for it to be powered up.
9. Verify that the SRE module is installed correctly and functioning normally by checking the LEDs on the faceplate of the SRE module. The **ON** LED and **ST** LED should be lit steady green a few minutes after the SRE module is installed.

If the **ON** LED is unlit, verify that there are enough power supplies installed. See [“Calculating Power Requirements for an EX8208 Switch” on page 121](#). If more power supplies are needed, install additional power supplies. See [“Installing an AC Power Supply in an EX8200 Switch” on page 240](#). If there are enough power supplies in the switch, remove and install the SRE module again. See [“Removing an SRE Module from an EX8208 Switch” on page 253](#).

If the **ST** LED is lit steady yellow, the SRE module has failed. Remove the module and install a new SRE module. See [“Removing an SRE Module from an EX8208 Switch” on page 253](#).

Figure 76: Installing an SRE Module in an EX8208 Switch



Taking the SF Module Offline in an EX8208 Switch

The SF module provides switching functionality for an EX8208 switch. Your switch can have either zero SF modules or one SF module.

NOTE: If you take the SF module offline in a switch configuration having only one Switch Fabric and Routing Engine (SRE) module, throughput will be low.

To take the SF module offline:

1. Take the SF module offline:

```
user@switch> request chassis cb offline slot 2
```

For an SF module, the control board slot number is always 2.

2. (Optional) Confirm that the SF module is offline:

```
user@switch> show chassis environment cb slot-number
```

The state field in the command output shows that the SF module is offline. It is now safe to remove or replace the SF module.

SEE ALSO

[Switch Fabric \(SF\) Module in an EX8208 Switch | 81](#)

Removing an SF Module from an EX8208 Switch

You must remove the Switch Fabric (SF) module from the EX8208 switch if you need to replace the module or if you need to remove the switch components before moving the chassis without using a mechanical lift.

The SF module is always installed in the slot labeled SF.

NOTE: Do not lift the SF module by holding the ejector levers. The levers cannot support the weight of the module. Lifting the modules by the levers might bend the levers. Bent levers will prevent the SF module from being properly seated in the chassis.

Before you begin to remove an SF module:

- Ensure you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).

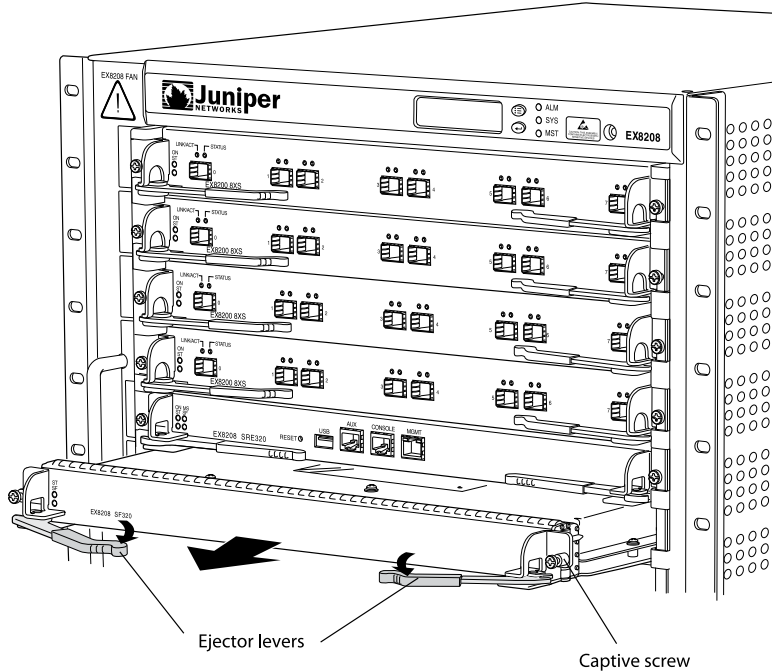
Ensure that you have the following parts and tools available to remove an SF module:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 2
- Antistatic bag or antistatic mat
- Replacement SF module or cover panel for the slot

To remove an SF module (see [Figure 77 on page 259](#)):

1. Take the SF module offline. See [“Taking the SF Module Offline in an EX8208 Switch” on page 257](#).
2. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to the ESD point on the chassis.
3. Place the antistatic bag or antistatic mat on a flat, stable surface.
4. Loosen the screws on each side of the SF module by turning them counterclockwise using the screwdriver until they are completely unseated.
5. Pull both the ejector levers outwards, away from the faceplate of the SF module, until they go no further. This action causes the SF module to slide out of the chassis slightly.
6. Grasping the ejector levers, pull the SF module to about halfway out.
7. Taking care not to touch the leads, pins, or solder connections, place one hand underneath the SF module to support it and slide it out of the chassis completely.
8. Place the SF module in the antistatic bag or on the antistatic mat.
9. If you are not replacing the SF module, install the cover panel over the empty slot by tightening the screws on each side of the cover panel with the screwdriver.

Figure 77: Removing an SF Module from an EX8208 Switch



Installing an SF Module in an EX8208 Switch

You can install either zero Switch Fabric (SF) modules or one SF module in an EX8208 switch depending on the switch configuration you want to have. One SF module is included in the base configuration. See [“EX8208 Switch Configurations” on page 27](#).

The SF module can be installed only in the slot labeled SF. The SF module is keyed so that it does not fit in any other slot in the chassis.

NOTE: Do not lift the SF module by holding the ejector levers. The levers cannot support the weight of the module. Lifting the module by the levers might bend the levers. Bent levers prevent the SF module from being properly seated in the chassis.

Before you begin installing an SF module in an EX8208 switch:

- Ensure you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).

Ensure that you have the following parts and tools available to install an SF module:

- Electrostatic discharge (ESD) grounding strap

- Phillips (+) screwdriver, number 2

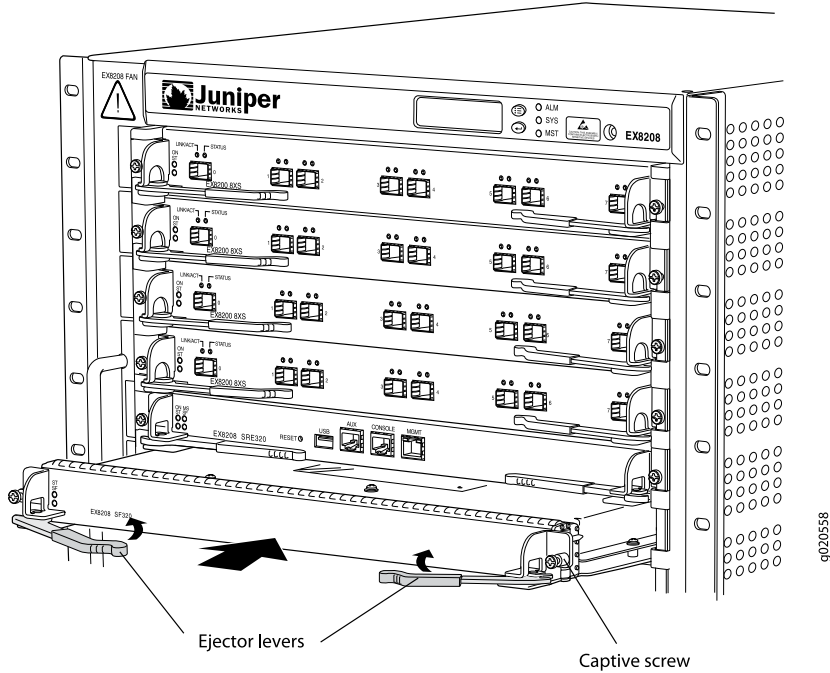
To install an SF module (see [Figure 78 on page 261](#)):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
2. If the slot has a cover panel on it, use the Phillips (+) screwdriver, number 2 to remove the two screws on each side of the cover panel. Save the cover panel for later use.
3. Taking care not to touch the leads, pins, or solder connections, pull the SF module out from the bag.
4. Pull both the ejector levers outwards, away from the faceplate of the SF module, until they go no further.
5. Align the sides of the SF module with the guides inside the chassis.
6. Ensuring that the module remains correctly aligned, slide the SF module into the chassis until you feel resistance.
7. Push both the ejector levers towards the faceplate of the SF module until the levers are flush against the faceplate and are fully engaged.
8. Tighten the screws on each side of the SF module by turning them clockwise using the Phillips (+) screwdriver, number 2. Ensure that the SF module is fully seated in the chassis.
9. Verify that the SF module is installed correctly and functioning normally by checking the LEDs on the faceplate of the SF module. The **ST** LED and **SF** LED should be lit steady green a few minutes after the SF module is installed.

If the **ST** LED is unlit, check whether there are enough power supplies installed. See [“Calculating Power Requirements for an EX8208 Switch” on page 121](#). If more power supplies are needed, install additional power supplies. See [“Installing an AC Power Supply in an EX8200 Switch” on page 240](#). If there are enough power supplies in the switch, remove and install the SF module again. See [“Removing an SF Module from an EX8208 Switch” on page 257](#).

If the **ST** LED or the **SF** LED is lit steady yellow, the SF module has failed. Remove the SF module and install a new one. See [“Removing an SF Module from an EX8208 Switch” on page 257](#).

Figure 78: Installing an SF Module in an EX8208 Switch



Maintaining the EX8200 Line Cards

IN THIS SECTION

- [Handling and Storing Line Cards | 262](#)
- [Maintaining Line Card Cables | 267](#)
- [Unpacking a Line Card Used in an EX8200 Switch | 267](#)
- [Removing a Line Card from an EX8200 Switch | 268](#)
- [Installing a Line Card in an EX8200 Switch | 271](#)

Handling and Storing Line Cards

IN THIS SECTION

- [Holding a Line Card | 262](#)
- [Storing a Line Card | 266](#)

Components in the line cards are fragile. To avoid damaging the line cards, follow the procedures in this topic. The procedures use the following terms to describe the four edges of the line cards:

- Faceplate—Edge of the line card that has connectors into which you insert the transceivers.
- Connector edge—Edge opposite the faceplate.
- Top edge—Edge at the top of the line card when the line card is vertical.
- Bottom edge—Edge at the bottom of the line card when the line card is vertical.



CAUTION: Failure to handle line cards as specified in these procedures can cause irreparable damage to them.

Holding a Line Card

You must hold a line card horizontally when installing it in the chassis. You may hold a line card vertically or horizontally when carrying it.



CAUTION: Be prepared to support the full weight as you slide the line card into the chassis.

To hold a line card vertically:

1. Orient the line card so that the faceplate faces you. To verify the orientation, confirm that the text on the line card is right-side up.
2. Place one hand around the line card faceplate about a quarter of the way down from the top edge. Do not press hard on it.

3. Place the other hand at the bottom edge of the line card.

If the line card is horizontal before you grasp it, place your left hand around the faceplate and your right hand along the bottom edge.

To hold a line card horizontally:

1. Orient the line card so that the faceplate faces you.
2. Grasp the top edge with your left hand and the bottom edge with your right hand.

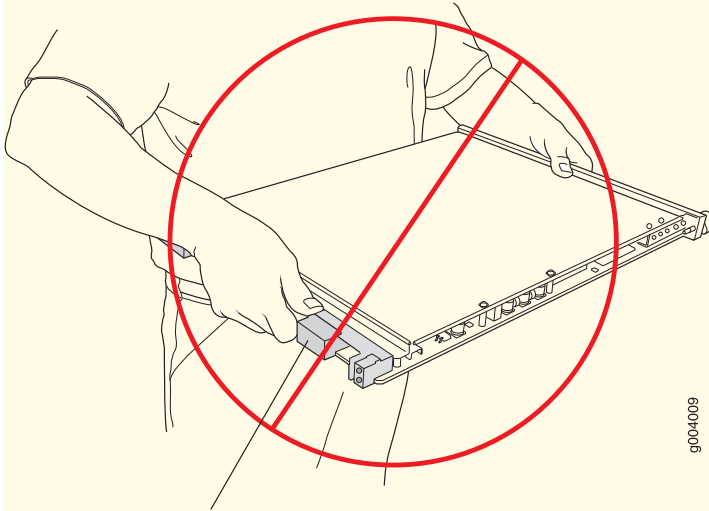
You can rest the faceplate of the line card against your body as you carry it.



CAUTION: Take care not to hit the line card against any object as you carry it. Line card components are fragile.

Never hold or grasp the line card anywhere except the places mentioned in these procedures. In particular, never grasp the connector edge. See [Figure 79 on page 265](#).

Figure 79: Do Not Grasp the Connector Edge



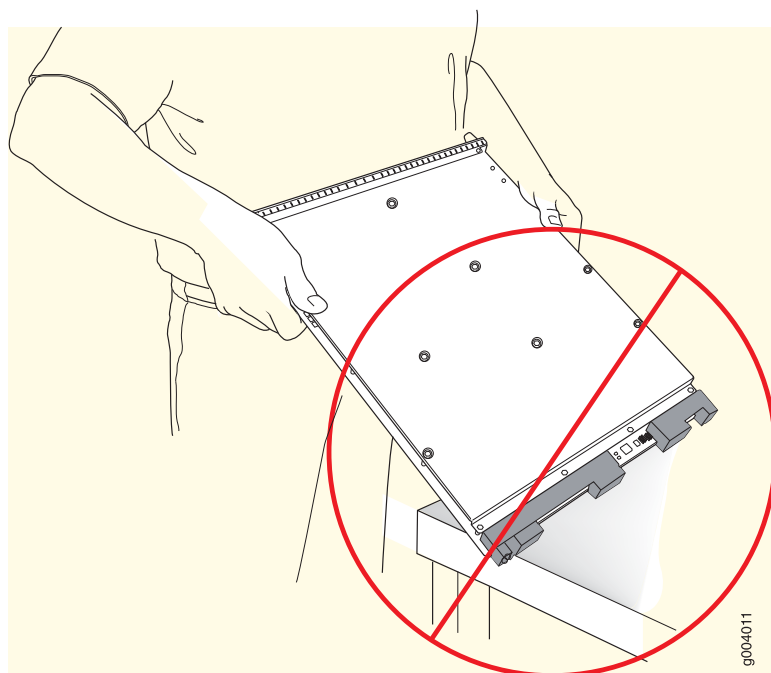
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Do not hold connector edge.

Never carry the line card while holding the faceplate with only one hand.

Do not rest any edge of a line card directly against a hard surface. See [Figure 80 on page 265](#).

Figure 80: Do Not Rest the Edge of a Line Card on a Hard Surface



Do not rest connectors on any surface.

If you must rest a line card temporarily on an edge, place a cushion between the edge and the surface.

Do not stack line cards on top of one another or on top of any other component. Place each line card separately in an antistatic bag or on an antistatic mat placed on a flat, stable surface.

Storing a Line Card

You must store a line card in the chassis or in a spare shipping container, horizontally and sheet metal side down. Do not stack line cards on top of one another or on top of any other component. Place each line card separately in an antistatic bag or on an antistatic mat placed on a flat, stable surface.

NOTE: Because a line card is heavy, and because antistatic bags are fragile, inserting the line card into the bag is best done with two people, each to do one of the following steps.

To insert a line card into an antistatic bag:

1. Hold the line card in the horizontal position with the faceplate facing you.
2. Slide the opening of the bag over the line card connector edge.

If you must insert the line card into a bag by yourself:

1. Lay the line card horizontally on a flat, stable surface, sheet metal side down.
2. Orient the line card with the faceplate facing you.
3. Carefully insert the line card connector edge into the opening of the bag and pull the bag toward you to cover the line card.

Maintaining Line Card Cables

Components in the line cards are fragile. To extend the lives of your line card cables and to avoid problems that can result from cable damage, follow these procedures:

To maintain line card cables:

- Place excess cable out of the way. Do not allow fastened loops of cable to dangle from the connector. Placing fasteners on the loops helps retain their shape.
- Keep the cable connections clean and free of dust and other particles, which can cause drops in the received power level. Always inspect cables and clean them if necessary before connecting a port.
- Label both ends of line card cables to identify them.

Unpacking a Line Card Used in an EX8200 Switch

The line cards for EX8200 switches are rigid sheet-metal structures that house the line card components including network ports. The line cards are shipped in a cardboard carton, secured with foam packing material.



CAUTION: The line cards are maximally protected inside the shipping carton. Do not unpack the line cards until you are ready to install them in the switch chassis.

Before you unpack a line card:

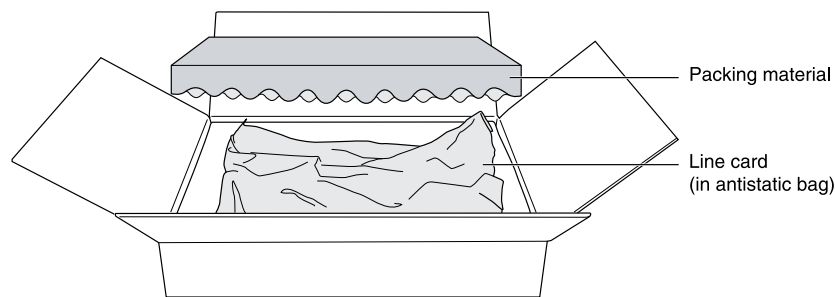
- Ensure that you have taken the necessary precautions to prevent ESD damage (see [“Prevention of Electrostatic Discharge Damage” on page 381](#)).

- Ensure that you know how to handle and store the line card (see *Handling and Storing Line Cards in EX6200 and EX8200 Switches*).

To unpack a line card (see [Figure 36 on page 144](#)):

1. Move the shipping carton to a staging area as close to the installation site as possible.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Pull out the packing material, which holds the line card in place.
5. Remove the line card from the antistatic bag.
6. Save the shipping carton and packing materials in case you need to move or ship the line card later.

Figure 81: Unpacking a Line Card Used in an EX8200 Switch



SEE ALSO

[Packing a Line Card Used in an EX8200 Switch | 344](#)

Removing a Line Card from an EX8200 Switch

EX8200 switches have field-replaceable unit (FRU) line cards that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions.

Before you begin removing a line card from an EX8200 switch:

- Ensure that you have taken the necessary precautions to prevent Electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage”](#) on page 381).
- If there are any transceivers installed in the line card, remove them before you remove the line card. See [“Remove a Transceiver”](#) on page 275.
- Ensure that you know how to handle and store the line card (see *Handling and Storing Line Cards in EX6200 and EX8200 Switches*).

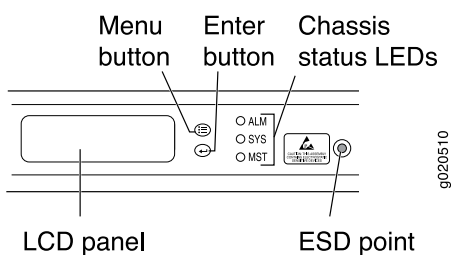
Ensure that you have the following parts and tools available to remove a line card from an EX8200 switch chassis:

- ESD grounding strap
- Phillips (+) screwdriver, number 2
- An antistatic bag or an antistatic mat
- Replacement line card or a cover panel and its captive screws to cover the empty slot

To remove a line card from an EX8200 switch:

1. Place the antistatic bag or antistatic mat on a flat, stable surface.
2. Attach the ESD grounding strap to your bare wrist and connect the strap to the ESD point on the switch chassis (see [Figure 82](#) on page 269). The ESD point is at the same location on EX8208 and EX8216 switches.

Figure 82: Location of the ESD Point on an EX8200 Switch Chassis

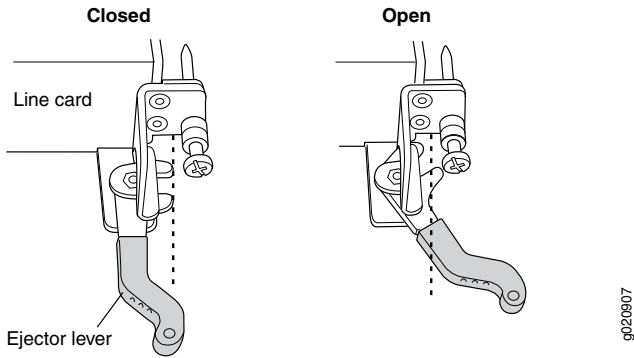


3. Label the cables connected to each port on the line card so you can reconnect the cables to the correct ports.
4. Take the line card offline by issuing the following CLI command:


```
user@switch> request chassis fpc slot slot-number offline
```
5. Remove the captive screws on the faceplate of the line card by using the screwdriver.

- Grasp the ejector levers on the faceplate of the line card and pull them outward simultaneously until they are in the open position and the line card is fully unseated. The closed and the open positions of the 2-in.-long ejector levers (see [Figure 83 on page 270](#)) are not as markedly distinguishable as those of the 4-in.-long ones.

Figure 83: Closed and Open Positions of the 2-in. Ejector Lever



- Grasp the ejector levers and gently slide the line card halfway out of the chassis (see [Figure 84 on page 270](#) and [Figure 85 on page 270](#)).

Figure 84: Removing a Line Card with a 2-in. Ejector Lever

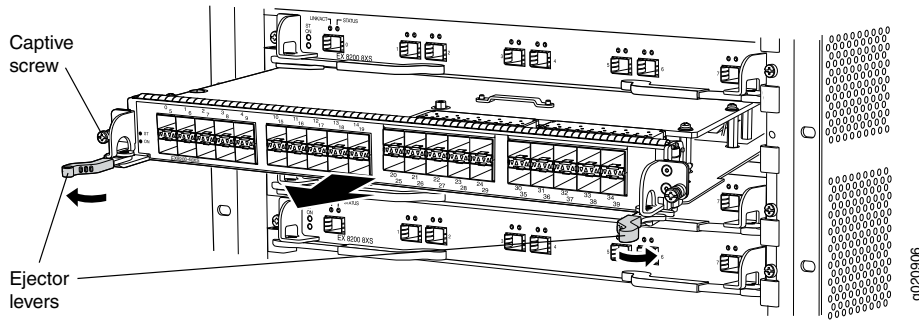
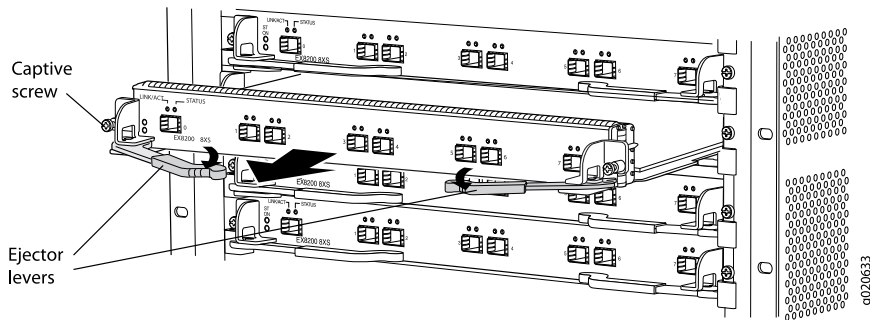


Figure 85: Removing a Line Card with a 4-in. Ejector Lever



See *Handling and Storing Line Cards in EX6200 and EX8200 Switches*.



CAUTION: Do not lift the line card by holding the ejector levers on the faceplate or the edge connectors. The levers cannot support the weight of the line card. Lifting the line cards by the levers might bend them. Bent levers prevent the line cards from being properly seated in the chassis.



CAUTION: Do not stack line cards on top of one another or on top of any other component. Place each line card separately in the antistatic bag or on the antistatic mat placed on a flat, stable surface.



CAUTION: The line cards in EX8200 switches weigh more than 10 lb (4.5 kg). Be prepared to support the full weight as you slide the line card out of the chassis.

8. Place one hand around the faceplate of the line card and the other hand under the line card to support it. Taking care not to touch line card components, pins, leads, or solder connections, gently slide the line card completely out of the chassis and place it in an antistatic bag or on its own antistatic mat placed on a flat, stable surface.



CAUTION: After removing a line card, wait for at least 30 seconds before installing a line card or removing another line card.

9. If you are not installing a line card in the emptied line card slot within a short time, install a blank cover panel over the slot and secure it with captive screws by using the screwdriver. Do this to protect the interior of the chassis from dust or other foreign substances and to ensure that the airflow inside the chassis is not disrupted.

Installing a Line Card in an EX8200 Switch

EX8200 switches have field-replaceable unit (FRU) line cards that can be installed in the line card slots on the front of the switch chassis. The line cards are hot-insertable and hot-removable: You can remove and replace them without powering off the switch or disrupting switch functions.

Before you begin installing a line card in the switch:

- Ensure that you have taken the necessary precautions to prevent Electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage”](#) on page 381).
- If there are any transceivers installed in the line card, remove them before you install the line card. For instructions on removing transceivers, see [“Remove a Transceiver”](#) on page 275.
- Ensure that you know how to handle and store the line card (see *Handling and Storing Line Cards in EX6200 and EX8200 Switches*).
- Ensure the switch has sufficient power to power the line card while maintaining its N+1 or N+N power configuration:
 - To determine the power requirements of the line card, see [“Power Requirements for EX8208 Switch Components”](#) on page 120 or *Power Requirements for EX8216 Switch Components*.
 - To determine whether the switch has enough power available for the line card, use the **show chassis power-budget-statistics** command if your switch is running Junos OS Release 10.2 or later. If your switch is running Junos OS Release 10.1 or earlier, see [“Calculating Power Requirements for an EX8208 Switch”](#) on page 121 or *Calculating Power Requirements for an EX8216 Switch* to calculate the available power.

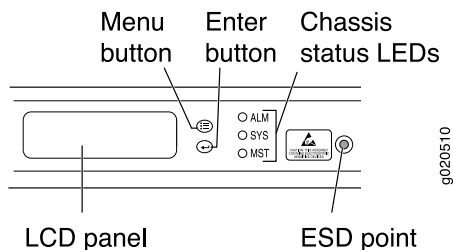
Ensure that you have the following parts and tools available to install a line card in the switch:

- ESD grounding strap
- Phillips (+) screwdriver, number 2

To install a line card in the switch:

1. Attach the ESD grounding strap to your bare wrist and connect the strap to the ESD point on the switch chassis (see [Figure 86](#) on page 272). The ESD point is at the same location on EX8208 and EX8216 switches.

