JUNIPER NETWORKS | Engineering Simplicity

EX3400 Switch Hardware Guide

Juniper Networks, Inc.
1133 Innovation Way
Sunnyvale, California 94089
USA
408-745-2000
www.juniper.net

EX3400 Switch Hardware Guide

The information in this document is current as of the date on the title page.

YEAR 2000 NOTICE

Juniper Networks hardware and software products are Year 2000 compliant. Junos OS has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

END USER LICENSE AGREEMENT

Table of Contents

2

4

Maintaining Components

About the Documentation

Use this guide to install hardware and perform initial software configuration, routine maintenance, and troubleshooting for the EX3400 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.xsl; }
   ```

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

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.

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`
Italic text like this	• Introduces or emphasizes important new terms. • Identifies guide names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS CLI User Guide* • RFC 1997, *BGP Communities Attribute*

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

Convention	Description	Examples
Italic text like this	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** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• 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** *metric***>;**
| (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** (*string1* | *string2* | *string3*)
# (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 [** *community-ids* **]**

Indention and braces ({ })	Identifies a level in the configuration hierarchy.	[edit]
		routing-options {
		  static {
		    route default {
		      nexthop *address*;
		      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.	• 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:
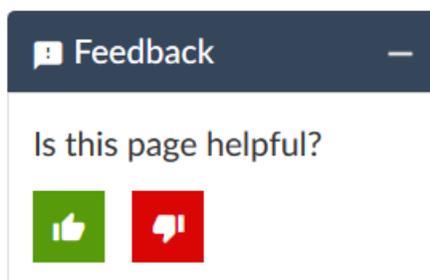
  - Click the thumbs-up icon if the information on the page was helpful to you.

  - 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

Overview

EX3400 System Overview

EX3400 Switches Hardware Overview

Juniper Networks EX Series Ethernet Switches provide scalable connectivity for the enterprise market, including branch offices, campus locations, and data centers. The switches run the Juniper Networks Junos operating system (Junos OS), which provides Layer 2 and Layer 3 switching, routing, and security services.

Juniper Networks EX3400 Ethernet Switches provide connectivity for low-density environments.

Benefits of the EX3400 Switch

High flexibility—EX3400 switches provide a flexible solution that supports converged data, voice, and video environments.

Support for MACsec—EX3400 switches support IEEE 802.1AE MACsec, providing support for link-layer data confidentiality, data integrity, and data origin authentication. The MACsec feature enables EX3400 to support 88 Gbps of near line-rate hardware-based traffic encryption on all Gigabit Ethernet and 10 Gigabit Ethernet ports.

Nondisruptive software upgrades—EX3400 switches feature a resilient operating system that supports high availability (HA) features such as graceful Routing Engine switchover (GRES), nonstop active routing (NSR), and nonstop software upgrade (NSSU), providing software upgrades and changes without disrupting network traffic.

EX3400 Switches First View

EX3400 switches provide:

- Either 24 or 48 RJ-45 ports (labeled **0** through **23** or **0** through **47**) that support 10/100/1000BASE-T Gigabit Ethernet connectors.

- Four uplink ports (labeled **0** through **3** on the front panel) that support small form-factor pluggable (SFP) transceivers and small form-factor pluggable plus (SFP+) transceivers, and two 40-Gigabit Ethernet ports (labeled **0** through **1** on the rear panel) that support quad small form-factor pluggable plus (QSFP+) transceivers.

- Virtual Chassis capability—You can connect up to 10 EX3400 switches together to form one unit that you manage as a single chassis, called a *Virtual Chassis*.

- Power over Ethernet (PoE) or Power over Ethernet plus (PoE+) on all RJ-45 ports (in PoE-capable models).

Uplink Ports

EX3400 switches have autosensing uplink ports that you can use to:

- Connect an access switch to a distribution switch

- Interconnect member switches of a Virtual Chassis

The QSFP+ uplink ports are configured as Virtual Chassis ports (VCPs) by default. You can use these ports to interconnect Virtual Chassis members. To use the QSFP+ uplink ports as network ports, you must configure them as network ports. The uplink ports on the front panel are configured as network ports by default. To use the uplink ports on the front panel as VCPs, you must configure them as VCPs. See *Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port*.

The uplink ports on the front panel support four 1-gigabit SFP transceivers, four 10-gigabit SFP+ transceivers, or a combination of four SFP+ and SFP transceivers. The QSFP+ uplink ports support 40-gigabit QSFP+ transceivers. For a list of supported transceivers, see .

NOTE: You cannot form a Virtual Chassis by using SFP transceivers.

Virtual Chassis

You can interconnect a maximum of 10 EX3400 switches to form a Virtual Chassis. You can operate these interconnected switches as a single, logical device with a single IP address.

You can use the following ports to interconnect an EX3400 switch in a Virtual Chassis:

- QSFP+ ports configured as VCPs by using QSFP+ transceivers

-
    NOTE: You cannot form a Virtual Chassis by using SFP transceivers.

    Uplink ports on the front panel configured as VCPs by using SFP+ transceivers

By default, the QSFP+ ports are configured as VCPs.

Console Ports

EX3400 switches have two console ports—an RJ-45 console port and a Mini-USB Type-B console port. The RJ-45 console port is on the rear panel of the switch and the mini-USB console port is on the front panel. Both console ports are labeled **CON**. The RJ-45 console port accepts a cable that has an RJ-45 connector and the Mini-USB Type-B console port accepts a Mini-B plug (5-pin) connector to connect to the console management device.

Power over Ethernet Ports

EX3400 switches are available with or without Power over Ethernet (PoE) or Power over Ethernet Plus (PoE+) capability. Models that support PoE or PoE+ provide that support on all RJ-45 ports. PoE ports provide electrical current to devices—such as IP phones, wireless access points, and security cameras—through network cables, thus eliminating the need for separate power cords for those devices.

NOTE: IEEE 802.3at class 4 powered devices require category 5 or higher Ethernet cables.

The remainder of this documentation uses the term PoE for both PoE and PoE+ unless there is a need to distinguish between the two.

EX3400 Switch Models

EX3400 switch models are available:

- With 24 or 48 RJ-45 ports

- With or without PoE+ capability

- With front-to-back or back-to-front airflow

- With AC or DC power supplies

lists the EX3400 switch models.

Table 3: EX3400 Switch Models

Model	Access Ports	Power Supply Provided by Default	Ports in Which PoE+ Is Available	Maximum System Power Available for PoE/PoE+	Direction of Airflow	First Junos OS Release
EX3400-24T	24 Gigabit Ethernet	JPSU-150-AC-AFO	–	–	Front-to-back	15.1X53-D50
EX3400-24P	24 Gigabit Ethernet	JPSU-600-AC-AFO	All 24 ports	• 720 W with two 600 W power supplies installed • 370 W with one 600 W power supply installed	Front-to-back	15.1X53-D50
EX3400-24T-DC	24 Gigabit Ethernet	JPSU-150W-DC-AFO	–	–	Front-to-back	15.1X53-D51
EX3400-48T	48 Gigabit Ethernet	JPSU-150-AC-AFO	–	–	Front-to-back	15.1X53-D50

Table 3: EX3400 Switch Models *(continued)*

Model	Access Ports	Power Supply Provided by Default	Ports in Which PoE+ Is Available	Maximum System Power Available for PoE/PoE+	Direction of Airflow	First Junos OS Release
EX3400-48T-AFI	48 Gigabit Ethernet	JPSU-150-AC-AFI	–	–	Back-to-front	15.1X53-D50
EX3400-48P	48 Gigabit Ethernet	JPSU-920-AC-AFO	All 48 ports	• 1440 W with two 920 W power supplies installed • 740 W with one 920 W power supply installed	Front-to-back	15.1X53-D50
EX3400-48T-DC	48 Gigabit Ethernet	JPSU-150W-DC-AFO	–	–	Front-to-back	18.2R3-S4

EX3400 Switch Hardware and CLI Terminology Mapping

This topic describes the hardware terms used in EX3400 switch documentation and the corresponding terms used in the Junos OS CLI. See .

Table 4: CLI Equivalents of Terms Used in Documentation for EX3400 Switches

Hardware Item (Field as Displayed in CLI)	Description (Field as Displayed in CLI)	Value (Field as Displayed in CLI)	Item in Documentation	Additional Information
Chassis	One of the following: • EX3400-24T • EX3400-24P • EX3400-24T-DC • EX3400-48T • EX3400-48T-AFI • EX3400-48P • EX3400-48T-DC	–	Switch chassis	"Chassis Physical Specifications for EX3400 Switches" on page 26
FPC (*n*)	On standalone EX3400 switches: Abbreviated name of the Flexible PIC Concentrator (FPC) One of the following: • EX3400-24T • EX3400-24P • EX3400-24T-DC • EX3400-48T • EX3400-48T-AFI • EX3400-48P • EX3400-48T-DC	Value of *n* is always 0.	The switch does not have actual FPCs. In this case, FPC refers to the switch itself.	*Understanding Interface Naming Conventions*
	On EX3400 Virtual Chassis: Member ID of the switch within the Virtual Chassis	*n* is a value in the range of 0–9.	In this case, the FPC number refers to the member ID assigned to the switch.	*Understanding Virtual Chassis Components*

Table 4: CLI Equivalents of Terms Used in Documentation for EX3400 Switches *(continued)*

Hardware Item (Field as Displayed in CLI)	Description (Field as Displayed in CLI)	Value (Field as Displayed in CLI)	Item in Documentation	Additional Information
PIC (*n*)	Abbreviated name of the Physical Interface Card (PIC)	*n* is a value in the range of 0–2.	The switch does not have actual PIC devices; see entries for PIC 0 through PIC 2 for the equivalent item on the switch.	*Understanding Interface Naming Conventions*
	One of the following: • 24x 10/100/1000 BASE-T • 48x 10/100/1000 BASE-T	PIC 0	RJ-45 ports on the front panel of the switch.	"Front Panel of an EX3400 Switch" on page 28
	4x GE SFP+	PIC 2	SFP+ uplink ports on the front panel of the switch.	"Front Panel of an EX3400 Switch" on page 28
	2x XE QSFP+	PIC 1	QSFP+ uplink ports on the rear panel of the switch.	"Rear Panel of an EX3400 Switch" on page 30
Xcvr (*n*)	Abbreviated name of the transceiver	*n* is a value equivalent to the number of the port in which the transceiver is installed.	Optical transceivers	"Pluggable Transceivers Supported on EX3400 Switches" on page 66
Power Supply (*n*)	One of the following: • JPSU-150W-AC-AFI • JPSU-150W-AC-AFO • JPSU-600W-AC-AFO • JPSU-920W-AC-AFO • JPSU-150W-DC-AFO	*n* has a value 0 or 1, corresponding to the power supply slot number.	AC power supply or DC power supply	"AC Power Supply in EX3400 Switches" on page 41 "DC Power Supply in EX3400 Switches" on page 45

Table 4: CLI Equivalents of Terms Used in Documentation for EX3400 Switches *(continued)*

Hardware Item (Field as Displayed in CLI)	Description (Field as Displayed in CLI)	Value (Field as Displayed in CLI)	Item in Documentation	Additional Information
Fan Tray	One of the following: • Fan Module, Airflow In (AFI) • Fan Module, Airflow Out (AFO)	*n* has a value 0 or 1, corresponding to the fan module slot number.	Fan tray	"EX3400 Cooling System" on page 38

Chassis Physical Specifications for EX3400 Switches

The EX3400 switch chassis is a rigid sheet-metal structure that houses the hardware components. Table 5 on page 26 summarizes the physical specifications of the EX3400 switch chassis.

Table 5: Physical Specifications of the EX3400 Switch Chassis

Description	Value
Chassis height	1.72 in. (4.4 cm)
Chassis width	• 17.4 in. (44.1 cm) • 19 in. (48.2 cm) with mounting brackets attached
Chassis depth	13.8 in. (35 cm)

Table 5: Physical Specifications of the EX3400 Switch Chassis *(continued)*

Description	Value
Weight	• EX3400-24T (without power supply or fan modules installed): 9.755 lb (4.425 kg) • EX3400-24T-DC (without power supply or fan modules installed): 9.755 lb (4.425 kg) • EX3400-24P (without power supply or fan modules installed): 9.965 lb (4.52 kg) • EX3400-48T (without power supply or fan modules installed): 10.227 lb (4.639 kg) • EX3400-48T-AFI (without power supply or fan modules installed): 10.238 lb (4.644 kg) • EX3400-48P (without power supply or fan modules installed): 10.49 lb (4.758 kg) • EX3400-48T-DC (without power supply or fan modules installed): 10.227 lb (4.639 kg) • JPSU-150-AC-AFO: 1.433 lb (0.65 kg) • JPSU-150-AC-AFI: 1.433 lb (0.65 kg) • JPSU-600-AC-AFO: 1.823 lb (0.827 kg) • JPSU-920-AC-AFO: 1.874 lb (0.85 kg) • JPSU-150W-DC-AFO: 1.433 lb (0.65 kg)

SEE ALSO

Field-Replaceable Units in EX3400 Switches

Field-replaceable units (FRUs) are components that you can replace at your site. The FRUs in EX3400 switches are hot-removable and hot-insertable: You can remove and replace them without powering off the switch. The FRUs in EX3400 switches are:

• Power supplies

• Fan modules

• Transceivers

> **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.

EX3400 Chassis

IN THIS SECTION

Front Panel of an EX3400 Switch

The front panel of an EX3400 switch consists of the following components:

- RJ-45 ports:

  - Depending on the switch model, 24 or 48 RJ-45 ports (labeled **0** through **23** or **0** through **47**) that support 10/100/1000BASE-T Gigabit Ethernet connectors

  - PoE available in all RJ-45 ports in EX3400-24P and EX3400-48P models

  - PoE not available in any network port in EX3400-24T, EX3400-24T-DC, EX3400-48T, EX3400-48T-AFI, and EX3400-48T-DC models

- Three chassis status LEDs

- Four port status mode LEDs in models with PoE capability and three port status mode LEDs in models without PoE capability

- One Factory Reset/Mode button

- One Mini-USB console port (the Mini-USB Type-B console port accepts a Mini-B plug (5-pin) connector to connect to the console management device)

- Four uplink ports that support SFP+ transceivers, SFP transceivers, or a combination of these transceivers. These uplink ports are configured as network ports by default. To use the uplink ports to interconnect Virtual Chassis members, you must configure them as VCPs. See *Setting an Uplink Port on an EX Series or QFX Series Switch as a Virtual Chassis Port*.

Figure 1 on page 29 shows the front panel of an EX3400 switch with 24 Gigabit Ethernet ports.
Figure 2 on page 29 shows the front panel of an EX3400 switch with 48 Gigabit Ethernet ports.

Figure 1: Front Panel of an EX3400 Switch with 24 Gigabit Ethernet Ports
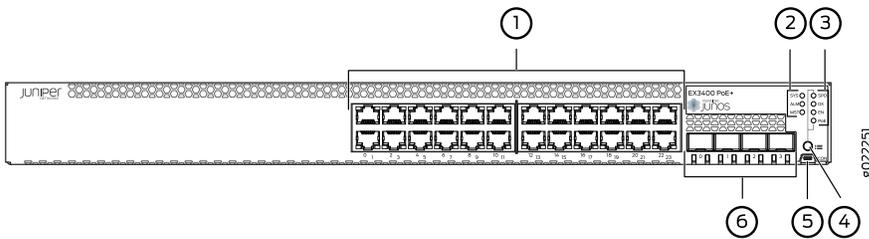
1—RJ-45 ports	4—Factory Reset/Mode button
2—Chassis status LEDs	5—Mini-USB console port
3—Port status mode LEDs. The LED labeled **PoE** is present only on models with PoE capability.	6—Uplink ports

Figure 2: Front Panel of an EX3400 Switch with 48 Gigabit Ethernet Ports
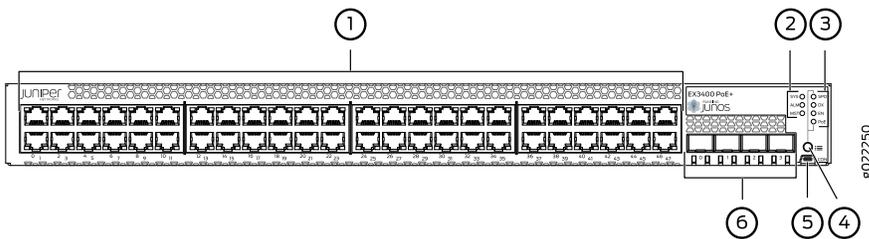
1—RJ-45 ports	4—Factory Reset/Mode button
2—Chassis status LEDs	5—Mini-USB console port
3—Port status mode LEDs. The LED labeled **PoE** is present only on models with PoE capability.	6—Uplink ports

Rear Panel of an EX3400 Switch

The rear panel of the EX3400 switch consists of the following components:

- 1 USB port

- 1 management Ethernet port that supports an RJ-45 connector

- 1 RJ-45 console port (the RJ-45 console port accepts a cable with an RJ-45 connector to connect to the console management device)

- 1 protective earthing terminal

- 2 QSFP+ uplink ports. These uplink ports are configured as Virtual Chassis ports (VCPs) by default. You can use these uplink ports to interconnect Virtual Chassis members. To use the QSFP+ uplink ports as network ports, you must configure them as network ports.

- 1 ESD point

- 2 fan modules

- CLEI code label

- Serial Number ID Label

- 1 AC power supply or DC power supply

- Empty slot for power supply covered by a blank panel or DC power supply

shows the rear panel of an EX3400 switch with AC power supply.

The power cord retainer extends out of the chassis by 3 in. (7.62 cm). The fan module handle extends out of the chassis by 1.2 in. (3 cm).

Figure 3: Rear Panel of an EX3400 Switch with an AC Power Supply
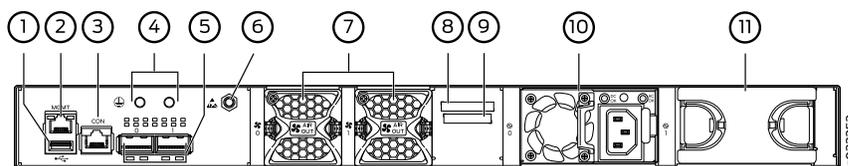
1—USB port	7—Fan modules
2—Management Ethernet port	8—CLEI code label
3—RJ-45 console port	9—Serial Number ID Label
4—Protective earthing terminal	10—AC power supply
5—QSFP+ uplink ports	11—Empty slot for power supply covered by a blank panel
6—ESD point	

shows the rear panel of an EX3400 switch with DC power supply.

Figure 4: Rear Panel of an EX3400 Switch with a DC Power Supply
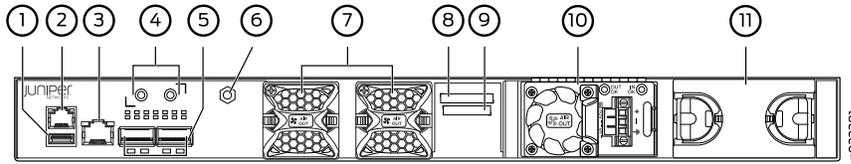
1—USB port	7—Fan modules
2—Management Ethernet port	8—CLEI code label
3—RJ-45 console port	9—Serial Number ID Label
4—Protective earthing terminal	10—DC power supply
5—QSFP+ uplink ports	11—Empty slot for power supply covered by a blank panel
6—ESD point	

NOTE: EX3400 switches shipped after 2 February, 2017 have serial number ID label on the side panel of the chassis and on the rear panel of the chassis. EX3400 switches shipped before 2 February, 2017 have the serial number ID label only on the side panel of the chassis.

Chassis Status LEDs in EX3400 Switches

The front panel of an EX3400 switch has three chassis status LEDs labeled **SYS**, **ALM**, and **MST** (see).

Figure 5: Chassis Status LEDs in an EX3400 Switch
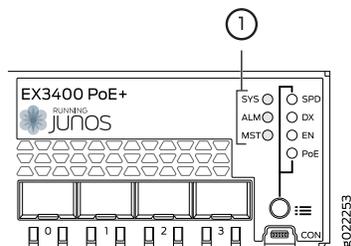
1—Chassis Status LEDs

Table 6 on page 32 describes the chassis status LEDs in an EX3400 switch, their colors and states, and the status they indicate.

Table 6: Chassis Status LEDs in an EX3400 Switch

LED Label	Color	State and Description
SYS	Green	- On steadily—Junos OS for EX Series switches has been loaded on the switch. - Blinking—The switch is booting. - Off—The switch is powered off or is halted.
ALM	Red	There is a major alarm. **NOTE:** When you connect power to the switch, the alarm LED (**ALM**) glows red. This behavior is normal. Plugging an active Ethernet cable into the management port (**MGMT**) on the switch completes the network link and turns off the **ALM** LED. (See "Connect a Device to a Network for Out-of-Band Management" on page 122.) Connecting the switch to a dedicated management console instead of a network does not affect the **ALM** LED. The LED remains red until the switch is connected to a network.
	Yellow	There is a minor alarm. **NOTE:** The **ALM** LED glows yellow if you commit a configuration to make it active on the switch without creating a rescue configuration to back it up. To save the most recently committed configuration as the rescue configuration, enter the operational mode command **request system configuration rescue save**.
	Unlit	There is no alarm or the switch is halted.

Table 6: Chassis Status LEDs in an EX3400 Switch *(continued)*

LED Label	Color	State and Description
MST	Green	In a standalone EX3400 switch: • On steadily—The switch is functioning normally as the primary. • Off—The switch is powered off or is halted. In a Virtual Chassis configuration: • On steadily—The switch is functioning normally and is the primary in the Virtual Chassis configuration. • Blinking—The switch is functioning normally and is the backup in the Virtual Chassis configuration. • Off—The switch is a linecard member in the Virtual Chassis configuration or is halted.

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.

You can view the colors of the two LEDs remotely through the CLI by issuing the operational mode command **show chassis led**.

SEE ALSO

Understand Alarm Types and Severity Levels on EX Series Switches | **215**

Management Port LEDs in EX3400 Switches

The management port, which is on the rear panel of an EX3400 switch, has two LEDs that indicate link/activity and port status (see).

Figure 6: LEDs on the Management Port on an EX3400 Switch
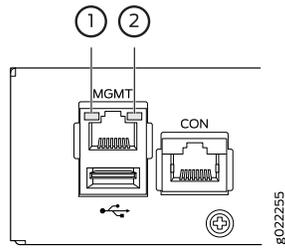
1—Link/Activity LED	2—Status LED

Table 7 on page 34 describes the Link/Activity LED.

Table 7: Link/Activity LED on the Management Port on an EX3400 Switch

LED	Color	State and Description
Link/Activity	Green	• Blinking—The port and the link are active, and there is link activity. • Off—The port is not active.

Table 8 on page 34 describes the Status LED.

Table 8: Status LED on the Management Port on an EX3400 Switch

LED	Color	State and Description
Status	Green	Indicates the speed. The speed indicators are: • Off—Link speed is 10 Mbps • Blinking—Link speed is 100 Mbps • On Steadily—Link speed is 1000 Mbps

SEE ALSO

Connect a Device to a Network for Out-of-Band Management | **122**

RJ-45 Network Port and Uplink Port LEDs in EX3400 Switches

Each RJ-45 network port and the uplink port on an EX3400 switch have two LEDs each that indicate link/activity and port status. See Figure 7 on page 35, Figure 8 on page 35, and Figure 9 on page 35.

Figure 7: LEDs on the RJ-45 Network Ports
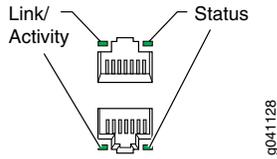
Figure 8: LEDs on the SFP+ Uplink Ports
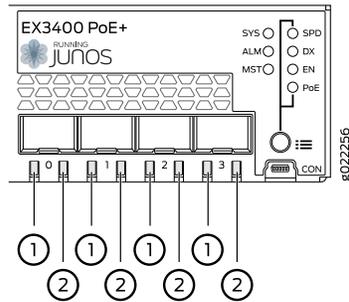
1—Link/Activity LED on the SFP+ uplink ports	2—Status LED on the SFP+ uplink ports

Figure 9: LEDs on the QSFP+ Uplink Ports
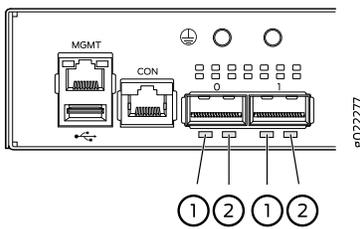
1—Link/Activity LED on the QSFP+ uplink ports	2—Status LED on the QSFP+ uplink ports

Table 9 on page 35 describes the Link/Activity LED.

Table 9: Link/Activity LED on the RJ-45 Network Ports and the Uplink Ports

LED	Color	State and Description
Link/Activity	Green	• Blinking—The port and the link are active, and there is link activity; or the switch is transitioning to the EZSetup mode. • On steadily—The port and the link are active, but there is no link activity; or the switch is reverting to the factory default configuration. • Off—The port is not active.

Figure 10 on page 36 shows the LEDs that indicate the status of one of the four port parameters—speed, duplex mode, administrative status, and Power over Ethernet (PoE) status. Use the Factory Reset/Mode button on the far right side of the front panel to toggle the Status LED to show the different port parameters for RJ-45 network ports. You can tell which port parameter is indicated by the Status LED by looking at which port status mode LED (**SPD**, **DX**, **EN**, and **PoE**) is lit. The LED labeled **PoE** is not available on switch models with RJ-45 network ports that do not provide PoE.

Figure 10: Port Mode LEDs on EX3400 Switches
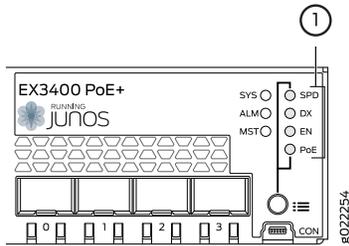
1—Port mode LEDs

Table 10 on page 36 describes the Status LED on the RJ-45 network ports.

Table 10: Status LED on the RJ-45 Network Ports in EX3400 Switches

Port Parameters	State and Description
Speed (**SPD**)	Indicates the speed. The speed indicators are: • Unlit—10 Mbps • Blinking—100 Mbps • On steadily—1000 Mbps
Duplex mode (**DX**)	Indicates the duplex mode. The status indicators are: • Green—Port is set to full-duplex mode. • Unlit—Port is set to half-duplex mode.
Administrative status (**EN**)	Indicates the administrative status. The status indicators are: • Green—Port is administratively enabled. • Unlit—Port is administratively disabled.

Table 10: Status LED on the RJ-45 Network Ports in EX3400 Switches *(continued)*

Port Parameters	State and Description

PoE status (**PoE**)	Indicates the PoE status. The status indicators for are:
	
	• On steadily—PoE is available on the port, a device that draws power from the port is connected to the port, and the device is drawing power from the port.
	• Blinking—PoE is available on the port, but no power is drawn from the port because of one of the following:
	  • No device that draws power from the port is connected to the port.
	  • A device that draws power from the port is connected to the port, but the device is not drawing any power from the port.
	• Unlit—PoE is not available on the port.
	
	NOTE: PoE Status LED is available on the following EX3400 switch models:
	
	• EX3400-24P
	• EX3400-48P

Starting in Junos OS Release 19.4R1, you can use the **request chassis beacon** command on EX3400 switches to identify the switch or a port on the switch. When you execute the command, the status LEDs on the RJ-45 network ports blink two times per second irrespective of the mode the ports are operating in (see *How to Locate a Device or Port Using the Chassis Beacon*).

The uplink ports operate in full-duplex mode and PoE is not applicable on uplink ports. The Status LED on uplink ports indicate the Speed (**SPD**) and Administrative status (**EN**). Table 11 on page 37 describes the Status LED on the uplink ports.

Table 11: Status LED on the Uplink Ports in EX3400 Switches

Port Parameters	State and Description

Status LED	Indicates the speed and administrative status.
	
	• The indicators for SFP+ uplink ports are:
	  • On steadily—10 Gbps
	  • Blinking—1000 Mbps
	  • Unlit—The port is administratively disabled or the link is down
	• The indicators for QSFP+ uplink ports are:
	  • On steadily—40-Gigabit port is up
	  • Unlit—40-Gigabit port is down

You can tell which port parameter is indicated by the Status LED on RJ-45 network ports and uplink ports by issuing the operational mode command **show chassis led**.

EX3400 Cooling System

IN THIS SECTION

-

The cooling system in an EX3400 switch consists of two fans along the rear of the chassis and a fan each in the power supplies. The fans provide front-to-back or back-to-front chassis cooling depending on the switch model.

Airflow Direction in EX3400 Switch Models

Table 12 on page 38 shows the different EX3400 switch models and their direction of airflow.

Table 12: Airflow Direction in EX3400 Switch Models

Model	Direction of Airflow
EX3400-24T	Front-to-back
EX3400-24P	Front-to-back
EX3400-24T-DC	Front-to-back
EX3400-48T	Front-to-back
EX3400-48T-AFI	Back-to-front
EX3400-48P	Front-to-back
EX3400-48T-DC	Front-to-back

Front-to-Back Airflow

In switch models with front-to-back airflow, the air intake is located on the front of the chassis. Cool air is pulled into the chassis and pushed toward the rear of the chassis. Hot air exhausts from the rear of the chassis. See Figure 11 on page 39.

Figure 11: Front-to-Back Airflow Through the EX3400 Switch Chassis
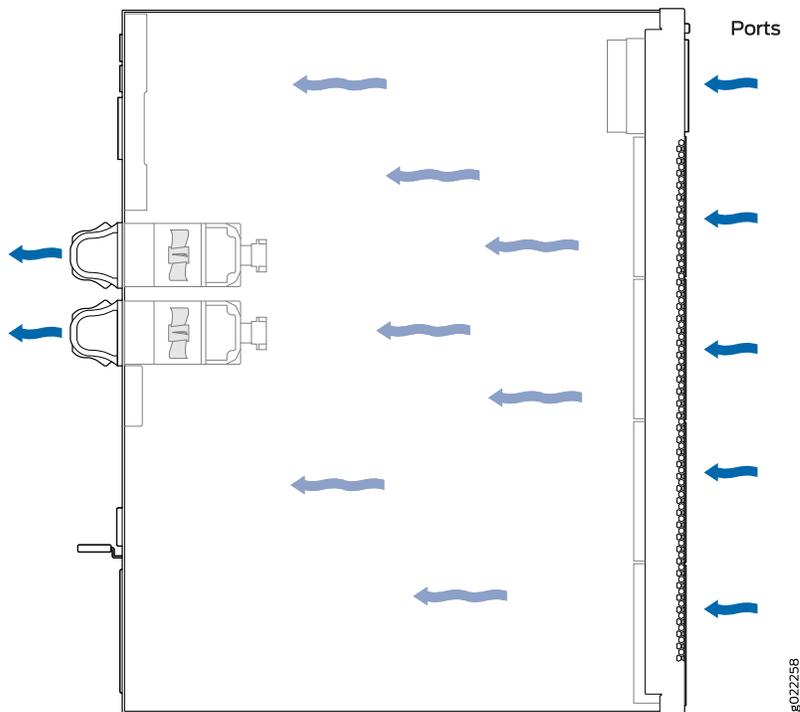
Back-to-Front Airflow

In switch models with back-to-front airflow, the air intake is located on the rear of the chassis. Cool air is pulled into the chassis and pushed toward the front of the chassis. Hot air exhausts from the front of the chassis. See Figure 12 on page 40.

Figure 12: Back-to-Front Airflow Through the EX3400 Switch Chassis
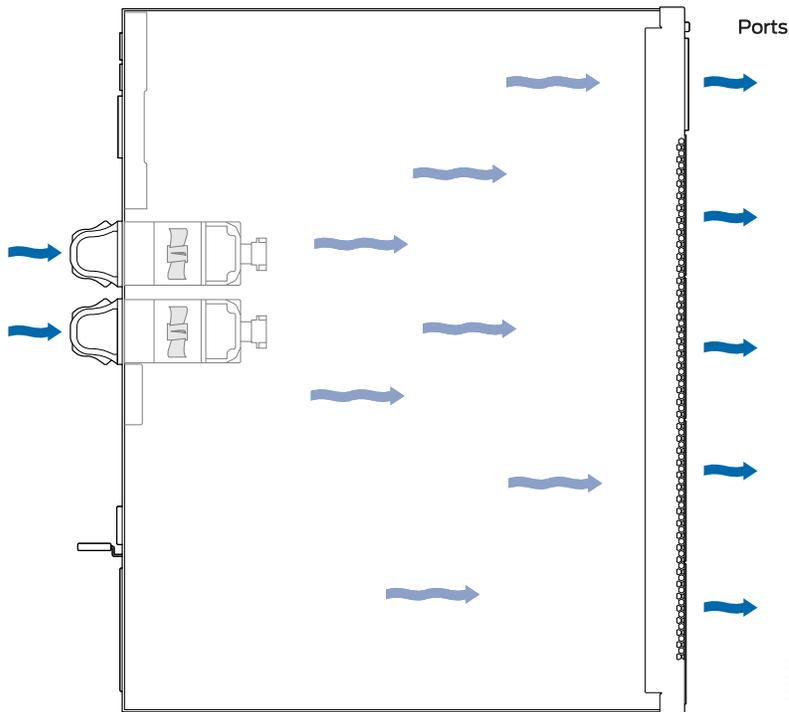
Under normal operating conditions, the fans operate at moderate speeds for minimal noise. Temperature sensors in the chassis monitor the temperature within the chassis. If any fan fails or if the temperature inside the chassis rises above the threshold, the switch raises an alarm and all functioning fans operate at a higher speed than normal. If the temperature inside the chassis rises above the threshold, the switch shuts down automatically.

RELATED DOCUMENTATION

Understand Alarm Types and Severity Levels on EX Series Switches **| 215**

Clearance Requirements for Airflow and Hardware Maintenance for EX3400 Switches **| 63**

Prevention of Electrostatic Discharge Damage **| 276**

EX3400 Power System

IN THIS SECTION

AC Power Supply in EX3400 Switches

The AC power supplies in EX3400 switches are hot-insertable and hot-removable field-replaceable units (FRUs): You can install them without powering off the switch or disrupting the switching function. The switch is shipped with one power supply installed.

> **NOTE:** After powering on the switch, wait for at least 60 seconds before powering it off. After powering off the switch, wait for at least 60 seconds before powering it back on.
>
> If only one power supply is installed in your EX3400 switch, you need to power off the switch before removing the power supply.

Table 13 on page 41 lists the power consumed by each EX3400 switch model. The maximum power available on a PoE+ port is 30 W.

Table 13: Power Consumed by EX3400 Switches

Model Number	Number of PoE-Enabled Ports	Maximum Power Consumed by the Switch	Maximum System Power Available for PoE
EX3400-24T	–	100 W	–

Table 13: Power Consumed by EX3400 Switches *(continued)*

Model Number	Number of PoE-Enabled Ports	Maximum Power Consumed by the Switch	Maximum System Power Available for PoE
EX3400-24P	24	110 W	• 720 W with two 600 W power supplies installed • 370 W with one 600 W power supply installed
EX3400-48T	–	120 W	–
EX3400-48T-AFI	–	120 W	–
EX3400-48P	48	120 W	• 1440 W with two 920 W power supplies installed • 740 W with one 920 W power supply installed

NOTE: In EU countries, Egypt, Nigeria, Saudi Arabia, Serbia, South Korea, and South Africa, you must ensure that the redundant power supply is installed in the switch chassis.

SEE ALSO

Connecting AC Power to an EX3400 Switch | **116**

Connecting DC Power to an EX3400 Switch | **118**

AC Power Supply LEDs in EX3400 Switches

Figure 13 on page 43 shows the location of the LEDs on an AC power supply for an EX3400 switch.

Figure 13: AC Power Supply LEDs in an EX3400 Switch
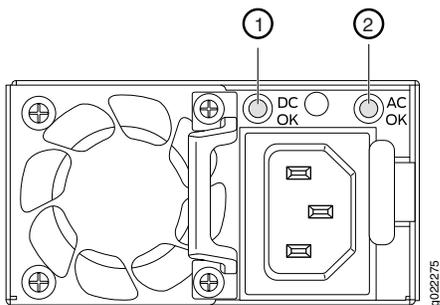
| 1—**DC OK** LED | 2—**AC OK** LED |

describes the AC power supply LEDs.

Table 14: AC Power Supply LEDs in EX3400 Switches

LED	Color	Description
AC OK	Unlit	Indicates one of the following: • AC power input voltage is not within normal operating range. • No AC power input.
	Green	Power supply is receiving proper input power.
DC OK	Unlit	Indicates one of the following: • **IN OK** LED is unlit. • The power supply is not delivering power correctly.
	Green	The power supply is delivering power and is functioning correctly.
	Red	The power supply has failed and must be replaced.

> **NOTE:** If the **AC OK** LED and the **DC OK** LED are not lit green, either the AC power cord is not installed properly or the power input voltage is not within normal operating range.
>
> If the **AC OK** LED is lit green and the **DC OK** LED is unlit or lit red, the AC power supply is installed properly, but the power supply has an internal failure.

AC Power Cord Specifications for EX3400 Switches

A detachable AC power cord is supplied with the AC power supplies. The coupler is type C13 as described by 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.

> ⚠️ **CAUTION:** The AC power cord provided with each power supply is intended for use with that power supply only and not for any other use.

> **NOTE:** In North America, AC power cords must not exceed 4.5 meters (approximately 14.75 feet) 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 supplied with the switch are in compliance.

Table 15 on page 44 gives the AC power cord specifications for the countries and regions listed in the table.

Table 15: AC Power Cord Specifications

Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number
Argentina	250 VAC, 10 A, 50 Hz	IRAM 2073 Type RA/3	CBL-EX-PWR-C13-AR
Australia	250 VAC, 10 A, 50 Hz	AS/NZZS 3112 Type SAA/3	CBL-EX-PWR-C13-AU
Brazil	250 VAC, 10 A, 50 Hz	NBR 14136 Type BR/3	CBL-EX-PWR-C13-BR
China	250 VAC, 10 A, 50 Hz	GB 1002-1996 Type PRC/3	CBL-EX-PWR-C13-CH
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII Type VIIG	CBL-EX-PWR-C13-EU
India	250 VAC, 10 A, 50 Hz	IS 1293 Type IND/3	CBL-EX-PWR-C13-IN
Israel	250 VAC, 10 A, 50 Hz	SI 32/1971 Type IL/3G	CBL-EX-PWR-C13-IL
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16 Type I/3G	CBL-EX-PWR-C13-IT

Table 15: AC Power Cord Specifications *(continued)*

Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	SS-00259 Type VCTF	CBL-EX-PWR-C13-JP
Korea	250 VAC, 10 A, 50 Hz or 60 Hz	CEE (7) VII Type VIIGK	CBL-EX-PWR-C13-KR
North America	125 VAC, 13 A, 60 Hz	NEMA 5-15 Type N5-15	CBL-EX-PWR-C13-US
	125 VAC, 15 A, 60 Hz	NEMA 5-15 Type N5-15	CBL-PWR-C13-US-48P
South Africa	250 VAC, 10 A, 50 Hz	SABS 164/1:1992 Type ZA/13	CBL-EX-PWR-C13-SA
Switzerland	250 VAC, 10 A, 50 Hz	SEV 6534-2 Type 12G	CBL-EX-PWR-C13-SZ
Taiwan	125 VAC, 11 A and 15 A, 50 Hz	NEMA 5-15P Type N5-15P	CBL-EX-PWR-C13-TW
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A Type BS89/13	CBL-EX-PWR-C13-UK

illustrates the plug on the power cord for some of the countries or regions listed in .

Figure 14: AC Plug Types

Australia   China   Europe   Italy   Japan   North America   UK

DC Power Supply in EX3400 Switches

IN THIS SECTION

The DC power supplies in EX3400 switches are hot-insertable and hot-removable field-replaceable units (FRUs): You can install them without powering off the switch or disrupting the switching function. The switch is shipped with one power supply installed.

> **NOTE:** After powering on the switch, wait for at least 60 seconds before powering it off. After powering off the switch, wait for at least 60 seconds before powering it back on.
>
> If only one power supply is installed in your EX3400 switch, you need to power off the switch before removing the power supply.

Table 16 on page 46 lists the power consumed by a DC-powered EX3400 switch model.

Table 16: Power Consumed by a DC-Powered EX3400 Switch

Model Number	Number of PoE-Enabled Ports	Maximum Power Consumed by the Switch	Maximum System Power Available for PoE
EX3400-24T-DC	–	110 W	–
EX3400-48T-DC	–	120 W	–

Characteristics of a DC Power Supply

EX3400 switches support 150 W DC power supply.

You can install up to two DC power supplies in an EX3400 switch. Power supplies are installed in the power supply slots labeled **PSU 0** and **PSU 1** in the rear panel of the chassis.

Table 17 on page 46 lists the details of the power supplies used in EX3400 switches.

Table 17: Details of the DC Power Supplies in EX3400 Switches

Details	150 W DC Power Supply
Model number	JPSU-150-DC-AFO
Field-replaceable unit (FRU) type	Hot-insertable and hot-removable
Power supply weight	1.433 lb (0.65 kg)
Minimum installed in chassis	1
Maximum installed in chassis	2

Table 17: Details of the DC Power Supplies in EX3400 Switches *(continued)*

Details	150 W DC Power Supply
Power supply slots	Install in power supply slots in the rear panel of the chassis.
Fans	Internal
Airflow	Front-to-back, indicated by label **AIR OUT**
Power supply status LEDs	**IN OK** and **OUT OK**

To prevent electrical injury while installing or removing DC power supplies, carefully follow the instructions given in "Installing a DC Power Supply in an EX3400 Switch" on page 202 and "Removing a DC Power Supply from an EX3400 Switch" on page 200.

DC Power Supply Airflow

Each power supply has its own fan and is cooled by its own internal cooling system.

Each power supply has a label **AIR OUT** on the faceplate of the power supply that indicates the direction of airflow in the power supply.

Table 18 on page 47 lists the DC power supply models and the direction of airflow in them.

Table 18: Airflow Direction in DC Power Supply Models for EX3400 Switches

Model	Label on Power Supply	Direction of Airflow
JPSU-150-DC-AFO	**AIR OUT**	Front-to-back—that is, air intake to cool the chassis is through the vents on the front panel of the chassis and hot air exhausts through the vents on the rear panel of the chassis.

DC Power Supply LEDs in EX3400 Switches

Figure 15 on page 48 shows the LEDs on a DC power supply for an EX3400 switch.

Figure 15: LEDs on the DC Power Supply for EX3400 Switches
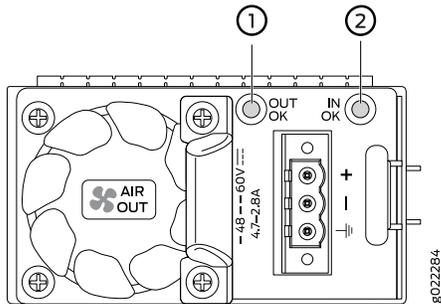
1—**OUT OK** LED	2—**IN OK** LED

Table 19 on page 48 describes the LEDs on the DC power supplies.

Table 19: DC Power Supply LEDs on an EX3400 Switch

Name	Color	Description
IN OK	Unlit	Indicates one of the following: ● The power supply is disconnected from the DC power feed. ● The DC power input voltage is not within the normal operating range. ● No DC power input.
	Green	The power supply is receiving power.
OUT OK	Unlit	Indicates one of the following: ● **IN OK** LED is unlit. ● The power supply is not delivering power correctly.
	Green	The power supply is functioning correctly.
	Red	The power supply has failed and must be replaced.

Power Specifications for EX3400 Switches

This topic describes the power supply electrical specifications for EX3400 switches.

Table 20 on page 49 provides the AC power supply electrical specifications for EX3400 switches.

Table 20: AC Power Supply Electrical Specifications for EX3400 Switches

Item	Specification
AC input voltage	100 through 240 VAC
AC input line frequency	50 Hz/60 Hz nominal
AC system current rating	• EX3400-24P: 8.5 A at 100 VAC • EX3400-24P: 4.25 A at 240 VAC • EX3400-24T: 3 A at 100 VAC • EX3400-24T: 1.5 A at 240 VAC • EX3400-48P: 12 A at 100 VAC • EX3400-48P: 6.5 A at 240 VAC • EX3400-48T: 3 A at 100 VAC • EX3400-48T: 1.5 A at 240 VAC

provides the DC power supply electrical specifications for EX3400 switches.

Table 21: DC Power Supply Electrical Specifications for EX3400 Switches

Item	Specification
DC input voltage	–48 through –60 VDC
DC input current rating	4.7 A maximum at –48 VDC
Power supply output	150 W

NOTE: For DC power supplies, we recommend that you provide at least 4.7 A at 48 VDC and use a facility circuit breaker rated for 10 A minimum. Doing so enables you to operate the switch in any configuration without upgrading the power infrastructure, and enables the switch to function at full capacity using multiple power supplies.

2

CHAPTER

Site Planning, Preparation, and Specifications

Site Preparation Checklist for EX3400 Switches

The checklist in Table 22 on page 51 summarizes the tasks you need to perform when preparing a site for EX3400 switch installation.

Table 22: 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 54		
Power			
Measure distance between external power sources and switch installation site.			
Locate sites for connection of system grounding.			
Calculate the power consumption and requirements.	"Power Specifications for EX3400 Switches" on page 48		
Hardware Configuration			

Table 22: Site Preparation Checklist *(continued)*

Item or Task	For More Information	Performed by	Date
Choose the number and types of switches you want to install.	"EX3400 Switches Hardware Overview" on page 19		
Rack or Cabinet			
Verify that your rack or cabinet meets the minimum requirements for the installation of the switch.	• Rack Requirements on page 60 • Cabinet Requirements on page 62		
Plan rack or cabinet location, including required space clearances.	"Clearance Requirements for Airflow and Hardware Maintenance for EX3400 Switches" on page 63		
Secure the rack or cabinet to the floor and building structure.			
Wall			
Verify that the wall meets the minimum requirements for the installation of the switch.	*Requirements for Mounting an EX3400 Switch on a Desktop or Wall*		
Verify that there is appropriate clearance in your selected location.	"Clearance Requirements for Airflow and Hardware Maintenance for EX3400 Switches" on page 63		

Table 22: Site Preparation Checklist *(continued)*

Item or Task	For More Information	Performed by	Date
Cables			
Acquire cables and connectors: • Determine the number of cables needed based on your planned configuration. • Review the maximum distance allowed for each cable. Choose the length of cable based on the distance between the hardware components being connected.			
Plan the cable routing and management.			

RELATED DOCUMENTATION

Installing and Connecting an EX3400 Switch | 95

EX3400 Site Guidelines and Requirements

IN THIS SECTION

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 23 on page 55 provides the required environmental conditions for normal switch operation.

Table 23: 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 *Pluggable Transceivers Supported on EX2200 Switches*.	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
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.

Table 23: EX Series Switch Environmental Tolerances *(continued)*

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
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.
EX4300 The maximum thermal output for EX4300-48T is 423 BTU/hour and for EX4300-48P is 5844 BTU/hour.	EX4300 switches except the EX4300-48MP model— No performance degradation up to 10,000 feet (3048 meters) EX4300-48MP model— No performance degradation up to 6,000 feet (1829 meters)	EX4300 switches except the EX4300-48MP model— Normal operation ensured in the relative humidity range 10% through 85% (noncondensing) EX4300-48MP model— Normal operation ensured in the relative humidity range 5% through 90% (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.
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.

Table 23: EX Series Switch Environmental Tolerances *(continued)*

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
EX4550	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in the relative humidity range 10% through 85% (noncondensing)	• 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.
EX4600	No performance degradation to 6,562 feet (2000 meters)	Normal operation ensured in the relative humidity range 5% through 90%, noncondensing • Short-term operation ensured in the relative humidity range 5% through 93%, noncondensing **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.	• 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.

Table 23: EX Series Switch Environmental Tolerances *(continued)*

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
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.
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.

Table 23: EX Series Switch Environmental Tolerances *(continued)*

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
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
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

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 24: Site Electrical Wiring Guidelines

Site Wiring Factor	Guidelines
Signaling limitations	If your site experiences any of the following problems, consult experts in electrical surge suppression and shielding: • 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	To reduce or eliminate RFI from your site wiring, do the following: • 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	If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, seek expert advice. Some of the problems caused by strong sources of electromagnetic interference (EMI) are: • 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

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

provides the rack requirements and specifications.

Table 25: Rack Requirements and Specifications

Rack Requirement	Guidelines
Rack type	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. A U is the standard rack unit defined by the Electronic Components Industry Association (http://www.ecianow.org).
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	• 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	• 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 | **254**

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

provides the cabinet requirements and specifications.

Table 26: Cabinet Requirements and Specifications

Cabinet Requirement	Guidelines
Cabinet size	The minimum cabinet size is 36 in. (91.4 cm) depth. Large cabinets improve airflow and reduce chances of overheating.
Cabinet clearance	- 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	When you mount the device in a cabinet, ensure that ventilation through the cabinet is sufficient to prevent overheating. - 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.

Clearance Requirements for Airflow and Hardware Maintenance for EX3400 Switches

When planning the site for installing an EX3400 switch, you must allow sufficient clearance around the installed switch (see Figure 16 on page 63).

Figure 16: Clearance Requirements for Airflow and Hardware Maintenance for EX3400 Switches
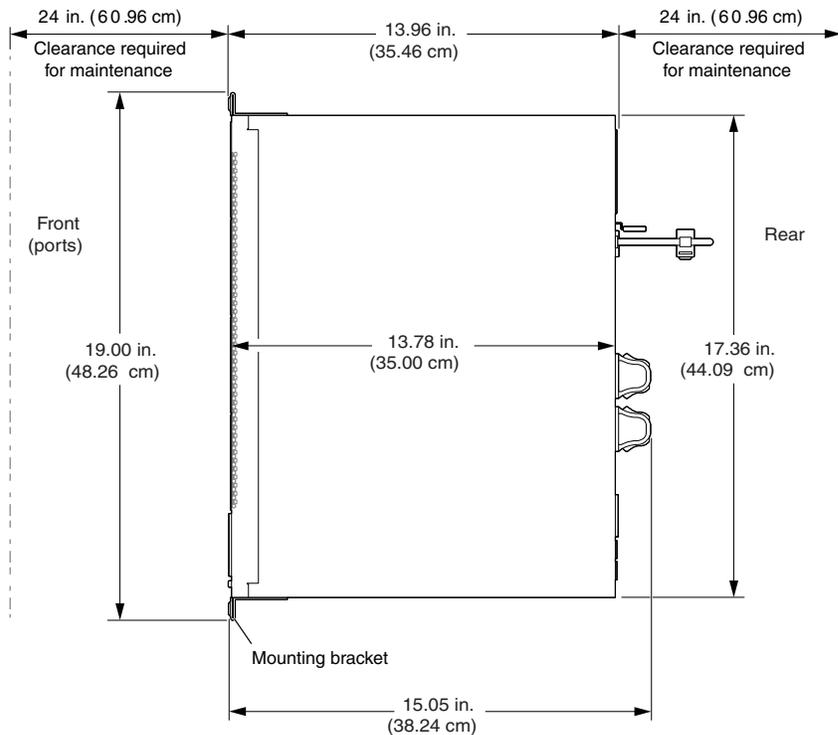
The power cord retainer extends out of the rear of the chassis by 3 in. (7.62 cm). The fan module handle extends out of the chassis by 1.2 in. (3 cm).

Follow these clearance requirements:

- For the cooling system to function properly, the airflow around the chassis must be unrestricted. See Figure 17 on page 64 and Figure 18 on page 65.

Figure 17: Front-to-Back Airflow Through the EX3400 Switch Chassis

Ports

g022258
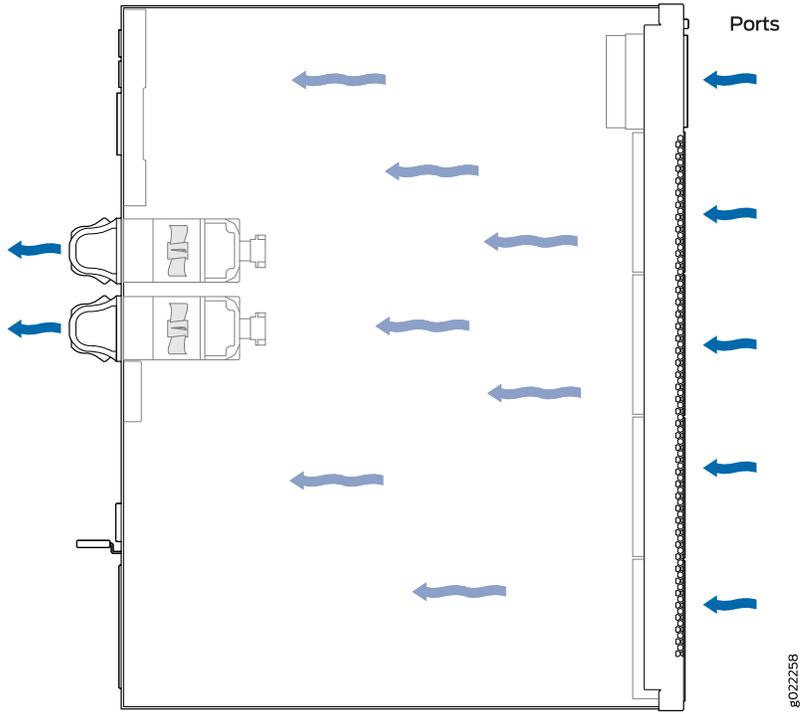
Figure 18: Back-to-Front Airflow Through the EX3400 Switch Chassis
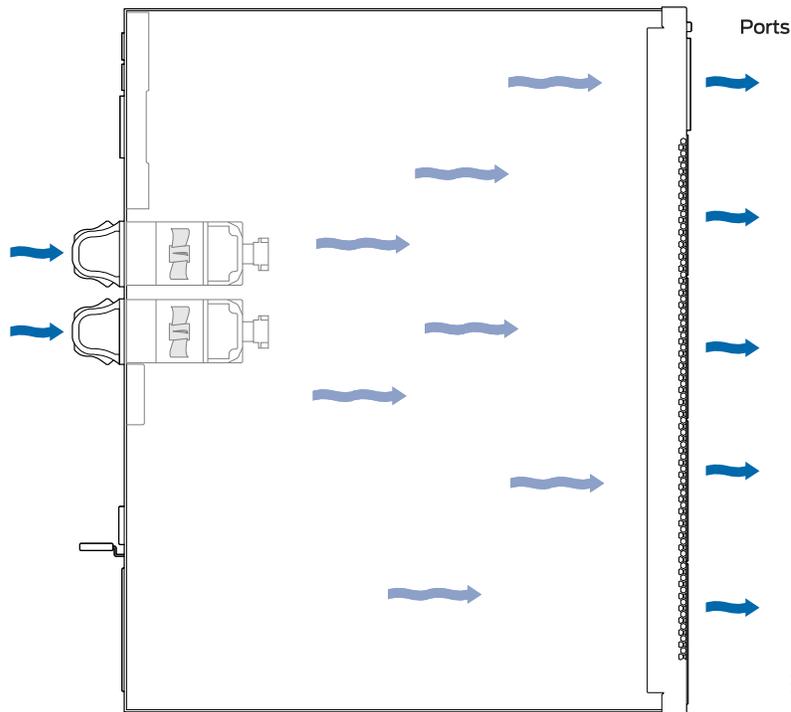
- If you are mounting an EX3400 switch in a rack or cabinet with other equipment, or if you are placing it on the desktop or floor near other equipment, ensure that the exhaust from other equipment does not blow into the intake vents of the chassis.

- Leave at least 24 in. (61 cm) in front of the switch and behind the switch. For service personnel to remove and install hardware components, you must leave adequate space at the front and back of the switch. 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.

EX3400 Network Cable and Transceiver Planning

IN THIS SECTION

- Pluggable Transceivers Supported on EX3400 Switches | **66**
- SFP+ Direct Attach Copper Cables for EX Series Switches | **67**
- QSFP+ Direct Attach Copper Cables for EX Series Switches | **69**

66

66

Pluggable Transceivers Supported on EX3400 Switches

Uplink ports on EX3400 switches support SFP, SFP+, and QSFP+ transceivers. You can find the list of transceivers supported on EX3400 switches and information about those transceivers at the Hardware Compatibility Tool page for EX3400.

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, SFP+, and QSFP+ transceivers installed in EX3400 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**.

NOTE: The transceivers support DOM even if they are installed in uplink ports configured as Virtual Chassis ports.

SEE ALSO

Front Panel of an EX3400 Switch | **28**

Install a Transceiver | **126**

SFP+ Direct Attach Copper Cables for EX Series Switches

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 19 on page 68.

Figure 19: SFP+ Direct Attach Copper Cables for EX Series Switches
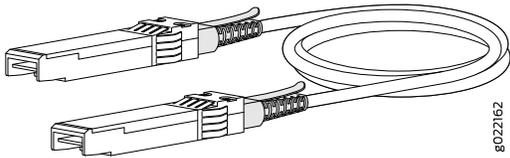
The cables are hot-removable and hot-insertable: You can remove and replace them without powering off the switch or disrupting switch functions. A cable comprises a low-voltage cable assembly that connects directly into two 10-Gigabit Ethernet ports, one at each end of the cable. The cables use high-performance 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

QSFP+ Direct Attach Copper Cables for EX Series Switches

IN THIS SECTION

Quad small form-factor pluggable plus (QSFP+) direct attach copper (DAC) cables are suitable for in-rack connections between QSFP+ ports on EX3400, EX4300, EX4550, EX4600, EX9251, and EX9253 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 QSFP+ 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

QSFP+ passive DAC cables are hot-removable and hot-insertable. A cable consists of a cable assembly that connects directly into two QSFP+ modules, one at each end of the cable. The cables use integrated duplex serial data links for bidirectional communication and are designed for data rates up to 40 Gbps. Passive DAC cables have no signal amplification built into the cable assembly. See Figure 20 on page 70.

Figure 20: QSFP+ Direct Attach Copper Cables
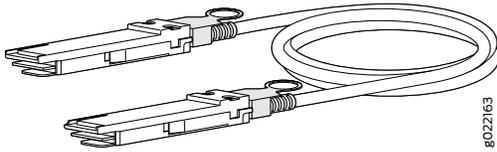
DAC Cables Supported on EX3400, EX4300, EX4550, EX4600, EX9251, and EX9253 Switches

For the list of DAC cables supported on EX3400, EX4300, EX4550, EX4600, EX9251, and EX9253 switches and the specifications of these cables, see:

- EX3400—Hardware Compatibility Tool page for EX3400
- EX4300—Hardware Compatibility Tool page for EX4300
- EX4550—Hardware Compatibility Tool page for EX4550
- EX4600—Hardware Compatibility Tool page for EX4600
- EX9251—Hardware Compatibility Tool page for EX9251