Figure 86: Location of the ESD Point on an EX8200 Switch Chassis



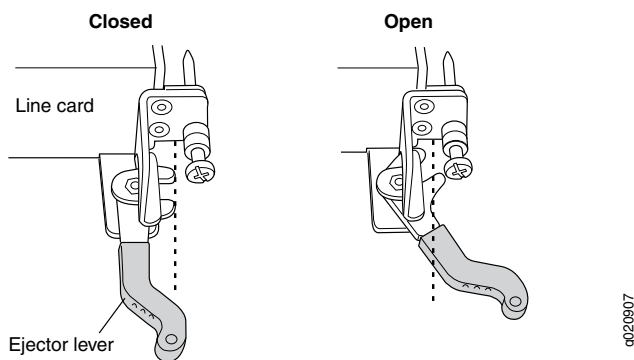
2. If the line card slot has a cover panel on it, use the screwdriver to remove the captive screws on each side of the cover panel. Save the cover panel and the screws for later use.



CAUTION: Do not lift the line card by holding the ejector levers on the faceplate or the edge connectors. The levers cannot support the weight of the line card. Lifting the line card by the levers might bend them. Bent levers prevent line cards from being properly seated in the chassis.

3. Taking care not to touch line card components, pins, leads, or solder connections, remove the line card from its bag.
4. Grasp the ejector levers on the faceplate of the line card and pull them outward until they are fully open. The closed and the open positions of the 2-in.-long ejector levers (see [Figure 87 on page 273](#)) are not as markedly distinguishable as those of the 4-in-long ones.

Figure 87: Closed and Open Positions of the 2-in. Ejector Lever



5. Place one hand around the faceplate of the line card and the other hand under the line card to support it.



CAUTION: The line cards in EX8200 switches weigh more than 10 lb (4.5 kg). Be prepared to support the full weight as you slide the line card into the chassis.

Before you slide the line card into the slot on the switch chassis, ensure the line card is aligned correctly. Misalignment might cause the pins to bend, making the line card unusable.

6. Lift the line card, and position it in the chassis with the faceplate facing you and the sides of the line card aligned with the guides in the line card slot on the switch chassis.

7. Make sure the levers stay in the open position (see [Figure 87 on page 273](#)) and gently slide the line card fully into the slot using both hands.

NOTE: You might need to lift the line card slightly to seat it correctly in the slot.

8. Grasp the ejector levers on the line card and push them inward simultaneously until the line card is fully seated (see [Figure 88 on page 274](#) and [Figure 89 on page 274](#)).

Figure 88: Installing a Line Card with a 2-in. Ejector Lever

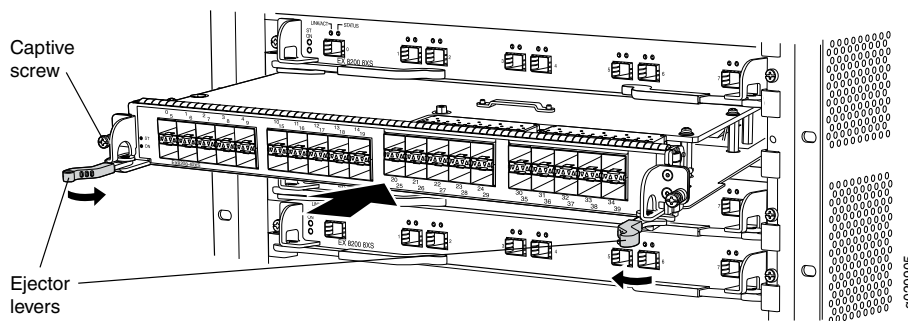
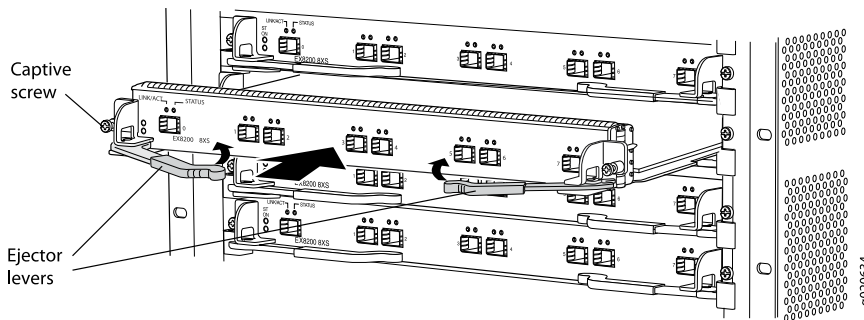


Figure 89: Installing a Line Card with a 4-in. Ejector Lever



CAUTION: Do not overtighten the captive screws, because doing so might damage the line card connector.

9. Tighten the captive screws on the faceplate of the line card by using the screwdriver.
10. Verify that the **ON** LED starts blinking in green. When the **ON** LED is lit steadily, the line card is ready for use. If the **ON** LED does not blink or is not lit steadily, see [“Troubleshooting an EX8200 Line Card’s Failure to Power On” on page 317](#).



CAUTION: After the **ON** LED is lit steadily, wait for at least 30 seconds before installing another line card or removing a line card.

You can verify that the line card is functioning correctly by issuing the **show chassis fpc** and **show chassis fpc pic-status** commands.

NOTE: If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/support/tools/updateinstallbase/> . Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.

Maintain Transceivers

IN THIS SECTION

- Remove a Transceiver | 275
- Remove a QSFP28 Transceiver | 279
- Install a Transceiver | 281
- Install a QSFP28 Transceiver | 283

Remove a Transceiver

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the device or disrupting device functions.

NOTE: After you remove a transceiver or when you change the media-type configuration, wait for 6 seconds for the interface to display the operational commands.

Before you remove a transceiver from a device, ensure that you have taken the necessary precautions for the safe handling of lasers (see [“Laser and LED Safety Guidelines and Warnings”](#) on page 367).

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat
- Rubber safety caps to cover the transceiver and fiber-optic cable connector
- A dust cover to cover the port or a replacement transceiver

[Figure 90 on page 278](#) shows how to remove a QSFP+ transceiver. The procedure is the same for all types of transceivers except the QSFP28 and CFP transceivers.

To remove a transceiver from a device:

1. Place the antistatic bag or antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the switch.
3. Label the cable connected to the transceiver so that you can reconnect it correctly.



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.



WARNING: Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.



CAUTION: Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

4. Remove the cable connected to the transceiver (see [“Disconnect a Fiber-Optic Cable” on page 286](#)). Cover the transceiver and the end of each fiber-optic cable connector with a rubber safety cap immediately after disconnecting the fiber-optic cables.
5. If there is a cable management system, arrange the cable in the cable management system to prevent it from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.



CAUTION: Do not bend the fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

6. To remove an SFP, SFP+, XFP, or a QSFP+ transceiver:
 - a. By using your fingers, pull open the ejector lever on the transceiver to unlock the transceiver.



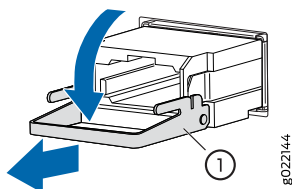
CAUTION: Before removing the transceiver, make sure that you open the ejector lever completely until you hear it click. This prevents damage to the transceiver.

- b. Grasp the transceiver ejector lever and gently slide the transceiver approximately 0.5 in. (1.3 cm) straight out of the port.



CAUTION: To prevent ESD damage to the transceiver, do not touch the connector pins at the end of the transceiver.

Figure 90: Remove a QSFP+ Transceiver



1—Ejector lever

To remove a CFP transceiver:

- a. Loosen the screws on the transceiver by using your fingers.
- b. Grasp the screws on the transceiver and gently slide the transceiver approximately 0.5 in. (1.3 cm) straight out of the port.



CAUTION: To prevent ESD damage to the transceiver, do not touch the connector pins at the end of the transceiver.

7. By using your fingers, grasp the body of the transceiver and pull it straight out of the port.

8. Place the transceiver in the antistatic bag or on the antistatic mat placed on a flat, stable surface.
9. Place the dust cover over the empty port or install the replacement transceiver.

Remove a QSFP28 Transceiver

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace them without powering off the device or disrupting the device functions.

NOTE: After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.

NOTE: We recommend that you use only optical transceivers and optical connectors purchased from Juniper Networks with your Juniper Networks device.

Before you remove a transceiver from a device, ensure that you have taken the necessary precautions for safe handling of lasers (see [“Laser and LED Safety Guidelines and Warnings” on page 367](#)).

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat
- Rubber safety caps to cover the transceiver and fiber-optic cable connector
- A dust cover to cover the port or a replacement transceiver

To remove a QSFP28 transceiver (see [Figure 91 on page 280](#)):

1. Place an antistatic bag or antistatic mat on a flat, stable surface to receive the QSFP28 transceiver. Have a rubber safety cap ready for the QSFP28 transceiver and the cable.
2. Wrap and fasten one end of an ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the switch.
3. Label the cable connected to the QSFP28 transceiver so that you can later reconnect it to the correct QSFP28 transceiver.

4. Disconnect the cable from the transceiver. Immediately cover the transceiver and the end of the cable with a rubber safety cap.



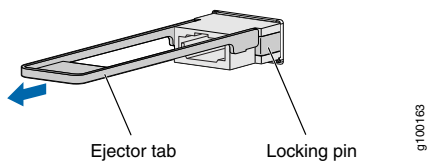
CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

5. If there is a cable management system, arrange the cable in the cable management system to prevent it from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.



CAUTION: Do not bend the fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

Figure 91: Remove a QSFP28 Transceiver



6. Pull the ejector tab straight back. The locking pins on the transceiver automatically release the transceiver.
7. Place the transceiver on the antistatic mat or in the antistatic bag.
8. Place the dust cover over the empty port or install the replacement transceiver.

Install a Transceiver

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the device or disrupting the device functions.

NOTE: After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.

NOTE: We recommend that you use only optical transceivers and optical connectors purchased from Juniper Networks with your Juniper Networks device.



CAUTION: If you face a problem running a Juniper Networks device that uses a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

Before you install a transceiver in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see [“Laser and LED Safety Guidelines and Warnings” on page 367](#)).

Ensure that you have a rubber safety cap available to cover the transceiver.

[Figure 62 on page 191](#) shows how to install a QSFP+ transceiver. The procedure is the same for all types of transceivers except the QSFP28 and CFP transceivers.

To install a transceiver:



CAUTION: To prevent electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the switch.
2. Remove the transceiver from its bag.

3. Check to see whether the transceiver is covered with a rubber safety cap. If it is not, cover the transceiver with a rubber safety cap.



WARNING: Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.

4. If the port in which you want to install the transceiver is covered with a dust cover, remove the dust cover and save it in case you need to cover the port later. If you are hot-swapping a transceiver, wait for at least 10 seconds after removing the transceiver from the port before installing a new transceiver.
5. Using both hands, carefully place the transceiver in the empty port. The connectors must face the chassis.



CAUTION: Before you slide the transceiver into the port, ensure that the transceiver is aligned correctly. Misalignment might cause the pins to bend, making the transceiver unusable.

6. Slide the transceiver in gently until it is fully seated. If you are installing a CFP transceiver, tighten the captive screws on the transceiver by using your fingers.
7. Remove the rubber safety cap from the transceiver and the end of the cable, and insert the cable into the transceiver.



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.



CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

8. If there is a cable management system, arrange the cable in the cable management system to prevent the cable from dislodging or developing stress points. Secure the cable so that it does not support its

own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.

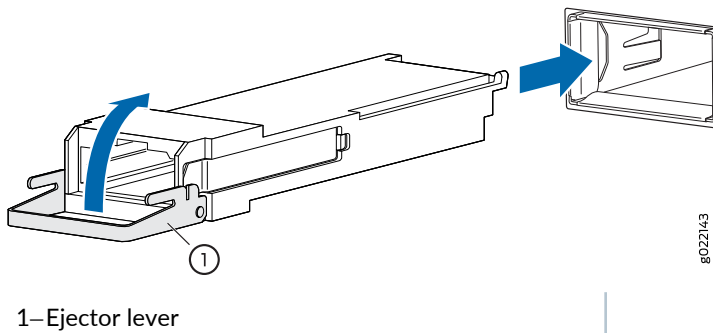


CAUTION: Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.



CAUTION: Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

Figure 92: Install a Transceiver



Install a QSFP28 Transceiver

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the device or disrupting the device functions.

NOTE: After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.

NOTE: We recommend that you use only optical transceivers and optical connectors purchased from Juniper Networks with your Juniper Networks device.



CAUTION: If you face a problem running a Juniper Networks device that uses a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

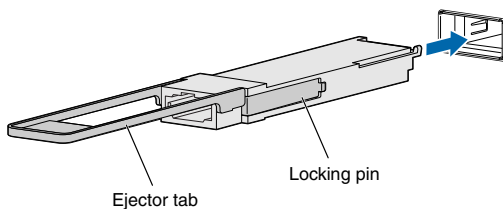
Before you install a transceiver in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see [“Laser and LED Safety Guidelines and Warnings”](#) on page 367).

Ensure that you have a rubber safety cap available to cover the transceiver.

To install a QSFP28 transceiver (see [Figure 93](#) on page 284):

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the switch.
2. Verify that a rubber safety cap covers the QSFP28 transceiver.
3. Orient the transceiver in front of the port so that the QSFP28 connector faces the appropriate direction.

Figure 93: Install a QSFP28 Transceiver



4. Slide the transceiver into the slot until the locking pins lock in place. If there is resistance, remove the transceiver and flip it so that the connector faces the other direction.
5. Remove the rubber safety cap from the transceiver and the end of the cable, and insert the cable into the transceiver.



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.



CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

6. If there is a cable management system, arrange the cable in the cable management system to prevent the cable from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.



CAUTION: Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.



CAUTION: Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

Maintain Fiber-Optic Cables

IN THIS SECTION

- [Connect a Fiber-Optic Cable | 285](#)
- [Disconnect a Fiber-Optic Cable | 286](#)
- [How to Handle Fiber-Optic Cables | 287](#)

Connect a Fiber-Optic Cable

Before you connect a fiber-optic cable to an optical transceiver installed in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see [“Laser and LED Safety Guidelines and Warnings” on page 367](#)).

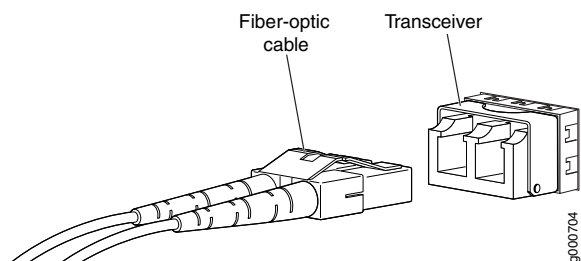
To connect a fiber-optic cable to an optical transceiver installed in a device:



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

1. If the fiber-optic cable connector is covered with a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the optical transceiver. Save the cap.
3. Insert the cable connector into the optical transceiver (see [Figure 63 on page 192](#)).

Figure 94: Connect a Fiber-Optic Cable to an Optical Transceiver Installed in a Device



4. Secure the cables so that they do not support their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.



CAUTION: Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

Disconnect a Fiber-Optic Cable

Juniper Networks devices have optical transceivers to which you can connect fiber-optic cables.

Before you disconnect a fiber-optic cable from an optical transceiver, ensure that you have taken the necessary precautions for safe handling of lasers. See [“Laser and LED Safety Guidelines and Warnings” on page 367](#).

Ensure that you have the following parts and tools available:

- A rubber safety cap to cover the transceiver
- A rubber safety cap to cover the fiber-optic cable connector

To disconnect a fiber-optic cable from an optical transceiver installed in the device:

1. Disable the port in which the transceiver is installed by issuing the following command:

```
[edit interfaces]  
user@device# set interface-name disable
```



WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

2. Carefully unplug the fiber-optic cable connector from the transceiver.
3. Cover the transceiver with a rubber safety cap.



WARNING: Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.

4. Cover the fiber-optic cable connector with the rubber safety cap.

How to Handle Fiber-Optic Cables

Fiber-optic cables connect to optical transceivers that are installed in Juniper Networks devices.

To maintain fiber-optic cables:

- When you unplug a fiber-optic cable from a transceiver, place rubber safety caps over the transceiver and on the end of the cable.
- Anchor fiber-optic cables to prevent stress on the connectors. When attaching a fiber-optic cable to a transceiver, be sure to secure the fiber-optic cable so that it does not support its own weight as it hangs to the floor. Never let a fiber-optic cable hang free from the connector.
- Avoid bending fiber-optic cables beyond their minimum bend radius. Bending fiber-optic cables into arcs smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.
- Frequent plugging and unplugging of fiber-optic cables in and out of optical instruments can damage the instruments, which are expensive to repair. Attach a short fiber extension to the optical equipment. Any wear and tear due to frequent plugging and unplugging is then absorbed by the short fiber extension, which is easier and less expensive to replace than the instruments.
- Keep fiber-optic cable connections clean. Microdeposits of oil and dust in the canal of the transceiver or cable connector can cause loss of light, reduction in signal power, and possibly intermittent problems with the optical connection.
 - To clean the transceiver canal, use an appropriate fiber-cleaning device such as RIFOCS Fiber Optic Adaptor Cleaning Wands (part number 946). Follow the instructions in the cleaning kit you use.
 - After cleaning the transceiver, make sure that the connector tip of the fiber-optic cable is clean. Use only an approved alcohol-free fiber-optic cable cleaning kit such as the Opptex Cletop-S Fiber Cleaner. Follow the instructions in the cleaning kit you use.

Removing an EX8208 from a Rack or Cabinet

IN THIS SECTION

- [Powering Off an EX8200 Switch | 289](#)
- [Removing an EX8208 Switch from a Rack or Cabinet | 290](#)
- [Removing an EX8208 Switch from a Rack or Cabinet Using a Mechanical Lift | 292](#)
- [Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift | 294](#)

Powering Off an EX8200 Switch

Before you power off the switch:

- Ensure that you understand how to prevent electrostatic discharge damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).
- Ensure that you do not need to forward traffic through the switch.

Ensure that you have the following parts and tools available to power off the switch:

- An electrostatic discharge (ESD) grounding strap
- An external management device such as a PC
- A cable to connect the external management device to the console port (CON) or management port (MGMT) on the primary Switch Fabric and Routing Engine (SRE) module in an EX8208 switch or on the primary Routing Engine (RE) module in an EX8216 switch.

To power off a switch:

1. Connect a management device to the primary SRE module in an EX8208 switch or to the primary RE module in an EX8216 switch. For connecting a management device to the console (CON) port, see [“Connect a Device to a Management Console Using an RJ-45 Connector” on page 183](#). For connecting a management device to the management (MGMT) port, see [“Connect a Device to a Network for Out-of-Band Management” on page 182](#).
2. If the switch has two SRE or RE modules, shut down the backup SRE or RE module first. (If your switch has only one SRE or RE module, skip to Step 2.) From the external management PC connected to the primary SRE or RE module, issue the **request system halt other-routing-engine** operational mode CLI command.

This command shuts down the backup SRE or RE module gracefully. A message displays on the console confirming that the backup SRE/RE module has halted.

3. Shut down the primary SRE or RE module from the external management device by issuing the **request system halt** operational mode CLI command. This command shuts down the switch gracefully and preserves system state information. A message displays on the console confirming that the operating system has halted.

You will see the following output (or something similar, depending on the hardware being shutdown) after entering the command:

```
Halting re1
*** FINAL System shutdown message from user@switch***
System going down IMMEDIATELY
Shutdown NOW!
```

```
[pid 859]
user@switch> JWaiting (max 60 seconds) for system process `vnlru' to stop...done
Waiting (max 60 seconds) for system process `bufdaemon' to stop...done
Waiting (max 60 seconds) for system process `syncer' to stop...
Syncing disks, vnodes remaining...2 2 2 1 1 0 0 0 0 done
syncing disks... All buffers synced.
Uptime: 3h3m49s
recorded reboot as normal shutdown
The operating system has halted. Please press any key to reboot.
```



CAUTION: The final output of any version of the **request system halt** command is the “The operating system has halted. Please press any key to reboot” message. Wait at least 60 seconds after first seeing this message before following the instructions in step 5 to power off the switch.

4. Attach the ESD grounding strap to your bare wrist and connect the strap to the ESD point on the chassis.
5. Flip the power supply **Enable** switch to the off position (OFF). Observe the power supply LEDs. The power supply LEDs should turn off (appear unlit). Repeat this step for all installed power supplies.

NOTE: After you power off a power supply, wait for at least 60 seconds before you turn it back on. After you power on a power supply, wait for at least 60 seconds before you turn it back off.

SEE ALSO

| [Powering On an EX8200 Switch | 180](#)

Removing an EX8208 Switch from a Rack or Cabinet

If you want to move an installed EX8208 switch to another location, you need to remove it from the rack or cabinet in which it is installed. In a four-post rack, an installed switch rests on adjustable mounting brackets bolted to the rack. In a two-post rack, an installed switch rests on the lip of the power cord tray

installed in the rack. The front-mounting brackets (“ears”) attached to the chassis are also bolted to the rack.

NOTE: When you remove multiple switches from a rack or cabinet, remove the switch in the top of the rack or cabinet first and proceed to remove the rest of the switches from top to bottom.



CAUTION: At least three people must be available to lift an unloaded switch chassis (all components removed) out of a rack or cabinet. For instructions on removing a switch without using a mechanical lift, see [“Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift” on page 294.](#)

Before removing an EX8208 switch from a rack or a cabinet:

- Ensure that the rack or cabinet is stable and secured to the building.
- Ensure that there is enough space to place the removed switch in its new location and along the path to the new location.
- Read [“General Safety Guidelines and Warnings” on page 347](#), with particular attention to [“Chassis and Component Lifting Guidelines” on page 354](#).
- Ensure that the switch has been safely powered off (see [“Powering Off an EX8200 Switch” on page 289](#)) and that you have unplugged (disconnected) the power cords.
- Ensure that you have disconnected any cables or wires attached to the switch ports.

Ensure that you have the following parts and tools available to remove the switch:

- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws, for mounting the switch on a rack or cabinet.
- A Phillips (+) screwdriver, number 1, to remove the power supplies from the chassis if you are mounting the switch without using a mechanical lift

To remove an EX8200 switch from a rack or cabinet:

1. Use the appropriate Phillips (+) screwdriver to remove the mounting screws that attach the chassis front-mounting brackets to the rack or cabinet.
2. Place the removed screws in a labeled bag. You will need them when you reinstall the chassis.
3. Lift the chassis from the rack or cabinet and place it on a mechanical lift. For instructions on how to remove the chassis using a mechanical lift, see [“Removing an EX8208 Switch from a Rack or Cabinet](#)

[Using a Mechanical Lift](#) on page 292. If a mechanical lift is not available, remove all components and manually lift the empty chassis out of the rack. For instructions on removing the chassis without using a mechanical lift, see [“Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift”](#) on page 294.

Removing an EX8208 Switch from a Rack or Cabinet Using a Mechanical Lift

Because of the switch's size and weight, we strongly recommend using a mechanical lift to remove the switch. For instructions on removing a switch without using a mechanical lift, see [“Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift”](#) on page 294.

Before you remove the switch using a lift:

- Ensure that the rack or cabinet is stable and secured to the building.
- Ensure that there is enough space to place the removed switch in its new location and along the path to the new location.
- Read [“General Safety Guidelines and Warnings”](#) on page 347, with particular attention to [“Chassis and Component Lifting Guidelines”](#) on page 354.
- Ensure that the switch has been safely powered off (see [“Powering Off an EX8200 Switch”](#) on page 289) and that you have unplugged (disconnected) the power cords to the power supplies.
- Ensure that you have disconnected any cables or wires attached to the switch ports.



CAUTION: When removing more than one switch from a rack or cabinet, remove the switch in the top of the rack or cabinet first and proceed to remove the rest of the switches from top to bottom.

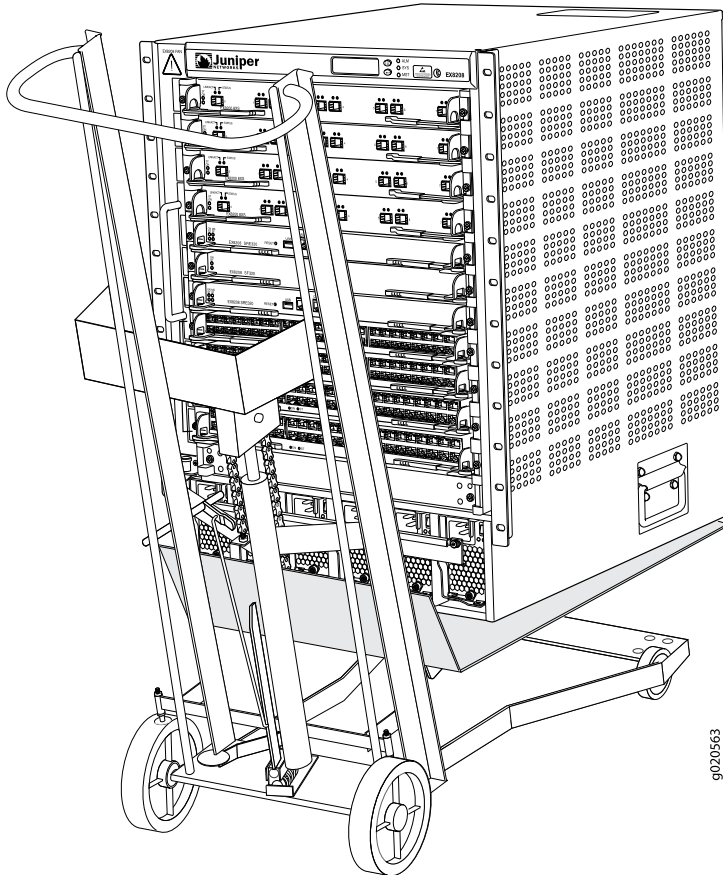
Ensure that you have the following parts and tools available to remove the switch:

- A mechanical lift
- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws

To remove the switch using a lift (see [Figure 95 on page 293](#)):

1. Use the appropriate Phillips (+) screwdriver to remove the 24 mounting screws that attach the chassis front-mounting brackets to the rack or cabinet.
2. Move the lift to the rack and position it so that its platform is centered about 0.5 in. (1.27 cm) below the bottom of the switch chassis and as close to it as possible.
3. Carefully slide the switch from the adjustable mounting brackets attached to the rack onto the lift.
4. Use the lift to transport the switch to its new location.

Figure 95: Removing an EX8208 Switch Chassis Using a Mechanical Lift



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Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift

If you cannot use a mechanical lift to remove the switch (the preferred method), you can remove it manually.



CAUTION: The chassis with only the backplane and no other components weighs approximately 89 lb (41 kg). Lifting the chassis and removing it from a rack or cabinet requires at least three people.

The chassis has two handles. Do not lift a fully loaded chassis by the handles; make sure the chassis is empty before you lift it. If two of the people lifting the chassis use the handles to lift it, the third person must lift from the rear of the chassis. The rear of the chassis is heavier than the front of the chassis, so when you lift the chassis by the handles, the chassis tips toward the heavier back end. The person lifting from the back must be aware of this behavior and must be braced to prevent the chassis from tipping over.

When lifting the chassis, do not grasp the switch by the blue panel at the top front of the chassis. Doing so can cause the panel to pop off of the switch.



CAUTION: When removing more than one switch from a rack, remove the switch at the top first. We strongly recommend removing a switch that is in an upper position in a rack or cabinet with a lift.

Before you remove the switch:

- Ensure that the rack or cabinet is stable and secured to the building.
- Ensure that there is enough space to place the removed switch in its new location and along the path to the new location.
- Review chassis lifting guidelines as described in [“Chassis and Component Lifting Guidelines” on page 354](#).
- Ensure that the switch has been safely powered off (see [“Powering Off an EX8200 Switch” on page 289](#)) and that you have unplugged (disconnected) the power cords to the power supplies.
- Ensure that you have disconnected any cables or wires attached to the switch ports.
- Remove all components except the backplane from the chassis. See:
 - [Removing an SRE Module from an EX8208 Switch on page 253](#)
 - [Removing an SF Module from an EX8208 Switch on page 257](#)

- [Removing a Line Card from an EX8200 Switch on page 268](#)
- [Removing a Fan Tray from an EX8208 Switch on page 235](#)
- [Removing an AC Power Supply from an EX8200 Switch on page 239](#)

Ensure that you have the following parts and tools available to remove the switch:

- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws

To remove the switch from the rack (see [Figure 96 on page 295](#)):

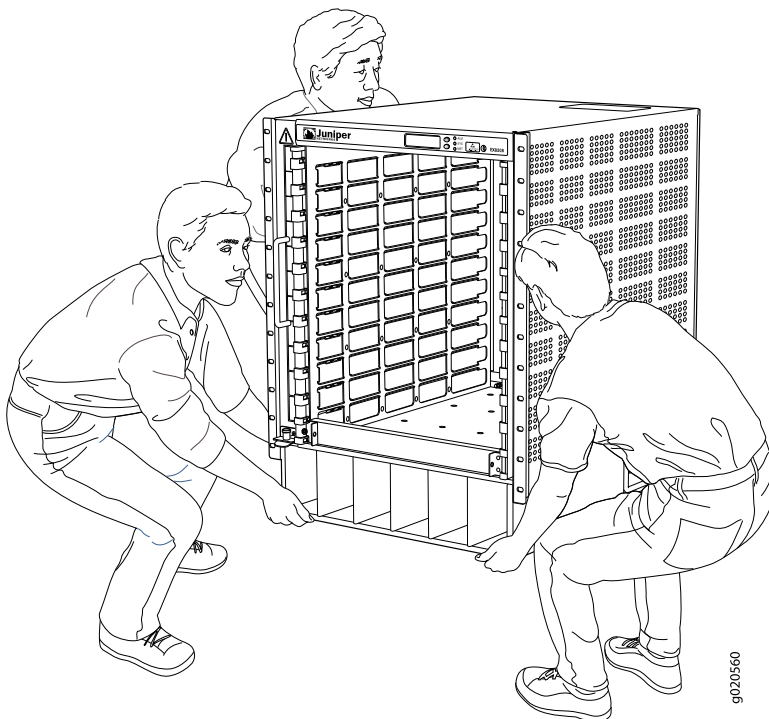
1. Use the appropriate Phillips (+) screwdriver to remove the 24 mounting screws that attach the chassis front-mounting brackets to the rack or cabinet.



WARNING: To prevent injury, keep your back straight and lift with your legs, not your back. Do not twist your body as you lift. Balance the load evenly and be sure that your footing is firm.

2. With one person on each side and one person in the back, hold onto the bottom of the chassis and carefully lift it out of the adjustable mounting brackets attached to the rack. If you have a pallet jack, move the switch onto the pallet jack.

Figure 96: Removing an EX8208 Switch Chassis Without Using a Mechanical Lift



3. Carefully move the chassis to its new location.

After you move the switch to its new location, reinstall the components in the chassis or store the components in antistatic bags. See:

- [Installing an SRE Module in an EX8208 Switch on page 255](#)
- [Installing an SF Module in an EX8208 Switch on page 259](#)
- [Installing a Line Card in an EX8200 Switch on page 271](#)
- [Installing a Fan Tray in an EX8208 Switch on page 237](#)
- [Installing an AC Power Supply in an EX8200 Switch on page 240](#)

Removing a Battery from an EX8208 Switch for Recycling

The EX8208 switch contains a CR2032 2.7-volt lithium battery on each Switch Fabric and Routing Engine (SRE) module installed in the chassis. The coin-shaped battery is approximately 0.75in. (20 mm) in diameter. The battery is estimated to last for over 50 years.

A base configuration switch has one SRE module, and a redundant configuration switch has two modules installed. Before recycling an SRE module or the switch chassis, remove the battery from each SRE module for battery recycling.

Before you begin to remove the battery:

- Power off the switch or take the SRE module offline. If only one SRE module is installed in a powered-on switch, you must halt the module before removing it. See [“Taking the SRE Module Offline in an EX8208 Switch” on page 251](#).

Ensure that you have the following parts and tools available:

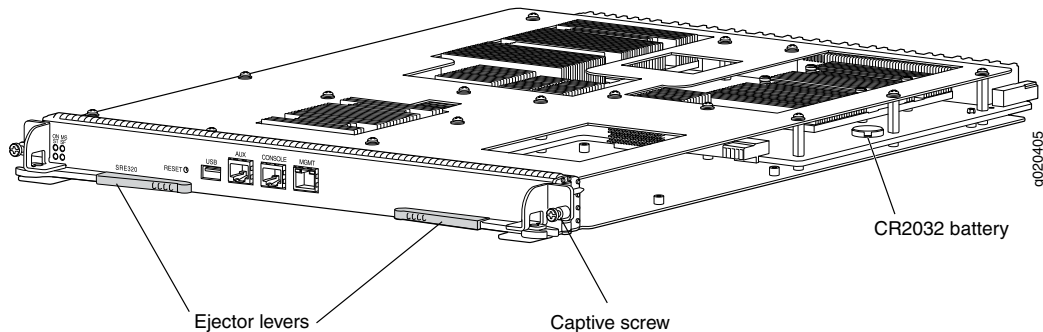
- Phillips (+) screwdriver, number 2
- Electrostatic discharge (ESD) grounding strap

To remove the battery from an SRE module in the switch (see [Figure 97 on page 297](#)):

1. Attach the antistatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Locate the SRE module in the switch chassis.

3. With the screwdriver, loosen the captive screws on each side of the SRE module by turning them counterclockwise until they are completely unseated.
4. Pull both ejector levers outwards, away from the faceplate of the SRE module, until they go no further. This action causes the module to slide slightly out of the chassis.
5. Grasp the ejector levers, and pull the SRE module out to about halfway.
6. Place one hand underneath the module to support it, and slide it completely out of the chassis.
7. Locate the coin-shaped CR2032 battery on the right side of the module near the third post (see [Figure 97 on page 297](#)).
8. With your finger, pry the battery out of its socket.
9. If you are recycling the entire chassis of a redundant configuration, repeat Steps 2 through 8 for the second SRE module.
10. Recycle the battery or batteries as required.

Figure 97: Location of the CR2032 Battery in an SRE Module



5

CHAPTER

Troubleshooting Hardware

Troubleshooting EX8200 Components | **299**

Troubleshooting EX8200 Components

IN THIS SECTION

- Understand Alarm Types and Severity Levels on EX Series Switches | 299
- Chassis Component Alarm Conditions on EX8200 Switches | 300
- Check Active Alarms with the J-Web Interface | 311
- Monitor System Log Messages | 312
- Troubleshooting an EX8200 Line Card's Failure to Power On | 317
- Troubleshoot Temperature Alarms in EX Series Switches | 320

Understand Alarm Types and Severity Levels on EX Series Switches

NOTE: This topic applies only to the J-Web Application package.

Alarms alert you to conditions that might prevent normal operation of the switch. Before monitoring alarms on a Juniper Networks EX Series Ethernet switch, become familiar with the terms defined in [Table 88 on page 299](#).

Table 88: Alarm Terms

Term	Definition
alarm	Signal alerting you to conditions that might prevent normal operation. On a switch, the alarm signal is the ALM LED lit on the front of the chassis.
alarm condition	Failure event that triggers an alarm.
alarm severity	Seriousness of the alarm. If the Alarm (ALM) LED is red, this indicates a major alarm. If the Alarm LED is yellow or amber, this indicates a minor alarm. If the Alarm LED is unlit, there is no alarm or the switch is halted.
chassis alarm	Preset alarm triggered by a physical condition on the switch such as a power supply failure, excessive component temperature, or media failure.

Table 88: Alarm Terms (*continued*)

Term	Definition
system alarm	Preset alarm triggered by a missing rescue configuration or failure to install a license for a licensed software feature. NOTE: On EX6200 switches, a system alarm can be triggered by an internal link error.

Alarm Types

The switch supports these alarms:

- Chassis alarms indicate a failure on the switch or one of its components. Chassis alarms are preset and cannot be modified.
- System alarms indicate a missing rescue configuration. System alarms are preset and cannot be modified, although you can configure them to appear automatically in the J-Web interface display or the CLI display.

Alarm Severity Levels

Alarms on switches have two severity levels:

- Major (red)—Indicates a critical situation on the switch that has resulted from one of the following conditions. A red alarm condition requires immediate action.
 - One or more hardware components have failed.
 - One or more hardware components have exceeded temperature thresholds.
 - An alarm condition configured on an interface has triggered a critical warning.
- Minor (yellow or amber)—Indicates a noncritical condition on the switch that, if left unchecked, might cause an interruption in service or degradation in performance. A yellow or amber alarm condition requires monitoring or maintenance.

A missing rescue configuration generates a yellow or amber system alarm.

SEE ALSO

[Dashboard for EX Series Switches | 205](#)

Chassis Component Alarm Conditions on EX8200 Switches

Purpose

This document provides information on chassis alarm conditions, and how you must respond when a certain chassis alarm is seen on your switch.

Various conditions related to the chassis components trigger yellow and red alarms. You cannot configure these conditions. See [“Understand Alarm Types and Severity Levels on EX Series Switches”](#) on page 299.

Action

You can monitor chassis alarms by watching the ALM chassis status LED and using the LCD panel to gather information about the alarm. See *Chassis Status LEDs in an EX8200 Switch* and *LCD Panel in an EX8200 Switch*.

To display switch chassis alarms in the CLI, use the following command

```
user@host> show chassis alarms
```

The command output displays the number of alarms currently active, the time when the alarm began, the severity level, and an alarm description. Note the date and time of an alarm so that you can correlate it with error messages in the messages system log file.

You can also monitor chassis alarms using the J-Web interface. See [“Check Active Alarms with the J-Web Interface”](#) on page 311.

[Table 89 on page 302](#) lists some of the chassis alarms that an EX8200 switch can generate.

Table 89: Chassis Alarms for EX8200 Switches

Component	Alarm Condition	Severity	Remedy	Additional Information
Fan tray	The fan tray has been removed from the chassis.	Minor (yellow) or Major (red)	Install the fan tray.	The switch will eventually get too hot to operate if a fan tray is removed. Temperature alarms will follow. This alarm is expected during fan tray removal and installation.
	One or more fans in a fan tray are spinning below the required speed.	Major (red)	Replace the fan tray.	Individual fans cannot be replaced; you must replace the fan tray.
	The fan tray might not be properly installed.	Major (red)	Remove and reinstall the fan tray. If removing and reinstalling the fan tray does not resolve the problem, reboot the switch.	The switch will eventually get too hot to operate if a fan tray is not operating. Temperature alarms will follow.

Table 89: Chassis Alarms for EX8200 Switches (continued)

Component	Alarm Condition	Severity	Remedy	Additional Information
Power supply	A power supply slot that contained a power supply at bootup is now empty.	Minor (yellow)	Install a power supply in the empty power supply slot.	<p>You can ignore this alarm in cases in which a power supply slot can remain empty.</p> <p>You will not see this alarm if the switch is booted with an empty power supply slot.</p> <p>This alarm is expected during power supply removal and installation.</p> <p>This alarm can be triggered during a line card installation. The alarm condition corrects itself when seen for this reason.</p>
	A power supply has failed due to an input or output failure, or due to temperature issues.	Major (red)	Replace the failed power supply.	
	The power supply might not be properly installed.	Major (red)	<ul style="list-style-type: none"> Remove and reinstall the power supply. If removing and reinstalling the power supply does not resolve the problem, reboot the switch. 	
	A power supply fan has failed.	Minor (yellow)	Replace the failed power supply.	
	A power supply has a high temperature.	Major (red)	Check the power supply fan.	

Table 89: Chassis Alarms for EX8200 Switches (continued)

Component	Alarm Condition	Severity	Remedy	Additional Information
	Insufficient power input	Major (red)	Check the power supply.	
	An unknown power supply is installed.	Major (red)	<ul style="list-style-type: none"> • Check the power supply. • Install a power supply recommended by Juniper Networks. 	

Table 89: Chassis Alarms for EX8200 Switches (continued)

Component	Alarm Condition	Severity	Remedy	Additional Information
<p>Temperature</p>	<p>The chassis warm temperature threshold has been exceeded and fan speeds have increased.</p>	<p>Minor (yellow)</p>	<p>Bring down the room temperature, if possible.</p> <p>Ensure that the airflow through the switch is unobstructed.</p>	<p>The chassis is warm and must be cooled down. The switch is still functioning normally.</p> <p>To monitor temperature:</p> <p>user@switch> show chassis environment</p> <p>To monitor temperature thresholds:</p> <p>user@switch> show chassis temperature-thresholds</p>
	<p>The chassis high temperature threshold has been exceeded and the fans are operating at full speed.</p>	<p>Major (red)</p>	<p>Bring down the room temperature, if possible.</p> <p>Ensure that the airflow through the switch is unobstructed.</p>	<p>The chassis is hot and must be cooled down. The switch might still function normally but is close to shutting down if it hasn't already.</p> <p>To monitor temperature:</p> <p>user@switch> show chassis environment</p> <p>To monitor temperature thresholds:</p> <p>user@switch> show chassis temperature-thresholds</p>
		<p>Minor (yellow)</p>		

Table 89: Chassis Alarms for EX8200 Switches (continued)

Component	Alarm Condition	Severity	Remedy	Additional Information
	The chassis warm temperature threshold has been exceeded, and one or more fans are not operating properly. The operating fans are running at full speed.		<p>Replace the fan tray that has the faulty fan or fans.</p> <p>Bring down the room temperature, if possible.</p> <p>Ensure that the airflow through the switch is unobstructed.</p>	<p>The chassis is warm and must be cooled down. The switch is still functioning normally.</p> <p>To monitor temperature: user@switch> show chassis environment</p> <p>To monitor temperature thresholds: user@switch> show chassis temperature-thresholds</p>
	The chassis high temperature threshold has been exceeded, and one or more fans are not operating properly. The operating fans are running at full speed.	Major (red)	<p>Replace the fan tray that has the faulty fan or fans.</p> <p>Bring down the room temperature, if possible.</p> <p>Ensure that the airflow through the switch is unobstructed.</p>	<p>The chassis is hot and must be cooled down. The switch might still function normally but is close to shutting down if it hasn't already.</p> <p>To monitor temperature: user@switch> show chassis environment</p> <p>To monitor temperature thresholds: user@switch> show chassis temperature-thresholds</p>
	The temperature sensor on a hardware component has failed.	Minor (yellow)	Replace the hardware component.	

Table 89: Chassis Alarms for EX8200 Switches (*continued*)

Component	Alarm Condition	Severity	Remedy	Additional Information
Management Ethernet interface	Management Ethernet link is down.	Major (red)	<p>Check whether a cable is connected to the management Ethernet interface, or whether the cable is defective. Replace the cable if required.</p> <p>If you are unable to resolve the problem, open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).</p>	

Table 89: Chassis Alarms for EX8200 Switches (continued)

Component	Alarm Condition	Severity	Remedy	Additional Information
Media	Minor loss of communication with backup Routing Engine.	Minor (yellow)	Not applicable	Alarm to inform user of the intermittent loss of communication with Backup RE
	Device booted from backup root.	Minor (yellow)	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).	
	/var or /config full (only 10% free).	Major (red)	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).	
	/var or /config full (only 25% free).	Minor (yellow)	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).	

Table 89: Chassis Alarms for EX8200 Switches (continued)

Component	Alarm Condition	Severity	Remedy	Additional Information
	Upgrade bank is empty or corrupted.	Major (red)	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).	
	Firmware version is not the latest.	Minor (yellow)	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).	
	Single-bit ECC error detected.	Major (red)	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).	
	Console device encounters framing error storm.	Not applicable	Check for faulty console cable.	

Table 89: Chassis Alarms for EX8200 Switches (*continued*)

Component	Alarm Condition	Severity	Remedy	Additional Information
Routing Engine module (RE module), Switch Fabric and Routing Engine module (SRE module), or Switch Fabric module (SF module)	The RE module, SRE module, or the SF module has failed.	Major (red)	Replace the failed module.	
	Rescue configuration is not set.	Minor (yellow)	Use the request system configuration rescue save command to set the rescue configuration.	
	Feature usage requires a license or the license for the feature usage has expired.	Minor (yellow)	Install the required license for the feature specified in the alarm. For more information, see <i>Understanding Software Licenses for EX Series Switches</i> .	
	Backup Routing Engine is active.	Minor (yellow)	Not applicable	Alarm to inform user.
Link Status	The link to the network is down.	Major (red) or Minor (yellow)	Check network connectivity.	The network link is disabled by default, so you might see this alarm before you connect the switch to the network.

Table 89: Chassis Alarms for EX8200 Switches (continued)

Component	Alarm Condition	Severity	Remedy	Additional Information
Line Cards	Hardware errors - Packet Forwarding Engine error, Line card fails to initiate, line card unresponsive	Major (red)	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).	
	Sensor errors - Temperature sensor error, voltage sensor error	Minor (yellow)	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).	

Check Active Alarms with the J-Web Interface

Purpose

NOTE: This topic applies only to the J-Web Application package.

Use the monitoring functionality to view alarm information for the EX Series switches including alarm type, alarm severity, and a brief description for each active alarm on the switching platform.

Action

To view the active alarms:

1. Select **Monitor > Events and Alarms > View Alarms** in the J-Web interface.

2. Select an alarm filter based on alarm type, severity, description, and date range.
3. Click **Go**.

All the alarms matching the filter are displayed.

NOTE: When the switch is reset, the active alarms are displayed.

Meaning

Table 90 on page 312 lists the alarm output fields.

Table 90: Summary of Key Alarm Output Fields

Field	Values
Type	Category of the alarm: <ul style="list-style-type: none"> • Chassis—Indicates an alarm condition on the chassis (typically an environmental alarm such as one related to temperature). • System—Indicates an alarm condition in the system.
Severity	Alarm severity—either major (red) or minor (yellow or amber).
Description	Brief synopsis of the alarm.
Time	Date and time when the failure was detected.

SEE ALSO

[Monitor System Log Messages | 312](#)

[Dashboard for EX Series Switches | 205](#)

[Understand Alarm Types and Severity Levels on EX Series Switches | 299](#)

Monitor System Log Messages

Purpose

NOTE: This topic applies only to the J-Web Application package.

Use the monitoring functionality to filter and view system log messages for EX Series switches.

Action

To view events in the J-Web interface, select **Monitor > Events and Alarms > View Events**.

Apply a filter or a combination of filters to view messages. You can use filters to display relevant events. [Table 91 on page 313](#) describes the different filters, their functions, and the associated actions.

To view events in the CLI, enter the following command:

show log

Table 91: Filtering System Log Messages

Field	Function	Your Action
System Log File	<p>Specifies the name of a system log file for which you want to display the recorded events.</p> <p>Lists the names of all the system log files that you configure.</p> <p>By default, a log file, messages, is included in the /var/log/ directory.</p>	<p>To specify events recorded in a particular file, select the system log filename from the list— for example, messages.</p> <p>Select Include archived files to include archived files in the search.</p>
Process	<p>Specifies the name of the process generating the events you want to display.</p> <p>To view all the processes running on your system, enter the CLI command show system processes.</p> <p>For more information about processes, see the Junos OS Installation and Upgrade Guide.</p>	<p>To specify events generated by a process, type the name of the process.</p> <p>For example, type mgd to list all messages generated by the management process.</p>

Table 91: Filtering System Log Messages (*continued*)

Field	Function	Your Action
Date From To	<p>Specifies the time period in which the events you want displayed are generated.</p> <p>Displays a calendar that allows you to select the year, month, day, and time. It also allows you to select the local time.</p> <p>By default, the messages generated during the last one hour are displayed. End Time shows the current time and Start Time shows the time one hour before End Time.</p>	<p>To specify the time period:</p> <ul style="list-style-type: none"> Click the Calendar icon and select the year, month, and date— for example, 02/10/2007. Click the Calendar icon and select the year, month, and date— for example, 02/10/2007. Click to select the time in hours, minutes, and seconds.
Event ID	<p>Specifies the event ID for which you want to display the messages.</p> <p>Allows you to type part of the ID and completes the remainder automatically.</p> <p>An event ID, also known as a system log message code, uniquely identifies a system log message. It begins with a prefix that indicates the generating software process or library.</p>	<p>To specify events with a specific ID, type the partial or complete ID— for example, TFTPD_AF_ERR.</p>
Description	<p>Specifies text from the description of events that you want to display.</p> <p>Allows you to use regular expressions to match text from the event description.</p> <p>NOTE: Regular expression matching is case-sensitive.</p>	<p>To specify events with a specific description, type a text string from the description with regular expression.</p> <p>For example, type ^Initial* to display all messages with lines beginning with the term <i>Initial</i>.</p>
Search	<p>Applies the specified filter and displays the matching messages.</p>	<p>To apply the filter and display messages, click Search.</p>
Reset	<p>Resets all the fields in the Events Filter box.</p>	<p>To reset the field values that are listed in the Events Filter box, click Reset.</p>

Table 91: Filtering System Log Messages (continued)

Field	Function	Your Action
<p>Generate Raw Report</p> <p>NOTE:</p> <ul style="list-style-type: none"> Starting in Junos OS Release 14.1X53, a Raw Report can be generated from the log messages being loaded in the Events Detail table. The Generate Raw Report button is enabled after the event log messages start loading in the Events Detail table. After the log messages are completely loaded in the Events Detail table, Generate Raw Report changes to Generate Report. 	<p>Generates a list of event log messages in nontabular format.</p>	<p>To generate a raw report:</p> <ol style="list-style-type: none"> Click Generate Raw Report. The <i>Opening filteredEvents.html</i> window appears. Select Open with to open the HTML file or select Save File to save the file. Click OK.
<p>Generate Report</p> <p>NOTE: Starting in Junos OS Release 14.1X53, a Formatted Report can be generated from event log messages being loaded in an Events Detail table. The Generate Report button appears only after event log messages are completely loaded in the Events Detail table. The Generate Raw Report button is displayed while event log messages are being loaded.</p>	<p>Generates a list of event log messages in tabular format, which shows system details, events filter criteria, and event details.</p>	<p>To generate a formatted report:</p> <ol style="list-style-type: none"> Click Generate Report. The <i>Opening Report.html</i> window appears. Select Open with to open the HTML file or select Save File to save the file. Click OK.

Meaning

Table 92 on page 316 describes the Event Summary fields.

NOTE: By default, the View Events page in the J-Web interface displays the most recent 25 events, with severity levels highlighted in different colors. After you specify the filters, Event Summary displays the events matching the specified filters. Click the **First**, **Next**, **Prev**, and **Last** links to navigate through messages.

Table 92: Viewing System Log Messages

Field	Function	Additional Information
Process	Displays the name and ID of the process that generated the system log message.	The information displayed in this field is different for messages generated on the local Routing Engine than for messages generated on another Routing Engine (on a system with two Routing Engines installed and operational). Messages from the other Routing Engine also include the identifiers re0 and re1 that identify the Routing Engine.
Severity	<p>Severity level of a message is indicated by different colors.</p> <ul style="list-style-type: none"> ● Unknown—Gray—Indicates no severity level is specified. ● Debug/Info/Notice—Green—Indicates conditions that are not errors but are of interest or might warrant special handling. ● Warning—Yellow or Amber—Indicates conditions that warrant monitoring. ● Error—Blue—Indicates standard error conditions that generally have less serious consequences than errors in the emergency, alert, and critical levels. ● Critical—Pink—Indicates critical conditions, such as hard-drive errors. ● Alert—Orange—Indicates conditions that require immediate correction, such as a corrupted system database. ● Emergency—Red—Indicates system panic or other conditions that cause the switch to stop functioning. 	A severity level indicates how seriously the triggering event affects switch functions. When you configure a location for logging a facility, you also specify a severity level for the facility. Only messages from the facility that are rated at that level or higher are logged to the specified file.