- EX9253—Hardware Compatibility Tool page for EX9253

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

IN THIS SECTION

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).

   $P_T = -15$ dBm

   $P_R = -28$ 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 dBm $- (-28$ dBm$) = 13$ 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 72).

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 27 on page 73 (here, the link is 2 km long and multimode, and the (P_B) is 13 dBm):

Table 27: Estimated Values for Factors Causing Link Loss

Link-Loss Factor	Estimated Link-Loss Value	Sample (LL) Calculation Values
Higher-order mode losses (HOL)	- Multimode—0.5 dBm - Single mode—None	- 0.5 dBm - 0 dBm
Modal and chromatic dispersion	- Multimode—None, if product of bandwidth and distance is less than 500 MHz/km - Single mode—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	- Multimode—1 dBm/km - Single mode—0.5 dBm/km	This example assumes the link is 2 km long. Fiber attenuation for 2 km: - (2 km) * (1.0 dBm/km) = 2 dBm - (2 km) * (0.5 dBm/km) = 1 dBm

Table 27: Estimated Values for Factors Causing Link Loss *(continued)*

Link-Loss Factor	Estimated Link-Loss Value	Sample (LL) Calculation Values
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 dBm) – (0.5 dBm [HOL]) – ((5) * (0.5 dBm)) – ((2) * (0.5 dBm)) – ((2 km) * (1.0 dBm/km)) – (1 dB [CRM]) = P_M

13 dBm – 0.5 dBm – 2.5 dBm – 1 dBm – 2 dBm – 1 dBm = P_M

P_M = 6 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.

EX3400 Management Cable Specifications and Pinouts

IN THIS SECTION

Management Cable Specifications

Table 28 on page 75 lists the specifications for the cables that connect the console and management ports to management devices.

Table 28: 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 123
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 122
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 29 on page 75 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 29: Console Port Connector Pinout Information

Pin	Signal	Description
1	RTS Output	Request to send
2	DTR Output	Data terminal ready

Table 29: Console Port Connector Pinout Information *(continued)*

Pin	Signal	Description
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

RJ-45 Management Port Connector Pinout Information

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

Table 30: 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

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 Port, SFP Port, SFP+ Port, QSFP+ Port, and QSFP28 Port Connector Pinout Information

The tables in this topic describe the connector pinout information for the RJ-45, QSFP+, QSFP28, SFP+, and SFP ports.

- Table 31 on page 78—10/100/1000BASE-T Ethernet network port connector pinout information

- Table 32 on page 78—SFP network port connector pinout information

- Table 33 on page 79—SFP+ network port connector pinout information

- Table 34 on page 80—QSFP+ and QSFP28 network module ports connector pinout information

Table 31: 10/100/1000BASE-T Ethernet Network Port Connector Pinout Information

Pin	Signal	Description
1	TRP1+	Transmit/receive data pair 1 Negative Vport (in PoE models)
2	TRP1-	Transmit/receive data pair 1 Negative Vport (in PoE models)
3	TRP2+	Transmit/receive data pair 2 Positive Vport (in PoE models)
4	TRP3+	Transmit/receive data pair 3
5	TRP3-	Transmit/receive data pair 3
6	TRP2-	Transmit/receive data pair 2 Positive Vport (in PoE models)
7	TRP4+	Transmit/receive data pair 4
8	TRP4-	Transmit/receive data pair 4

Table 32: SFP Network Port Connector Pinout Information

Pin	Signal	Description
1	VeeT	Module transmitter ground
2	TX_Fault	Module transmitter fault
3	TX_Disable	Transmitter disabled
4	SDA	2-wire serial interface data line
5	SCL-	2-wire serial interface clock
6	MOD_ABS	Module absent
7	RS	Rate select
8	RX_LOS	Receiver loss of signal indication

Table 32: SFP Network Port Connector Pinout Information *(continued)*

Pin	Signal	Description
9	VeeR	Module receiver ground
10	VeeR	Module receiver ground
11	VeeR	Module receiver ground
12	RD-	Receiver inverted data output
13	RD+	Receiver noninverted data output
14	VeeR	Module receiver ground
15	VccR	Module receiver 3.3 V supply
16	VccT	Module transmitter 3.3 V supply
17	VeeT	Module transmitter ground
18	TD+	Transmitter noninverted data input
19	TD-	Transmitter inverted data input
20	VeeT	Module transmitter ground

Table 33: SFP+ Network Port Connector Pinout Information

Pin	Signal	Description
1	VeeT	Module transmitter ground
2	TX_Fault	Module transmitter fault
3	TX_Disable	Transmitter disabled
4	SDA	2-wire serial interface data line
5	SCL-	2-wire serial interface clock
6	MOD_ABS	Module absent
7	RS0	Rate select 0, optionally controls SFP+ module receiver

Table 33: SFP+ Network Port Connector Pinout Information *(continued)*

Pin	Signal	Description
8	RX_LOS	Receiver loss of signal indication
9	RS1	Rate select 1, optionally controls SFP+ transmitter
10	VeeR	Module receiver ground
11	VeeR	Module receiver ground
12	RD-	Receiver inverted data output
13	RD+	Receiver noninverted data output
14	VeeR	Module receiver ground
15	VccR	Module receiver 3.3-V supply
16	VccT	Module transmitter 3.3-V supply
17	VeeT	Module transmitter ground
18	TD+	Transmitter noninverted data input
19	TD-	Transmitter inverted data input
20	VeeT	Module transmitter ground

Table 34: QSFP+ and QSFP28 Network Port Connector Pinout Information

Pin	Signal
1	GND
2	TX2n
3	TX2p
4	GND
5	TX4n
6	TX4p

Table 34: QSFP+ and QSFP28 Network Port Connector Pinout Information *(continued)*

Pin	Signal
7	GND
8	ModSelL
9	LPMode_Reset
10	VccRx
11	SCL
12	SDA
13	GND
14	RX3p
15	RX3n
16	GND
17	RX1p
18	RX1n
19	GND
20	GND
21	RX2n
22	RX2p
23	GND
24	RX4n
25	RX4p
26	GND
27	ModPrsL

Table 34: QSFP+ and QSFP28 Network Port Connector Pinout Information *(continued)*

Pin	Signal
28	IntL
29	VccTx
30	Vcc1
31	Reserved
32	GND
33	TX3p
34	TX3n
35	GND
36	TX1p
37	TX1n
38	GND

SFP+ Uplink Port Connector Pinout Information for an EX3400 Switch

EX3400 switches have four uplink ports that support 1-gigabit SFP transceivers and 10-gigabit SFP+ transceivers.

provides the pinout information for the SFP+ uplink port connector.

Table 35: Connector Pinout Information for the 10-Gigabit Ethernet Uplink Port

Pin	Signal	Description
1	VeeT	Module transmitter ground
2	TX_Fault	Module transmitter fault
3	TX_Disable	Transmitter disabled

Table 35: Connector Pinout Information for the 10-Gigabit Ethernet Uplink Port *(continued)*

Pin	Signal	Description
4	SDA	2-wire serial interface data line
5	SCL-	2-wire serial interface clock
6	MOD_ABS	Module absent
7	RS0	Rate select 0, optionally controls SFP+ module receiver
8	RX_LOS	Receiver loss of signal indication
9	RS1	Rate select 1, optionally controls SFP+ transmitter
10	VeeR	Module receiver ground
11	VeeR	Module receiver ground
12	RD-	Receiver inverted data output
13	RD+	Receiver noninverted data output
14	VeeR	Module receiver ground
15	VccR	Module receiver 3.3 V supply
16	VccT	Module transmitter 3.3 V supply
17	VeeT	Module transmitter ground
18	TD+	Transmitter noninverted data input
19	TD-	Transmitter inverted data input
20	VeeT	Module transmitter ground

QSFP+ Uplink Port Connector Pinout Information for an EX3400 Switch

EX3400 switches have two 40-Gigabit Ethernet uplink ports that support 40-gigabit QSFP+ transceivers.

provides the pinout information for the QSFP+ uplink port connector.

Table 36: Connector Pinout Information for the 40-Gigabit Ethernet Uplink Port

Pin	Signal
1	GND
2	TX2n
3	TX2p
4	GND
5	TX4n
6	TX4p
7	GND
8	ModSelL
9	LPMode_Reset
10	VccRx
11	SCL
12	SDA
13	GND
14	RX3p
15	RX3n
16	GND
17	RX1p
18	RX1n
19	GND
20	GND
21	RX2n

Table 36: Connector Pinout Information for the 40-Gigabit Ethernet Uplink Port *(continued)*

Pin	Signal
22	RX2p
23	GND
24	RX4n
25	RX4p
26	GND
27	ModPrsL
28	IntL
29	VccTx
30	Vcc1
31	Reserved
32	GND
33	TX3p
34	TX3n
35	GND
36	TX1p
37	TX1n
38	GND

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 37 on page 86 provides the pinout information for the RJ-45 to DB-9 serial port adapter.

Table 37: 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

EX3400 Virtual Chassis

IN THIS SECTION

- Planning EX3400 Virtual Chassis | **87**
- Understanding EX3400 Virtual Chassis Hardware Configuration | **87**
- Virtual Chassis Cabling Configuration Examples for EX3400 Switches | **88**

Planning EX3400 Virtual Chassis

Before interconnecting EX3400 switches in a Virtual Chassis configuration, you must consider the following factors:

- The number of switches in the Virtual Chassis and their location—You can interconnect a maximum of 10 EX3400 switches to form a Virtual Chassis composed exclusively of EX3400 switches.

- Mounting—You can mount the switches in a single rack or install them on multiple racks. For information about the size and strength of racks, see "Rack Requirements" on page 60.

- Cabling requirements for Virtual Chassis—You can interconnect EX3400 switches into a Virtual Chassis by using the uplink ports configured as Virtual Chassis ports (VCPs). By default, the QSFP+ uplink ports are configured as VCPs.

  For information about uplink port cabling requirements, see "Management Cable Specifications" on page 75.

- Power requirements—You must plan the installation site to meet the power requirements of the switches in a Virtual Chassis. See "Power Specifications for EX3400 Switches" on page 48.

- License requirements—You must have license keys for all the devices. See *Understanding Software Licenses for EX Series Switches*.

SEE ALSO

Clearance Requirements for Airflow and Hardware Maintenance for EX3400 Switches | 63

Understanding EX3400 Virtual Chassis Hardware Configuration

Virtual Chassis is a feature in Juniper Networks EX3400 Ethernet Switches that allows you to interconnect two or more EX3400 switches, enabling them to operate as a unified, single, high-bandwidth switch. You can interconnect a maximum of 10 EX3400 switches by using the uplink ports configured as Virtual Chassis ports (VCPs) to form a Virtual Chassis. By default, the QSFP+ uplink ports are configured as VCPs.

All EX3400 switch models support Virtual Chassis, and you can interconnect different models, which allows you to choose among a range of possible port configurations within the same Virtual Chassis.

The Virtual Chassis configuration includes a primary switch and a backup switch, with all other switches in the configuration designated as *linecard* member switches. Virtual Chassis operation is managed through the primary switch. Each switch in the Virtual Chassis is assigned a unique member ID.

Virtual Chassis Cabling Configuration Examples for EX3400 Switches

You can install EX3400 switches on a single rack or in multiple racks, or in different wiring closets, and interconnect them to form a Virtual Chassis.

You form an EX3400 Virtual Chassis by using uplink ports configured as Virtual Chassis ports (VCPs). By default, the QSFP+ uplink ports are configured as VCPs.

The physical location of the switches in a Virtual Chassis is restricted only by the maximum length supported for cables to connect the VCPs—in this case, the maximum length of the uplink port cables. For the maximum cable length for the uplink port cables supported by an EX3400 switch, see "Pluggable Transceivers Supported on EX3400 Switches" on page 66.

The following illustrations show examples of Virtual Chassis cabling configuration using SFP+ ports. The examples are applicable to configuration using QSFP+ ports also.

> **NOTE:** For increased availability and redundancy, we recommend that you always configure your Virtual Chassis in a ring topology.

Figure 21 on page 88, Figure 22 on page 89, and Figure 23 on page 89 show six EX3400 switches stacked vertically in a rack and interconnected in a ring topology.

Figure 21: EX3400 Switches Mounted on a Single Rack and Connected in a Ring Topology: Example 1
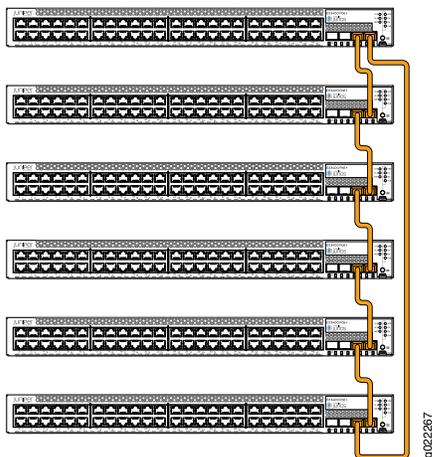
Figure 22: EX3400 Switches Mounted on a Single Rack and Connected in a Ring Topology: Example 2
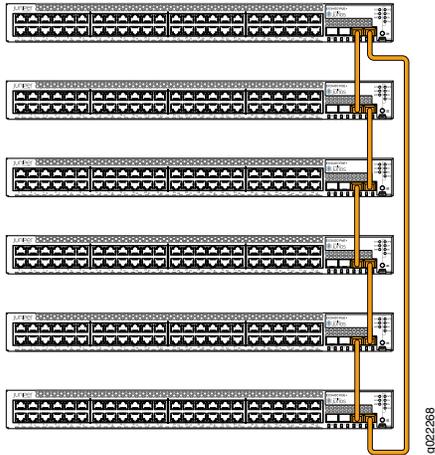
Figure 23: EX3400 Switches Mounted on a Single Rack and Connected in a Ring Topology: Example 3
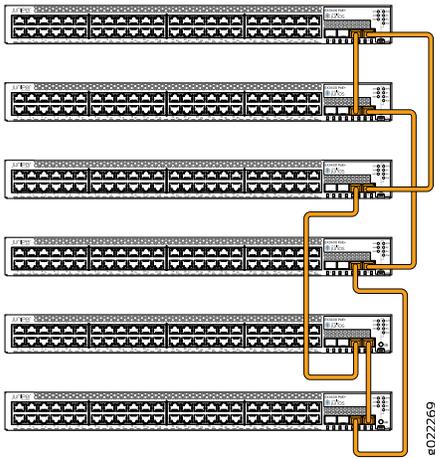
and show six EX3400 switches mounted on the top rows of adjacent racks and interconnected in a ring topology.

Figure 24: EX3400 Switches Mounted on Adjacent Racks and Connected in a Ring Topology Using Medium and Long Cables: Example 1
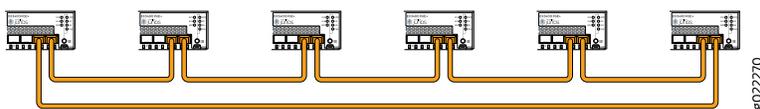
Figure 25: EX3400 Switches Mounted on Adjacent Racks and Connected in a Ring Topology Using Medium and Long Cables: Example 2
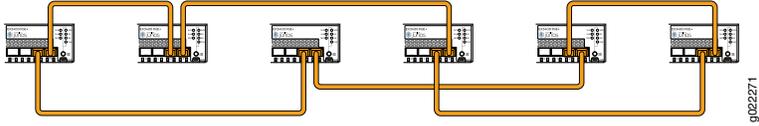
3
CHAPTER

Initial Installation and Configuration

Unpacking and Mounting the EX3400 Switch

IN THIS SECTION

Unpacking an EX3400 Switch

The EX3400 switches are shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory box.

> ⚠️ **CAUTION:** EX3400 switches are maximally protected inside the shipping carton. Do not unpack the switches until you are ready to begin installation.

To unpack the switch:

1. Move the shipping carton to a staging area as close to the installation site as possible, but where you have enough room to remove the system components.

2. Position the carton so that the arrows are pointing up.

3. Open the top flaps on the shipping carton.

4. Remove the accessory box and verify the contents in it against the parts inventory on the label attached to the carton.

5. Pull out the packing material holding the switch in place.

6. Verify the chassis components received against the packing list included with the switch. An inventory of parts provided with the switch is provided in "Parts Inventory (Packing List) for an EX3400 Switch" on page 93.

7. Save the shipping carton and packing materials in case you need to move or ship the switch later.

Parts Inventory (Packing List) for an EX3400 Switch

The EX3400 switches are shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory box.

The switch shipment includes a packing list. Check the parts you receive in the switch shipping carton against the items on the packing list. The parts shipped depend on the configuration you order.

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.

Table 38 on page 93 lists the parts and their quantities in the packing list.

Table 38: Parts List for an EX3400 Switch

Component	Quantity
Switch with one power supply and two fan modules	1
AC power cord appropriate for your geographical location (only for AC switch models)	1
Power cord retainer clip (only for AC switch models)	1
Mounting brackets	2
Mounting screws to attach the mounting brackets to the switch chassis	8
Rubber feet	4
RJ-45 cable and RJ-45 to DB-9 serial port adapter	1
Documentation Roadmap	1

Table 38: Parts List for an EX3400 Switch *(continued)*

Component	Quantity
Juniper Networks Product Warranty	1
End User License Agreement	1

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

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 EX3400 Switch

To install and connect an EX3400 switch:

1. Follow instructions in "Unpacking an EX3400 Switch" on page 92.

2. Mount the switch by following instructions appropriate for your site:

   - "Mounting an EX3400 Switch on a Desk or Other Level Surface" on page 96 (using the rubber feet provided)

   - "Mounting an EX3400 Switch on Two Posts in a Rack or Cabinet" on page 98 (using the mounting brackets provided)

   - "Mounting an EX3400 Switch on Four Posts in a Rack or Cabinet" on page 101 (using the separately orderable four-post rack-mount kit)

   - "Mounting an EX3400 Switch in a Recessed Position in a Rack or Cabinet" on page 104 (using the 2-in.-recess front-mounting brackets from the separately orderable four-post rack-mount kit)

   - "Mounting an EX3400 Switch on a Wall" on page 105 (using the separately orderable wall-mount kit)

3. Follow instructions in "Connect Earth Ground to an EX Series Switch" on page 109.

4. Follow instructions in "Connecting AC Power to an EX3400 Switch" on page 116 or "Connecting DC Power to an EX3400 Switch" on page 118.

5. Perform initial configuration of the switch by following instructions in "Connecting and Configuring an EX Series Switch (CLI Procedure)" on page 150.

6. Set the switch's management options by following the appropriate instructions:

   - Connect a Device to a Network for Out-of-Band Management on page 122

   - Connect a Device to a Management Console Using an RJ-45 Connector on page 123

SEE ALSO

Rack Requirements | 60

Cabinet Requirements | 62

Clearance Requirements for Airflow and Hardware Maintenance for EX3400 Switches | 63

Installing and Removing EX3400 Switch Hardware Components

The EX3400 switch chassis is a rigid sheet-metal structure that houses the hardware components. The field-replaceable units (FRUs) in EX3400 switches are:

- Power supplies

- Fan modules

- Transceivers

The power supplies and fan modules are hot-removable and hot-insertable: You can remove and replace them without powering off the switch or disrupting switch functions.

See these topics for instructions for installing and removing components:

- Installing an AC Power Supply in an EX3400 Switch on page 199

- Removing an AC Power Supply from an EX3400 Switch on page 197

- Installing a Fan Module in an EX3400 Switch on page 195

- Removing a Fan Module from an EX3400 Switch on page 194

- Installing a DC Power Supply in an EX3400 Switch on page 202

- Removing a DC Power Supply from an EX3400 Switch on page 200

- Install a Transceiver on page 126

- Remove a Transceiver on page 207

SEE ALSO

EX3400 Cooling System | 38

AC Power Supply in EX3400 Switches | 41

Pluggable Transceivers Supported on EX3400 Switches | 66

Mounting an EX3400 Switch on a Desk or Other Level Surface

You can mount an EX3400 switch on a desk or other level surface by using the four rubber feet that are shipped with the switch. The rubber feet stabilize the chassis.

Before mounting the switch on a desk or other level surface:

- Verify that the site meets the requirements described in "Site Preparation Checklist for EX3400 Switches" on page 51.

- Place the desk in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.

- Read "General Safety Guidelines and Warnings" on page 242, with particular attention to "Chassis and Component Lifting Guidelines" on page 249.

Ensure that you have the following parts and tools available:

- 4 rubber feet to stabilize the chassis on a desk or other level surface (provided in the accessory box in the switch carton)

To mount a switch on a desk or other level surface:

1. Remove the switch from the shipping carton (see "Unpacking an EX3400 Switch" on page 92).

2. Turn the chassis upside down on the desk or the level surface where you intend to mount the switch.

3. Attach the rubber feet to the bottom of the chassis, as shown in Figure 26 on page 97.

4. Turn the chassis right side up on the desk or the level surface.

5. Ensure that the switch rests firmly on the desk or the level surface.

Figure 26: Attaching Rubber Feet to a Switch Chassis
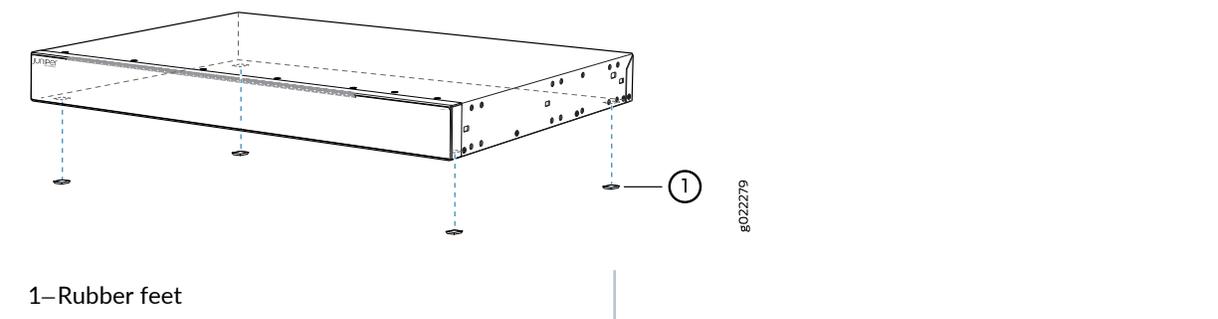
1—Rubber feet

SEE ALSO

Connecting AC Power to an EX3400 Switch | 116

Connecting DC Power to an EX3400 Switch | 118

Mounting an EX3400 Switch on Two Posts in a Rack or Cabinet

You can mount an EX3400 switch on two posts of a 19-in. rack or cabinet by using the mounting brackets provided with the switch. (The remainder of this topic uses *rack* to mean *rack or cabinet*.)

You can mount the switch on four posts of a four-post rack by using the mounting brackets provided with the separately orderable four-post rack-mount kit. See "Mounting an EX3400 Switch on Four Posts in a Rack or Cabinet" on page 101.

> **NOTE:** If you need to mount the switch in a recessed position on either a two-post rack or a four-post rack, you can use the 2-in.-recess front-mounting brackets provided in the separately orderable four-post rack-mount kit.

Before mounting the switch on two posts in a rack:

- Verify that the site meets the requirements described in "Site Preparation Checklist for EX3400 Switches" on page 51.

- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.

- Read "General Safety Guidelines and Warnings" on page 242, with particular attention to "Chassis and Component Lifting Guidelines" on page 249.

Ensure that you have the following parts and tools available:

- Phillips (+) screwdriver, number 2 (not provided)

- 2 mounting brackets and 8 mounting screws (provided)

- Screws to secure the chassis to the rack (not provided)

- 2-in.-recess front-mounting brackets (from the separately orderable four-post rack-mount kit) if you will mount the switch in a recessed position

> **NOTE:** One person must be available to lift the switch while another secures the switch to the rack.

> **CAUTION:** If you are mounting multiple units on a rack, mount the heaviest unit at the bottom of the rack and mount the other units from the bottom of the rack to the top in decreasing order of the weight of the units.

To mount the switch on two posts in a rack:

1. Remove the switch from the shipping carton (see "Unpacking an EX3400 Switch" on page 92).

2. Place the switch on a flat, stable surface.

3. Align the mounting brackets along the front or rear of the side panels of the switch chassis depending on how you want to mount the switch. For example, if you want to front-mount the switch, align the brackets along the front of the chassis. See Figure 27 on page 99.

Figure 27: Attaching the Mounting Bracket Along the Front of the Switch
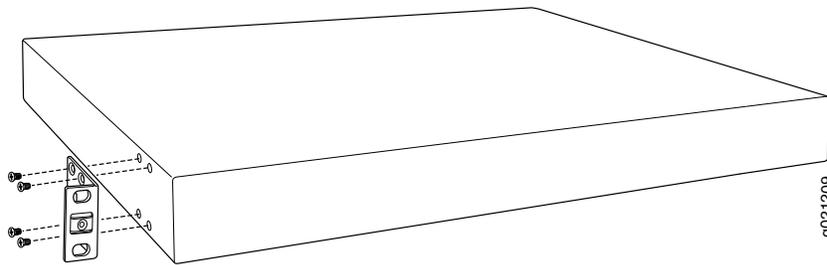
> **NOTE:** If you need to mount the switch in a recessed position, use the 2-in.-recess front-mounting brackets from the separately orderable four-post rack-mount kit.

4. Align the bottom holes in the mounting brackets with the holes on the side panels of the switch chassis.

5. Insert the mounting screws into the aligned holes.

6. Ensure that the other holes in the mounting brackets are aligned with the holes in the side panels. Insert a screw in each hole and tighten the screws.

7. Have one person grasp both sides of the switch, lift the switch, and position it in the rack, aligning the mounting bracket holes with the threaded holes in the rack or cabinet rail. Align the bottom hole in each mounting bracket with a hole in each rack rail, making sure the chassis is level. See Figure 28 on page 100.

Figure 28: Mounting the Switch on Two Posts in a Rack
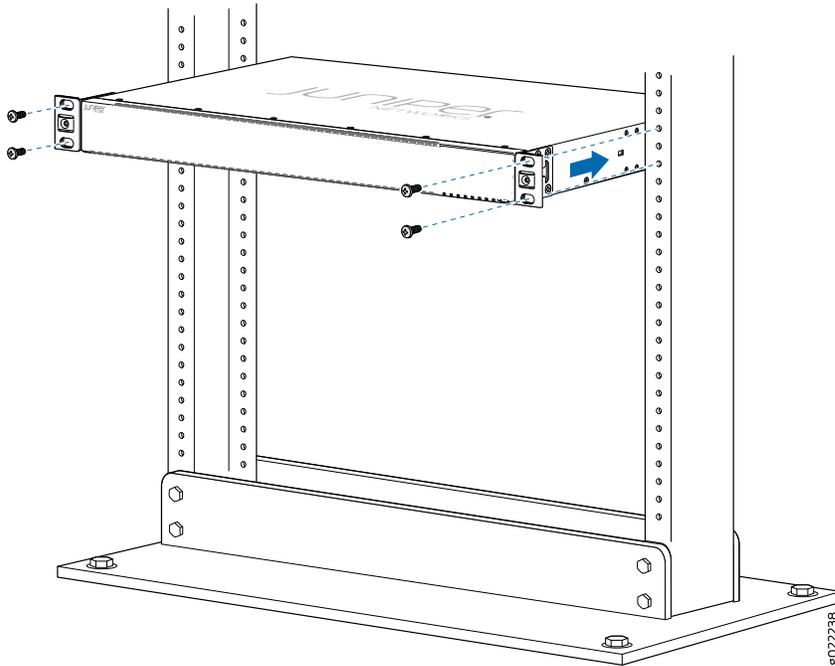
8. Have a second person secure the switch to the rack by using the appropriate screws. Tighten the screws.

9. Ensure that the switch chassis is level by verifying that all screws on one side of the rack are aligned with the screws on the other side.

SEE ALSO

Connect Earth Ground to an EX Series Switch | **109**

Connecting AC Power to an EX3400 Switch | **116**

Connecting DC Power to an EX3400 Switch | **118**

Connecting and Configuring an EX Series Switch (CLI Procedure) | **150**

Mounting an EX3400 Switch in a Recessed Position in a Rack or Cabinet | **104**

Rack-Mounting and Cabinet-Mounting Warnings | **254**

Mounting an EX3400 Switch on Four Posts in a Rack or Cabinet

You can mount an EX3400 switch on four posts of a 19-in. rack or cabinet by using the separately orderable four-post rack-mount kit. (The remainder of this topic uses *rack* to mean *rack or cabinet*.)

You can mount the switch on two posts in either a two-post rack or a four-post rack by using the mounting brackets provided with the switch. See "Mounting an EX3400 Switch on Two Posts in a Rack or Cabinet" on page 98.

> **NOTE:** If you need to mount the switch in a recessed position on either a two-post rack or a four-post rack, you can use the 2-in.-recess front-mounting brackets provided in the separately orderable four-post rack-mount kit.

Before mounting the switch on four posts in a rack:

- Verify that the site meets the requirements described in "Site Preparation Checklist for EX3400 Switches" on page 51.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
- Read "General Safety Guidelines and Warnings" on page 242, with particular attention to "Chassis and Component Lifting Guidelines" on page 249.

Ensure that you have the following parts and tools available:

- Phillips (+) screwdriver, number 2
- 6 flat-head 4-40 mounting screws (provided with the four-post rack-mount kit)
- 8 flat-head 4x6-mm Phillips mounting screws (provided with the four-post rack-mount kit)
- One pair each of flush or 2-in.-recess front-mounting brackets (provided with the four-post rack-mount kit)
- One pair of side mounting-rails (provided with the four-post rack-mount kit)
- One pair of rear-mounting blades (provided with the four-post rack-mount kit)
- Screws to secure the chassis and the rear-mounting blades to the rack (not provided)

> **NOTE:** One person must be available to lift the switch while another secures the switch to the rack.

> **CAUTION:** If you are mounting multiple units on a rack, mount the heaviest unit at the bottom of the rack and mount the other units from the bottom of the rack to the top in decreasing order of the weight of the units.

To mount the switch on four posts in a rack:

1. Remove the switch from the shipping carton (see "Unpacking an EX3400 Switch" on page 92).

2. Place the switch on a flat, stable surface.

3. Attach the front-mounting brackets (either the flush or the 2-in.-recess front-mounting brackets) to the side mounting-rails by using the 6 4-40 flat-head Phillips mounting screws. See Figure 29 on page 102.

Figure 29: Attaching the Front-Mounting Bracket to the Side Mounting-Rail

1—Side mounting-rail	2—Front-mounting bracket
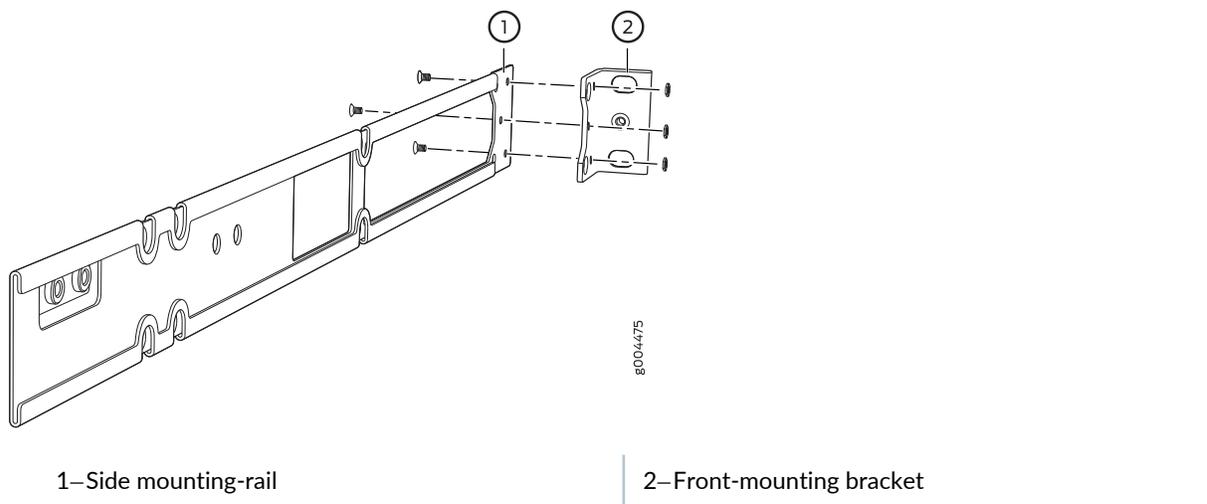
4. Align the side mounting-rails along the side panels of the switch chassis. Align the two holes in the rear of the side mounting-rails with the two holes on the rear of the side panel.

5. Insert 4x6-mm Phillips flat-head mounting screws into the two aligned holes and tighten the screws. Ensure that the two holes in the rear of the side mounting-rails are aligned with the remaining two holes in the side panel. See Figure 30 on page 103.

Figure 30: Attaching the Side Mounting-Rail to the Switch Chassis
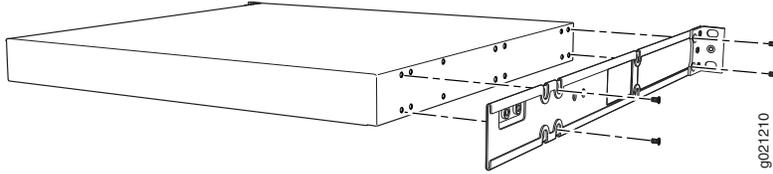
6. Insert the 4x6-mm Phillips flat-head mounting screws into the remaining two holes in the side mounting-rails and tighten the screws.

7. Have one person grasp both sides of the switch, lift the switch, and position it in the rack, aligning the side mounting-rail holes with the threaded holes in the front post of the rack. Align the bottom hole in both the front-mounting brackets with a hole in each rack rail, making sure the chassis is level. See .

Figure 31: Mounting the Switch to the Front Posts in a Rack
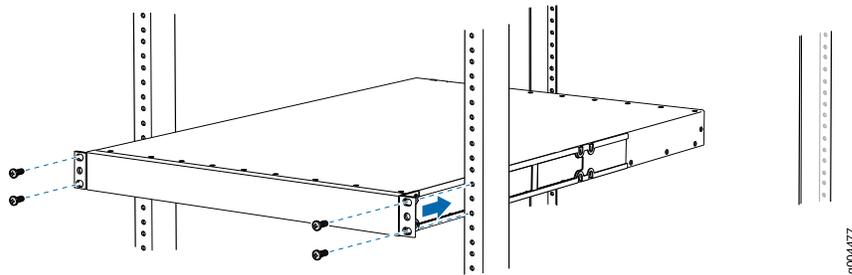
8. Have a second person secure the front of the switch to the rack by using the appropriate screws for your rack.

9. Slide the rear-mounting blades into the side mounting-rails. See .

Figure 32: Sliding the Rear-Mounting Blades into the Side Mounting-Rails
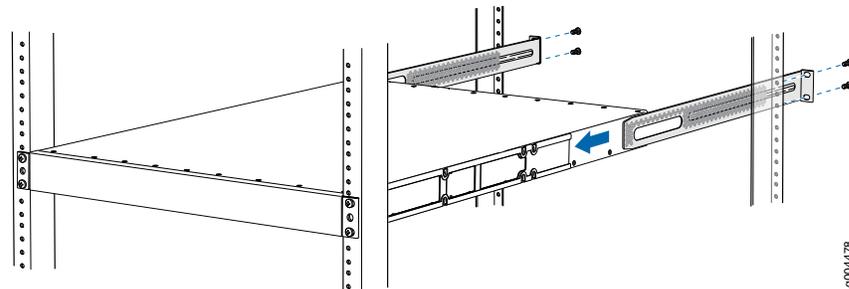
10. Attach the rear-mounting blades to the rear post by using the appropriate screws for your rack. Tighten the screws.

11. Ensure that the switch chassis is level by verifying that all the screws on the front of the rack are aligned with the screws at the back of the rack.

SEE ALSO

Mounting an EX3400 Switch in a Recessed Position in a Rack or Cabinet

You can mount an EX3400 switch in a rack or cabinet such that the switch is recessed inside the rack from the front of the rack by 2 inches. You can use the 2-in.-recess front-mounting brackets provided in the separately orderable four-post rack-mount kit to mount the switch in a recessed position.

Reasons that you might want to mount the switch in a recessed position include:

- You are mounting the switch in a cabinet and the cabinet doors do not close completely unless the switch is recessed.

- The switch you are mounting has transceivers installed in the uplink ports and the transceivers in the uplink ports protrude from the front of the switch.

To mount the switch in a recessed position on four posts, follow the instructions in "Mounting an EX3400 Switch on Four Posts in a Rack or Cabinet" on page 101. To mount the switch in a recessed position on two posts, follow the instructions in "Mounting an EX3400 Switch on Two Posts in a Rack or Cabinet" on page 98.

SEE ALSO

Mounting an EX3400 Switch on a Wall

You can mount an EX3400 switch on a wall by using the separately orderable wall-mount kit.

Before mounting the switch on a wall:

- Verify that the site meets the requirements described in "Site Preparation Checklist for EX3400 Switches" on page 51.
- Read "General Safety Guidelines and Warnings" on page 242, with particular attention to "Chassis and Component Lifting Guidelines" on page 249.

Ensure that you have the following parts and tools available:

- 2 wall-mounting brackets (provided in the wall-mount kit)
- 12 wall-mounting bracket screws (provided in the wall-mount kit)
- 6 mounting screws (8-32 x 1.25 in. or M4 x 30 mm) (not provided)
- Hollow wall anchors rated to support up to 75 lb (34 kg) if you are not screwing the screws directly into wall studs (not provided)
- Phillips (+) screwdriver, number 2

To mount one or two switches on a wall:

1. Remove the switch from the shipping carton (see "Unpacking an EX3400 Switch" on page 92).

2. Attach the wall-mounting brackets to the sides of the chassis using four wall-mounting bracket screws on each side, as shown in Figure 33 on page 106.

Figure 33: Attaching Wall-Mounting Brackets to a Switch Chassis
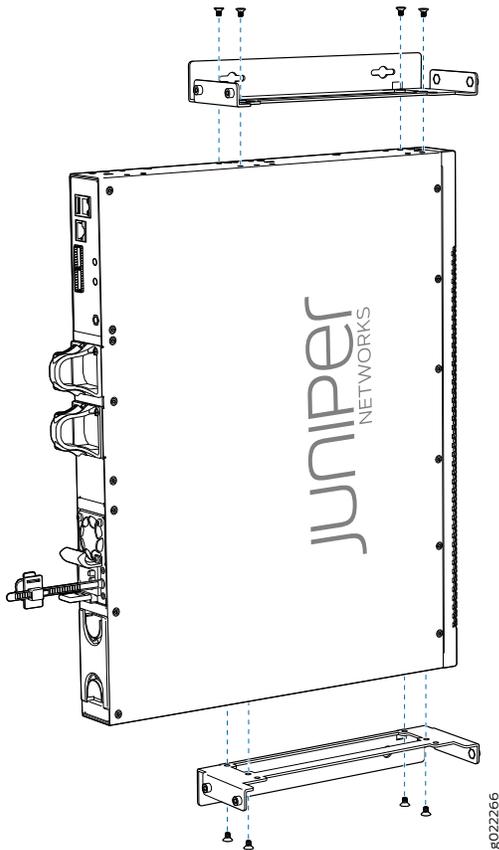
3. Install six mounting screws in the wall for the wall-mounting brackets at the location shown in
    :

    > **NOTE:** Tighten the screws only part way in, leaving about 1/4 in. (6 mm) distance between
    > the head of the screw and the wall.

    a. Drill a hole A and install a mounting screw.

    b. Drill a hole B at a distance of 5.98 in. (15.2 cm) from screw A on a level line to the right and install
        a mounting screw.

    c. Drill a hole C at a distance of 18.67 in. (47.43 cm) on a plumb line down from screw A and install a
        mounting screw.

    d. Drill a hole D at a distance of 18.67 in. (47.43 cm) on a plumb line down from screw B and install a
        mounting screw.

Figure 34: Measurements for Installing Mounting Screws

Rear

B   A   Front (ports)

18.67 in.
(47.42 cm)

D   C

5.98 in.
(15.2 cm)

1.76 in.
(4.47 cm)

g022273
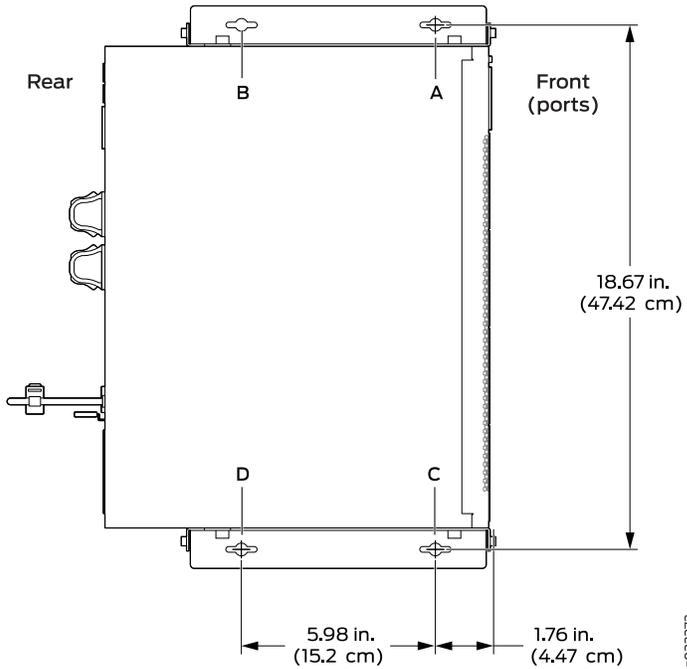
4. Place the switch against the wall such that the front panel of the switch faces to the right side and the holes in the mounting brackets heads align with the mounting screw heads.

5. Slide the switch chassis to the left or right a bit so that the mounting screws are pushed into the channels of the holes in the mounting brackets until the switch rests firmly in place as shown in .

6. Tighten all mounting screws.

Figure 35: Mounting the Switch on a Wall
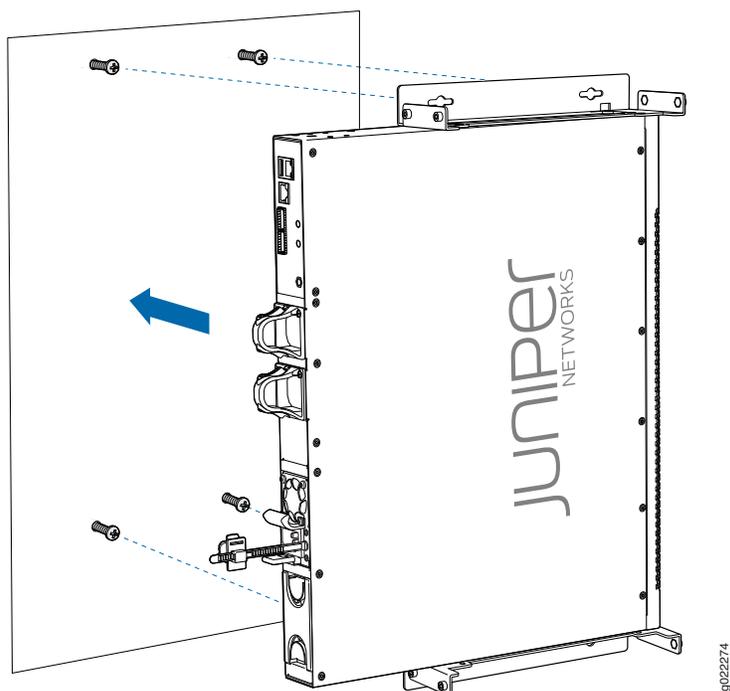
SEE ALSO

Connecting the EX3400 to Power

IN THIS SECTION

Connect Earth Ground to an EX Series Switch

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 37 on page 116).

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 39 on page 110 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 39 on page 110 lists the earthing terminal location, grounding cable and lug specifications, and parts needed for connecting an EX Series switch to earth ground.

Table 39: 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 mm²), minimum 90° C wire, or as permitted by the local code	Panduit LCC10-14BWL or equivalent—not provided	• 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 mm²), minimum 90° C wire, or as permitted by the local code	Panduit LCC10-14AW-L or equivalent—not provided	• Two 10-32 x .25 in. screws with #10 split-lock washer—not provided • Two #10 flat washers—not provided	

Table 39: 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	• 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	• 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	• EX2300 switches except EX2300-24MP and EX2300-48MP models • 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 • One Pan Phillips M 4 x 6 mm Nickel plated screw—provided	
EX3200, EX3300, and EX3400	Rear panel of the chassis	14 AWG (2 mm²), minimum 90° C wire, or as permitted by the local code	Panduit LCC10-14BWL or equivalent— not provided	• 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 114.

Table 39: 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 mm²), minimum 90° C wire, or as permitted by the local code	Panduit LCC10-14BWL or equivalent— not provided	• 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 114.
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	• 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 mm²), minimum 90° C wire, or as permitted by the local code	Panduit LCD2-14A-Q or equivalent —provided	• Two ¼ -20 x 0.5 in. screws with #¼" split-washer —provided • Two #¼" flat washers— provided	

Table 39: 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	Two earthing terminals: • Left side of the chassis • Rear panel of the chassis **NOTE:** You must use only one of the two protective earthing terminals.	2 AWG (33.6 mm²), minimum 90° C wire, or as permitted by the local code	Panduit LCD2-14A-Q or equivalent —provided	• 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 mm²), minimum 90° C wire, or one that complies with the local code	Thomas& Betts LCN6-14 or equivalent— provided	• 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 mm²), 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 39: 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 mm²), 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

lists the special instructions that you might need to follow before connecting earth ground to a switch.

Table 40: 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 750-021*xxx* through 750-030*xxx* require 10-24x.25 in. screws.

Table 40: Special Instructions to Follow Before Connecting Earth Ground to an EX Series Switch *(continued)*

Switch	Special Instructions
EX4200, EX4500, and EX4550	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. 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 36: Connecting the Grounding Lug to a Switch Mounted on Four Posts of a Rack** 1—Protective earthing terminal 3—Grounding lug 2—Side mounting-rail 4—Rear mounting-blade 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.)

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 37: Connecting a Grounding Cable to an EX Series Switch
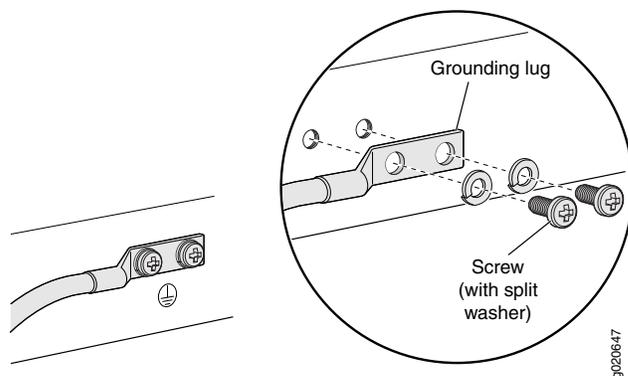
5. Secure the grounding lug to the protective earthing terminal with the washers and screws.

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 | **242**

Grounded Equipment Warning | **260**

Connecting AC Power to an EX3400 Switch

The power supply is installed in the power supply slot on the rear panel of the switch.

Ensure that you have the following parts and tools available:

- A power cord appropriate for your geographical location

- A power cord retainer clip (provided with the switch)

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 EX3400 Switches" on page 44).

> ⚠ **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 109.

To connect AC power to the switch:

1. Push the end of the power cord retainer strip into the slot above the power cord inlet until the strip snaps into place. Ensure that the loop in the retainer strip faces the power cord (see Figure 38 on page 118).

   The power cord retainer clip extends out of the chassis by 3 in. (7.62 cm)

2. Press the small tab on the retainer strip to loosen the loop. Slide the loop until there is enough space to insert the power cord coupler into the power cord inlet.

3. Locate the power cord or cords shipped with the switch; the cords have plugs appropriate for your geographical location. See "AC Power Cord Specifications for EX3400 Switches" on page 44.

> ⚡ **WARNING:** Ensure that the power cord does not drape where people can trip on it or block access to switch components.

4. Insert the power cord coupler firmly into the power cord inlet (see Figure 39 on page 118).

5. Slide the loop toward the power supply until it is snug against the base of the coupler.

6. Press the tab on the loop and draw out the loop into a tight circle.

7. If the AC power source outlet has a power switch, set it to the OFF (**0**) position.

8. Insert the power cord plug into an AC power source outlet.

9. If the AC power source outlet has a power switch, set it to the ON (|) position.

Figure 38: Connecting an AC Power Cord Retainer Clip to the AC Power Cord Inlet
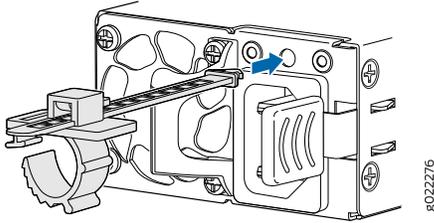
Figure 39: Connecting an AC Power Cord to the AC Power Cord Inlet
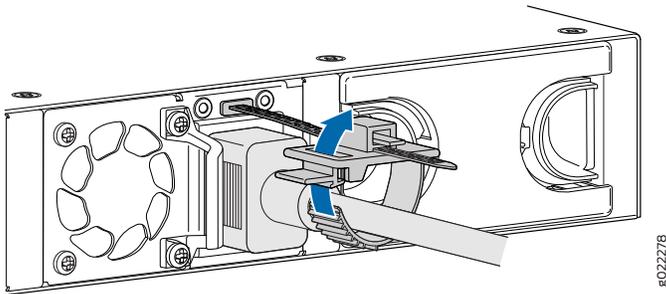
SEE ALSO

Connecting and Configuring an EX Series Switch (CLI Procedure) | **150**

AC Power Supply in EX3400 Switches | **41**

Connecting DC Power to an EX3400 Switch

The power supply is installed in the power supply slot in the rear panel.

> ⚠ **WARNING:** DC-powered switches are intended for installation only in a restricted-access location.

Before you begin connecting DC power to the switch, ensure that you have connected earth ground to the switch chassis.

> **CAUTION:** To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the switch 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 the earth ground. For instructions on connecting earth ground, see "Connect Earth Ground to an EX Series Switch" on page 109.

> **NOTE:** Grounding is required for DC systems and recommended for AC systems.

Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 276).

Install the power supply in the chassis. For instructions on installing a DC power supply in an EX3400 switch, see "Installing a DC Power Supply in an EX3400 Switch" on page 202.

Ensure that you have the following parts and tools available:

- DC power source cables (14–16 AWG) (not provided)
- Wire pins (Molex 192120005) (not provided)
- Terminal connector (provided)
- Phillips (+) screwdriver, number 2
- Slotted (-) screwdriver

To connect DC power to the switch:

1. Ensure that the input circuit breaker is open so that the cable leads do not become active while you are connecting DC power.

   > **NOTE:** The DC power inlet in the switch has two terminals labeled **+** and **–** and has a terminal to connect to earth ground. The DC power inlet has a clear plastic cover.

   > **NOTE:** The **+** terminal is referred to as +RTN and **–** terminal is referred to as –48 V in "DC Power Wiring Sequence Warning" on page 285 and "DC Power Electrical Safety Guidelines" on page 280.

2. Grasp the plastic cover in the middle, gently bend it outward, and pull it out. Save the cover.

3. Loosen the screws on the terminal connector by using the screwdriver.

4. Strip 0.25 inch (6.35 mm) of the insulator from one end of the power cable. Attach the two wires to the wire pins.

5. Secure the wire pins to the appropriate terminals on the terminal connector by using the screws from the terminal connector (see Figure 40 on page 120).

Figure 40: Securing Wire Pins to the Terminals on the Terminal Connector
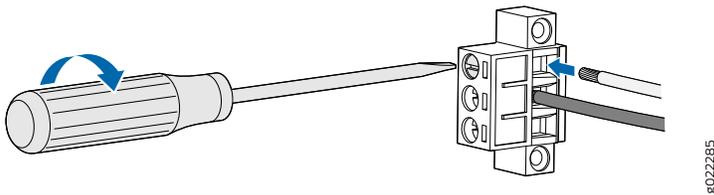
g022285

- To connect the wire pins to the appropriate terminals on the terminal connector:

    a. Connect the positive **(+)** wire pin to the **+** terminal on the terminal connector.

    b. Connect the negative **(–)** wire pin to the **–** terminal on the terminal connector.

    c. Ensure that the pins are fully inserted into the terminal connector.

    d. Tighten each screw on the terminal connector until snug by using the screwdriver. Do not overtighten—apply 4.5 lb-in. (0.51 Nm) of torque to the screws.

6. Insert the terminal connector (with the power cable attached) into the power supply socket on the switch and secure it by tightening the two screws on either side of the terminal connector (see).

Figure 41: Securing the Terminal Connector to the DC Power Inlet
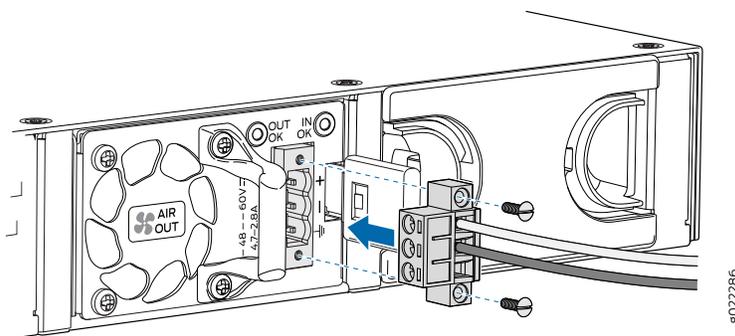
> **NOTE:** To supply sufficient power, terminate the DC input wiring on a facility DC source that is capable of supplying a minimum of 7.5 A at –48 VDC.

7. Connect the other end of the power cable to the power source.

8. Close the input circuit breaker.

9. Verify that the **IN OK** and the **OUT OK** LEDs are lit green and on steadily.

SEE ALSO

Connecting the EX3400 to External Devices

IN THIS SECTION

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 42 on page 122 shows the RJ-45 connector of the Ethernet cable supplied with the device.

Figure 42: RJ-45 Connector on an Ethernet Cable
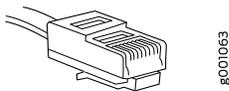
To connect a device to a network for out-of-band management (see Figure 43 on page 123):

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 43: Connect a Device to a Network for Out-of-Band Management
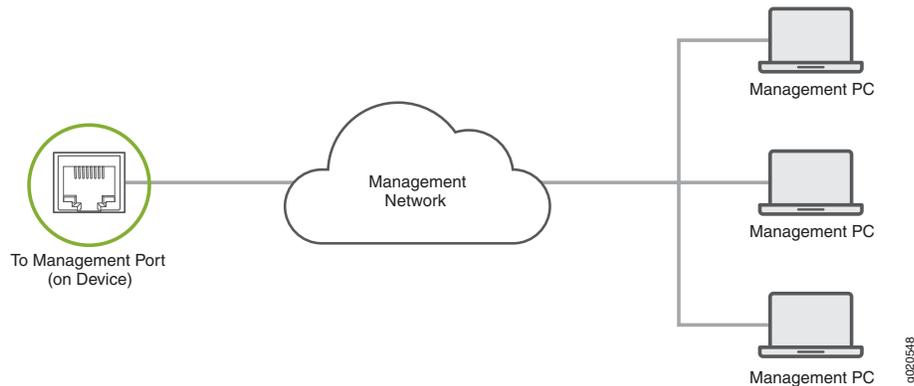
Connect a Device to a Management Console Using an RJ-45 Connector

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 44 on page 123 shows the RJ-45 connector of the Ethernet cable.

Figure 44: RJ-45 Connector on an Ethernet Cable
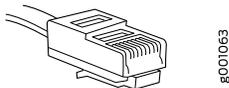
> **NOTE:** If your laptop or desktop PC does not have a DB-9 plug connector pin and you want to connect your laptop or desktop PC directly to the device, use a combination of the RJ-45 to DB-9 socket adapter supplied with the device and a USB to DB-9 plug adapter. You must provide the USB to DB-9 plug adapter.

To connect the device to a management console (see Figure 45 on page 124 and Figure 46 on page 124):

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 45 on page 124) or management console (see Figure 46 on page 124).

Figure 45: Connect a Device to a Management Console Through a Console Server

To Console Port   Console Server   PC

g020547
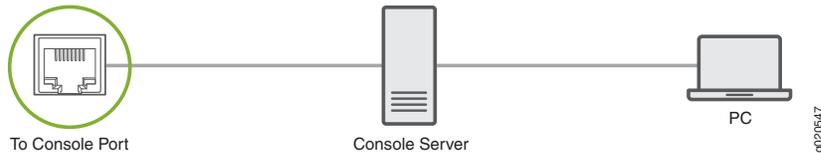
Figure 46: Connect a Device Directly to a Management Console

To Console port   PC

g020570

Connect an EX Series Switch to a Management Console Using the Mini-USB Type-B Console Port

EX2200-C, EX2300, EX2300-C , EX3400, EX4300, and EX4550 switches, except EX2300-24MP and EX2300-48MP models, have two console ports: an RJ-45 console port that accepts a cable with an RJ-45 connector and a Mini-USB Type-B console port that accepts a cable with a Mini-USB Type-B plug (5-pin) connector. You can configure and manage the switch using the RJ-45 console port or the Mini-USB Type-B console port. On EX2200-C and EX4550 switches, only one console port is active at a time and the console input is active only on that port. On EX2300, EX2300-C, EX3400, and EX4300 switches, both the RJ-45 console port and the Mini-USB Type-B console port can be active at the same time.

> **NOTE:** EX2300-24MP and EX2300-48MP models only have an RJ-45 console port.

By default, the RJ-45 console port is the active port. If your laptop or PC does not have a DB-9 plug connector pin or RJ-45 connector pin, you can connect your laptop or PC directly to the switch using a mini-USB cable that has a Standard-A USB connector on one end and a Mini-USB Type-B (5-pin) connector on the other end. You must first configure the Mini-USB Type-B console port as the active port before you can use it to connect to the switch.

This topic describes the procedure to connect EX2200-C, EX2300, EX2300-C, EX3400, EX4300, and EX4550 switches to the management console using the Mini-USB Type-B console port.

For information about configuring and managing an EX Series switch using the RJ-45 console port, see "Connect a Device to a Management Console Using an RJ-45 Connector" on page 123.

Before You Begin

Before you connect the switch using the Mini-USB Type-B console port:

- Ensure that the USB to Serial driver is installed on the host machine.
- Ensure that the HyperTerminal properties of the console server or laptop are set as follows:
  - Baud rate—9600
  - Flow control—None
  - Data—8
  - Parity—None
  - Stop bits—1
  - DCD state—Disregard

You will need the following parts and tools:

- One mini-USB cable with Standard-A and Mini-USB Type-B (5-pin) connectors (not provided)

To connect the switch to the console using the Mini-USB Type-B console port:

1. Connect the host machine to the device directly using the active console port or remotely using the management interface. To connect using the active console port, which is the RJ-45 console port by default, see "Connect a Device to a Management Console Using an RJ-45 Connector" on page 123.

2. Connect the Standard-A connector of the mini-USB cable to the host machine (PC or laptop).

3. Connect the Mini-USB Type-B (5-pin) connector of the mini-USB cable to the Mini-USB Type-B console port (labeled **CON**) on the switch.

4. By default, the RJ-45 port is set as an active console port and the Mini-USB Type-B port is the passive console port. Set the Mini-USB Type-B console port as the active console port using the **port-type** command. See *Configuring the Console Port Type (CLI Procedure)*.

5. Reboot the switch. The boot log appears on the activated console.

After the connection is established, the Mini-USB Type-B becomes the active console port. The host machine connected to the Mini-USB Type-B console port displays log messages and you can control switch functionality through it. On EX2300, EX2300-C, EX3400, and EX4300 switches, both the Mini-USB Type-B and RJ-45 console ports are now active. On EX2200-C and EX4550 switches, the Mini-USB Type-B console port is active and the RJ-45 console port is passive.

Connecting the EX3400 to the Network

IN THIS SECTION

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 261).

Ensure that you have a rubber safety cap available to cover the transceiver.

Figure 47 on page 128 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 47: Install a Transceiver

g022143

1—Ejector lever

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 261).

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 48 on page 129).

Figure 48: Connect a Fiber-Optic Cable to an Optical Transceiver Installed in a Device
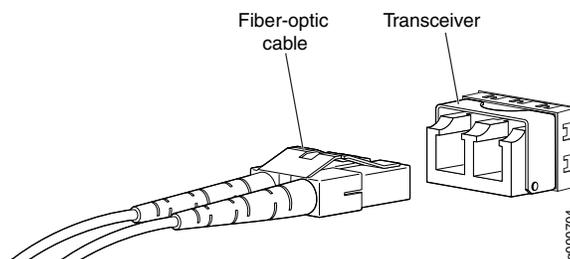
4. Secure the cables so that they do not support their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.

> ⚠ **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 EX3400

IN THIS SECTION

EX3400 Switch Default Configuration

Each EX Series switch is programmed with a factory-default configuration that contains the values set for each configuration parameter when a switch is shipped.

The EX3400 switch default configuration:

- Sets Ethernet switching and storm control on all interfaces

- Sets Power over Ethernet (PoE) on all RJ-45 ports of models that provide PoE

- Enables the following protocols:

  - Internet Group Management Protocol (IGMP) snooping

  - Rapid Spanning Tree Protocol (RSTP)

  - Link Layer Discovery Protocol (LLDP)

  - Link Layer Discovery Protocol Media Endpoint Discovery (LLDP-MED)

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" on page 158.

> **NOTE:** The factory-default configuration file is different for different EX3400 switch models.
>
> The number of interfaces in the default configuration file depends on the number of ports in the EX3400 switch.
>
> The **poe** statement does not appear for models without PoE.
>
> The four uplink ports on the front panel of EX3400 switches are listed as **ge-0/2/0** through **ge-0/2/3** and **xe-0/2/0** through **xe-0/2/3**.

The following is the factory-default configuration file for an EX3400 switch with 24 ports with PoE capability that runs Junos OS Release 18.2R3 or later.

```
system {
    auto-snapshot;
    phone-home {
        server https://redirect.juniper.net;
        rfc-compliant;
    }
    services {
        ssh;
        netconf {
            ssh;
            rfc-compliant;
            yang-compliant;
        }
    }
}
protocols {
    lldp {
        interface all;
    }
    lldp-med {
        interface all;
    }
    igmp-snooping {
        vlan default;
    }
    rstp {
        interface ge-0/0/0;
        interface ge-0/0/1;
        interface ge-0/0/2;
        interface ge-0/0/3;
```

```
        interface ge-0/0/4;
        interface ge-0/0/5;
        interface ge-0/0/6;
        interface ge-0/0/7;
        interface ge-0/0/8;
        interface ge-0/0/9;
        interface ge-0/0/10;
        interface ge-0/0/11;
        interface ge-0/0/12;
        interface ge-0/0/13;
        interface ge-0/0/14;
        interface ge-0/0/15;
        interface ge-0/0/16;
        interface ge-0/0/17;
        interface ge-0/0/18;
        interface ge-0/0/19;
        interface ge-0/0/20;
        interface ge-0/0/21;
        interface ge-0/0/22;
        interface ge-0/0/23;
        interface xe-0/2/0;
        interface xe-0/2/1;
        interface xe-0/2/2;
        interface xe-0/2/3;
        interface ge-0/2/0;
        interface ge-0/2/1;
        interface ge-0/2/2;
        interface ge-0/2/3;
    }
}
forwarding-options {
    storm-control-profiles default {
        all;
    }
}
poe {
    interface all;
}
interfaces {
    ## For phone-home connectivity to PHS enable dhcp on vme and irb.
    vme {
        unit 0 {
            family inet {
                dhcp;
```