Table 92: Viewing System Log Messages (continued)

Field	Function	Additional Information
Event ID	<p>Displays a code that uniquely identifies the message.</p> <p>The prefix on each code identifies the message source, and the rest of the code indicates the specific event or error.</p>	<p>The event ID begins with a prefix that indicates the generating software process.</p> <p>Some processes on a switch do not use codes. This field might be blank in a message generated from such a process.</p> <p>An event can belong to one of the following type categories:</p> <ul style="list-style-type: none"> • Error—Indicates an error or failure condition that might require corrective action. • Event—Indicates a condition or occurrence that does not generally require corrective action.
Event Description	Displays a more detailed explanation of the message.	
Time	Displays the time at which the message was logged.	

SEE ALSO

[Check Active Alarms with the J-Web Interface | 311](#)

[Understand Alarm Types and Severity Levels on EX Series Switches | 299](#)

Troubleshooting an EX8200 Line Card's Failure to Power On

Problem

Description: After you have installed a line card in an EX8200 switch, the line card fails to power on correctly. The **ON** LED on the line card is unlit or is not lit steadily.

Cause

The line card's failure to power on might have resulted from any one of these causes:

- The line card is not seated correctly in the slot in the switch chassis.
- The switch does not have sufficient power supplies installed to power on the line card while maintaining its N+1 or N+N power configuration.

- The line card requires a particular minimum Junos OS release to power on, and that minimum release is not running on the switch.

Solution

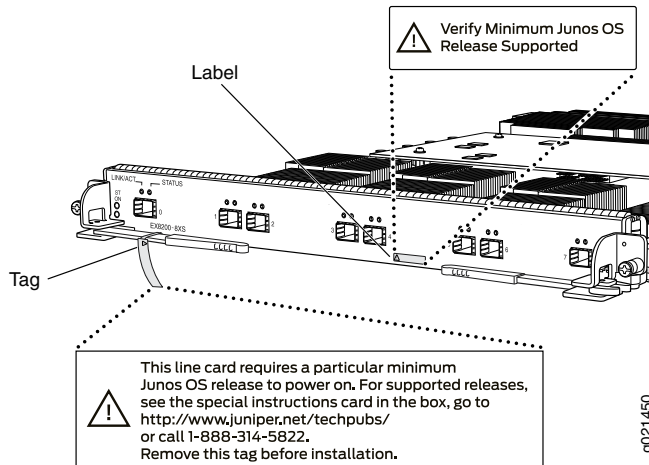
Possible solutions to these problems are:

If the **ON** LED is unlit:

- Ensure that the line card is installed correctly:
 - Issue the **show chassis fpc** command. If the state of the line card in the CLI is **Empty** :
 - a. Remove the line card (see [“Removing a Line Card from an EX8200 Switch” on page 268](#)).
 - b. Reinstall the line card (see [“Installing a Line Card in an EX8200 Switch” on page 271](#)).
- Determine whether the switch has sufficient power to power on the line card while maintaining its N+1 or N+N power configuration. Use one of the following methods to determine this :
 - Issue the **show chassis fpc** command. If the state of the line card in the CLI is **Offline** and the line card description is **No power**, the switch does not have enough power to power on the line card. Install additional power supplies in the switch. See [“Installing an AC Power Supply in an EX8200 Switch” on page 240](#) or [“Installing a DC Power Supply in an EX8200 Switch” on page 245](#).
 - Determine the power requirement of the line card. See [“Power Requirements for EX8208 Switch Components” on page 120](#) or *Power Requirements for EX8216 Switch Components*. Then follow the item below that is appropriate for your switch’s software release:
 - If your switch is running Junos OS Release 10.2 or later, issue the **show chassis power-budget-statistics** command. If the value of the **Total Power Available** field is less than the power requirement of the line card, the switch does not have enough power to power on the line card. Install additional power supplies in the switch. See [“Installing an AC Power Supply in an EX8200 Switch” on page 240](#) or [“Installing a DC Power Supply in an EX8200 Switch” on page 245](#).
 - If your switch is running Junos OS Release 10.1 or earlier, calculate the total power available—see [“Calculating Power Requirements for an EX8208 Switch” on page 121](#) or *Calculating Power Requirements for an EX8216 Switch*. If the switch does not have enough power to power on the line card, install additional power supplies in the switch. See [“Installing an AC Power Supply in an EX8200 Switch” on page 240](#) or [“Installing a DC Power Supply in an EX8200 Switch” on page 245](#).
- Determine whether the line card requires a particular minimum Junos OS release to power on:
 - a. If your line card has a yellow label on the faceplate, a tag on the left ejector, and one of the following model number and part number combinations, it requires a particular Junos OS release to power on (see [Figure 98 on page 319](#)):

- EX8200-8XS, 750-046748
- EX8200-40XS, 750-046750
- EX8200-48F, 750-046751
- EX8200-48T, 750-046749

Figure 98: Locations of the Tag and the Label on the Line Card



- b. Upgrade your switch to one of the following Junos OS releases (see *Understanding Software Installation on EX Series Switches*) :
- Junos OS Release 11.2–R1 and later
 - Junos OS Release 11.1–R2 and later
 - Junos OS Release 10.4–R5 and later

NOTE: If you are running a release prior to Junos OS Release 10.4R5 on your EX8200 switch, see this page in our Knowledge Base: <https://kb.juniper.net/KB21476> . This page lists recommended releases for EX Series switches.

- c. Reboot the switch to complete the upgrade process.

If the **ON** LED blinks in green but is not lit steadily:

- Tighten the captive screws on the faceplate of the line card to ensure that the line card is seated correctly in the slot in the switch chassis.

SEE ALSO

[Line Card Model and Version Compatibility in an EX8200 Switch | 84](#)

Troubleshoot Temperature Alarms in EX Series Switches

Problem

Description: EX Series switches generate a temperature alarm **FPC 0 EX-PFE1 Temp Too Hot**.

Cause

Temperature sensors in the chassis monitor the temperature of the chassis. The switch raises an alarm if a fan fails or if the temperature of the chassis exceeds permissible levels.

Solution

When the switch raises a temperature alarm such as the **FPC 0 EX-PFE1 Temp Too Hot** alarm, use the **show chassis environment** and the **show chassis temperature-thresholds** commands to identify the condition that triggered the alarm.



CAUTION: To prevent the switch from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature. To prevent airflow restriction, allow at least 6 inches (15.2 cm) of clearance around the ventilation openings.

1. Connect to the switch by using Telnet and issue the **show chassis environment** command. This command displays environmental information about the switch chassis, including the temperature, and information about the fans, power supplies, and Routing Engines. Following is a sample output on an EX9208 switch. The output is similar on other EX Series switches.

```
user@switch> show chassis environment
```

Class	Item	Status	Measurement
Temp	PEM 0	OK	40 degrees C / 104 degrees F
	PEM 1	OK	40 degrees C / 104 degrees F
	PEM 2	Absent	
	PEM 3	Absent	

	Routing Engine 0	OK	37 degrees C / 98 degrees F
	Routing Engine 0 CPU	OK	35 degrees C / 95 degrees F
	Routing Engine 1	Absent	
	Routing Engine 1 CPU	Absent	
	CB 0 Intake	OK	36 degrees C / 96 degrees F
	CB 0 Exhaust A	OK	34 degrees C / 93 degrees F
	CB 0 Exhaust B	OK	40 degrees C / 104 degrees F
	CB 0 ACBC	OK	39 degrees C / 102 degrees F
	CB 0 XF A	OK	46 degrees C / 114 degrees F
	CB 0 XF B	OK	45 degrees C / 113 degrees F
	CB 1 Intake	Absent	
	CB 1 Exhaust A	Absent	
	CB 1 Exhaust B	Absent	
	CB 1 ACBC	Absent	
	CB 1 XF A	Absent	
	CB 1 XF B	Absent	
	FPC 3 Intake	OK	48 degrees C / 118 degrees F
	FPC 3 Exhaust A	OK	46 degrees C / 114 degrees F
	FPC 3 Exhaust B	OK	51 degrees C / 123 degrees F
	FPC 3 XL TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XL Chip	OK	58 degrees C / 136 degrees F
	FPC 3 XL_XR0 TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XL_XR0 Chip	OK	51 degrees C / 123 degrees F
	FPC 3 XL_XR1 TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XL_XR1 Chip	OK	63 degrees C / 145 degrees F
	FPC 3 XQ TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XQ Chip	OK	63 degrees C / 145 degrees F
	FPC 3 XQ_XR0 TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XQ_XR0 Chip	OK	68 degrees C / 154 degrees F
	FPC 3 XM TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XM Chip	OK	76 degrees C / 168 degrees F
	FPC 3 XF TSen	OK	67 degrees C / 152 degrees F
	FPC 3 XF Chip	OK	75 degrees C / 167 degrees F
	FPC 3 PLX PCIe Switch TSe	OK	51 degrees C / 123 degrees F
	FPC 3 PLX PCIe Switch Chi	OK	54 degrees C / 129 degrees F
	FPC 3 Aloha FPGA 0 TSen	OK	51 degrees C / 123 degrees F
	FPC 3 Aloha FPGA 0 Chip	OK	70 degrees C / 158 degrees F
	FPC 3 Aloha FPGA 1 TSen	OK	51 degrees C / 123 degrees F
	FPC 3 Aloha FPGA 1 Chip	OK	75 degrees C / 167 degrees F
	FPC 5 Intake	Testing	
	FPC 5 Exhaust A	Testing	
	FPC 5 Exhaust B	Testing	
Fans	Top Rear Fan	OK	Spinning at intermediate-speed
	Bottom Rear Fan	OK	Spinning at intermediate-speed

Top Middle Fan	OK	Spinning at intermediate-speed
Bottom Middle Fan	OK	Spinning at intermediate-speed
Top Front Fan	OK	Spinning at intermediate-speed
Bottom Front Fan	OK	Spinning at intermediate-speed

Table 93 on page 322 lists the output fields for the **show chassis environment** command. Output fields are listed in the approximate order in which they appear.

Table 93: show chassis environment Output Fields

Field Name	Field Description
Class	Information about the category or class of chassis component: <ul style="list-style-type: none"> • Temp: Temperature of air flowing through the chassis in degrees Celsius (°C) and degrees Fahrenheit (°F). • Fans: Information about the status of fans and blowers.
Item	Information about the chassis components: Flexible PIC Concentrators (FPCs)—that is, the line cards—, Control Boards (CBs), Routing Engines (REs), Power Entry Modules (PEMs)—that is, the power supplies.
Status	Status of the specified chassis component. For example, if Class is Fans , the fan status can be: <ul style="list-style-type: none"> • OK: The fans are operational. • Testing: The fans are being tested during initial power-on. • Failed: The fans have failed or the fans are not spinning. • Absent: The fan tray is not installed.
Measurement	Depends on the Class. For example, if Class is Temp , indicates the temperature in degrees Celsius (°C) and degrees Fahrenheit (°F). If the Class is Fans , indicates actual fan RPM.

2. Issue the command **show chassis temperature-thresholds**. This command displays the chassis temperature threshold settings. Following is a sample output on an EX9208 switch. The output is similar on other EX Series switches.

```
user@ host> show chassis temperature-thresholds
```

Item	Fan speed (degrees C)		Yellow alarm (degrees C)		Red alarm (degrees C)		Fire Shutdown (degrees C)	
	Normal	High	Normal	Bad fan	Normal	Bad fan	Normal	
Chassis default	48	54	65	55	80	65	100	
Routing Engine 0	70	80	95	95	110	110	112	

FPC 3	55	60	75	65	105	80	110
FPC 5	55	60	75	65	90	80	95

Table 94 on page 323 lists the output fields for the **show chassis temperature-thresholds** command. Output fields are listed in the approximate order in which they appear.

Table 94: show chassis temperature-thresholds Output Fields

Field Name	Field Description
Item	Chassis component. You can configure for the threshold information for components such as the chassis and the Routing Engines to be displayed in the output. By default, information is displayed only for the chassis and the Routing Engines.
Fan speed	Temperature thresholds, in degrees Celsius, for the fans to operate at normal and at high speed. <ul style="list-style-type: none"> • Normal—The temperature threshold at which the fans operate at normal speed and when all the fans are operating. • High—The temperature threshold at which the fans operate at high speed or when a fan has failed. <p>NOTE: An alarm is not triggered until the temperature exceeds the threshold settings for a yellow or red alarm.</p>
Yellow or amber alarm	Temperature threshold, in degrees Celsius, that trigger a yellow or amber alarm. <ul style="list-style-type: none"> • Normal—The temperature threshold that must be exceeded on the component to trigger a yellow or amber alarm. • Bad fan—The temperature threshold that must be exceeded on the component to trigger a yellow or amber alarm.
Red alarm	Temperature threshold, in degrees Celsius, that trigger a red alarm. <ul style="list-style-type: none"> • Normal—The temperature threshold that must be exceeded on the component to trigger a red alarm. • Bad fan—The temperature threshold that must be exceeded on the component to trigger a red alarm.
Fire Shutdown	Temperature threshold, in degrees Celsius, for the switch to shut down.

When a temperature alarm is triggered, you can identify the condition that triggered it by running the **show chassis environment** command to display the chassis temperature values for each component and comparing those with the temperature threshold values, which you can display by running the **show chassis temperature-thresholds** command.

For example, for **FPC 3**:

- If the temperature of **FPC 3** exceeds 55° C, the output indicates that the fans are operating at a high speed (no alarm is triggered).
- If the temperature of **FPC 3** exceeds 65° C, a yellow alarm is triggered to indicate that one or more fans have failed.
- If the temperature of **FPC 3** exceeds 75° C, a yellow alarm is triggered to indicate that the temperature threshold limit is exceeded.

- If the temperature of **FPC 3** exceeds 80° C, a red alarm is triggered to indicate that one or more fans have failed.
- If the temperature of **FPC 3** exceeds 105° C, a red alarm is triggered to indicate that the temperature threshold limit is exceeded.
- If the temperature of **FPC 3** exceeds 110° C, the switch is powered off.

Table 95 on page 324 lists the possible causes for the switch to generate a temperature alarm and the respective remedies.

Table 95: Causes and Remedies for Temperature Alarms

Cause	Remedy
Ambient temperature is above threshold temperature.	Ensure that the ambient temperature is within the threshold temperature limit. See “Environmental Requirements and Specifications for EX Series Switches” on page 110.
Fan module or fan tray has failed.	<ul style="list-style-type: none"> • Check the fan. • Replace the faulty fan module or fan tray. • If the above two checks show no problems, open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll-free within the United States and Canada) or 1-408-745-9500 (from outside the United States).
Restricted airflow through the switch due to insufficient clearance around the installed switch.	Ensure that there is sufficient clearance around the installed switch. See the following topics to understand the clearance requirements of various EX Series switches.

6

CHAPTER

Contacting Customer Support and Returning the Chassis or Components

[Returning an EX8200 Chassis or Components](#) | **326**

Returning an EX8200 Chassis or Components

IN THIS SECTION

- [Returning an EX8200 Switch or Component for Repair or Replacement | 326](#)
- [Locating the Serial Number on an EX8200 Switch or Component | 327](#)
- [Contact Customer Support to Obtain Return Material Authorization | 339](#)
- [Packing an EX8200 Switch or Component | 340](#)
- [Packing a Line Card Used in an EX8200 Switch | 344](#)

Returning an EX8200 Switch or Component for Repair or Replacement

If you need to return a switch or hardware component to Juniper Networks for repair or replacement, follow this procedure:

1. Determine the serial number of the chassis if you need to return the switch. If you need to return one or more components, determine the serial number for each component. For instructions, see [“Locating the Serial Number on an EX8200 Switch or Component” on page 327](#).
2. Obtain an RMA number from JTAC as described in [“Contact Customer Support to Obtain Return Material Authorization” on page 339](#).

NOTE: Do not return any component to Juniper Networks unless you have first obtained an RMA number. Juniper Networks reserves the right to refuse shipments that do not have an RMA. Refused shipments are returned to the customer through collect freight.

3. Pack the switch or component for shipping as described in [“Packing an EX8200 Switch or Component” on page 340](#).

For more information about return and repair policies, see the customer support page at <https://www.juniper.net/support/guidelines.html>.

Locating the Serial Number on an EX8200 Switch or Component

If you are returning a switch or hardware component to Juniper Networks for repair or replacement, you must locate the serial number of the switch or component. You must provide the serial number to the Juniper Networks Technical Assistance Center (JTAC) when you contact them to obtain Return Materials Authorization (RMA). See [“Contact Customer Support to Obtain Return Material Authorization” on page 339](#).

If the switch is operational and you can access the command-line interface (CLI), you can list serial numbers for the switch and for some components with a CLI command. If you do not have access to the CLI or if the serial number for the component does not appear in the command output, you can locate the serial number ID label on the physical switch or component.

NOTE: If you want to find the serial number on the physical switch component, you will need to remove the component from the switch chassis, for which you must have the required parts and tools available. See *Installing and Removing EX8208 Switch Hardware Components* or *Installing and Removing EX8216 Switch Hardware Components*.

1. [Listing the Switch and Components Details with the CLI | 327](#)
2. [Locating the Serial Number ID Label on an EX8200 Switch Chassis | 330](#)
3. [Locating Serial Number ID Labels on FRU Components | 331](#)

Listing the Switch and Components Details with the CLI

To list the switch and switch components and their serial numbers, use the **show chassis hardware** CLI command:

The following output lists the switch components and serial numbers for an EX8208 switch:

```
user@switch> show chassis hardware
```

```
Hardware inventory:
Item          Version  Part number  Serial number  Description
Chassis       REV 09                CA1710120295  EX8208
Backplane     REV 09   710-022044  BT0910012150  EX8208-BP-S
CB 0          REV 20   710-020635  BE1710100381  EX8208-SRE320
  Routing Engine 0      BUILTIN    BUILTIN       RE-EX8208
CB 1          REV 20   710-020635  BE1710100375  EX8208-SRE320
  Routing Engine 1      BUILTIN    BUILTIN       RE-EX8208
CB 2          REV 12   710-021502  AZ1710100224  EX8208-SF320
FPC 6        REV 20   710-020683  BC0109228161  EX8200-48F
```

CPU	REV 14	710-020598	BF0109259581	EX8200-CPU
PIC 0		BUILTTIN	BUILTTIN	48x 100 Base-FX/1000
Base-X				
FPC 7	REV 20	710-020680	BD0109207992	EX8200-48T
CPU	REV 13	710-020598	BF0109197615	EX8200-CPU
PIC 0		BUILTTIN	BUILTTIN	48x 10/100/1000 Base-T
PSU 0	REV 19	740-021466	BG0709520429	EX8200-AC2K
PSU 1	REV 19	740-021466	BG0709520306	EX8200-AC2K
PSU 2	REV 19	740-021466	BG0709520415	EX8200-AC2K
PSU 3	REV 19	740-021466	BG0709520428	EX8200-AC2K
PSU 4	REV 19	740-021466	BG0709520431	EX8200-AC2K
PSU 5	REV 19	740-021466	BG0709520422	EX8200-AC2K
Fan Tray				
FTC 0	REV 13	760-020967	BW1210031360	EX8208-FT
FTC 1	REV 13	760-020967	BW1210031360	EX8208-FT
LCD 0	REV 04	710-025742	CE1710070218	EX8200 LCD

The following output lists the switch components and serial numbers for an EX8216 switch:

```
user@switch> show chassis hardware
```

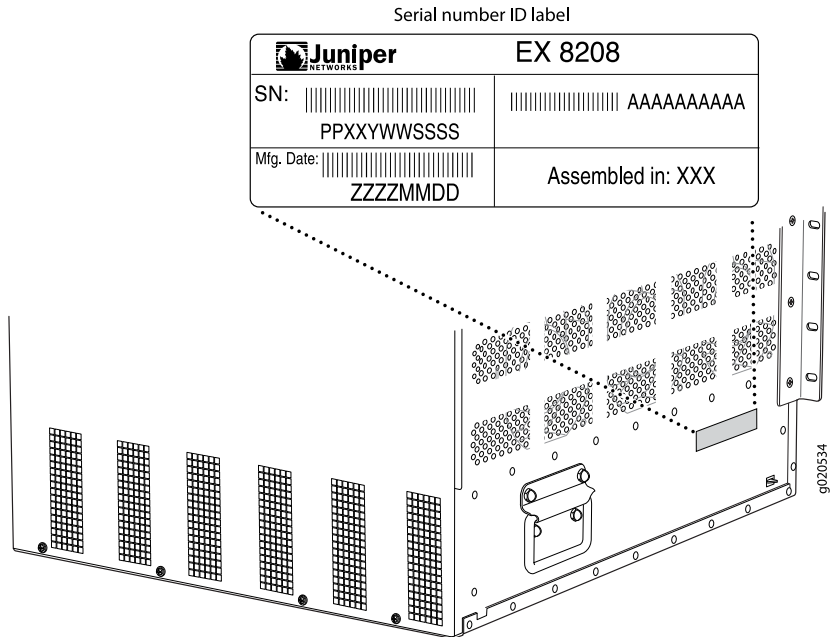
```
Hardware inventory:
Item          Version  Part number  Serial number  Description
Chassis       REV 06
Midplane      REV 06  710-016845  BA0909120112  EX8216-MP
CB 0          REV 22  710-020771  AX0109197723  EX8216-RE320
CB 1          REV 22  710-020771  AX0109197726  EX8216-RE320
  Routing Engine 1  BUILTTIN  BUILTTIN      RE-EX8216
FPC 3         REV 19  710-020683  BC0109083125  EX8200-48F
  CPU          REV 13  710-020598  BF0109144549  EX8200-CPU
FPC 4         REV 17  710-020683  BC0108500127  EX8200-48F
  CPU          REV 10  710-020598  BF0108460510  EX8200-CPU
  PIC 0        BUILTTIN  BUILTTIN      48x 100 Base-QFX/1000
Base-X
  Xcvr 1       REV 01  740-011613  PE70V89        SFP-SX
  Xcvr 11      REV 01  740-011613  PE70YCE        SFP-SX
  Xcvr 12      REV 01  740-011613  PE70VSH        SFP-SX
  Xcvr 13      REV 01  740-011613  E08C02063     SFP-SX
  Xcvr 14      REV 01  740-011613  PE70VKU        SFP-SX
  Xcvr 15      REV 01  740-011613  E08E03372     SFP-SX
  Xcvr 21      REV 01  740-011613  PE70VAD        SFP-SX
  Xcvr 22      REV 01  740-011613  E08E01228     SFP-SX
  Xcvr 23      REV 01  740-011613  PE70VSL        SFP-SX
```


Xcvr 24	REV 01	740-011613	E08E03409	SFP-SX
Xcvr 25	REV 01	740-011613	PE70VL4	SFP-SX
Xcvr 26	REV 01	740-011613	PDQ4L2Z	SFP-SX
Xcvr 27	REV 01	740-011613	PE70WFK	SFP-SX
Xcvr 28	REV 01	740-011782	PBD2B5U	SFP-SX
Xcvr 29	REV 01	740-011613	PE70UQX	SFP-SX
Xcvr 30	REV 01	740-011613	PE70VL5	SFP-SX
Xcvr 31	REV 01	740-011613	PE70V0F	SFP-SX
Xcvr 32	REV 01	740-011613	E08C02052	SFP-SX
Xcvr 33	REV 01	740-011613	E08C02197	SFP-SX
Xcvr 34	REV 01	740-011613	PE70V0L	SFP-SX
Xcvr 35	REV 01	740-011613	E08E03390	SFP-SX
Xcvr 36	REV 01	740-011613	PDQ4VL9	SFP-SX
Xcvr 37	REV 01	740-011613	E08E03370	SFP-SX
Xcvr 38	REV 01	740-011613	E08E03362	SFP-SX
Xcvr 39	REV 01	740-011613	E08C02065	SFP-SX
Xcvr 40	REV 01	740-011613	E08E03405	SFP-SX
Xcvr 41	REV 01	740-011613	E08E03411	SFP-SX
Xcvr 43	REV 01	740-011613	E08C02171	SFP-SX
Xcvr 45	REV 01	740-011613	E08E03410	SFP-SX
FPC 13	REV 16	710-016837	BB0109051344	EX8200-8XS
CPU				
SIB 0	REV 10	710-021613	AY0109166244	EX8216-SF320
SIB 1	REV 10	710-021613	AY0109166357	EX8216-SF320
SIB 2	REV 10	710-021613	AY0109166362	EX8216-SF320
SIB 3	REV 10	710-021613	AY0109166338	EX8216-SF320
SIB 4	REV 10	710-021613	AY0109166350	EX8216-SF320
SIB 5	REV 10	710-021613	AY0109166365	EX8216-SF320
SIB 6	REV 10	710-021613	AY0109166361	EX8216-SF320
SIB 7	REV 10	710-021613	AY0109166399	EX8216-SF320
PSU 0	REV 17	740-021466	BG0709170003	EX8200-AC2K
PSU 1	REV 17	740-021466	BG0709170004	EX8200-AC2K
PSU 2	REV 17	740-021466	BG0709170020	EX8200-AC2K
PSU 3	REV 17	740-021466	BG0709170017	EX8200-AC2K
PSU 4	REV 17	740-021466	BG0709170008	EX8200-AC2K
PSU 5	REV 17	740-021466	BG0709170018	EX8200-AC2K
Top Fan Tray				
FTC 0	REV 4	760-022620	CX1209140212	EX8216-FT
FTC 1	REV 4	760-022620	CX1209140212	EX8216-FT
Bottom Fan Tray				
FTC 0	REV 4	760-022620	CX1209140211	EX8216-FT
FTC 1	REV 4	760-022620	CX1209140211	EX8216-FT
LCD 0	REV 04	710-025742	CE0109186919	EX8200 LCD

Locating the Serial Number ID Label on an EX8200 Switch Chassis

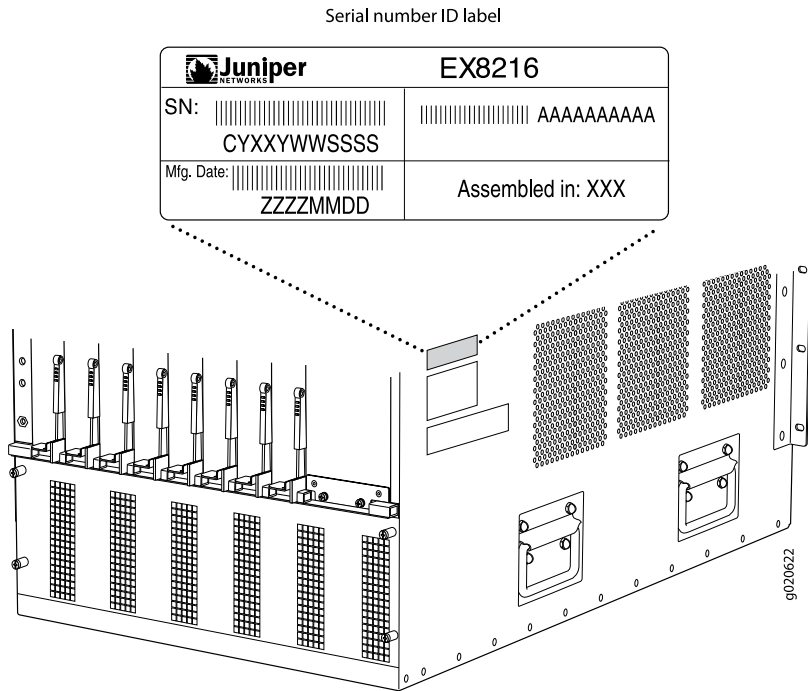
The serial number ID label is located near the bottom on the left side of the chassis on an EX8208 switch. See [Figure 99 on page 330](#).

Figure 99: Location of the Serial Number ID Label on EX8208 Switch Chassis



The serial number ID label is located near the bottom on the left side of the chassis on an EX8216 switch. See [Figure 100 on page 331](#).

Figure 100: Location of the Serial Number ID Label on EX8216 Switch Chassis

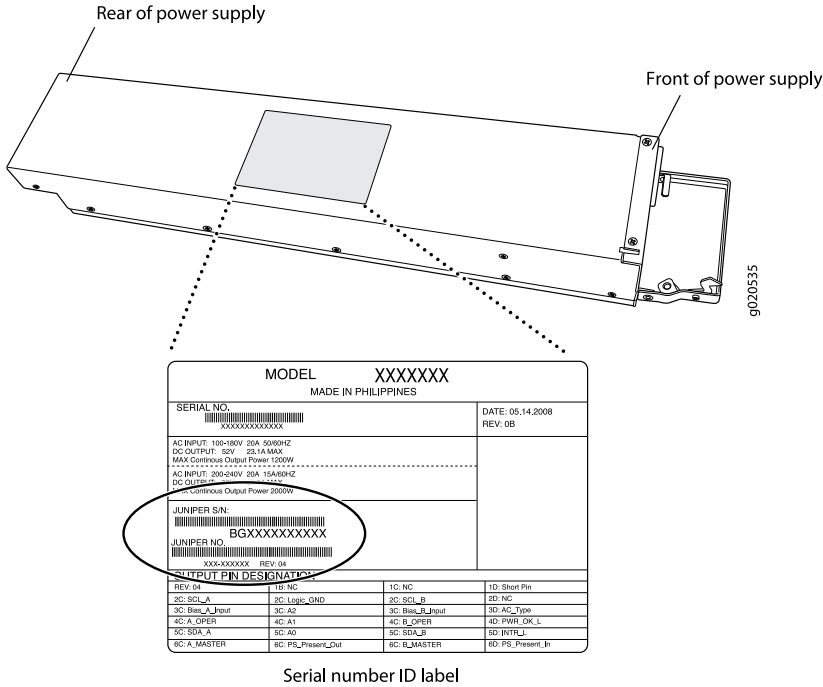


Locating Serial Number ID Labels on FRU Components

The power supplies, fan tray, SRE modules, RE modules, SF module, and line cards installed in an EX8200 switch are field-replaceable units (FRUs). For each of these FRUs, you must remove the FRU from the switch chassis to see the FRU's serial number ID label.

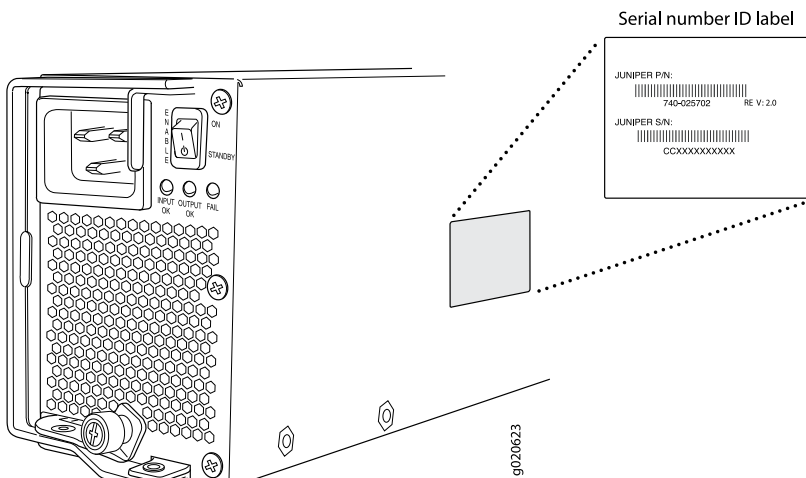
- 2000 W AC Power supply—The serial number ID label is on the left side of the power supply (see [Figure 101 on page 332](#)). See “[Removing an AC Power Supply from an EX8200 Switch](#)” on page 239.

Figure 101: Location of the Serial Number ID Label on a 2000 W AC Power Supply



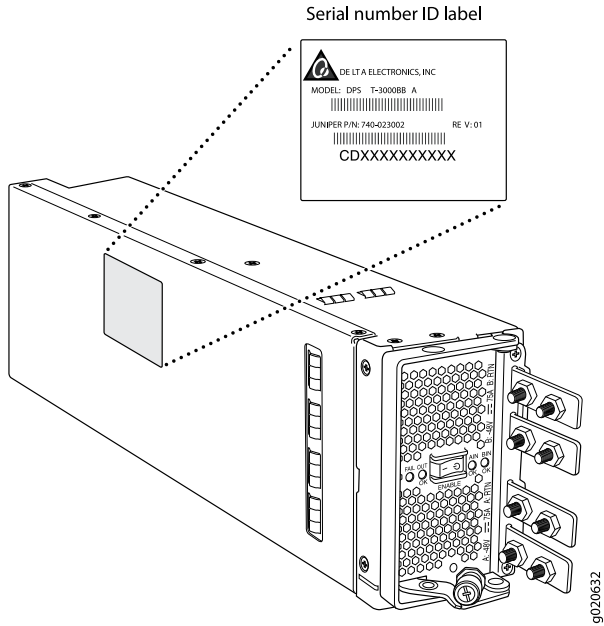
- 3000 W AC Power supply—The serial number ID label is on the right side of the power supply (see [Figure 102 on page 332](#)). See “[Removing an AC Power Supply from an EX8200 Switch](#)” on page 239.

Figure 102: Location of the Serial Number ID Label on a 3000 W AC Power Supply



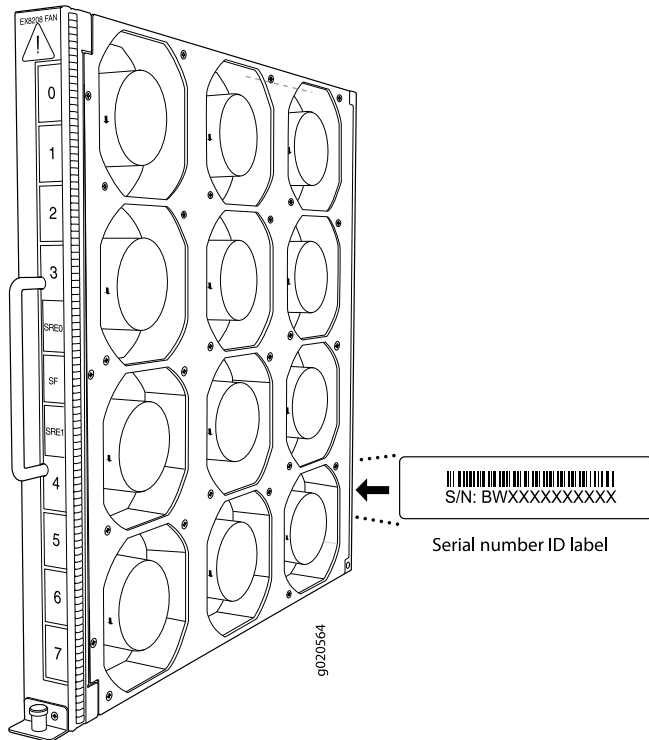
- DC Power supplies—The serial number ID label is on the left side of the DC power supply (see [Figure 103 on page 333](#)). See “[Removing a DC Power Supply from an EX8200 Switch](#)” on page 243.

Figure 103: Location of the Serial Number ID Label on 2000 W DC Power Supply and 3000 W DC Power Supply



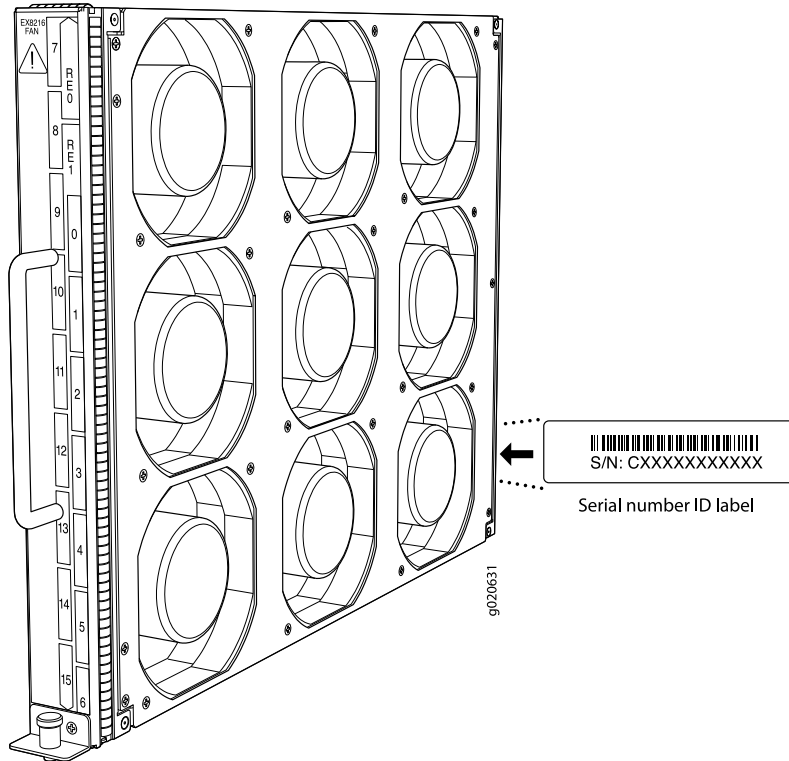
- Fan tray in an EX8208 switch—The serial number ID label is on the rear of the fan tray (see [Figure 104 on page 333](#)). See “[Removing a Fan Tray from an EX8208 Switch](#)” on page 235.

Figure 104: Location of the Serial Number ID label on the Fan Tray Used in an EX8208 Switch



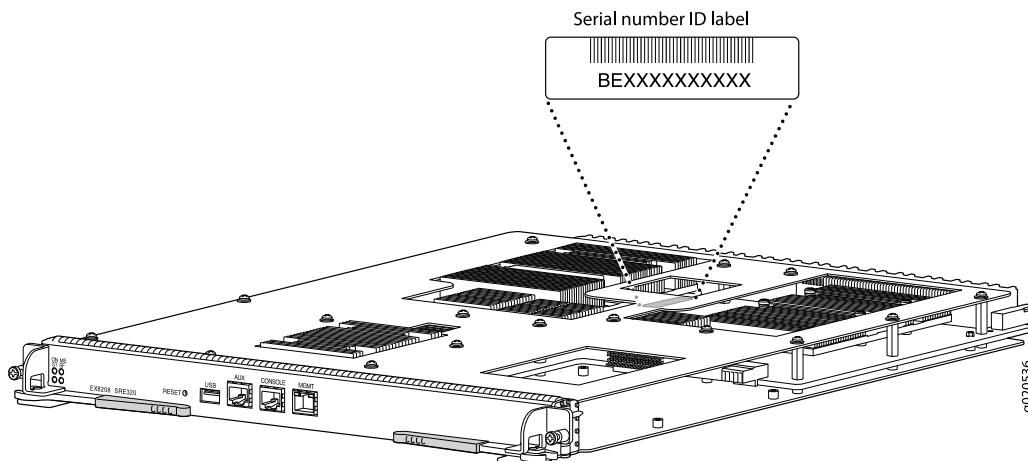
- Fan trays in an EX8216 switch—The serial number ID label is on the rear of each fan tray (see [Figure 105 on page 334](#)). See [Removing a Fan Tray from an EX8216 Switch](#).

Figure 105: Location of the Serial Number ID label on the Fan Tray Used in an EX8216 Switch



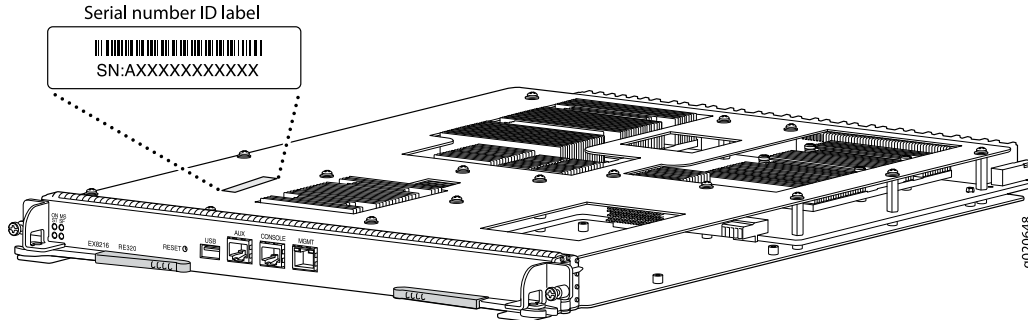
- Switch Fabric and Routing Engine (SRE) module in an EX8208 Switch— See [Figure 106 on page 334](#) to see the location of the serial number ID label on the SRE module. See [“Removing an SRE Module from an EX8208 Switch” on page 253](#).

Figure 106: Location of the Serial Number ID Label on the SRE Module



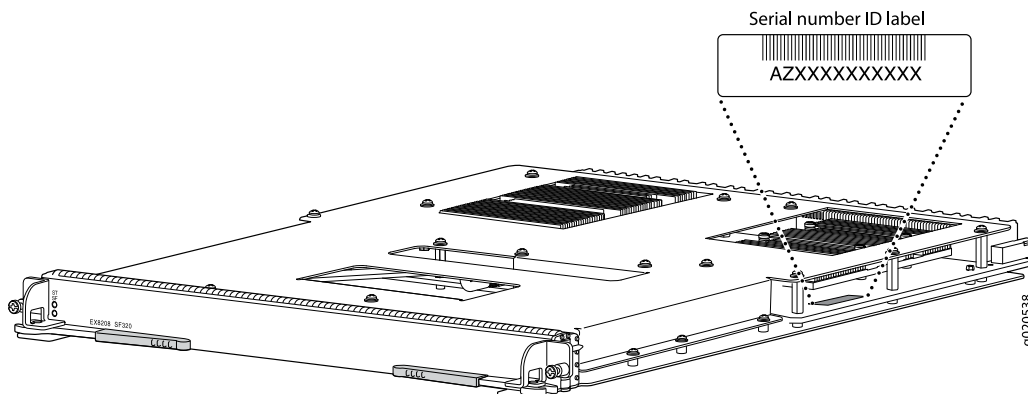
- Routing Engine (RE) module in an EX8216 Switch— See [Figure 107 on page 335](#) to see the location of the serial number ID label on the RE module. See *Removing an RE Module from an EX8216 Switch*.

Figure 107: Location of the Serial Number ID Label on the RE Module



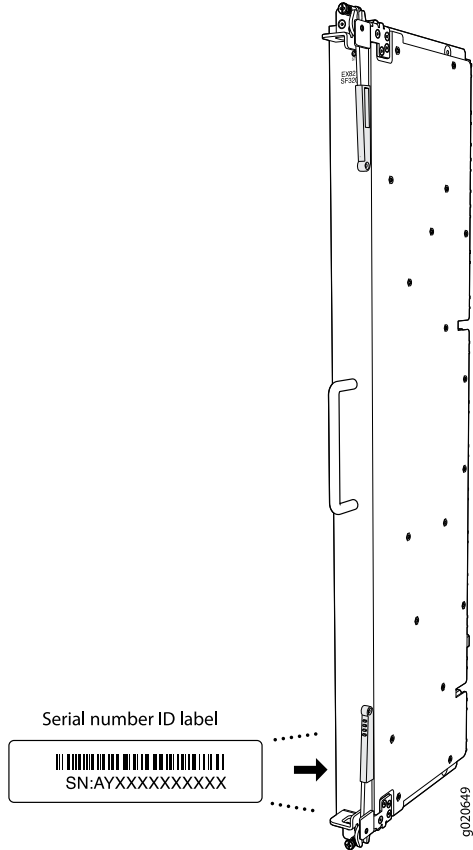
- Switch Fabric (SF) module in an EX8208 switch— See [Figure 108 on page 335](#) to see the location of the serial number ID label on the SF module. See ["Removing an SF Module from an EX8208 Switch" on page 257](#).

Figure 108: Location of the Serial Number ID Label on the SF Module Used in an EX8208 Switch



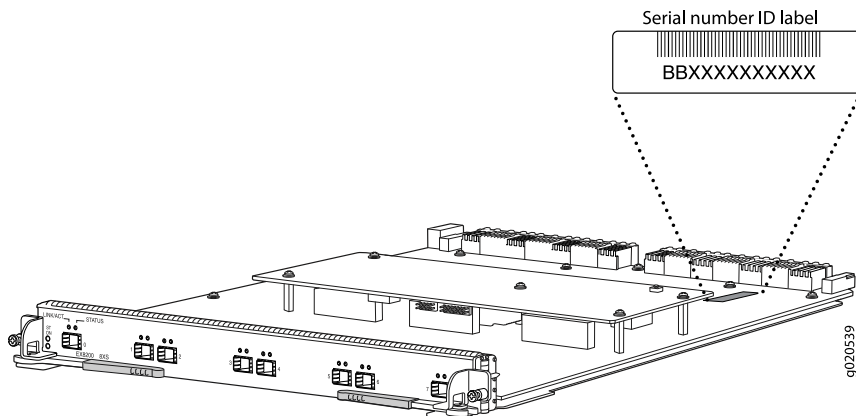
- Switch Fabric (SF) module in an EX8216 switch— See [Figure 109 on page 336](#) to see the location of the serial number ID label on the SF module. See *Removing an SF Module from an EX8216 Switch*.

Figure 109: Location of the Serial Number ID Label on the SF Module Used in an EX8216 Switch



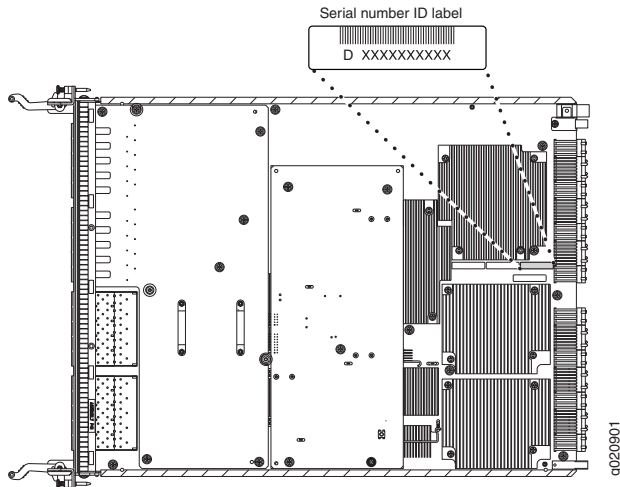
- 8-port SFP+ line card—See [Figure 110 on page 336](#) to see the location of the serial number ID label on this line card. See [“Removing a Line Card from an EX8200 Switch” on page 268](#).

Figure 110: Location of the Serial Number ID Label on the 8-Port SFP+ Line Card



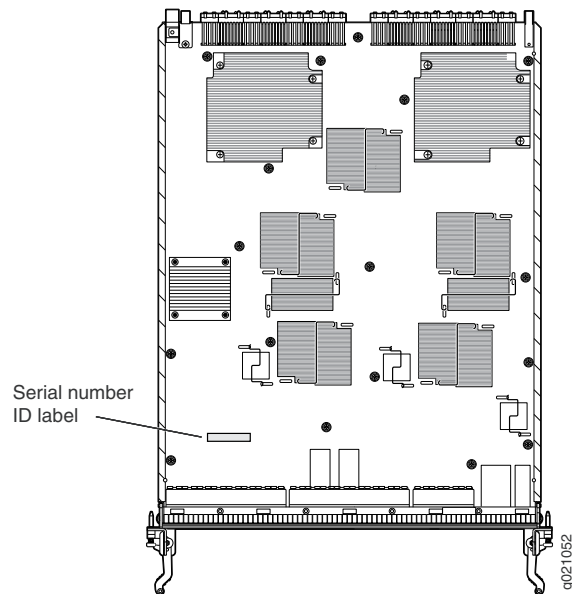
- 40-port SFP+ line card—See [Figure 111 on page 337](#) to see the location of the serial number ID label on this line card. See [“Removing a Line Card from an EX8200 Switch” on page 268](#).

Figure 111: Location of the Serial Number ID Label on the 40-Port SFP+ Line Card



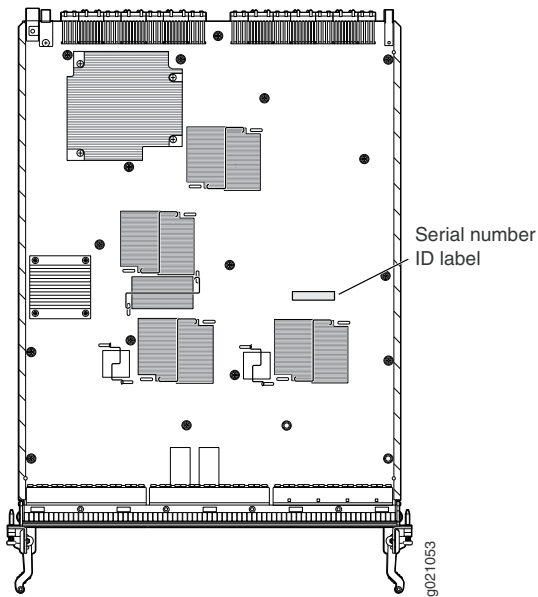
- EX8200-2XS-40P line card and EX8200-2XS-40T line card—See [Figure 112 on page 337](#) to see the location of the serial number ID label on these line cards. See [“Removing a Line Card from an EX8200 Switch” on page 268](#).

Figure 112: Location of the Serial Number ID Label on the EX8200-2XS-40P Line Card and EX8200-2XS-40T Line Card



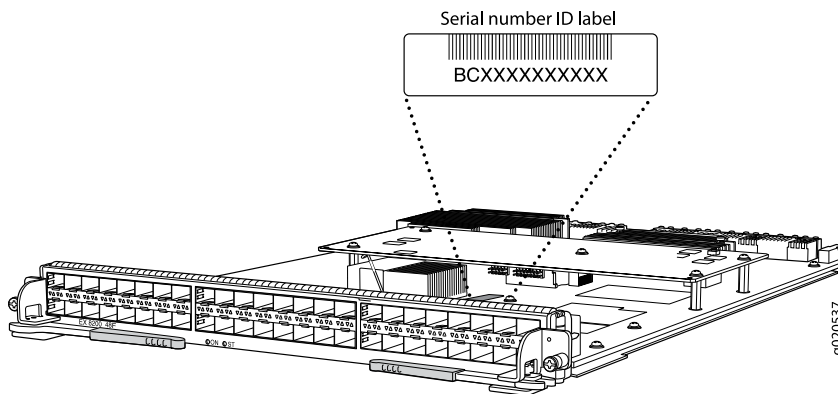
- EX8200-48PL line card and EX8200-48TL line card—See [Figure 113 on page 338](#) to see the location of the serial number ID label on these line cards. See [“Removing a Line Card from an EX8200 Switch” on page 268](#).

Figure 113: Location of the Serial Number ID Label on the EX8200-48PL Line Card and EX8200-48TL Line Card



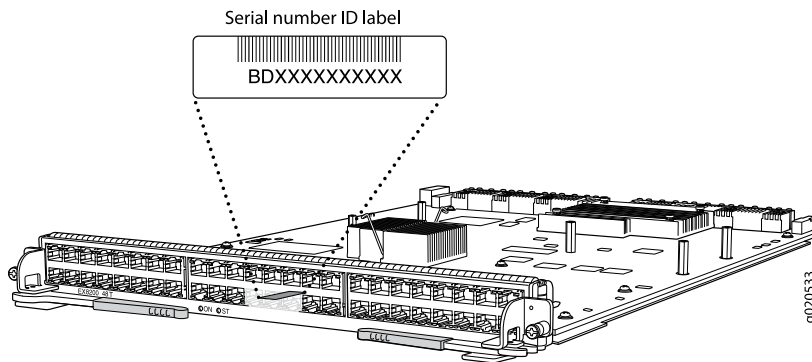
- 48-port SFP line card—See [Figure 114 on page 338](#) to see the location of the serial number ID label on this line card. See [“Removing a Line Card from an EX8200 Switch” on page 268](#).