```
                }
            }
        }
        irb {
            unit 0 {
                family inet {
                    dhcp;
                }
            }
        }
        ge-0/0/0 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/1 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/2 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/3 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/4 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
```

```
        }
        ge-0/0/5 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/6 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/7 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/8 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/9 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/10 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/11 {
```

```
        unit 0 {
          family ethernet-switching {
            storm-control default;
          }
        }
      }
      ge-0/0/12 {
        unit 0 {
          family ethernet-switching {
            storm-control default;
          }
        }
      }
      ge-0/0/13 {
        unit 0 {
          family ethernet-switching {
            storm-control default;
          }
        }
      }
      ge-0/0/14 {
        unit 0 {
          family ethernet-switching {
            storm-control default;
          }
        }
      }
      ge-0/0/15 {
        unit 0 {
          family ethernet-switching {
            storm-control default;
          }
        }
      }
      ge-0/0/16 {
        unit 0 {
          family ethernet-switching {
            storm-control default;
          }
        }
      }
      ge-0/0/17 {
        unit 0 {
          family ethernet-switching {
```

```
            storm-control default;
        }
    }
}
ge-0/0/18 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/19 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/20 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/21 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/22 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/23 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
```

```
        }
    }
    xe-0/2/0 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    xe-0/2/1 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    xe-0/2/2 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    xe-0/2/3 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/2/0 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/2/1 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
```

```
    ge-0/2/2 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/2/3 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
}
groups {
    junos-defaults {
        protocols {
            igmp {
                interface me0.0 {
                    disable;
                }
                interface vme.0 {
                    disable;
                }
            }
        }
    }
}
system {
    commit {
        factory-settings {
            reset-chassis-lcd-menu;
            reset-virtual-chassis-configuration;
        }
    }
}
chassis {
    redundancy {
        graceful-switchover;
    }
}
vlans {
    default {
```

```
        vlan-id 1;
        l3-interface irb.0;
    }
  }
}
```

The following is the factory-default configuration file for an EX3400 switch with 48 ports with PoE capability that runs a version of Junos OS release earlier than 18.2R3.

```
system {
   auto-snapshot;
   syslog {
      user * {
         any emergency;
      }
      file messages {
         any notice;
         authorization info;
      }
      file interactive-commands {
         interactive-commands any;
      }
   }
   commit {
      factory-settings {
         reset-virtual-chassis-configuration;
         reset-chassis-lcd-menu;
      }
   }
}
interfaces {
   ge-0/0/0 {
      unit 0 {
         family ethernet-switching {
            storm-control default;
         }
      }
   }
   ge-0/0/1 {
      unit 0 {
         family ethernet-switching {
            storm-control default;
         }
      }
   }
```

```
ge-0/0/2 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/3 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/4 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/5 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/6 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/7 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/8 {
    unit 0 {
```

```
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/9 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/10 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/11 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/12 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/13 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/14 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
```

```
            }
        }
    }
    ge-0/0/15 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/16 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/17 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/18 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/19 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/20 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
```

```
        }
        ge-0/0/21 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/22 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/23 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/24 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/25 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/26 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/0/27 {
```

```
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/28 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/29 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/30 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/31 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/32 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/33 {
        unit 0 {
            family ethernet-switching {
```

```
            storm-control default;
        }
    }
}
ge-0/0/34 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/35 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/36 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/37 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/38 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/39 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
```

```
        }
    }
    ge-0/0/40 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/41 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/42 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/43 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/44 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
    ge-0/0/45 {
        unit 0 {
            family ethernet-switching {
                storm-control default;
            }
        }
    }
```

```
ge-0/0/46 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/0/47 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/2/0 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
xe-0/2/0 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/2/1 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
xe-0/2/1 {
    unit 0 {
        family ethernet-switching {
            storm-control default;
        }
    }
}
ge-0/2/2 {
    unit 0 {
```

```
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        xe-0/2/2 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        ge-0/2/3 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
        xe-0/2/3 {
            unit 0 {
                family ethernet-switching {
                    storm-control default;
                }
            }
        }
    }
    forwarding-options {
        storm-control-profiles default {
            all;
        }
    }
    protocols {
        lldp {
            interface all;
        }
        lldp-med {
            interface all;
        }
        igmp-snooping {
            vlan default;
        }
        rstp {
            interface ge-0/0/0;
```

```
interface ge-0/0/1;
interface ge-0/0/2;
interface ge-0/0/3;
interface ge-0/0/4;
interface ge-0/0/5;
interface ge-0/0/6;
interface ge-0/0/7;
interface ge-0/0/8;
interface ge-0/0/9;
interface ge-0/0/10;
interface ge-0/0/11;
interface ge-0/0/12;
interface ge-0/0/13;
interface ge-0/0/14;
interface ge-0/0/15;
interface ge-0/0/16;
interface ge-0/0/17;
interface ge-0/0/18;
interface ge-0/0/19;
interface ge-0/0/20;
interface ge-0/0/21;
interface ge-0/0/22;
interface ge-0/0/23;
interface ge-0/0/24;
interface ge-0/0/25;
interface ge-0/0/26;
interface ge-0/0/27;
interface ge-0/0/28;
interface ge-0/0/29;
interface ge-0/0/30;
interface ge-0/0/31;
interface ge-0/0/32;
interface ge-0/0/33;
interface ge-0/0/34;
interface ge-0/0/35;
interface ge-0/0/36;
interface ge-0/0/37;
interface ge-0/0/38;
interface ge-0/0/39;
interface ge-0/0/40;
interface ge-0/0/41;
interface ge-0/0/42;
interface ge-0/0/43;
interface ge-0/0/44;
```