Figure 114: Location of the Serial Number ID Label on the 48-Port SFP Line Card



- 48-port RJ-45 line card—See [Figure 115 on page 339](#) to see the location of the serial number ID label on this line card. See [“Removing a Line Card from an EX8200 Switch” on page 268](#).

Figure 115: Location of the Serial Number ID Label on the 48-Port RJ-45 Line Card



Contact Customer Support to Obtain Return Material Authorization

If you are returning a device or hardware component to Juniper Networks for repair or replacement, obtain a Return Material Authorization (RMA) number from Juniper Networks Technical Assistance Center (JTAC).

After locating the serial number of the device or hardware component you want to return, open a service request with Juniper Networks Technical Assistance Center (JTAC) on the Web or by telephone.

Before you request an RMA number from JTAC, be prepared to provide the following information:

- Your existing service request number, if you have one
- Serial number of the component
- Your name, organization name, telephone number, fax number, and shipping address
- Details of the failure or problem
- Type of activity being performed on the device when the problem occurred
- Configuration data displayed by one or more **show** commands

You can contact JTAC 24 hours a day, seven days a week on the Web or by telephone:

- Service Request Manager: <https://support.juniper.net/support>
- Telephone: +1-888-314-JTAC (+1-888-314-5822), toll free in U.S., Canada, and Mexico

NOTE: For international or direct-dial options in countries without toll free numbers, see <https://support.juniper.net/support>

If you are contacting JTAC by telephone, enter your 12-digit service request number followed by the pound (#) key for an existing case, or press the star (*) key to be routed to the next available support engineer.

The support representative validates your request and issues an RMA number for return of the component.

Packing an EX8200 Switch or Component

If you are returning an EX8200 switch or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you begin packing the switch or component, ensure you have:

- Followed all the steps listed in [“Contact Customer Support to Obtain Return Material Authorization” on page 339](#).
 - Retrieved the original shipping carton and packing materials. Contact your JTAC representative if you do not have these materials, to learn about approved packing materials. See [“Contact Customer Support to Obtain Return Material Authorization” on page 339](#).
 - Ensure you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 381](#).
1. [Packing an EX8200 Switch | 340](#)
 2. [Packing EX8200 Switch Components for Shipping | 343](#)

Packing an EX8200 Switch

If you need to transport the switch to another location or return the switch to Juniper Networks, you need to pack the switch securely in its original packaging to prevent damage during transportation.

Before you pack the switch:

1. Power off the switch. See [“Powering Off an EX8200 Switch” on page 289](#).
2. Remove all wires, plugs, and power cords from the switch.
3. Remove all line cards and pack them in their original shipping containers. See [“Packing a Line Card Used in an EX8200 Switch” on page 344](#).
4. Install cover panels over blank slots.

Leave components that came installed in the chassis in the chassis.

NOTE: Any line cards ordered with the switch are shipped separately. Do not pack any line cards with the switch.

Ensure that you have the following parts and tools available to pack the switch:

- A 7/16-in. or 11-mm open-end or socket wrench to install the bracket bolts on the chassis and shipping pallet
- The original switch packing material (wooden pallet, cardboard box, accessory box and its contents, foam padding, and brackets and bracket bolts for attaching the chassis to the pallet)
- Electrostatic discharge (ESD) grounding strap

The EX8200 switch is shipped in a cardboard box that has a two-layer wooden pallet base with foam cushioning between the layers. The switch chassis is bolted to the pallet base with 4 pallet fasteners, 2 on each side of the chassis.



CAUTION: The switch is maximally protected inside the shipping box. Pack the switch only in its original shipping box, securely bolted to the original wooden shipping pallet.

Do not pack the switch in anything except its original container or the switch might be damaged in transit.

To pack the switch (see [Figure 117 on page 343](#)):

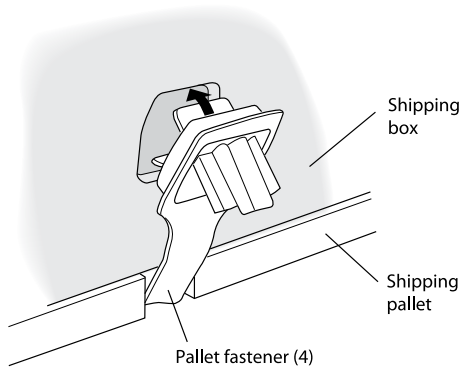
1. Move the wooden pallet and packing material to a staging area as close to the switch as possible. Make sure there is enough space to move the chassis from the rack or cabinet to the wooden pallet.
2. Remove the switch from the rack or cabinet. For EX8208 switches, see [“Removing an EX8208 Switch from a Rack or Cabinet Using a Mechanical Lift” on page 292](#) or [“Removing an EX8208 Switch from a Rack or Cabinet Without Using a Mechanical Lift” on page 294](#)). For EX8216 switches, see *Removing an EX8216 Switch from a Rack or Cabinet*.

Move the chassis to the shipping pallet (see [“Chassis and Component Lifting Guidelines” on page 354](#)). Position the switch on the pallet so that the front of the switch is facing the silkscreened “front” mark on the pallet. The pallet also has crop marks to guide you in positioning the chassis.

3. Use the 7/16-in. or 11-mm open-end or socket wrench to install the four sets of brackets and bolts that secure the chassis to the wooden pallet.
4. Slide the plastic cover over the switch chassis. The plastic cover is part of the switch’s original packing materials.

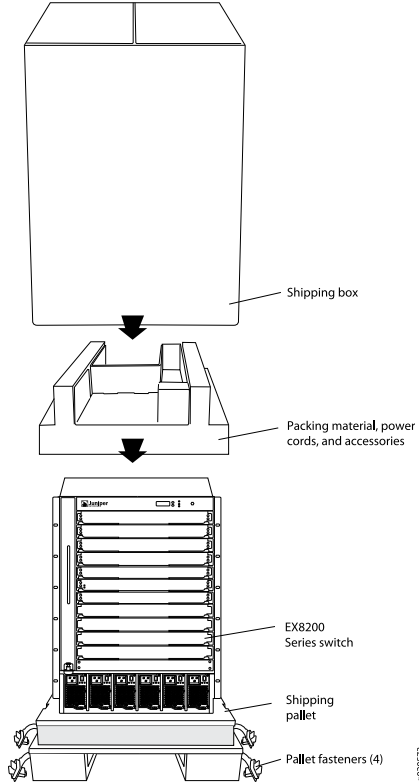
5. Replace the foam padding on top of the chassis.
6. Place the power cords in the box.
7. Remove the adjustable mounting brackets from the rack or cabinet and place them and their connecting screws in the accessory box.
8. Place the accessory box in its slot in the foam padding. See [“Parts Inventory \(Packing List\) for an EX8208 Switch” on page 144](#) or *Parts Inventory (Packing List) for an EX8216 Switch* to verify that you have included all the proper contents of the accessory box.
9. Slide the cardboard box over the chassis, making sure that the arrows on the box point up and the pallet fasteners to secure the cardboard box to the wooden pallet are near the bottom.
10. Attach the cardboard box to the wooden pallet using the four pallet fasteners attached to the pallet. See [Figure 116 on page 342](#). Squeeze together the two ridges (“fins”) in the depression in each pallet fastener, then slide each fastener into its corresponding slot in the cardboard box and release the ridges to secure the latch.

Figure 116: Insert Pallet Fasteners in the Cardboard Box



11. Write the RMA number on the exterior of the box to ensure proper tracking.

Figure 117: Packing an EX8200 Switch



Packing EX8200 Switch Components for Shipping

To pack EX8200 switch components, follow the instructions here. For instructions to pack line cards, see [“Packing a Line Card Used in an EX8200 Switch” on page 344](#).

Before you begin packing a switch component, ensure that you have the following parts and tools available:

- Antistatic bag, one for each component
- Electrostatic discharge (ESD) grounding strap



CAUTION: Do not stack switch components. Return individual components in separate boxes if they do not fit together on one level in the shipping box.

To pack EX8200 switch components:

- Place individual components in antistatic bags.
- Use the original packing materials if they are available. If the original packing materials are not available, ensure the component is adequately packed to prevent damage during transit. The packing material you use must be able to support the weight of the component.

- Ensure that the components are adequately protected by wrapping them well with packing materials. Pack the component in an oversized box (if the original box is not available) with extra packing material around the unit so that the component is prevented from moving around inside the box.
- Securely tape the box closed.
- Write the RMA number on the exterior of the box to ensure proper tracking.

Packing a Line Card Used in an EX8200 Switch

If you are returning a line card to Juniper Networks for repair or replacement, pack it as described in this topic.

Before you begin packing a line card:

- Ensure that you have taken the necessary precautions to prevent ESD damage (see [“Prevention of Electrostatic Discharge Damage” on page 381](#)).
- Ensure that you know how to handle and store the line card (see *Handling and Storing Line Cards in EX6200 and EX8200 Switches*).
- Retrieve the original shipping carton and packing materials. Contact your JTAC representative if you do not have these materials, to learn about approved packing materials. See [“Contact Customer Support to Obtain Return Material Authorization” on page 339](#).
- Obtain an antistatic bag.



CAUTION: Do not stack line cards on top of one another or on top of any other component. Place each line card separately in an antistatic bag.

To pack a line card:

1. Place the line card in the antistatic bag.
2. Place the line card in the shipping carton.
3. Place the packing foam on top of and around the line card.
4. Close the top of the cardboard shipping box and seal it with packing tape.
5. Write the RMA number on the exterior of the box to ensure proper tracking.

7

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General Safety Guidelines and Warnings

The following guidelines help ensure your safety and protect the device from damage. The list of guidelines might not address all potentially hazardous situations in your working environment, so be alert and exercise good judgment at all times.

- Perform only the procedures explicitly described in the hardware documentation for this device. Make sure that only authorized service personnel perform other system services.
- Keep the area around the device clear and free from dust before, during, and after installation.
- Keep tools away from areas where people could trip over them while walking.
- Do not wear loose clothing or jewelry, such as rings, bracelets, or chains, which could become caught in the device.
- Wear safety glasses if you are working under any conditions that could be hazardous to your eyes.
- Do not perform any actions that create a potential hazard to people or make the equipment unsafe.
- Never attempt to lift an object that is too heavy for one person to handle.
- Never install or manipulate wiring during electrical storms.
- Never install electrical jacks in wet locations unless the jacks are specifically designed for wet environments.
- Operate the device only when it is properly grounded.
- Follow the instructions in this guide to properly ground the device to earth.
- Replace fuses only with fuses of the same type and rating.
- Do not open or remove chassis covers or sheet-metal parts unless instructions are provided in the hardware documentation for this device. Such an action could cause severe electrical shock.
- Do not push or force any objects through any opening in the chassis frame. Such an action could result in electrical shock or fire.
- Avoid spilling liquid onto the chassis or onto any device component. Such an action could cause electrical shock or damage the device.
- Avoid touching uninsulated electrical wires or terminals that have not been disconnected from their power source. Such an action could cause electrical shock.
- Some parts of the chassis, including AC and DC power supply surfaces, power supply unit handles, SFB card handles, and fan tray handles might become hot. The following label provides the warning of the hot surfaces on the chassis:



- Always ensure that all modules, power supplies, and cover panels are fully inserted and that the installation screws are fully tightened.

Definitions of Safety Warning Levels

The documentation uses the following levels of safety warnings (there are two *Warning* formats):

NOTE: You might find this information helpful in a particular situation, or you might overlook this important information if it was not highlighted in a Note.



CAUTION: You need to observe the specified guidelines to prevent minor injury or discomfort to you or severe damage to the device.

Attention Veillez à respecter les consignes indiquées pour éviter toute incommodité ou blessure légère, voire des dégâts graves pour l'appareil.



WARNING: This symbol alerts you to the risk of personal injury from a laser.

Avertissement Ce symbole signale un risque de blessure provoquée par rayon laser.



WARNING: This 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.

Waarschuwing Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijke letsels kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen.

Varoitus Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista.

Avertissement Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents.

Warnung Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt.

Avvertenza Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti.

Advarsel Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker.

Aviso Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes.

¡Atención! Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes.

Varning! Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador.

Qualified Personnel Warning



WARNING: Only trained and qualified personnel should install or replace the device.

Waarschuwing Installatie en reparaties mogen uitsluitend door getraind en bevoegd personeel uitgevoerd worden.

Varoitus Ainoastaan koulutettu ja pätevä henkilökunta saa asentaa tai vaihtaa tämän laitteen.

Avertissement Tout installation ou remplacement de l'appareil doit être réalisé par du personnel qualifié et compétent.

Warnung Gerät nur von geschultem, qualifiziertem Personal installieren oder auswechseln lassen.

Avvertenza Solo personale addestrato e qualificato deve essere autorizzato ad installare o sostituire questo apparecchio.

Advarsel Kun kvalifisert personell med riktig opplæring bør montere eller bytte ut dette utstyret.

Aviso Este equipamento deverá ser instalado ou substituído apenas por pessoal devidamente treinado e qualificado.

¡Atención! Estos equipos deben ser instalados y reemplazados exclusivamente por personal técnico adecuadamente preparado y capacitado.

Varning! Denna utrustning ska endast installeras och bytas ut av utbildad och kvalificerad personal.

Warning Statement for Norway and Sweden



WARNING: The equipment must be connected to an earthed mains socket-outlet.

Advarsel Apparatet skal kobles til en jordet stikkontakt.

Varning! Apparatet skall anslutas till jordat nätuttag.

Fire Safety Requirements

In the event of a fire emergency, the safety of people is the primary concern. You should establish procedures for protecting people in the event of a fire emergency, provide safety training, and properly provision fire-control equipment and fire extinguishers.

In addition, you should establish procedures to protect your equipment in the event of a fire emergency. Juniper Networks products should be installed in an environment suitable for electronic equipment. We recommend that fire suppression equipment be available in the event of a fire in the vicinity of the equipment and that all local fire, safety, and electrical codes and ordinances be observed when you install and operate your equipment.

Fire Suppression

In the event of an electrical hazard or an electrical fire, you should first turn power off to the equipment at the source. Then use a Type C fire extinguisher, which uses noncorrosive fire retardants, to extinguish the fire.

Fire Suppression Equipment

Type C fire extinguishers, which use noncorrosive fire retardants such as carbon dioxide and Halotron™, are most effective for suppressing electrical fires. Type C fire extinguishers displace oxygen from the point of combustion to eliminate the fire. For extinguishing fire on or around equipment that draws air from the environment for cooling, you should use this type of inert oxygen displacement extinguisher instead of an extinguisher that leaves residues on equipment.

Do not use multipurpose Type ABC chemical fire extinguishers (dry chemical fire extinguishers). The primary ingredient in these fire extinguishers is monoammonium phosphate, which is very sticky and difficult to clean. In addition, in the presence of minute amounts of moisture, monoammonium phosphate can become highly corrosive and corrodes most metals.

Any equipment in a room in which a chemical fire extinguisher has been discharged is subject to premature failure and unreliable operation. The equipment is considered to be irreparably damaged.

NOTE: To keep warranties effective, do not use a dry chemical fire extinguisher to control a fire at or near a Juniper Networks device. If a dry chemical fire extinguisher is used, the unit is no longer eligible for coverage under a service agreement.

We recommend that you dispose of any irreparably damaged equipment in an environmentally responsible manner.

Installation Instructions Warning



WARNING: Read the installation instructions before you connect the device to a power source.

Waarschuwing Raadpleeg de installatie-aanwijzingen voordat u het systeem met de voeding verbindt.

Varoitus Lue asennusohjeet ennen järjestelmän yhdistämistä virtälähteeseen.

Avertissement Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.

Warnung Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen.

Avvertenza Consultare le istruzioni di installazione prima di collegare il sistema all'alimentatore.

Advarsel Les installasjonsinstruksjonene før systemet kobles til strømkilden.

Aviso Leia as instruções de instalação antes de ligar o sistema à sua fonte de energia.

¡Atención! Ver las instrucciones de instalación antes de conectar el sistema a la red de alimentación.

Varning! Läs installationsanvisningarna innan du kopplar systemet till dess strömförsörjningsenhet.

Chassis and Component Lifting Guidelines

- Before moving the device to a site, ensure that the site meets the power, environmental, and clearance requirements.
- Before lifting or moving the device, disconnect all external cables and wires.
- As when lifting any heavy object, ensure that most of the weight is borne by your legs rather than your back. Keep your knees bent and your back relatively straight. Do not twist your body as you lift. Balance the load evenly and be sure that your footing is firm.
- Use the following lifting guidelines to lift devices and components:

- Up to 39.7 lbs (18 kg): One person.
- 39.7 lbs (18 kg) to 70.5 lbs (32 kg): Two or more people.
- 70.5 lbs (32 kg) to 121.2 lbs (55 kg): Three or more people.
- Above 121.2 lbs (55 kg): Material handling systems (such as levers, slings, lifts and so on) must be used. When this is not practical, specially trained persons or systems must be used (riggers or movers).

Restricted Access Warning



WARNING: This unit is intended for installation in restricted access areas. A restricted access area is an area to which access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and which is controlled by the authority responsible for the location.

Waarschuwing Dit toestel is bedoeld voor installatie op plaatsen met beperkte toegang. Een plaats met beperkte toegang is een plaats waar toegang slechts door servicepersoneel verkregen kan worden door middel van een speciaal instrument, een slot en sleutel, of een ander veiligheidsmiddel, en welke beheerd wordt door de overheidsinstantie die verantwoordelijk is voor de locatie.

Varoitus Tämä laite on tarkoitettu asennettavaksi paikkaan, johon pääsy on rajoitettua. Paikka, johon pääsy on rajoitettua, tarkoittaa paikkaa, johon vain huoltohenkilöstö pääsee jonkin erikoistyökalun, lukkoon sopivan avaimen tai jonkin muun turvalaitteen avulla ja joka on paikasta vastuussa olevien toimivaltaisten henkilöiden valvoma.

Avertissement Cet appareil est à installer dans des zones d'accès réservé. Ces dernières sont des zones auxquelles seul le personnel de service peut accéder en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout autre moyen de sécurité. L'accès aux zones de sécurité est sous le contrôle de l'autorité responsable de l'emplacement.

Warnung Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Ein Bereich mit beschränktem Zutritt ist ein Bereich, zu dem nur Wartungspersonal mit einem Spezialwerkzeugs, Schloß und Schlüssel oder anderer Sicherheitsvorkehrungen Zugang hat, und der von dem für die Anlage zuständigen Gremium kontrolliert wird.

Avvertenza Questa unità deve essere installata in un'area ad accesso limitato. Un'area ad accesso limitato è un'area accessibile solo a personale di assistenza tramite un'attrezzo speciale, lucchetto, o altri dispositivi di sicurezza, ed è controllata dall'autorità responsabile della zona.

Advarsel Denne enheten er laget for installasjon i områder med begrenset adgang. Et område med begrenset adgang gir kun adgang til servicepersonale som bruker et spesielt verktøy, lås og nøkkel, eller en annen sikkerhetsanordning, og det kontrolleres av den autoriteten som er ansvarlig for området.

Aviso Esta unidade foi concebida para instalação em áreas de acesso restrito. Uma área de acesso restrito é uma área à qual apenas tem acesso o pessoal de serviço autorizado, que possui uma ferramenta, chave e fechadura especial, ou qualquer outra forma de segurança. Esta área é controlada pela autoridade responsável pelo local.

¡Atención! Esta unidad ha sido diseñada para instalarse en áreas de acceso restringido. Área de acceso restringido significa un área a la que solamente tiene acceso el personal de servicio mediante la utilización de una herramienta especial, cerradura con llave, o algún otro medio de seguridad, y que está bajo el control de la autoridad responsable del local.

Varning! Denna enhet är avsedd för installation i områden med begränsat tillträde. Ett område med begränsat tillträde får endast tillträdas av servicepersonal med ett speciellt verktyg, lås och nyckel, eller annan säkerhetsanordning, och kontrolleras av den auktoritet som ansvarar för området.

Ramp Warning



WARNING: When installing the device, do not use a ramp inclined at more than 10 degrees.

Waarschuwing Gebruik een oprijplaat niet onder een hoek van meer dan 10 graden.

Varoitus Älä käytä sellaista kaltevaa pintaa, jonka kaltevuus ylittää 10 astetta.

Avertissement Ne pas utiliser une rampe dont l'inclinaison est supérieure à 10 degrés.

Warnung Keine Rampen mit einer Neigung von mehr als 10 Grad verwenden.

Avvertenza Non usare una rampa con pendenza superiore a 10 gradi.

Advarsel Bruk aldri en rampe som heller mer enn 10 grader.

Aviso Não utilize uma rampa com uma inclinação superior a 10 graus.

¡Atención! No usar una rampa inclinada más de 10 grados

Varning! Använd inte ramp med en lutning på mer än 10 grader.

Rack-Mounting and Cabinet-Mounting Warnings

Ensure that the rack or cabinet in which the device is installed is evenly and securely supported. Uneven mechanical loading could lead to a hazardous condition.



WARNING: To prevent bodily injury when mounting or servicing the device in a rack, take the following precautions to ensure that the system remains stable. The following directives help maintain your safety:

- The device must be installed in a rack that is secured to the building structure.
- The device should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting the device on a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing equipment, install the stabilizers before mounting or servicing the device in the rack.

Waarschuwing Om lichamelijk letsel te voorkomen wanneer u dit toestel in een rek monteert of het daar een servicebeurt geeft, moet u speciale voorzorgsmaatregelen nemen om ervoor te zorgen dat het toestel stabiel blijft. De onderstaande richtlijnen worden verstrekt om uw veiligheid te verzekeren:

- De Juniper Networks switch moet in een stellage worden geïnstalleerd die aan een bouwsel is verankerd.
- Dit toestel dient onderaan in het rek gemonteerd te worden als het toestel het enige in het rek is.
- Wanneer u dit toestel in een gedeeltelijk gevuld rek monteert, dient u het rek van onderen naar boven te laden met het zwaarste onderdeel onderaan in het rek.
- Als het rek voorzien is van stabiliseringshulpmiddelen, dient u de stabilisatoren te monteren voordat u het toestel in het rek monteert of het daar een servicebeurt geeft.

Varoitus Kun laite asetetaan telineeseen tai huolletaan sen ollessa telineessä, on noudatettava erityisiä varotoimia järjestelmän vakavuuden säilyttämiseksi, jotta vältetään loukkaantumiselta. Noudata seuraavia turvallisuusohjeita:

- Juniper Networks switch on asennettava telineeseen, joka on kiinnitetty rakennukseen.
- Jos telineessä ei ole muita laitteita, aseta laite telineen alaosaan.
- Jos laite asetetaan osaksi täytettyyn telineeseen, aloita kuormittaminen sen alaosasta kaikkein raskaimmalla esineellä ja siirry sitten sen yläosaan.
- Jos telinettä varten on vakaimet, asenna ne ennen laitteen asettamista telineeseen tai sen huoltamista siinä.

Avertissement Pour éviter toute blessure corporelle pendant les opérations de montage ou de réparation de cette unité en casier, il convient de prendre des précautions spéciales afin de maintenir la stabilité du système. Les directives ci-dessous sont destinées à assurer la protection du personnel:

- Le rack sur lequel est monté le Juniper Networks switch doit être fixé à la structure du bâtiment.
- Si cette unité constitue la seule unité montée en casier, elle doit être placée dans le bas.
- Si cette unité est montée dans un casier partiellement rempli, charger le casier de bas en haut en plaçant l'élément le plus lourd dans le bas.
- Si le casier est équipé de dispositifs stabilisateurs, installer les stabilisateurs avant de monter ou de réparer l'unité en casier.

Warnung Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt. Die folgenden Richtlinien sollen zur Gewährleistung Ihrer Sicherheit dienen:

- Der Juniper Networks switch muß in einem Gestell installiert werden, das in der Gebäudestruktur verankert ist.
- Wenn diese Einheit die einzige im Gestell ist, sollte sie unten im Gestell angebracht werden.
- Bei Anbringung dieser Einheit in einem zum Teil gefüllten Gestell ist das Gestell von unten nach oben zu laden, wobei das schwerste Bauteil unten im Gestell anzubringen ist.
- Wird das Gestell mit Stabilisierungszubehör geliefert, sind zuerst die Stabilisatoren zu installieren, bevor Sie die Einheit im Gestell anbringen oder sie warten.

Avvertenza Per evitare infortuni fisici durante il montaggio o la manutenzione di questa unità in un supporto, occorre osservare speciali precauzioni per garantire che il sistema rimanga stabile. Le seguenti direttive vengono fornite per garantire la sicurezza personale:

- Il Juniper Networks switch deve essere installato in un telaio, il quale deve essere fissato alla struttura dell'edificio.
- Questa unità deve venire montata sul fondo del supporto, se si tratta dell'unica unità da montare nel supporto.
- Quando questa unità viene montata in un supporto parzialmente pieno, caricare il supporto dal basso all'alto, con il componente più pesante sistemato sul fondo del supporto.
- Se il supporto è dotato di dispositivi stabilizzanti, installare tali dispositivi prima di montare o di procedere alla manutenzione dell'unità nel supporto.