```
        interface ge-0/0/45;
        interface ge-0/0/46;
        interface ge-0/0/47;
        interface ge-0/2/0;
        interface xe-0/2/0;
        interface ge-0/2/1;
        interface xe-0/2/1;
        interface ge-0/2/2;
        interface xe-0/2/2;
        interface ge-0/2/3;
        interface xe-0/2/3;
    }
}
poe {
    interface all;
}
```

SEE ALSO

Configuration Files Terms

Connecting and Configuring an EX Series Switch (CLI Procedure) | 150

EX3400 Switches Hardware Overview | 19

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" on page 158.

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" on page 30.

   - 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*.

   - 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" on page 124.

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)

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 49 on page 156 or Figure 50 on page 156):

Figure 49: LCD Panel in an EX3200, EX4200, EX4500, EX4550, or EX8200 Switch
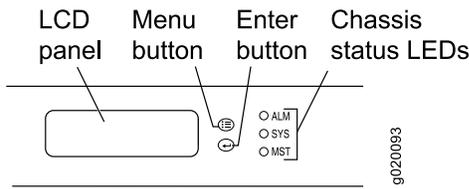
Figure 50: LCD Panel in an EX4300 Switches Except EX4300-48MP and EX4300-48MP-S Switches
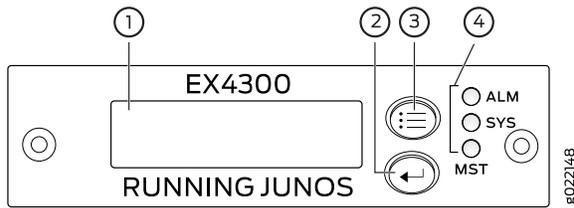
1—LCD panel	3—LCD panel Menu button
2—LCD panel Enter button	4—Chassis status LEDs

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.

Reverting to the Default Factory Configuration for the EX Series Switch

With EX Series switches, if for any reason the current active configuration fails, you can revert to the factory-default configuration.

You can also roll back to a previous configuration, as described in *Rolling Back Junos OS Configuration Changes*, or revert to the rescue configuration, as described in *Reverting to the Rescue Configuration for the EX Series Switch*.

> **TIP:** If you have lost the root password, it is not necessary to revert to the factory-default configuration to reset it. See *Recovering the Root Password on Switches*.

The factory-default configuration contains the basic configuration settings for the switch. This is the first configuration of the switch and it is loaded when the switch is first powered on. For the factory-default configuration file for your switch, see the hardware documentation for your switch.

> **TIP:** You can run the EZsetup script to complete the initial configuration of the switch *after* reverting to the factory-default configuration. (The EZsetup script is available only on fixed configuration switches, it is not available on modular switches.) For information on completing the initial configuration using either the CLI or the J-Web interface, see "Connecting and Configuring an EX Series Switch (CLI Procedure)" on page 150 or "Connecting and Configuring an EX Series Switch (J-Web Procedure)" on page 154.

You can revert to the factory-default configuration by using the **Menu** button to the right of the LCD panel on switches with LCD panel or by using the **request system zeroize** operational command or the **load factory-default** configuration command. (If your switch model does not have an LCD panel, use these commands.) You can also use the **load factory-default** command to revert to the factory-default configuration file that contains all default settings *except* the root password setting, which is retained.

These procedures are described in the following sections:

- Reverting to the EX Series Switch Factory-Default Configuration Using the request system zeroize Command | **159**
- Reverting to the EX Series Switch Factory-Default Configuration Using the load factory-default Command | **160**
- Reverting to the Factory-Default Configuration Using the EX Series Switch LCD Panel | **161**
- Reverting to the Factory-Default Configuration Using the Factory Reset/Mode button on EX2300, EX3400, and EX4300-48MP Switches | **162**

Reverting to the EX Series Switch Factory-Default Configuration Using the request system zeroize Command

The **request system zeroize** command is a standard Junos OS operational mode command that removes all configuration information and resets all key values. The operation unlinks all user-created data files,

including customized configuration and log files, from their directories. The switch then reboots and reverts to the factory-default configuration.

To completely erase user-created data so that it is unrecoverable, use the **request system zeroize media** command.

> ⚠️ **CAUTION:** Before issuing **request system zeroize**, use the **request system snapshot** command to back up the files currently used to run the switch to a secondary device.

To revert to the factory-default configuration by using the **request system zeroize** command:

1. `user@switch>` **request system zeroize**
   ```
   warning: System will be rebooted and may not boot without configuration
   Erase all data, including configuration and log files? [yes,no] (yes)
   ```

2. Type **yes** to remove configuration and log files and revert to the factory-default configuration.

> **NOTE:** The **auto-image-upgrade** statement is added under the **[edit chassis]** hierarchy level when you use this procedure, and thus the automatic image upgrade feature is made available on the switch.

Reverting to the EX Series Switch Factory-Default Configuration Using the load factory-default Command

The **load factory-default** command is a standard Junos OS configuration command that replaces the current active configuration with the factory-default configuration (except the root password setting, which by default is not set but which you must set in order to commit the new configuration in this procedure).

If you want to run the EZsetup script to complete the initial configuration of the switch after you revert to the factory-default configuration, do not use the **load factory-default** command. Instead do the reversion using either the LCD panel or the **request system zeroize** command. If you use the **load factory-default** command to revert to the factory-default configuration, the configuration for the root password is retained and the EZsetup script will not run. (The EZsetup script is available only on fixed configuration switches, it is not available on modular switches.)

> **NOTE:** The **load factory-default** command by itself is not supported on EX3300, EX4200, EX4500, and EX4550 switches configured in a Virtual Chassis.

To revert to the factory-default configuration by using the **load factory-default** command:

> **NOTE:** If you use this procedure, you must delete the system commit factory settings, set the root password, and commit the configuration. These steps are not required when you revert to the factory-default configuration by using **request system zeroize**. Also, the **auto-image-upgrade** statement is not added to the configuration when you use this procedure; it *is* added to the configuration when you use **request system zeroize**.

1. [edit]

   user@switch# **load factory-default**

2. [edit]

   user@switch# **delete system commit factory-settings**

3. [edit]

   user@switch# **set system root-authentication plain-text-password**

4. [edit]

   user@switch# **commit**

5. Check the member ID and primary-role priority with the **show virtual-chassis** command and check to see whether there are remaining settings for uplink VCPs by using the **show virtual-chassis vc-port** command.

Reverting to the Factory-Default Configuration Using the EX Series Switch LCD Panel

To set the switch to the factory-default configuration, for EX Series switches, you can use the LCD panel and buttons on the front panel of the switch. If the EX Series switch model does not have an LCD panel, use one of the procedures described in the following sections.

Figure 51: EX Series Switch LCD Panel
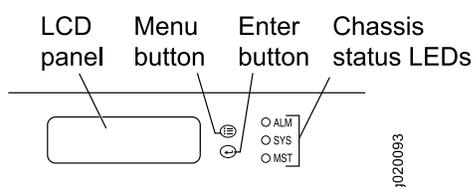
> **NOTE:** To revert a member switch of a Virtual Chassis to the factory-default configuration, first disconnect the cables connected to the Virtual Chassis ports (VCPs) to avoid affecting Virtual Chassis configuration parameters (member ID, primary-role priority, and setting of VCP uplinks) on other members. See "Disconnect a Fiber-Optic Cable" on page 211, *Disconnecting a Virtual Chassis Cable from an EX4200 Switch*, or *Disconnecting a Virtual Chassis Cable from an EX4500 Switch*.

To revert to the factory-default configuration by using the LCD panel:

1. Press the **Menu** button until you see MAINTENANCE MENU on the panel.

2. Press the **Enter** button.

3. Press **Menu** until you see FACTORY DEFAULT.

4. Press **Enter**. The display says RESTORE DEFAULT?

5. Press **Enter**. The screen flashes **FACTORY DEFAULT IN PROGRESS** and returns to the idle menu.

6. Complete the initial configuration of the switch. See "Connecting and Configuring an EX Series Switch (CLI Procedure)" on page 150 or "Connecting and Configuring an EX Series Switch (J-Web Procedure)" on page 154.

Reverting to the Factory-Default Configuration Using the Factory Reset/Mode button on EX2300, EX3400, and EX4300-48MP Switches

To set the EX2300 switches except the EX2300-24MP and EX2300-48MP switches, EX2300-C switches, EX3400 switches, and EX4300-48MP switches to the factory-default configuration, use the Factory Reset/Mode button located on the far right side of the front panel.

> **NOTE:** To revert a member switch of a Virtual Chassis to the factory-default configuration, disconnect the cables connected to the VCPs to avoid affecting Virtual Chassis configuration parameters (member ID, primary-role priority, and setting of VCP uplinks) on other members (see "Disconnect a Fiber-Optic Cable" on page 211).

To revert to the factory-default configuration by using the Factory Reset/Mode button:

1. Press the Factory Reset/Mode button for 10 seconds. The switch transitions into factory-default configuration, the console displays **committing factory default configuration**, and the Link/Activity LED on the RJ-45 network ports and the uplink ports is lit steadily in green color.

2. Press the Factory Reset/Mode button for 10 more seconds. The switch transitions into initial setup mode, the console displays **committing ezsetup config**, and the Link/Activity LED on the RJ-45 network ports and the uplink ports blink in green color.

The Factory Reset/Mode button is enabled by default. You can disable the button using the CLI.

To disable the Factory Reset/Mode button, run the commands:

1. [edit]
    user@switch# **set chassis config-button no-clear**

2. [edit]
    user@switch# **commit**

To enable the Factory Reset/Mode button, run the commands:

1. [edit]
    user@switch# **delete chassis config-button no-clear**

2. [edit]
    user@switch# **commit**

SEE ALSO

>
>
> *Understanding Configuration Files*

Dashboard for EX Series Switches

IN THIS SECTION

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 41 on page 165 lists the details that are displayed on each member switch.

Table 41: 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 42 on page 166 describes the possible status of a member switch.

Table 42: 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 43: System Information

Field	Description
System name	Indicates the local name of the EX Series switch. The local name of the EX Series switches changes when an individual image is clicked.
	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.
Device model	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.
	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.
	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.

Table 43: System Information *(continued)*

Field	Description
Inventory details	

Table 43: System Information *(continued)*

Field	Description
	Indicates the following:
	• 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.
	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.
	• 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 43: 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 44: Health Status

Field	Description
EX2200, EX2200-C, EX3200, EX3300, EX4200, and EX4300 Switches	

Table 44: Health Status *(continued)*

Field	Description
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. **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.
Flash	Indicates the usage and capacity of internal flash memory and any external USB flash drive. **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. 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.
Temp.	Indicates the chassis temperature status. Temperatures are listed in Celsius and the corresponding Fahrenheit values. **NOTE:** The **Temp** field is unavailable for a standalone EX2200-C switch. The **Temp** field is dynamically available for an EX2200 Virtual Chassis switch based on the model of the member clicked. **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. In EX4600 Virtual Chassis, to display the temperature of the Routing Engine of each switch, mouse over the green-colored indicator.
CPU load	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.

Table 44: 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**. 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. **NOTE:** The **Fan status** field is unavailable for a standalone EX2200-C switch. The **Fan status** field is dynamically available for an EX2200 Virtual Chassis switch based on the model of the member clicked. In EX4600 Virtual Chassis, mouse over the fan icon to display the fan status of all the switches.

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.	Indicates the chassis temperature status. Temperatures in the dashboard are listed in Celsius and the corresponding Fahrenheit values. **NOTE:** The **Temp** field is unavailable for an EX4500 switch.
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	Indicates the status of the fans in the fan tray. The possible values are **OK**, **Failed**, and **Absent**. **NOTE:** The fans are located on the side panel of the chassis.
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 44: 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

Field	Description
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

Field	Description
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

Field	Description
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 44: 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 45: 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 46 on page 176—Describes the chassis viewer for EX2200 switches.
- Table 47 on page 176—Describes the chassis viewer for EX2200-C switches.
- Table 48 on page 177—Describes the chassis viewer for EX3200, EX3300, and EX4200 switches.
- Table 49 on page 179—Describes the chassis viewer for EX4300 switches.
- Table 50 on page 181—Describes the chassis viewer for EX4500 switches.
- Table 51 on page 182—Describes the chassis viewer for EX4550 switches.

Table 46: Chassis Viewer for EX2200 Switches

Field	Description
Front View	
Interface status	In the image, the following colors denote the interface status: - 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.
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	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 outlet icon to display name, status, and description information.

Table 47: Chassis Viewer for EX2200-C Switches

Field	Description
Front View	

Table 47: Chassis Viewer for EX2200-C Switches *(continued)*

Field	Description
Interface status	In the image, the following colors denote the interface status: ● 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.
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.
Rear View	
Power supply	Mouse over the power outlet icon to display name, status, and description information.

Table 48: Chassis Viewer for EX3200, EX3300, and EX4200 Switches

Field	Description
Front View	

Table 48: Chassis Viewer for EX3200, EX3300, and EX4200 Switches *(continued)*

Field	Description
Interface status	In the image, the following colors denote the interface status: • 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. For a Virtual Chassis configuration, select the switch to view the interface status. 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. 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. 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.
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 48: 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: • 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 49: 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: • 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 49: Chassis Viewer for EX4300 Switches *(continued)*

Field	Description
PIC 2 slot	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. 24-port and 48-port EX4300 switches support the 4-port 10-Gigabit SFP+ uplink module. EX4300-32F switches support the 2-port 40-Gigabit QSFP+ uplink module and the 8-port 10-Gigabit SFP+ uplink module. When you install a transceiver in the port, the following colors denote the interface status: • 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	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 49: Chassis Viewer for EX4300 Switches *(continued)*

Field	Description
PIC 1 slot	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. After you install a transceiver in the port, the following colors denote the interface status: • Green—Interface is up and operational. • Yellow—Interface is up but is not operational. • Gray—Interface is down and not operational. 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. When a QSFP+ port is configured as a Virtual Chassis Port (VCP), the following colors denote the VCP status: • Green—VCP is up and operational. • Yellow—VCP is up but is not operational. • Gray—VCP is down and not operational.

Table 50: Chassis Viewer for EX4500 Switches

Field	Description
Front View	
Interface status	In the image, the colors listed below denote the interface status: • 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. For a Virtual Chassis configuration, select the switch to view the interface status. If an SFP+ uplink module is installed in the switch, mouse over the interface (ports) on the module for more information. 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.
LCD panel	LCD panel configured for the LEDs on the ports. Mouse over the icon to view the current character display.

Table 50: 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

Field	Description
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: - 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 51: Chassis Viewer for EX4550 Switches

Field	Description

Front View

Table 51: Chassis Viewer for EX4550 Switches *(continued)*

Field	Description
Interface status	In the image, the colors listed below denote the interface status:
	• 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.
	For a Virtual Chassis configuration, select the switch to view the interface status.
	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.
	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.
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	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 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 51: Chassis Viewer for EX4550 Switches *(continued)*

Field	Description
Virtual Chassis port	Displayed only when switches are configured as a Virtual Chassis. In the image, the colors listed below denote the Virtual Chassis port (VCP) status: • 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 52: 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	In the image, the colors listed below denote the interface status for both copper and fiber media type of ports: • 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.
PIC 1 and PIC 2 slots	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. When you install a transceiver in the port, the following colors denote the interface status: • Green—Interface is up and operational. • Yellow—Interface is up but is not operational. • Gray—Interface is down and not operational.

Table 52: Chassis Viewer for EX4600 Switches *(continued)*

Field	Description
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

Field	Description
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 53: Chassis Viewer for EX4650 Switches

Field	Description
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.
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 53: 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 54: 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	Select the CB or line card. In the image, the colors listed below denote the interface status: • 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. You can view status for the following ports on the SRE module: • 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.) CBs support 4 SFP+ uplink ports. Mouse over the interface on the CB for more information. 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.

Table 54: 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.

Table 55: Chassis Viewer for EX8208 Switches

Field	Description
Front View	
Interface status	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: • 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. You can view status for the following ports on the SRE module: • 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. • 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.) Because the SF module has no ports, no status information is displayed.

Table 55: Chassis Viewer for EX8208 Switches *(continued)*

Field	Description
Slot numbers	Slots on the switch are labeled, from the top of the switch down: • 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 56: Chassis Viewer for EX8216 Switches

Field	Description
Front View	

Table 56: Chassis Viewer for EX8216 Switches *(continued)*

Field	Description
Interface status	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: • 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. You can view status for the following ports on the RE module: • 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. • 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	Slots on the switch are labeled, from the top of the switch down: • RE0 (RE module) • RE1 (RE module) • 0–15 (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 consolidated information about the fans.
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	
SF modules	Mouse over the SF module icons in their respective slots to display information. Slots are numbered SF7–SF0, from left to right.

Table 57: Chassis Viewer for XRE200 External Routing Engines

Field	Description
Front View	
Interface status	In the image, the colors listed below denote the interface status: • 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. For a Virtual Chassis configuration, select the switch to view the interface status.
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	In the image, the colors listed below denote the Virtual Chassis port (VCP) status: • Green—VCP is up and operational. • Yellow—VCP is up but is nonoperational. • Gray—VCP 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.
Temperature	The active slots contain a gray temperature icon. Mouse over the icon to display temperature information for the slot.
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.
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 57: 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

EX8216 Switch Hardware Overview

XRE200 External Routing Engine Hardware Guide

4

CHAPTER

Maintaining Components

Maintaining the EX3400 Switch Cooling System

IN THIS SECTION

Removing a Fan Module from an EX3400 Switch

Each fan module in EX3400 switches is a hot-removable and hot-insertable field-replaceable unit (FRU) installed in the rear panel of the switch: You can remove and replace it without powering off the switch or disrupting switch functions.

> **NOTE:** If you remove both the fan modules, you must replace at least one fan module within four minutes for the switch to operate without disrupting its functions.

Ensure that you have the following parts and tools available:

- Phillips (+) screwdriver, number 2

- An antistatic bag or an antistatic mat

- A replacement fan module

1. Place the antistatic bag or the antistatic mat on a flat, stable surface.

2. Loosen the captive screws on the front faceplate of the fan module by using your fingers. If you are unable to loosen the captive screws by using your fingers, use the screwdriver.

   > **WARNING:** To prevent injury, do not touch the fan with your hands or any tools as you slide the fan module out of the chassis—the fan might still be running.

3. Grasp the handle on the fan module and pull it firmly to slide the fan module out of the chassis.

4. Place the fan module in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

5. Install the replacement fan.

6. Tighten the captive screws on the faceplate of the fan module by using your fingers. If you are unable to tighten the captive screws by using your fingers, use the screwdriver.

Figure 52: Removing a Fan Module from an EX3400 Switch
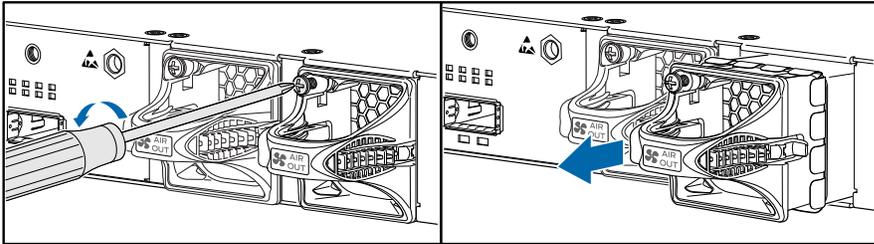
> **NOTE:** Both the fan modules must be installed and operational for optimal functioning of the switch.

Installing a Fan Module in an EX3400 Switch

Each fan module is a hot-removable and hot-insertable field-replaceable unit (FRU) installed in the rear panel of the switch: You can remove and replace it without powering off the switch or disrupting switch functions.

> ⚠ **CAUTION:** Do not mix:
>
> - AC and DC power supplies in the same chassis.
>
> - Fan modules with different directions for the airflow in the same chassis.
>
> - Power supplies with different directions for the airflow in the same chassis.
>
> - Power supplies and fan modules with different directions for the airflow in the same chassis.

Before you install a fan module in the switch:

- Ensure you understand how to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 276.

Ensure that you have the following parts and tools available to install a fan module in the switch chassis:

- ESD grounding strap
- Phillips (+) screwdriver, number 2

1. Ensure that you have the correct fan module. The direction of the airflow in the fan module must match the direction of the airflow in the installed power supply.

2. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.

3. Remove the fan module from its bag.

4. Hold the handle of the fan module with one hand and support the weight of the module with the other hand. Place the fan module in the fan module slot on the rear panel of the switch and slide it in until it is fully seated.

5. Tighten the captive screws on the faceplate of the fan module by using your fingers. If you are unable to tighten the captive screws by using your fingers, use the screwdriver.

Figure 53: Installing a Fan Module in an EX3400 Switch
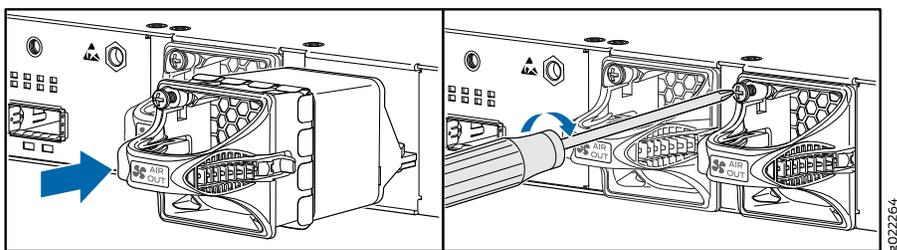
NOTE: If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at
https://www.juniper.net/customers/support/tools/updateinstallbase/ . Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.

Maintaining the EX3400 Power System

IN THIS SECTION

Removing an AC Power Supply from an EX3400 Switch

The power supplies in EX3400 switches are hot-removable and hot-insertable field-replaceable units (FRUs) installed in the rear panel of the switch: You can remove and replace them without powering off the switch or disrupting switch functions.

> **NOTE:** If only one power supply is installed in the switch, you must power off the switch before removing the power supply.

Before you remove a power supply from an EX3400 switch, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 276).

Ensure that you have the following parts and tools available to remove a power supply from an EX3400 switch:

- ESD grounding strap

- Phillips (+) screwdriver, number 2 (not provided)

- Antistatic bag or an antistatic mat

- Replacement power supply or a cover panel for the power supply slot

> **CAUTION:** We recommend that you install either a replacement power supply or a cover panel in the empty power supply slot to prevent chassis overheating and dust accumulation.

To remove an AC power supply from the switch (see Figure 54 on page 198):

1. Place the antistatic bag or the 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 chassis.

3. If the AC power source outlet has a power switch, set it to the OFF (**O**) position.

4. Gently pull out the plug end of the power cord connected to the power source outlet.

5. Remove the power cord from the power supply faceplate by detaching the power cord retainer and gently pulling out the socket end of the power cord connected to the power supply faceplate.

6. Slide the ejector lever toward the left until the power supply is unseated.

7. Grasp the power supply handle and pull firmly to slide the power supply halfway out of the chassis.

8. Place one hand under the power supply to support it and slide it completely out of the chassis. Take care not to touch power supply components, pins, leads, or solder connections.

9. Place the power supply in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

10. If you are not replacing the power supply, install the cover panel over the slot.

Figure 54: Removing an AC Power Supply from an EX3400 Switch
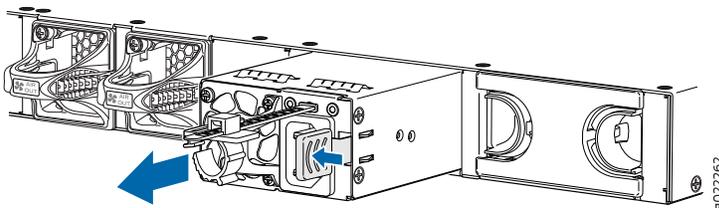
Installing an AC Power Supply in an EX3400 Switch

Each AC power supply in EX3400 switches is a hot-removable and hot-insertable field-replaceable unit (FRU) installed in the rear panel of the switch: You can remove and replace it without powering off the switch or disrupting switch functions.

> ⚠ **CAUTION:** Do not mix:
>
> - AC and DC power supplies in the same chassis.
> - Power supplies with different directions for the airflow in the same chassis.
> - Fan modules with different directions for the airflow in the same chassis.
> - Power supplies and fan modules with different directions for the airflow in the same chassis.

Before you install an AC power supply in the switch:

- Ensure you understand how to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 276.

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

- ESD grounding strap
- Phillips (+) screwdriver, number 2

> **NOTE:** Each power supply must be connected to a dedicated power source outlet. The switch is shipped with one power supply preinstalled. Additional power supplies are separately orderable. You can install up to two power supplies in the switch.

To install an AC power supply in the switch (see Figure 55 on page 200):

1. Ensure that you have the correct power supply. The direction of the airflow in the power supply must match the direction of the airflow in the installed fan module.

2. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.

3. If the power supply slot has a cover panel on it, loosen the captive screws on the cover panel by using your fingers or the screwdriver. Hold the captive screw and gently pull it outward to remove the cover panel. Save the cover panel for later use.

4. Taking care not to touch power supply pins, leads, or solder connections, remove the power supply from the bag.

5. Using both hands, place the power supply in the power supply slot on the rear panel of the switch and slide it in until it is fully seated and the ejector lever fits into place.

Figure 55: Installing an AC Power Supply in an EX3400 Switch
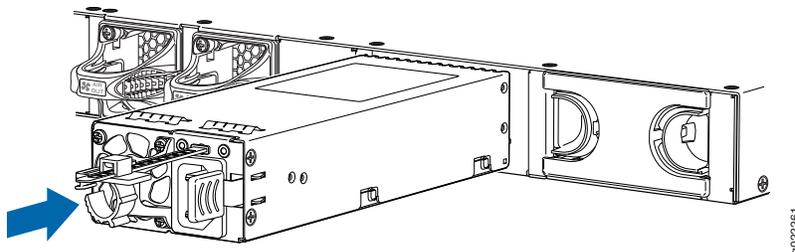
> **NOTE:** If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at https://www.juniper.net/customers/support/tools/updateinstallbase/. Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.

SEE ALSO

AC Power Supply in EX3400 Switches | 41

Removing a DC Power Supply from an EX3400 Switch

The power supplies in EX3400 switches is a hot-removable and hot-insertable field-replaceable units (FRUs) installed in the rear panel of the switch: You can remove and replace them without powering off the switch or disrupting switch functions.

> **NOTE:** If only one power supply is installed in the switch, you must power off the switch before removing the power supply.

Before you remove a power supply from an EX3400 switch, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 276).

Ensure that you have the following parts and tools available to remove the power supply from the switch chassis:

- ESD grounding strap

- Phillips (+) screwdriver, number 2 (not provided)

- Slotted (-) screwdriver

- Antistatic bag or an antistatic mat

- Replacement power supply or a cover panel for the power supply slot

> ⚠️ **CAUTION:** We recommend that you install either a replacement power supply or a cover panel in the empty power supply slot to prevent chassis overheating and dust accumulation.

To remove a DC power supply from the switch (see Figure 56 on page 202):

1. Place the antistatic bag or the 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 chassis.

3. 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.

4. Remove the two screws that attach the terminal connector to the power supply socket.

5. Remove the terminal connector from the power supply unit.

6. Slide the ejector lever toward the left until the power supply is unseated.

7. Grasp the power supply handle and pull firmly to slide the power supply halfway out of the chassis.

8. Taking care not to touch power supply 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.

9. Place the power supply in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

10. If you are not replacing the power supply, install the cover panel over the slot.

Figure 56: Removing a DC Power Supply from an EX3400 Switch
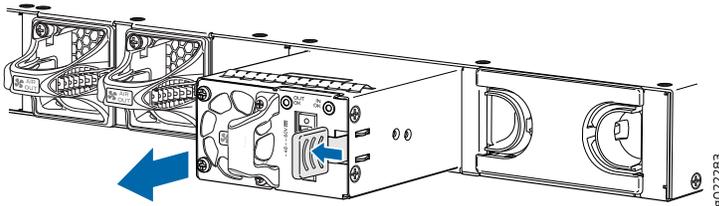
Installing a DC Power Supply in an EX3400 Switch

Each DC power supply in EX3400 switches is a hot-removable and hot-insertable field-replaceable unit (FRU) installed in the rear panel of the switch: You can remove and replace the power supplies without powering off the switch or disrupting switch functions.

> ⚠ **CAUTION:** Do not mix:
>
> - AC and DC power supplies in the same chassis.
>
> - Power supplies with different directions for the airflow in the same chassis.
>
> - Fan modules with different directions for the airflow in the same chassis.
>
> - Power supplies and fan modules with different directions for the airflow in the same chassis.

Before you install an DC power supply in the switch:

- Ensure you understand how to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 276.

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

- ESD grounding strap
- Phillips (+) screwdriver, number 2

NOTE: Each power supply must be connected to a dedicated power source. The switch is shipped with one power supply preinstalled. Additional power supplies are separately orderable. You can install up to two power supplies in the switch.

To install a DC power supply in the switch (see):

1. Ensure that the fan modules installed in the switch have the **AIR OUT** label on them.

2. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.

3. If the power supply slot has a cover panel on it, loosen the captive screws on the cover panel by using your fingers or the screwdriver. Hold the captive screw and gently pull it outward to remove the cover panel. Save the cover panel for later use.

4. Taking care not to touch power supply pins, leads, or solder connections, remove the power supply from the bag.

5. Using both hands, place the power supply in the power supply slot on the rear panel of the switch and slide it in until it is fully seated and the ejector lever fits into place.

Figure 57: Installing a DC Power Supply in an EX3400 Switch
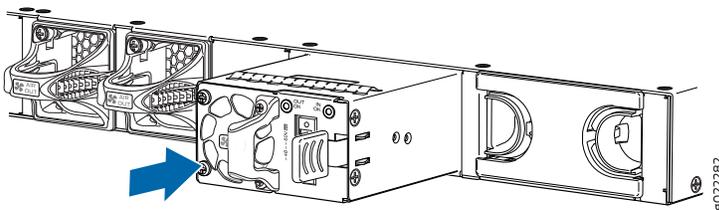
NOTE: If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at https://www.juniper.net/customers/support/tools/updateinstallbase/. Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.

SEE ALSO

Maintaining a Transceiver

IN THIS SECTION

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 261).

Ensure that you have a rubber safety cap available to cover the transceiver.

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 58: Install a Transceiver
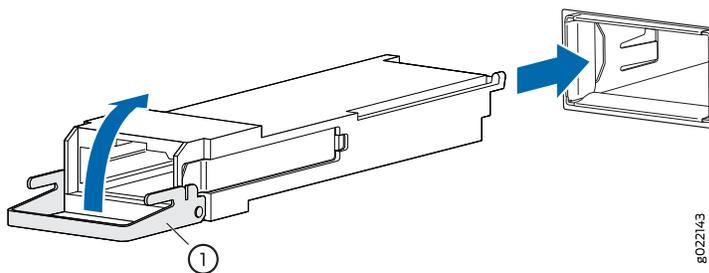
1—Ejector lever

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 261).

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 59 on page 209 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 211). 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 59: Remove a QSFP+ Transceiver
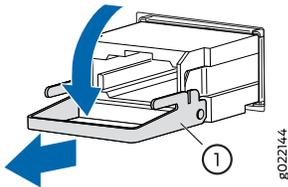
1—Ejector lever

    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.

Maintaining Fiber-Optic Cables

IN THIS SECTION

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 261).

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 48 on page 129).

Figure 60: Connect a Fiber-Optic Cable to an Optical Transceiver Installed in a Device
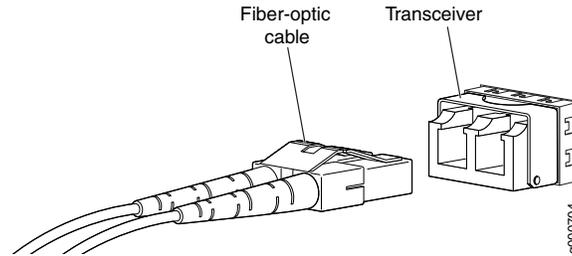
4. Secure the cables so that they do not support their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.

> ⚠️ **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 261.

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.

5

CHAPTER

Troubleshooting Hardware

Troubleshooting EX3400 Components

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 58 on page 215.

Table 58: 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.

Table 58: Alarm Terms *(continued)*

Term	Definition
chassis alarm	Preset alarm triggered by a physical condition on the switch such as a power supply failure, excessive component temperature, or media failure.
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

Chassis Component Alarm Conditions on EX3400 Switches

This topic describes the chassis component alarm conditions on EX3400 switches.

Table 59 on page 217 lists the alarm conditions on EX3400 switches, their severity levels, and the actions you can take to respond to them.

Table 59: Alarm Conditions on EX3400 Switches

Chassis Component	Alarm Condition	Alarm Severity	Remedy
Fan modules	Fan module is not installed.	Major (red)	Install the fan module.
	Mix of fan modules with different airflow directions.	Major (red)	Do not mix fan modules with different directions for the airflow in the same chassis.
	Mix of fan modules and power supplies with different airflow directions.	Major (red)	Do not mix fan modules and power supplies with different directions for the airflow in the same chassis.
Power supplies	A power supply has been removed from the chassis.	Minor (yellow)	Install a power supply in the empty slot.
	The power supply is not switched on.	Minor (yellow)	Check the input connection to the power supply.
	An unknown power supply is installed.	Major (red)	Install a power supply recommended by Juniper Networks.
	Mix of power supplies with different airflow directions.	Major (red)	Do not mix power supplies with different directions for the airflow in the same chassis.
	Mix of fan modules and power supplies with different airflow directions.	Major (red)	Do not mix fan modules and power supplies with different directions for the airflow in the same chassis.

Table 59: Alarm Conditions on EX3400 Switches *(continued)*

Chassis Component	Alarm Condition	Alarm Severity	Remedy
Temperature	The temperature inside the chassis reaches the yellow alarm limit.	Minor (yellow)	• Check the fan. • 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).
	The temperature inside the chassis reaches the red alarm limit.	Major (red)	• Check the fan. • 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).
	The temperature sensor has failed.	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).
Management Ethernet interface	Management Ethernet link is down.	Major (red)	• Check whether a cable is connected to the management Ethernet interface, or whether the cable is defective. Replace the cable if required. • 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).

Table 59: Alarm Conditions on EX3400 Switches *(continued)*

Chassis Component	Alarm Condition	Alarm Severity	Remedy
Routing Engine	**/var** partition usage is high.	Minor (yellow)	Clean up the system file storage space on the switch. For more information, see *Freeing Up System Storage Space*.
	/var partition is full.	Major (red)	Clean up the system file storage space on the switch. For more information, see *Freeing Up System Storage Space*.
	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 *Understanding Software Licenses for EX Series Switches*.

SEE ALSO

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

lists the alarm output fields.

Table 60: Summary of Key Alarm Output Fields

Field	Values
Type	Category of the alarm: • 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 | **220**

Dashboard for EX Series Switches | **164**

Understand Alarm Types and Severity Levels on EX Series Switches | **215**

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 61 on page 221 describes the different filters, their functions, and the associated actions.

To view events in the CLI, enter the following command:

show log

Table 61: Filtering System Log Messages

Field	Function	Your Action
System Log File	Specifies the name of a system log file for which you want to display the recorded events. Lists the names of all the system log files that you configure. By default, a log file, **messages**, is included in the **/var/log/** directory.	To specify events recorded in a particular file, select the system log filename from the list— for example, **messages**. Select **Include archived files** to include archived files in the search.
Process	Specifies the name of the process generating the events you want to display. To view all the processes running on your system, enter the CLI command **show system processes**. For more information about processes, see the *Junos OS Installation and Upgrade Guide*.	To specify events generated by a process, type the name of the process. For example, type **mgd** to list all messages generated by the management process.

Table 61: Filtering System Log Messages *(continued)*

Field	Function	Your Action
Date From To	Specifies the time period in which the events you want displayed are generated. Displays a calendar that allows you to select the year, month, day, and time. It also allows you to select the local time. 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.	To specify the time period: • 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	Specifies the event ID for which you want to display the messages. Allows you to type part of the ID and completes the remainder automatically. 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.	To specify events with a specific ID, type the partial or complete ID— for example, **TFTPD_AF_ERR**.
Description	Specifies text from the description of events that you want to display. Allows you to use regular expressions to match text from the event description. NOTE: Regular expression matching is case-sensitive.	To specify events with a specific description, type a text string from the description with regular expression. For example, type **^Initial*** to display all messages with lines beginning with the term *Initial*.
Search	Applies the specified filter and displays the matching messages.	To apply the filter and display messages, click **Search**.
Reset	Resets all the fields in the Events Filter box.	To reset the field values that are listed in the Events Filter box, click **Reset**.

Table 61: Filtering System Log Messages *(continued)*

Field	Function	Your Action
Generate Raw Report NOTE: ● 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.	Generates a list of event log messages in nontabular format.	To generate a raw report: 1. Click **Generate Raw Report**. The *Opening filteredEvents.html* window appears. 2. Select **Open with** to open the HTML file or select **Save File** to save the file. 3. Click **OK**.
Generate Report 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.	Generates a list of event log messages in tabular format, which shows system details, events filter criteria, and event details.	To generate a formatted report: 1. Click **Generate Report**. The *Opening Report.html* window appears. 2. Select **Open with** to open the HTML file or select **Save File** to save the file. 3. Click **OK**.

Meaning

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 62: 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	Severity level of a message is indicated by different colors. • **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 62: Viewing System Log Messages *(continued)*

Field	Function	Additional Information
Event ID	Displays a code that uniquely identifies the message. The prefix on each code identifies the message source, and the rest of the code indicates the specific event or error.	The event ID begins with a prefix that indicates the generating software process. Some processes on a switch do not use codes. This field might be blank in a message generated from such a process. An event can belong to one of the following type categories: • **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 | **219**

Understand Alarm Types and Severity Levels on EX Series Switches | **215**

Troubleshooting PoE Voltage Injection Failure in EX2300, EX3400, or EX4300 Switch Models with PoE Capability

Problem

Description: Devices that draw power from EX2300, EX3400, or EX4300 switch models with Power over Ethernet (PoE) capability do not get power from those switches. The problem persists after rebooting the switches or upgrading to the latest version of Junos OS.

Environment: EX2300, EX3400, or EX4300 switch models with PoE capability are connected to EX2200, EX3200, or EX4200 switch models with PoE capability by using RJ-45 network ports.

Solution

When you connect EX2300, EX3400, or EX4300 switch models with PoE capability to EX2200, EX3200, or EX4200 switch models with PoE capability by using RJ-45 network ports, disable PoE on all the RJ-45 network ports used to connect the switches using the command:

`user@device>` **set poe interface** *interface-name* **disable**

SEE ALSO

> *Understanding PoE on EX Series Switches*

Troubleshooting Storage Issues While Upgrading Junos OS in EX2300 and EX3400 Switches

Problem

Description: Upgrading Junos OS in EX2300 and EX3400 switches fails.

Symptoms: When you upgrade Junos OS in EX2300 and EX3400 switches, you get the error **not enough space to unpack** *installation-pack-name*.

Cause

There is not enough memory in the switch to install the upgrade installation package.

Solution

If upgrading Junos OS in EX2300 and EX3400 switches fails due to the lack of memory in the switch:

1. Perform a system storage cleanup and delete unwanted files in the system storage by using the command:

   `user@switch>` **request system storage cleanup**

   > **NOTE:**
   >
   > You can get the list of files that this command deletes by using the command:
   >
   > `user@switch>` **request system storage cleanup dry-run**
   >
   > This command does not delete files in the *root* folder; it deletes files in the folders *jail*, *log*, and *tmp* only.

2. If any directory is taking up a lot of memory, delete unwanted files in that directory. Check the memory utilization by using the command:

   `user@switch>` **show system storage**

3. Delete non-recovery snapshots.

   - If Junos OS 15.1X53D56 or later is installed in your switch:

     a. Delete non-recovery snapshots by using the command:

        `user@switch>` **request system software add** *software-image-name* **force**

   - If a version of Junos OS released earlier than Junos OS 15.1X53D56 is installed in your switch:

     a. Check for non-recovery snapshots by using the command:

        `user@switch>` **show system snapshot**

     b.
        > **NOTE:** Snapshot names are not completed automatically in the CLI; you must enter the snapshot name.

        Delete non-recovery snapshots by using the command:

```
user@switch> request system snapshot delete snapshot-name
```

4. After upgrading Junos OS, delete the upgrade installation package by using the command:

```
user@switch> request system software add software-image-name force unlink
```

SEE ALSO

Understanding Software Installation on EX Series Switches

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
```

lists the output fields for the **show chassis environment** command. Output fields are listed in the approximate order in which they appear.

Table 63: show chassis environment Output Fields

Field Name	Field Description
Class	Information about the category or class of chassis component: • **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: • **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**

```
                Fan speed          Yellow alarm        Red alarm        Fire Shutdown
               (degrees C)         (degrees C)        (degrees C)        (degrees C)
   Item          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 64 on page 231 lists the output fields for the **show chassis temperature-thresholds** command.
Output fields are listed in the approximate order in which they appear.

Table 64: 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 cha... display 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. • **Normal**—The temperature threshold at which the fans operate at normal speed and when all the fa... • **High**—The temperature threshold at which the fans operate at high speed or when a fan has failed ... NOTE: An alarm is not triggered until the temperature exceeds the threshold settings for a yellow or ...
Yellow or amber alarm	Temperature threshold, in degrees Celsius, that trigger a yellow or amber alarm. • **Normal**—The temperature threshold that must be exceeded on the component to trigger a yellow ... • **Bad fan**—The temperature threshold that must be exceeded on the component to trigger a yellow ...
Red alarm	Temperature threshold, in degrees Celsius, that trigger a red alarm. • **Normal**—The temperature threshold that must be exceeded on the component to trigger a red alar... • **Bad fan**—The temperature threshold that must be exceeded on the component to trigger a red alar...
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 65 on page 232 lists the possible causes for the switch to generate a temperature alarm and the respective remedies.

Table 65: 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 54.
Fan module or fan tray has failed.	- 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 EX3400 Chassis or Components

IN THIS SECTION

Returning an EX3400 Switch or Component for Repair or Replacement

If you need to return an EX3400 switch or hardware component to Juniper Networks for repair or replacement, follow this procedure:

1. Determine the serial number of the component. For instructions, see "Locating the Serial Number on an EX3400 Switch or Component" on page 235.

2. Obtain an RMA number from JTAC as described in "Contact Customer Support to Obtain Return Material Authorization" on page 237.

   > **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 EX3400 Switch or Component for Shipping" on page 237.

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 EX3400 Switch or Component

If you are returning an EX3400 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 Material Authorization (RMA).

If the switch is operational and you can access the 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 (see Figure 61 on page 236 and Figure 62 on page 236) 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.

Listing the Switch and Components Details with the CLI

To list the switch and switch components and their serial numbers, enter the following CLI command:

user@switch> **show chassis hardware**

```
Hardware inventory:
Item              Version  Part number  Serial number     Description
Chassis                                 NY0215350046
Routing Engine 1           BUILTIN      BUILTIN           RE-EX3400-48P
FPC 0             REV 05   650-059857   NY0215350046      EX3400-48P
  CPU                      BUILTIN      BUILTIN           FPC CPU
  PIC 0           REV 05   BUILTIN      BUILTIN           48x10/100/1000 Base-T
  PIC 1           REV 05   650-059857   NY0215350046      2x40G QSFP
    Xcvr 0        REV      740-044512   APF14500007NFC    QSFP+-40G-CU50CM
```

```
  PIC 2             REV 05    650-059857    NY0215350046        4x10G SFP/SFP+
    Xcvr 0          REV 01    740-021308    1YT511104293        SFP+-10G-SR
  Power Supply 0 REV 02      640-060601    1EDS5250082         JPSU-920W-AC-AFO
  Fan Tray 0                                                   Fan Module, Airflow Out
(AFO)
  Fan Tray 1                                                   Fan Module, Airflow Out
(AFO)
```

Locating the Chassis Serial Number ID Label on an EX3400 Switch

EX3400 switches shipped after 2 February, 2017 have serial number ID label on the side panel of the chassis (see) and on the rear panel of the chassis (see). EX3400 switches shipped before 2 February, 2017 have the serial number ID label only on the side panel of the chassis.

Figure 61: Location of the Serial Number ID Label on the Side Panel of an EX3400 Switch

1—Serial Number ID Label
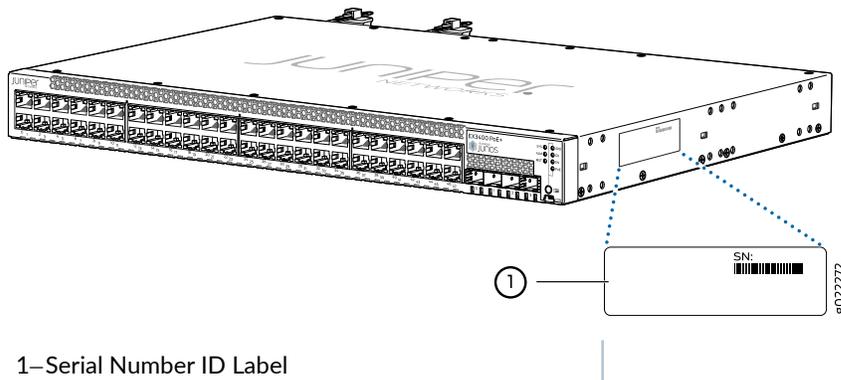
Figure 62: Location of the Serial Number ID Label on the Rear Panel of an EX3400 Switch

1—Serial Number ID Label
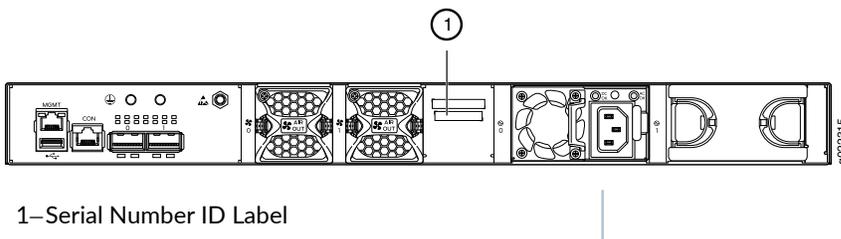
Contact Customer Support to Obtain Return Material Authorization

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 EX3400 Switch or Component for Shipping

IN THIS SECTION

If you are returning an EX3400 switch or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you begin, ensure that you have 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 237.

Ensure that you have the following parts and tools available:

- Antistatic bag, one for each switch or component
- Phillips (+) screwdriver, number 2

Packing a Switch for Shipping

To pack a switch for shipping:

1. On the console or other management device connected to the switch, enter the CLI operational mode and issue the following command to shut down the switch software:

   ```
   user@switch> request system halt
   ```

   Wait until a message appears on the console confirming that the operating system has halted.

2. Disconnect power from the switch by performing one of the following:

   - If the power source outlet has a power switch, set it to the OFF (0) position.

   - If the power source outlet does not have a power switch, gently pull out the plug end of the power cord connected to the power source outlet.

3. Remove the cables that connect the switch to all external devices. See "Disconnect a Fiber-Optic Cable" on page 211.

4. Remove all optical transceivers installed in the switch. See "Remove a Transceiver" on page 207.

5. If the switch is mounted on a wall or on two posts, have one person support the weight of the switch while another person unscrews and removes the mounting screws. Use the Phillips (+) screwdriver to remove the screws.

6. Remove the switch from the wall, rack, cabinet, or desk and place the switch in an antistatic bag.

7. Slip on the end caps of the packaging foam on both sides of the switch.

8. Place the switch in the shipping carton.

9. Place the packing foam on top of and around the switch.

10. If you are returning accessories or FRUs with the switch, pack them as instructed in "Packing Switch Components for Shipping" on page 239.

11. Close the top of the cardboard carton and seal it with packing tape.

12. Write the RMA number on the exterior of the carton to ensure proper tracking.

Packing Switch Components for Shipping

To pack and ship switch components:

- Place individual components in antistatic bags.

- Ensure that the components are adequately protected with packing materials and packed so that the pieces are prevented from moving around inside the carton.

- Close the top of the cardboard shipping carton and seal it with packing tape.

- Write the RMA number on the exterior of the carton to ensure proper tracking.

7
CHAPTER

Safety and Compliance Information

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 lichamelijk letsel 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 vare 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! Apparaten 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 virtalähteeseen.

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 possua 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 vältytään 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, oeriormente 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.

Varning! 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.

Varning! Den här enheten måste vara ordentligt jordad. Följ instruktionerna i den här guiden för att jorda enheten ordentligt.

Laser and LED Safety Guidelines and Warnings

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.

Varning! Rikta inte blicken in mot strålen och titta inte direkt på den genom optiska instrument.

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 emiteres 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 an 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.

Varning! Osynlig strålning kan avges från en portöppning utan ansluten fiberkabel och du bör därför undvika att bli utsatt för strålning genom att inte stirra in i oskyddade öppningar.

Maintenance and Operational Safety Guidelines and Warnings

IN THIS SECTION

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 ontploffingsgevaar 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 vastaavantyyppistä 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 baterían EXclusivamente con el mismo tipo o el equivalente recomendado por el fabricante. Desechar las baterías gastadas según las instrucciones del fabricante.

Varning! 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 kuumenevat, kun ne ovat yhteydessä sähkövirran ja maan kanssa, ja ne voivat aiheuttaa vakavia palovammoja tai hitsata metalliesineet kiinni liitäntänapoihin.

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.

Varning! Tag av alla smycken (inklusive ringar, halsband och armbandsur) innan du arbetar på utrustning som är kopplad till kraftledningar. 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.

Varning! 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 encaminador 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 aperturas para ventilación.

Varning! 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 efetuada 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

Varning! 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 metallically 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 metallically 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 63 on page 277) 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 63 on page 277). If you are returning a component, place it in an antistatic bag before packing it.

Figure 63: Placing a Component into an Antistatic Bag
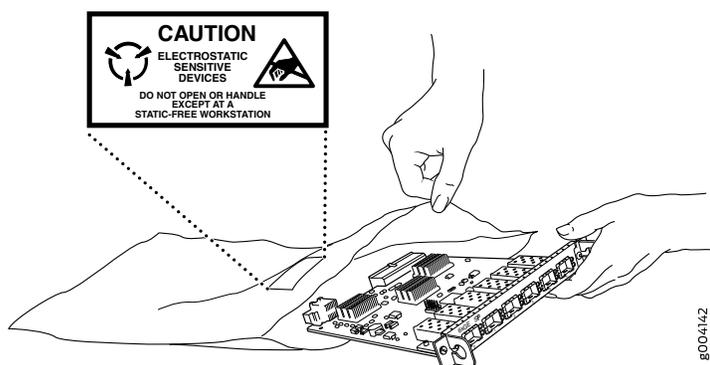
> ⚠️ **CAUTION:** ANSI/TIA/EIA-568 cables such as Category 5e and Category 6 can get electrostatically charged. To dissipate this charge, always ground the cables to a suitable and safe earth ground before connecting them to the system.
>
> **Attention** Les câbles ANSI/TIA/EIA-568, par exemple Cat 5e 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。

g017253

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).

Varning! 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).

Varning! 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.

Varning! 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 yhdistettava kytkentajarjestys on maajohto maajohtoon, +RTN varten +RTN, −48 V varten − 48 V. Oikea irrotettava kytkentajarjestys on −48 V varten − 48 V, +RTN varten +RTN, maajohto maajohtoon.

Avertissement Câblez l'approvisionnement d'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 johdinliitäntää, esimerkiksi suljettua silmukkaa tai kourumaista liitäntää, jossa on ylöspäin käännetyt kiinnityskorvat. Tällaisten liitäntöjen 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 sluten 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.

Varning! 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.
>
> **Varning!** 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

Compliance Statements for EMC Requirements for EX Series Switches

IN THIS SECTION

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

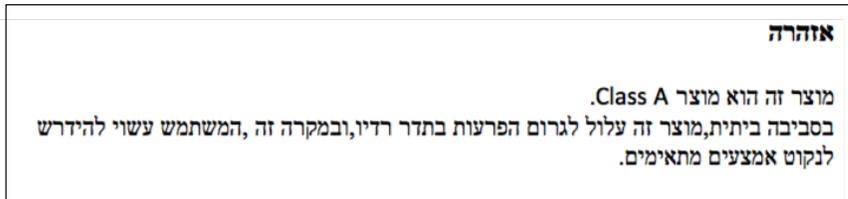此為甲類資訊技術設備。於一般家居環境使用時,本設備可能導致射頻干擾,用戶請採取相應措施。

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

אזהרה

מוצר זה הוא מוצר Class A.
בסביבה ביתית,מוצר זה עלול לגרום הפרעות בתדר רדיו,ובמקרה זה, המשתמש עשוי להידרש
לנקוט אמצעים מתאימים.

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

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用する
と電波妨害を引き起こすことがあります。この場合には使用者が適切な対策
を講ずるよう要求されることがあります。　　　　　　VCCI-A

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.
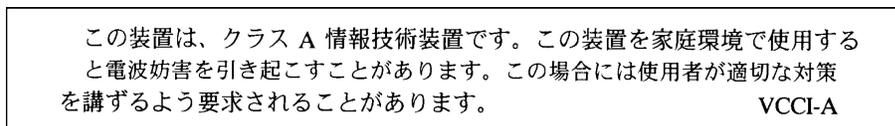
VCCI-A

Korea

이 기기는 업무용(A급) 전자파적합기기로서 판
매자 또는 사용자는 이 점을 주의하시기 바라
며, 가정외의 지역에서 사용하는 것을 목적으로
합니다.

Korean Class A Warning   g040913

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.