Advarsel Unngå fysiske skader under montering eller reparasjonsarbeid på denne enheten når den befinner seg i et kabinett. Vær nøye med at systemet er stabilt. Følgende retningslinjer er gitt for å verne om sikkerheten:

- Juniper Networks switch må installeres i et stativ som er forankret til bygningsstrukturen.
- Denne enheten bør monteres nederst i kabinettet hvis dette er den eneste enheten i kabinettet.
- Ved montering av denne enheten i et kabinett som er delvis fylt, skal kabinettet lastes fra bunnen og opp med den tyngste komponenten nederst i kabinettet.
- Hvis kabinettet er utstyrt med stabiliseringsutstyr, skal stabilisatorene installeres før montering eller utføring av reparasjonsarbeid på enheten i kabinettet.

Aviso Para se prevenir contra danos corporais ao montar ou reparar esta unidade numa estante, deverá tomar precauções especiais para se certificar de que o sistema possui um suporte estável. As seguintes directrizes ajudá-lo-ão a efectuar o seu trabalho com segurança:

- O Juniper Networks switch deverá ser instalado numa prateleira fixa à estrutura do edifício.
- Esta unidade deverá ser montada na parte inferior da estante, caso seja esta a única unidade a ser montada.
- Ao montar esta unidade numa estante parcialmente ocupada, coloque os itens mais pesados na parte inferior da estante, arrumando-os de baixo para cima.
- Se a estante possuir um dispositivo de estabilização, instale-o antes de montar ou reparar a unidade.

¡Atención! Para evitar lesiones durante el montaje de este equipo sobre un bastidor, oerriormente durante su mantenimiento, se debe poner mucho cuidado en que el sistema quede bien estable. Para garantizar su seguridad, proceda según las siguientes instrucciones:

- El Juniper Networks switch debe instalarse en un bastidor fijado a la estructura del edificio.
- Colocar el equipo en la parte inferior del bastidor, cuando sea la única unidad en el mismo.
- Cuando este equipo se vaya a instalar en un bastidor parcialmente ocupado, comenzar la instalación desde la parte inferior hacia la superior colocando el equipo más pesado en la parte inferior.
- Si el bastidor dispone de dispositivos estabilizadores, instalar éstos antes de montar o proceder al mantenimiento del equipo instalado en el bastidor.

Warning! För att undvika kroppsskada när du installerar eller utför underhållsarbete på denna enhet på en ställning måste du vidta särskilda försiktighetsåtgärder för att försäkra dig om att systemet står stadigt. Följande riktlinjer ges för att trygga din säkerhet:

- Juniper Networks switch måste installeras i en ställning som är förankrad i byggnadens struktur.
- Om denna enhet är den enda enheten på ställningen skall den installeras längst ned på ställningen.
- Om denna enhet installeras på en delvis fylld ställning skall ställningen fyllas nedifrån och upp, med de tyngsta enheterna längst ned på ställningen.
- Om ställningen är försedd med stabiliseringsdon skall dessa monteras fast innan enheten installeras eller underhålls på ställningen.

Grounded Equipment Warning



WARNING: This device must be properly grounded at all times. Follow the instructions in this guide to properly ground the device to earth.

Waarschuwing Dit apparaat moet altijd goed geaard zijn. Volg de instructies in deze gids om het apparaat goed te aarden.

Varoitus Laitteen on oltava pysyvästi maadoitettu. Maadoita laite asianmukaisesti noudattamalla tämän oppaan ohjeita.

Avertissement L'appareil doit être correctement mis à la terre à tout moment. Suivez les instructions de ce guide pour correctement mettre l'appareil à la terre.

Warnung Das Gerät muss immer ordnungsgemäß geerdet sein. Befolgen Sie die Anweisungen in dieser Anleitung, um das Gerät ordnungsgemäß zu erden.

Avvertenza Questo dispositivo deve sempre disporre di una connessione a massa. Seguire le istruzioni indicate in questa guida per connettere correttamente il dispositivo a massa.

Advarsel Denne enheten på jordes skikkelig hele tiden. Følg instruksjonene i denne veiledningen for å jorde enheten.

Aviso Este equipamento deverá estar ligado à terra. Siga las instrucciones en esta guía para conectar correctamente este dispositivo a tierra.

¡Atención! Este dispositivo debe estar correctamente conectado a tierra en todo momento. Siga las instrucciones en esta guía para conectar correctamente este dispositivo a tierra.

Warning! Den här enheten måste vara ordentligt jordad. Följ instruktionerna i den här guiden för att jorda enheten ordentligt.

Radiation from Open Port Apertures Warning



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

Waarschuwing Aangezien onzichtbare straling vanuit de opening van de poort kan komen als er geen fiberkabel aangesloten is, dient blootstelling aan straling en het kijken in open openingen vermeden te worden.

Varoitus Koska portin aukosta voi emittoitua näkymätöntä säteilyä, kun kuitukaapelia ei ole kytkettynä, vältä säteilylle altistumista äläkä katso avoimiin aukkoihin.

Avertissement Des radiations invisibles à l'il nu pouvant traverser l'ouverture du port lorsqu'aucun câble en fibre optique n'y est connecté, il est recommandé de ne pas regarder fixement l'intérieur de ces ouvertures.

Warnung Aus der Port-Öffnung können unsichtbare Strahlen emittieren, wenn kein Glasfaserkabel angeschlossen ist. Vermeiden Sie es, sich den Strahlungen auszusetzen, und starren Sie nicht in die Öffnungen!

Avvertenza Quando i cavi in fibra non sono inseriti, radiazioni invisibili possono essere emesse attraverso l'apertura della porta. Evitate di esporvi alle radiazioni e non guardate direttamente nelle aperture.

Advarsel Unngå utsettelse for stråling, og stirr ikke inn i åpninger som er åpne, fordi usynlig stråling kan emitteres fra portens åpning når det ikke er tilkoblet en fiberkabel.

Aviso Dada a possibilidade de emissão de radiação invisível através do orifício da via de acesso, quando esta não tiver nenhum cabo de fibra conectado, deverá evitar a exposição à radiação e não deverá olhar fixamente para orifícios que se encontrarem a descoberto.

¡Atención! Debido a que la apertura del puerto puede emitir radiación invisible cuando no existe un cable de fibra conectado, evite mirar directamente a las aperturas para no exponerse a la radiación.

Warning! Osynlig stråling kan avges från en portöppning utan ansluten fiberkabel och du bör därför undvika att bli utsatt för stråling genom att inte stirra in i oskyddade öppningar.

Laser and LED Safety Guidelines and Warnings

IN THIS SECTION

- [General Laser Safety Guidelines | 367](#)
- [Class 1 Laser Product Warning | 368](#)
- [Class 1 LED Product Warning | 369](#)
- [Laser Beam Warning | 370](#)

Juniper Networks devices are equipped with laser transmitters, which are considered a Class 1 Laser Product by the U.S. Food and Drug Administration and are evaluated as a Class 1 Laser Product per EN 60825-1 requirements.

Observe the following guidelines and warnings:

General Laser Safety Guidelines

When working around ports that support optical transceivers, observe the following safety guidelines to prevent eye injury:

- Do not look into unterminated ports or at fibers that connect to unknown sources.
- Do not examine unterminated optical ports with optical instruments.
- Avoid direct exposure to the beam.



WARNING: Unterminated optical connectors can emit invisible laser radiation. The lens in the human eye focuses all the laser power on the retina, so focusing the eye directly on a laser source—even a low-power laser—could permanently damage the eye.

Avertissement Les connecteurs à fibre optique sans terminaison peuvent émettre un rayonnement laser invisible. Le cristallin de l'œil humain faisant converger toute la puissance du laser sur la rétine, toute focalisation directe de l'œil sur une source laser, —même de faible puissance—, peut entraîner des lésions oculaires irréversibles.

Class 1 Laser Product Warning



WARNING: Class 1 laser product.

Waarschuwing Klasse-1 laser produkt.

Varoitus Luokan 1 lasertuote.

Avertissement Produit laser de classe I.

Warnung Laserprodukt der Klasse 1.

Avvertenza Prodotto laser di Classe 1.

Advarsel Laserprodukt av klasse 1.

Aviso Produto laser de classe 1.

¡Atención! Producto láser Clase I.

Varning! Laserprodukt av klass 1.

Class 1 LED Product Warning



WARNING: Class 1 LED product.

Waarschuwing Klasse 1 LED-product.

Varoitus Luokan 1 valodiodituote.

Avertissement Alarme de produit LED Class I.

Warnung Class 1 LED-Produktwarnung.

Avvertenza Avvertenza prodotto LED di Classe 1.

Advarsel LED-produkt i klasse 1.

Aviso Produto de classe 1 com LED.

¡Atención! Aviso sobre producto LED de Clase 1.

Varning! Lysdiodprodukt av klass 1.

Laser Beam Warning



WARNING: Do not stare into the laser beam or view it directly with optical instruments.

Waarschuwing Niet in de straal staren of hem rechtstreeks bekijken met optische instrumenten.

Varoitus Älä katso säteeseen äläkä tarkastele sitä suoraan optisen laitteen avulla.

Avertissement Ne pas fixer le faisceau des yeux, ni l'observer directement à l'aide d'instruments optiques.

Warnung Nicht direkt in den Strahl blicken und ihn nicht direkt mit optischen Geräten prüfen.

Avvertenza Non fissare il raggio con gli occhi né usare strumenti ottici per osservarlo direttamente.

Advarsel Stirr eller se ikke direkte p strlen med optiske instrumenter.

Aviso Não olhe fixamente para o raio, nem olhe para ele directamente com instrumentos ópticos.

¡Atención! No mirar fijamente el haz ni observarlo directamente con instrumentos ópticos.

Warning! Rikta inte blicken in mot strålen och titta inte direkt på den genom optiska instrument.

Maintenance and Operational Safety Guidelines and Warnings

IN THIS SECTION

- [Battery Handling Warning | 372](#)
- [Jewelry Removal Warning | 373](#)
- [Lightning Activity Warning | 375](#)

- Operating Temperature Warning | 376
- Product Disposal Warning | 378

While performing the maintenance activities for devices, observe the following guidelines and warnings:

Battery Handling Warning



WARNING: Replacing a battery incorrectly might result in an explosion. Replace a battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Waarschuwing Er is ontplofingsgevaar als de batterij verkeerd vervangen wordt. Vervang de batterij slechts met hetzelfde of een equivalent type dat door de fabrikant aanbevolen is. Gebruikte batterijen dienen overeenkomstig fabrieksvoorschriften weggeworpen te worden.

Varoitus Räjähdyksen vaara, jos akku on vaihdettu väärään akkuun. Käytä vaihtamiseen ainoastaan saman- tai vastaaventyyppistä akkua, joka on valmistajan suosittelema. Hävitä käytetyt akut valmistajan ohjeiden mukaan.

Avertissement Danger d'explosion si la pile n'est pas remplacée correctement. Ne la remplacer que par une pile de type semblable ou équivalent, recommandée par le fabricant. Jeter les piles usagées conformément aux instructions du fabricant.

Warnung Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr. Ersetzen Sie die Batterie nur durch den gleichen oder vom Hersteller empfohlenen Batterietyp. Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers.

Advarsel Det kan være fare for eksplosjon hvis batteriet skiftes på feil måte. Skift kun med samme eller tilsvarende type som er anbefalt av produsenten. Kasser brukte batterier i henhold til produsentens instruksjoner.

Avvertenza Pericolo di esplosione se la batteria non è installata correttamente. Sostituire solo con una di tipo uguale o equivalente, consigliata dal produttore. Eliminare le batterie usate secondo le istruzioni del produttore.

Aviso Existe perigo de explosão se a bateria for substituída incorrectamente. Substitua a bateria por uma bateria igual ou de um tipo equivalente recomendado pelo fabricante. Destrua as baterias usadas conforme as instruções do fabricante.

¡Atención! Existe peligro de explosión si la batería se reemplaza de manera incorrecta. Reemplazar la batería EXclusivamente con el mismo tipo o el equivalente recomendado por el fabricante. Desechar las baterías gastadas según las instrucciones del fabricante.

Warning! Explosionsfara vid felaktigt batteribyte. Ersätt endast batteriet med samma batterityp som rekommenderas av tillverkaren eller motsvarande. Följ tillverkarens anvisningar vid kassering av använda batterier.

Jewelry Removal Warning



WARNING: Before working on equipment that is connected to power lines, remove jewelry, including rings, necklaces, and watches. Metal objects heat up when connected to power and ground and can cause serious burns or can be welded to the terminals.

Waarschuwing Alvorens aan apparatuur te werken die met elektrische leidingen is verbonden, sieraden (inclusief ringen, kettingen en horloges) verwijderen. Metalen voorwerpen worden warm wanneer ze met stroom en aarde zijn verbonden, en kunnen ernstige brandwonden veroorzaken of het metalen voorwerp aan de aansluitklemmen lassen.

Varoitus Ennen kuin työskentelet voimavirtajohtoihin kytkettyjen laitteiden parissa, ota pois kaikki korut (sormukset, kaulakorut ja kellot mukaan lukien). Metalliesineet kuumentuvat, kun ne ovat yhteydessä sähkövirran ja maan kanssa, ja ne voivat aiheuttaa vakavia palovammoja tai hitsata metalliesineet kiinni liitännänpoihin.

Avertissement Avant d'accéder à cet équipement connecté aux lignes électriques, ôter tout bijou (anneaux, colliers et montres compris). Lorsqu'ils sont branchés à l'alimentation et reliés à la terre, les objets métalliques chauffent, ce qui peut provoquer des blessures graves ou souder l'objet métallique aux bornes.

Warnung Vor der Arbeit an Geräten, die an das Netz angeschlossen sind, jeglichen Schmuck (einschließlich Ringe, Ketten und Uhren) abnehmen. Metallgegenstände erhitzen sich, wenn sie an das Netz und die Erde angeschlossen werden, und können schwere Verbrennungen verursachen oder an die Anschlußklemmen angeschweißt werden.

Avvertenza Prima di intervenire su apparecchiature collegate alle linee di alimentazione, togliersi qualsiasi monile (inclusi anelli, collane, braccialetti ed orologi). Gli oggetti metallici si riscaldano quando sono collegati tra punti di alimentazione e massa: possono causare ustioni gravi oppure il metallo può saldarsi ai terminali.

Advarsel Fjern alle smykker (inkludert ringer, halskjeder og klokker) før du skal arbeide på utstyr som er koblet til kraftledninger. Metallgjenstander som er koblet til kraftledninger og jord blir svært varme og kan forårsake alvorlige brannskader eller smelte fast til polene.

Aviso Antes de trabalhar em equipamento que esteja ligado a linhas de corrente, retire todas as jóias que estiver a usar (incluindo anéis, fios e relógios). Os objectos metálicos aquecerão em contacto com a corrente e em contacto com a ligação à terra, podendo causar queimaduras graves ou ficarem soldados aos terminais.

¡Atención! Antes de operar sobre equipos conectados a líneas de alimentación, quitarse las joyas (incluidos anillos, collares y relojes). Los objetos de metal se calientan cuando

se conectan a la alimentación y a tierra, lo que puede ocasionar quemaduras graves o que los objetos metálicos queden soldados a los bornes.

Warning! Tag av alla smycken (inklusive ringar, halsband och armbandsur) innan du arbetar på utrustning som är kopplad till kraftledning. Metallobjekt hettas upp när de kopplas ihop med ström och jord och kan förorsaka allvarliga brännskador; metallobjekt kan också sammansvetsas med kontakterna.

Lightning Activity Warning



WARNING: Do not work on the system or connect or disconnect cables during periods of lightning activity.

Waarschuwing Tijdens onweer dat gepaard gaat met bliksem, dient u niet aan het systeem te werken of kabels aan te sluiten of te ontkoppelen.

Varoitus Älä työskentele järjestelmän parissa äläkä yhdistä tai irrota kaapeleita ukkosilmalla.

Avertissement Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage.

Warnung Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert.

Avvertenza Non lavorare sul sistema o collegare oppure scollegare i cavi durante un temporale con fulmini.

Advarsel Utfør aldri arbeid på systemet, eller koble kabler til eller fra systemet når det tordner eller lyner.

Aviso Não trabalhe no sistema ou ligue e desligue cabos durante períodos de mau tempo (trovoada).

¡Atención! No operar el sistema ni conectar o desconectar cables durante el transcurso de descargas eléctricas en la atmósfera.

Warning! Vid åska skall du aldrig utföra arbete på systemet eller ansluta eller koppla loss kablar.

Operating Temperature Warning



WARNING: To prevent the device from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature. To prevent airflow restriction, allow at least 6 in. (15.2 cm) of clearance around the ventilation openings.

Waarschuwing Om te voorkomen dat welke switch van de Juniper Networks router dan ook oververhit raakt, dient u deze niet te bedienen op een plaats waar de maximale aanbevolen omgevingstemperatuur van 40° C wordt overschreden. Om te voorkomen dat de luchtstroom wordt beperkt, dient er minstens 15,2 cm speling rond de ventilatie-openingen te zijn.

Varoitus Ettei Juniper Networks switch-sarjan reititin ylikuumentuisi, sitä ei saa käyttää tilassa, jonka lämpötila ylittää korkeimman suositellun ympäristölämpötilan 40° C. Ettei ilmanvaihto estyisi, tuuletusaukkojen ympärille on jätettävä ainakin 15,2 cm tilaa.

Avertissement Pour éviter toute surchauffe des routeurs de la gamme Juniper Networks switch, ne l'utilisez pas dans une zone où la température ambiante est supérieure à 40° C. Pour permettre un flot d'air constant, dégagez un espace d'au moins 15,2 cm autour des ouvertures de ventilations.

Warnung Um einen Router der switch vor Überhitzung zu schützen, darf dieser nicht in einer Gegend betrieben werden, in der die Umgebungstemperatur das empfohlene Maximum von 40° C überschreitet. Um Lüftungsverschluß zu verhindern, achten Sie darauf, daß mindestens 15,2 cm lichter Raum um die Lüftungsöffnungen herum frei bleibt.

Avvertenza Per evitare il surriscaldamento dei switch, non adoperateli in un locale che ecceda la temperatura ambientale massima di 40° C. Per evitare che la circolazione dell'aria sia impedita, lasciate uno spazio di almeno 15.2 cm di fronte alle aperture delle ventole.

Advarsel Unngå overoppheting av eventuelle rutere i Juniper Networks switch Disse skal ikke brukes på steder der den anbefalte maksimale omgivelsestemperaturen overstiger 40° C (104° F). Sørg for at klaringen rundt lufteåpningene er minst 15,2 cm (6 tommer) for å forhindre nedsatt luftsirkulasjon.

Aviso Para evitar o sobreaquecimento do encaminhador Juniper Networks switch, não utilize este equipamento numa área que exceda a temperatura máxima recomendada de 40° C. Para evitar a restrição à circulação de ar, deixe pelo menos um espaço de 15,2 cm à volta das aberturas de ventilação.

¡Atención! Para impedir que un encaminhador de la serie Juniper Networks switch se recaliente, no lo haga funcionar en un área en la que se supere la temperatura ambiente máxima recomendada de 40° C. Para impedir la restricción de la entrada de aire, deje un espacio mínimo de 15,2 cm alrededor de las aberturas para ventilación.

Warning! Förhindra att en Juniper Networks switch överhettas genom att inte använda den i ett område där den maximalt rekommenderade omgivningstemperaturen på 40° C överskrids. Förhindra att luftcirkulationen inskränks genom att se till att det finns fritt utrymme på minst 15,2 cm omkring ventilationsöppningarna.

Product Disposal Warning



WARNING: Disposal of this device must be handled according to all national laws and regulations.

Waarschuwing Dit produkt dient volgens alle landelijke wetten en voorschriften te worden afgedankt.

Varoitus Tämän tuotteen lopullisesta hävittämisestä tulee huolehtia kaikkia valtakunnallisia lakeja ja säännöksiä noudattaen.

Avertissement La mise au rebut définitive de ce produit doit être effectuée conformément à toutes les lois et réglementations en vigueur.

Warnung Dieses Produkt muß den geltenden Gesetzen und Vorschriften entsprechend entsorgt werden.

Avvertenza L'eliminazione finale di questo prodotto deve essere eseguita osservando le normative italiane vigenti in materia

Advarsel Endelig disponering av dette produktet må skje i henhold til nasjonale lover og forskrifter.

Aviso A descartagem final deste produto deverá ser efectuada de acordo com os regulamentos e a legislação nacional.

¡Atención! El desecho final de este producto debe realizarse según todas las leyes y regulaciones nacionales

Warning! Slutlig kassering av denna produkt bör skötas i enlighet med landets alla lagar och föreskrifter.

General Electrical Safety Guidelines and Warnings



WARNING: Certain ports on the device are designed for use as intrabuilding (within-the-building) interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed outside plant (OSP) cabling. To comply with NEBS requirements and protect against lightning surges and commercial power disturbances, the intrabuilding ports *must not* be metallicity connected to interfaces that connect to the OSP or its wiring. The intrabuilding ports on the device are suitable for connection to intrabuilding or unexposed wiring or cabling only. The addition of primary protectors is not sufficient protection for connecting these interfaces metallicity to OSP wiring.

Avertissement Certains ports de l'appareil sont destinés à un usage en intérieur uniquement (ports Type 2 ou Type 4 tels que décrits dans le document GR-1089-CORE) et doivent être isolés du câblage de l'installation extérieure exposée. Pour respecter les exigences NEBS et assurer une protection contre la foudre et les perturbations de tension secteur, les ports pour intérieur *ne doivent pas* être raccordés physiquement aux interfaces prévues pour la connexion à l'installation extérieure ou à son câblage. Les ports pour intérieur de l'appareil sont réservés au raccordement de câbles pour intérieur ou non exposés uniquement. L'ajout de protections ne constitue pas une précaution suffisante pour raccorder physiquement ces interfaces au câblage de l'installation extérieure.



CAUTION: Before removing or installing components of a device, connect an electrostatic discharge (ESD) grounding strap to an ESD point and wrap and fasten the other end of the strap around your bare wrist. Failure to use an ESD grounding strap could result in damage to the device.

Attention Avant de retirer ou d'installer des composants d'un appareil, raccordez un bracelet antistatique à un point de décharge électrostatique et fixez le bracelet à votre poignet nu. L'absence de port d'un bracelet antistatique pourrait provoquer des dégâts sur l'appareil.

- Install the device in compliance with the following local, national, and international electrical codes:
 - United States—National Fire Protection Association (NFPA 70), United States National Electrical Code.
 - Other countries—International Electromechanical Commission (IEC) 60364, Part 1 through Part 7.
 - Evaluated to the TN power system.

- Canada—Canadian Electrical Code, Part 1, CSA C22.1.
- Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.

Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.

- Locate the emergency power-off switch for the room in which you are working so that if an electrical accident occurs, you can quickly turn off the power.
- Make sure that grounding surfaces are cleaned and brought to a bright finish before grounding connections are made.
- Do not work alone if potentially hazardous conditions exist anywhere in your workspace.
- Never assume that power is disconnected from a circuit. Always check the circuit before starting to work.
- Carefully look for possible hazards in your work area, such as moist floors, ungrounded power extension cords, and missing safety grounds.
- Operate the device within marked electrical ratings and product usage instructions.
- To ensure that the device and peripheral equipment function safely and correctly, use the cables and connectors specified for the attached peripheral equipment, and make certain they are in good condition.

You can remove and replace many device components without powering off or disconnecting power to the device, as detailed elsewhere in the hardware documentation for this device. Never install equipment that appears to be damaged.

Action to Take After an Electrical Accident

If an electrical accident results in an injury, take the following actions in this order:

1. Use caution. Be aware of potentially hazardous conditions that could cause further injury.
2. Disconnect power from the device.
3. If possible, send another person to get medical aid. Otherwise, assess the condition of the victim, then call for help.

Prevention of Electrostatic Discharge Damage

Device components that are shipped in antistatic bags are sensitive to damage from static electricity. Some components can be impaired by voltages as low as 30 V. You can easily generate potentially damaging static voltages whenever you handle plastic or foam packing material or if you move components across plastic or carpets. Observe the following guidelines to minimize the potential for electrostatic discharge (ESD) damage, which can cause intermittent or complete component failures:

- Always use an ESD wrist strap when you are handling components that are subject to ESD damage, and make sure that it is in direct contact with your skin.

If a grounding strap is not available, hold the component in its antistatic bag (see [Figure 118 on page 382](#)) in one hand and touch the exposed, bare metal of the device with the other hand immediately before inserting the component into the device.



WARNING: For safety, periodically check the resistance value of the ESD grounding strap. The measurement must be in the range 1 through 10 Mohms.

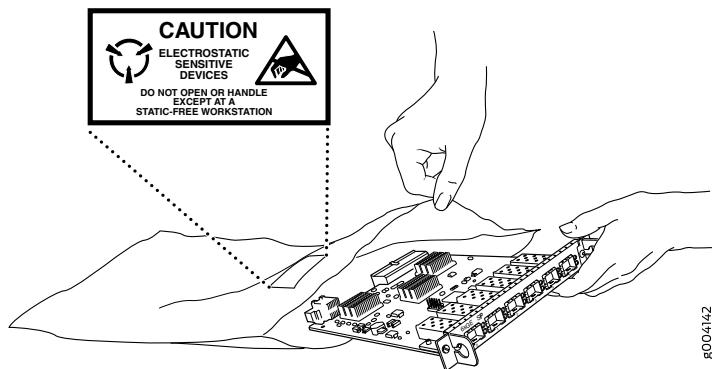
Avertissement Par mesure de sécurité, vérifiez régulièrement la résistance du bracelet antistatique. Cette valeur doit être comprise entre 1 et 10 mégohms (Mohms).

- When handling any component that is subject to ESD damage and that is removed from the device, make sure the equipment end of your ESD wrist strap is attached to the ESD point on the chassis.

If no grounding strap is available, touch the exposed, bare metal of the device to ground yourself before handling the component.

- Avoid contact between the component that is subject to ESD damage and your clothing. ESD voltages emitted from clothing can damage components.
- When removing or installing a component that is subject to ESD damage, always place it component-side up on an antistatic surface, in an antistatic card rack, or in an antistatic bag (see [Figure 118 on page 382](#)). If you are returning a component, place it in an antistatic bag before packing it.

Figure 118: Placing a Component into an Antistatic Bag



CAUTION: ANSI/TIA/EIA-568 cables such as Category 5e and Category 6 can get electrostatically charged. To dissipate this charge, always ground the cables to a suitable and safe earth ground before connecting them to the system.

Attention Les câbles ANSI/TIA/EIA-568, par exemple Cat 5e et Cat 6, peuvent emmagasiner des charges électrostatiques. Pour évacuer ces charges, reliez toujours les câbles à une prise de terre adaptée avant de les raccorder au système.

AC Power Electrical Safety Guidelines

The following electrical safety guidelines apply to AC-powered devices:

- Note the following warnings printed on the device:

“CAUTION: THIS UNIT HAS MORE THAN ONE POWER SUPPLY CORD. DISCONNECT ALL POWER SUPPLY CORDS BEFORE SERVICING TO AVOID ELECTRIC SHOCK.”

“ATTENTION: CET APPAREIL COMPORTE PLUS D'UN CORDON D'ALIMENTATION. AFIN DE PRÉVENIR LES CHOCS ÉLECTRIQUES, DÉBRANCHER TOUT CORDON D'ALIMENTATION AVANT DE FAIRE LE DÉPANNAGE.”

- AC-powered devices are shipped with a three-wire electrical cord with a grounding-type plug that fits only a grounding-type power outlet. Do not circumvent this safety feature. Equipment grounding must comply with local and national electrical codes.
- You must provide an external certified circuit breaker (2-pole circuit breaker or 4-pole circuit breaker based on your device) rated minimum 20 A in the building installation.

- The power cord serves as the main disconnecting device for the AC-powered device. The socket outlet must be near the AC-powered device and be easily accessible.
- For devices that have more than one power supply connection, you must ensure that all power connections are fully disconnected so that power to the device is completely removed to prevent electric shock. To disconnect power, unplug all power cords (one for each power supply).

Power Cable Warning (Japanese)

WARNING: The attached power cable is only for this product. Do not use the cable for another product.

注意

附属の電源コードセットはこの製品専用です。
他の電気機器には使用しないでください。

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AC Power Disconnection Warning



WARNING: Before working on the device or near power supplies, unplug all the power cords from an AC-powered device.

Waarschuwing Voordat u aan een frame of in de nabijheid van voedingen werkt, dient u bij wisselstroom toestellen de stekker van het netsnoer uit het stopcontact te halen.

Varoitus Kytke irti vaihtovirtalaitteiden virtajohto, ennen kuin teet mitään asennuspohjalle tai työskentelet virtalähteiden läheisyydessä.

Avertissement Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif.

Warnung Bevor Sie an einem Chassis oder in der Nähe von Netzgeräten arbeiten, ziehen Sie bei Wechselstromeinheiten das Netzkabel ab bzw.

Avvertenza Prima di lavorare su un telaio o intorno ad alimentatori, scollegare il cavo di alimentazione sulle unità CA.

Advarsel Før det utføres arbeid på kabinettet eller det arbeides i nærheten av strømforsyningsenheter, skal strømledningen trekkes ut på vekselstrømsenheter.

Aviso Antes de trabalhar num chassis, ou antes de trabalhar perto de unidades de fornecimento de energia, desligue o cabo de alimentação nas unidades de corrente alternada.

¡Atención! Antes de manipular el chasis de un equipo o trabajar cerca de una fuente de alimentación, desenchufar el cable de alimentación en los equipos de corriente alterna (CA).

Warning! Innan du arbetar med ett chassi eller nära strömförsörjningsenheter skall du för växelströmsenheter dra ur nätsladden.

DC Power Electrical Safety Guidelines

- A DC-powered device is equipped with a DC terminal block that is rated for the power requirements of a maximally configured device.
- For permanently connected equipment, a readily accessible disconnect device shall be incorporated external to the equipment.
- For pluggable equipment, the socket-outlet shall be installed near the equipment and shall be easily accessible.
- Be sure to connect the ground wire or conduit to a solid central office earth ground.
- A closed loop ring is recommended for terminating the ground conductor at the ground stud.
- Run two wires from the circuit breaker box to a source of 48 VDC.
- A DC-powered device that is equipped with a DC terminal block is intended only for installation in a restricted-access location. In the United States, a restricted-access area is one in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code ANSI/NFPA 70.

NOTE: Primary overcurrent protection is provided by the building circuit breaker. This breaker must protect against excess currents, short circuits, and earth grounding faults in accordance with NEC ANSI/NFPA 70.

- Ensure that the polarity of the DC input wiring is correct. Under certain conditions, connections with reversed polarity might trip the primary circuit breaker or damage the equipment.
- The marked input voltage of -48 VDC for a DC-powered device is the nominal voltage associated with the battery circuit, and any higher voltages are only to be associated with float voltages for the charging function.
- Because the device is a positive ground system, you must connect the positive lead to the terminal labeled **RTN**, the negative lead to the terminal labeled -48 VDC, and the earth ground to the device grounding points.

DC Power Disconnection Warning



WARNING: Before performing any of the DC power procedures, ensure that power is removed from the DC circuit. To ensure that all power is off, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the device handle of the circuit breaker in the OFF position.

Waarschuwing Voordat u een van de onderstaande procedures uitvoert, dient u te controleren of de stroom naar het gelijkstroom circuit uitgeschakeld is. Om u ervan te verzekeren dat alle stroom UIT is geschakeld, kiest u op het schakelbord de stroomverbreker die het gelijkstroom circuit bedient, draait de stroomverbreker naar de UIT positie en plakt de schakelaarhendel van de stroomverbreker met plakband in de UIT positie vast.

Varoitus Varmista, että tasavirtapiirissä ei ole virtaa ennen seuraavien toimenpiteiden suorittamista. Varmistaaksesi, että virta on KATKAISTU täysin, paikanna tasavirrasta huolehtivassa kojetaulussa sijaitseva suojakytkin, käännä suojakytkin KATKAISTU-asentoon ja teippaa suojakytkimen varsi niin, että se pysyy KATKAISTU-asennossa.

Avertissement Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifier que le circuit en courant continu n'est plus sous tension. Pour en être sûr, localiser le disjoncteur situé sur le panneau de service du circuit en courant continu, placer le disjoncteur en position fermée (OFF) et, à l'aide d'un ruban adhésif, bloquer la poignée du disjoncteur en position OFF.

Warnung Vor Ausführung der folgenden Vorgänge ist sicherzustellen, daß die Gleichstromschaltung keinen Strom erhält. Um sicherzustellen, daß sämtlicher Strom abgestellt ist, machen Sie auf der Schalttafel den Unterbrecher für die Gleichstromschaltung ausfindig, stellen Sie den Unterbrecher auf AUS, und kleben Sie den Schaltergriff des Unterbrechers mit Klebeband in der AUS-Stellung fest.

Avvertenza Prima di svolgere una qualsiasi delle procedure seguenti, verificare che il circuito CC non sia alimentato. Per verificare che tutta l'alimentazione sia scollegata (OFF), individuare l'interruttore automatico sul quadro strumenti che alimenta il circuito CC, mettere l'interruttore in posizione OFF e fissarlo con nastro adesivo in tale posizione.

Advarsel Før noen av disse prosedyrene utføres, kontroller at strømmen er frakoblet likestrømkretsen. Sørg for at all strøm er slått AV. Dette gjøres ved å lokalisere strømbryteren på brytertavlen som betjener likestrømkretsen, slå strømbryteren AV og teipe bryterhåndtaket på strømbryteren i AV-stilling.

Aviso Antes de executar um dos seguintes procedimentos, certifique-se que desligou a fonte de alimentação de energia do circuito de corrente contínua. Para se assegurar

que toda a corrente foi DESLIGADA, localize o disjuntor no painel que serve o circuito de corrente contínua e coloque-o na posição OFF (Desligado), segurando nessa posição a manivela do interruptor do disjuntor com fita isoladora.

¡Atención! Antes de proceder con los siguientes pasos, comprobar que la alimentación del circuito de corriente continua (CC) esté cortada (OFF). Para asegurarse de que toda la alimentación esté cortada (OFF), localizar el interruptor automático en el panel que alimenta al circuito de corriente continua, cambiar el interruptor automático a la posición de Apagado (OFF), y sujetar con cinta la palanca del interruptor automático en posición de Apagado (OFF).

Warning! Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten. Kontrollera att all strömförsörjning är BRUTEN genom att slå AV det överspänningsskydd som skyddar likströmskretsen och tejpa fast överspänningsskyddets omkopplare i FRÅN-läget.

DC Power Grounding Requirements and Warning

An insulated grounding conductor that is identical in size to the grounded and ungrounded branch circuit supply conductors but is identifiable by green and yellow stripes is installed as part of the branch circuit that supplies the device. The grounding conductor is a separately derived system at the supply transformer or motor generator set.



WARNING: When you install the device, the ground connection must always be made first and disconnected last.

Waarschuwing Bij de installatie van het toestel moet de aardverbinding altijd het eerste worden gemaakt en het laatste worden losgemaakt.

Varoitus Laitetta asennettaessa on maahan yhdistäminen aina tehtävä ensiksi ja maadoituksen irti kytkeminen viimeiseksi.

Avertissement Lors de l'installation de l'appareil, la mise à la terre doit toujours être connectée en premier et déconnectée en dernier.

Warnung Der Erdanschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden.

Avvertenza In fase di installazione dell'unità, eseguire sempre per primo il collegamento a massa e disconnetterlo per ultimo.

Advarsel Når enheten installeres, må jordledningen alltid tilkobles først og frakobles sist.

Aviso Ao instalar a unidade, a ligação à terra deverá ser sempre a primeira a ser ligada, e a última a ser desligada.

¡Atención! Al instalar el equipo, conectar la tierra la primera y desconectarla la última.

Warning! Vid installation av enheten måste jordledningen alltid anslutas först och kopplas bort sist.

DC Power Wiring Sequence Warning



WARNING: Wire the DC power supply using the appropriate lugs. When connecting power, the proper wiring sequence is ground to ground, +RTN to +RTN, then -48 V to -48 V. When disconnecting power, the proper wiring sequence is -48 V to -48 V, +RTN to +RTN, then ground to ground. Note that the ground wire must always be connected first and disconnected last.

Waarschuwing De juiste bedradingsvolgorde verbonden is aarde naar aarde, +RTN naar +RTN, en -48 V naar -48 V. De juiste bedradingsvolgorde losgemaakt is en -48 naar -48 V, +RTN naar +RTN, aarde naar aarde.

Varoitus Oikea yhdistettävä kytkentäjärjestys on maajohto maajohtoon, +RTN varten +RTN, -48 V varten -48 V. Oikea irrotettava kytkentäjärjestys on -48 V varten -48 V, +RTN varten +RTN, maajohto maajohtoon.

Avertissement Câblez l'alimentation CC En utilisant les crochets appropriés à l'extrémité de câblage. En reliant la puissance, l'ordre approprié de câblage est rectifié pour rectifier, +RTN à +RTN, puis -48 V à -48 V. En débranchant la puissance, l'ordre approprié de câblage est -48 V à -48 V, +RTN à +RTN, a alors rectifié pour rectifier. Notez que le fil de masse devrait toujours être relié d'abord et débranché pour la dernière fois. Notez que le fil de masse devrait toujours être relié d'abord et débranché pour la dernière fois.

Warnung Die Stromzufuhr ist nur mit geeigneten Ringösen an das DC Netzteil anzuschliessen. Die richtige Anschlusssequenz ist: Erdanschluss zu Erdanschluss, +RTN zu +RTN und dann -48V zu -48V. Die richtige Sequenz zum Abtrennen der Stromversorgung ist -48V zu -48V, +RTN zu +RTN und dann Erdanschluss zu Erdanschluss. Es ist zu beachten dass der Erdanschluss immer zuerst angeschlossen und als letztes abgetrennt wird.

Avvertenza Mostra la morsettiera dell'alimentatore CC. Cablare l'alimentatore CC usando i connettori adatti all'estremità del cablaggio, come illustrato. La corretta sequenza di cablaggio è da massa a massa, da positivo a positivo (da linea ad L) e da negativo a negativo (da neutro a N). Tenere presente che il filo di massa deve sempre venire collegato per primo e scollegato per ultimo.

Advarsel Riktig tilkoples tilkoplingssekvens er jord til jord, +RTN til +RTN, -48 V til -48 V. Riktig frakoples tilkoplingssekvens er -48 V til -48 V, +RTN til +RTN, jord til jord.

Aviso Ate con alambre la fuente de potencia cc Usando los terminales apropiados en el extremo del cableado. Al conectar potencia, la secuencia apropiada del cableado se muele para moler, +RTN a +RTN, entonces -48 V a -48 V. Al desconectar potencia, la secuencia apropiada del cableado es -48 V a -48 V, +RTN a +RTN, entonces molió

para moler. Observe que el alambre de tierra se debe conectar siempre primero y desconectar por último. Observe que el alambre de tierra se debe conectar siempre primero y desconectar por último.

¡Atención! Wire a fonte de alimentação de DC Usando os talões apropriados nan EXTremidade da fiação. Ao conectar a potência, a seqüência apropriada da fiação é moída para moer, +RTN a +RTN, então -48 V a -48 V. Ao desconectar a potência, a seqüência apropriada da fiação é -48 V a -48 V, +RTN a +RTN, moeu então para moer. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último.

Varning! Korrekt kopplingssekvens ar jord till jord, +RTN till +RTN, -48 V till -48 V. Korrekt kopplas kopplingssekvens ar -48 V till -48 V, +RTN till +RTN, jord till jord.

DC Power Wiring Terminations Warning



WARNING: When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations must be the appropriate size for the wires and must clamp both the insulation and conductor.

Waarschuwing Wanneer geslagen bedrading vereist is, dient u bedrading te gebruiken die voorzien is van goedgekeurde aansluitingspunten, zoals het gesloten-lus type of het grijperschop type waarbij de aansluitpunten omhoog wijzen. Deze aansluitpunten dienen de juiste maat voor de draden te hebben en dienen zowel de isolatie als de geleider vast te klemmen.

Varoitus Jos säikeellinen johdin on tarpeen, käytä hyväksyttyä johdinliitääntä, esimerkiksi suljettua silmukkaa tai kourumaista liitääntä, jossa on ylöspäin käännetyt kiinnityskorvat. Tällaisten liitääntöjen tulee olla kooltaan johtimiin sopivia ja niiden tulee puristaa yhteen sekä eristeen että johdinosan.

Avertissement Quand des fils torsadés sont nécessaires, utiliser des douilles terminales homologuées telles que celles à circuit fermé ou du type à plage ouverte avec cosses rebroussées. Ces douilles terminales doivent être de la taille qui convient aux fils et doivent être refermées sur la gaine isolante et sur le conducteur.

Warnung Wenn Litzenverdrahtung erforderlich ist, sind zugelassene Verdrahtungsabschlüsse, z.B. für einen geschlossenen Regelkreis oder gabelförmig, mit nach oben gerichteten Kabelschuhen zu verwenden. Diese Abschlüsse sollten die angemessene Größe für die Drähte haben und sowohl die Isolierung als auch den Leiter festklemmen.

Avvertenza Quando occorre usare trecce, usare connettori omologati, come quelli a occhiello o a forcella con linguette rivolte verso l'alto. I connettori devono avere la misura adatta per il cablaggio e devono serrare sia l'isolante che il conduttore.

Advarsel Hvis det er nødvendig med flertrådede ledninger, brukes godkjente ledningsavslutninger, som for eksempel lukket sløyfe eller spadetype med oppoverbøyde kabelsko. Disse avslutningene skal ha riktig størrelse i forhold til ledningene, og skal klemme sammen både isolasjonen og lederen.

Aviso Quando forem requeridas montagens de instalação eléctrica de cabo torcido, use terminações de cabo aprovadas, tais como, terminações de cabo em circuito fechado e planas com terminais de orelha voltados para cima. Estas terminações de cabo deverão ser do tamanho apropriado para os respectivos cabos, e deverão prender simultaneamente o isolamento e o fio condutor.

¡Atención! Cuando se necesite hilo trenzado, utilizar terminales para cables homologados, tales como las de tipo "bucle cerrado" o "espada", con las lengüetas de

conexión vueltas hacia arriba. Estos terminales deberán ser del tamaño apropiado para los cables que se utilicen, y tendrán que sujetar tanto el aislante como el conductor.

Varning! När flertrådiga ledningar krävs måste godkända ledningskontakter användas, t.ex. kabelsko av slutet eller öppen typ med uppåtvänd tapp. Storleken på dessa kontakter måste vara avpassad till ledningarna och måste kunna hålla både isoleringen och ledaren fastklämda.

Multiple Power Supplies Disconnection Warning



WARNING: The network device has more than one power supply connection. All connections must be removed completely to remove power from the unit completely.

Waarschuwing Deze eenheid heeft meer dan één stroomtoevoerverbinding; alle verbindingen moeten volledig worden verwijderd om de stroom van deze eenheid volledig te verwijderen.

Varoitus Tässä laitteessa on useampia virtalähdekytkentöjä. Kaikki kytkennät on irrotettava kokonaan, jotta virta poistettaisiin täysin laitteesta.

Avertissement Cette unité est équipée de plusieurs raccordements d'alimentation. Pour supprimer tout courant électrique de l'unité, tous les cordons d'alimentation doivent être débranchés.

Warnung Diese Einheit verfügt über mehr als einen Stromanschluß; um Strom gänzlich von der Einheit fernzuhalten, müssen alle Stromzufuhren abgetrennt sein.

Avvertenza Questa unità ha più di una connessione per alimentatore elettrico; tutte le connessioni devono essere completamente rimosse per togliere l'elettricità dall'unità.

Advarsel Denne enheten har mer enn én strømtilkobling. Alle tilkoblinger må kobles helt fra for å eliminere strøm fra enheten.

Aviso Este dispositivo possui mais do que uma conexão de fonte de alimentação de energia; para poder remover a fonte de alimentação de energia, deverão ser desconectadas todas as conexões existentes.

¡Atención! Esta unidad tiene más de una conexión de suministros de alimentación; para eliminar la alimentación por completo, deben desconectarse completamente todas las conexiones.

Warning! Denna enhet har mer än en strömförsörjningsanslutning; alla anslutningar måste vara helt avlägsnade innan strömtillförseln till enheten är fullständigt bruten.

TN Power Warning



WARNING: The device is designed to work with a TN power system.

Waarschuwing Het apparaat is ontworpen om te functioneren met TN energiesystemen.

Varoitus Koje on suunniteltu toimimaan TN-sähkövoimajärjestelmien yhteydessä.

Avertissement Ce dispositif a été conçu pour fonctionner avec des systèmes d'alimentation TN.

Warnung Das Gerät ist für die Verwendung mit TN-Stromsystemen ausgelegt.

Avvertenza Il dispositivo è stato progettato per l'uso con sistemi di alimentazione TN.

Advarsel Utstyret er utfomet til bruk med TN-strømsystemer.

Aviso O dispositivo foi criado para operar com sistemas de corrente TN.

¡Atención! El equipo está diseñado para trabajar con sistemas de alimentación tipo TN.

Warning! Enheten är konstruerad för användning tillsammans med elkraftssystem av TN-typ.

Agency Approvals for EX Series Switches

This topic applies to hardware devices in the EX Series product family, which includes EX Series switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

These hardware devices comply with the following standards:

- Safety
 - CAN/CSA-C22.2 No. 60950-1 Information Technology Equipment
 - UL 60950-1 Information Technology Equipment
 - EN 60950-1 Information Technology Equipment
 - IEC 60950-1 Information Technology Equipment
 - EN 60825-1 Safety of Laser Products - Part 1: Equipment classification and requirements

- EMC
 - FCC 47CFR Part 15 Class A (USA)
 - EN 55022 Class A Emissions (Europe)
 - ICES-003 Class A
 - VCCI Class A (Japan)
 - AS/NZS CISPR 22 Class A (Australia/New Zealand)
 - CISPR 22 Class A
 - EN 55024
 - EN 300386
 - EN 61000-3-2 Power Line Harmonics
 - EN 61000-3-3 Voltage Fluctuations and Flicker
 - EN 61000-4-2 ESD
 - EN 61000-4-3 Radiated Immunity
 - EN 61000-4-4 EFT
 - EN 61000-4-5 Surge
 - EN 61000-4-6 Low Frequency Common Immunity
 - EN 61000-4-11 Voltage Dips and Sags

Battery Compliance Statement for Environmental Requirements for EX Series Switches

EX6200 and EX8200 Ethernet switches contain lithium batteries.

Batteries used in these switches are not based on substances containing mercury, lead, or cadmium. The batteries used in these switches comply with EU Directives 91/157/EEC, 93/86/EEC, and 98/101/EEC. The product documentation includes instructional information on the proper method of reclamation and recycling.

RELATED DOCUMENTATION

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Compliance Statements for EMC Requirements for EX Series Switches

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This topic applies to hardware devices in the EX Series product family, which includes EX Series switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic describes the EMC requirements for these hardware devices.

Canada

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. Industry Canada does not guarantee the equipment will operate to the users' satisfaction.

Before installing this equipment, users should ensure that it is permissible to connect the equipment to the facilities of the local telecommunications company. The equipment must also be installed using an

acceptable method of connection. In some cases, the inside wiring associated with a single line individual service can be extended by means of a certified connector assembly. The customer should be aware that compliance with the above conditions might not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, might give the telecommunications company cause to request the user to disconnect the equipment.



CAUTION: Users should not attempt to make electrical ground connections by themselves, but should contact the appropriate inspection authority or an electrician, as appropriate.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution might be particularly important in rural areas.

Taiwan

此為甲類資訊技術設備。於一般家居環境使用時，本設備可能導致射頻干擾，用戶請採取相應措施。

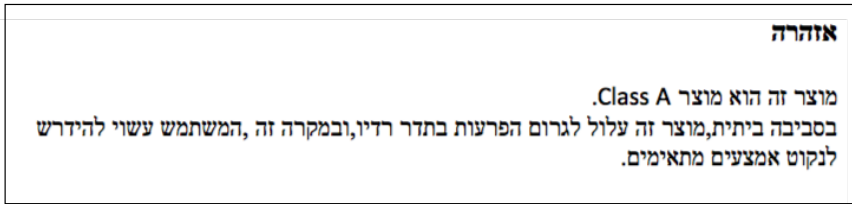
The preceding translates as follows:

This is a Class A device. In a domestic environment, this device might cause radio interference, in which case the user needs to take adequate measures.

European Community

This is a Class A device. In a domestic environment this device might cause radio interference, in which case the user needs to take adequate measures.

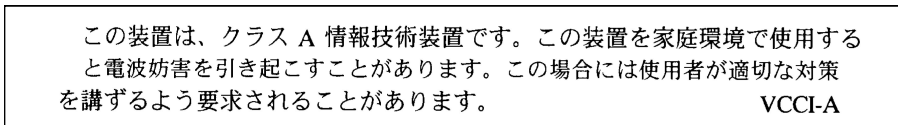
Israel



The preceding translates as follows:

Warning: This product is Class A. In residential environments, the product may cause radio interference, and in such a situation, the user may be required to take adequate measures.

Japan



The preceding translates as follows:

This is a Class A device. In a domestic environment this device might cause radio interference, in which case the user needs to take adequate measures.

VCCI-A

Korea

이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Korean Class A Warning 9040913

The preceding translates as follows:

This equipment is Industrial (Class A) electromagnetic wave suitability equipment and seller or user should take notice of it, and this equipment is to be used in the places except for home

United States

The device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users need to correct the interference at their own expense.

FCC Part 15 Statement

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, might cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or TV technician for help.

Nonregulatory Environmental Standards

NEBS compliance—These EX Series switches are Network Equipment Building System (NEBS) compliant:

- EX2200-24T and EX2200-48T
- EX3200-24T, EX3200-48T
- EX3300-24T, EX3300-48T
- EX4200-24T, EX4200-24F, EX4200-24F-S, EX4200-48T and EX4200-48T-S

- EX4300-24T, EX4300-24T-S, EX4300-24P, EX4300-24P-S, EX4300-32F, EX4300-32F-S, EX4300-48T, EX4300-48T-AFI, EX4300-48T-S, EX4300-48P, and EX4300-48P-S
- All EX4500 switches with AC power supplies
- EX4550-32T-AFO, EX4550-32T-AFI, EX4550-32F-AFO, EX4550-32F-AFI, and EX4550-32F-S
- EX4600-40F and EX4600-40F-S
- All EX6200 switches

NOTE: For the EX6200-48P line cards, the intrabuilding ports must use shielded intrabuilding cabling or wiring that is grounded at both ends.

- All EX8200 switches
- EX9251
- EX9253

These switches meet the following NEBS compliance standards:

- SR-3580 NEBS Criteria Levels (Level 4 Compliance)
- GR-1089-CORE: EMC and Electrical Safety for Network Telecommunications Equipment
- GR-63-CORE: NEBS, Physical Protection
 - The equipment is suitable for installation as part of the Common Bonding Network (CBN).
 - The equipment is suitable for installation in locations where the National Electrical Code (NEC) applies.
 - The battery return connection is to be treated as an Isolated DC return (DC-I), as defined in GR-1089-CORE.
 - You must provision a readily accessible device outside of the equipment to disconnect power. The device must also be rated based on local electrical code practice.

Compliance Statements for Acoustic Noise for EX Series Switches

This topic applies to hardware devices in the EX Series product family, which includes EX Series switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 70 dB(A) oder weniger gemäss EN ISO 7779

Translation: The emitted sound pressure is below 70 dB(A) per EN ISO 7779.