Juniper Networks | Engineering Simplicity

EX4400 Switch Hardware Guide

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EX4400 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

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Table of Contents

About the Documentation

IN THIS SECTION

Use this guide to install hardware and perform initial software configuration, routine maintenance, and troubleshooting for the EX4400 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

Table 1 on page xiii defines notice icons used in this guide.

Table 1: Notice Icons

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

Table 2 on page xiii 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		

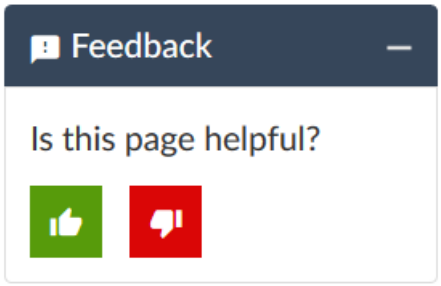
Table 2: Text and Syntax Conventions *(continued)*

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/.

CHAPTER 1

Overview

EX4400 System Overview

IN THIS SECTION

EX4400 Switches Hardware Overview

IN THIS SECTION

Juniper Networks® EX4400 Ethernet Switches provide connectivity for high-density environments and scalability for growing networks. Typically, EX4400 switches are used in large branch offices, campus wiring closets, and data centers. In data centers, you can position EX4400 switches as top-of-rack switches to provide connectivity for all devices in the rack.

We ship the EX4400 switches with or without ports that support IEEE 802.3bt Power over Ethernet (PoE-bt), with AC or DC power supplies, and with front-to-back or back-to-front airflow directions. Dual hot-swappable AC or DC power supplies provide 1+1 redundancy. Dual hot-swappable fan trays maintain

high system availability. We've also provided a slot in the EX4400 switch models for installing an optional extension module.

You can manage EX4400 switches by using the CLI. You can manage EX4400 switches deployed in a cloud network by using Juniper Mist™.

Here is a brief overview of the EX4400 switch:

Video: EX4400 Switch Hardware Overview

Benefits of the EX4400 Switch

Cloud readiness—EX4400 switches are our first cloud-ready switches. You can deploy them in cloud networks and manage them by using Juniper Mist.

Support for Virtual Chassis—EX4400 switches support Virtual Chassis technology. You can interconnect up to 10 EX4400 switches to form a Virtual Chassis.

Support for channelization—You can channelize the QSFP28 ports on the EX4400 and increase the number of interfaces.

Support for MACsec and EVPN-VXLAN architecture—EX4400 switches support IEEE 802.1AE Media Access Control Security (MACsec) and EVPN-VXLAN. Support for MACsec and EVPN-VXLAN ensures link-layer data confidentiality, data integrity, and data origin authentication to help secure deployments in enterprise multicloud deployments. The RJ-45, SFP, or SFP+ network ports and the ports in the 4x25GbE SFP28 extension module support MACsec with AES-128, AES-256, AES-XPN-128, and AES-XPN-256 encryption.

Support for IEEE 802.3bt Power over Ethernet (PoE-bt)—The RJ-45 ports in EX4400-24P and EX4400-48P switches support IEEE 802.3bt (PoE-bt), providing power up to 90 W per port.

Support for fast Power over Ethernet—The RJ-45 ports in EX4400-24P and EX4400-48P switches support fast Power over Ethernet, which delivers PoE power to devices connected to the ports even before the switch is fully operational. This is beneficial when the connected devices need only power, and not network connectivity.

Compact solution—The EX4400 switch is a modular single rack unit (1-U) device that is an apt solution for crowded wiring closets and access switch locations. It provides carrier-class reliability of modular systems with the economics and flexibility of stackable platforms.

High availability—EX4400 switches provide high availability through redundant power supplies and fans, graceful Routing Engine switchover (GRES), and nonstop bridging (NSB) and nonstop active routing when deployed in a Virtual Chassis configuration.

System Software and Hardware Features

Juniper Networks EX Series Switches run Junos® operating system (Junos OS), which provides Layer 2 and Layer 3 switching, routing, and security services. The first Junos OS release, hardware features, and software features supported on the models are listed in Table 3 on page 20.

Table 3: First Junos OS Release and Hardware Features Supported on EX4400 Switch Models

Switch Model	Aggregate Throughput (Bidirectional)	First Junos OS Release Supported	Hardware Features	Software Features
EX4400-24T and EX4400-24P	324 Gbps	Junos OS Release 21.1R1	• Quadcore x86 CPU • 4-GB DDR4 memory with ECC support • 20GB EMMC storage	• Feature-rich automation capabilities with support for zero-touch provisioning (ZTP), Python, YANG, and Chef • Support for VXLAN as a Layer 2 or Layer 3 gateway • Advanced Junos OS features such as MACsec with AES-256 encryption, EVPN-VXLAN, EVPN, BGP, microsegmentation based on group-based policies (GBP), and flow-based telemetry in the hardware for monitoring traffic flows to prevent security threats
EX4400-48T and EX4400-48P	348 Gbps			
EX4400-48F	456 Gbps			

Components on the Front and Rear Panels of EX4400 Switch Models

IN THIS SECTION

Components on the Front and Rear Panels of EX4400-24T and EX4400-24P Switches

Figure 1 on page 21 shows the front view of an EX4400-24T switch with 24 RJ-45 ports.
Figure 2 on page 21 shows the front view of an EX4400-24P switch with 24 RJ-45 ports that support PoE-bt.

Figure 1: Front View of an EX4400-24T Switch

Figure 2: Front View of an EX4400-24P Switch

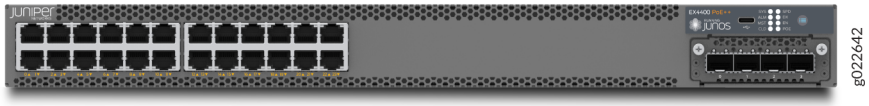


Figure 3 on page 21 shows the rear view of an EX4400-24T and EX4400-24P switch with AC power supplies.

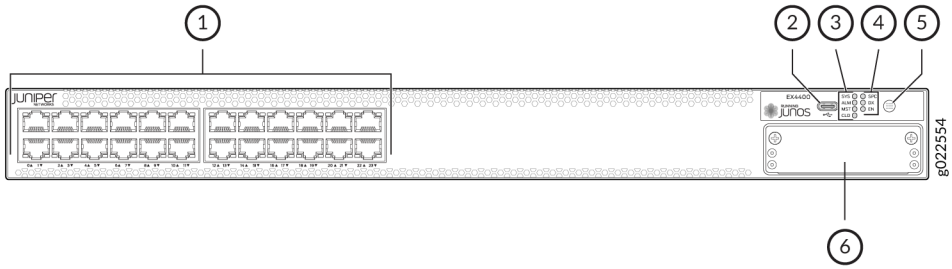
Figure 3: Rear View of an EX4400-24T and EX4400-24P Switch with AC Power Supplies

Figure 4 on page 21 shows the rear view of an EX4400-24T switch with DC power supplies.

Figure 4: Rear View of an EX4400-24T Switch with DC Power Supplies

Figure 5 on page 22 shows the components on the front panel of an EX4400-24T switch.

Figure 5: Components on the Front Panel of an EX4400-24T Switch

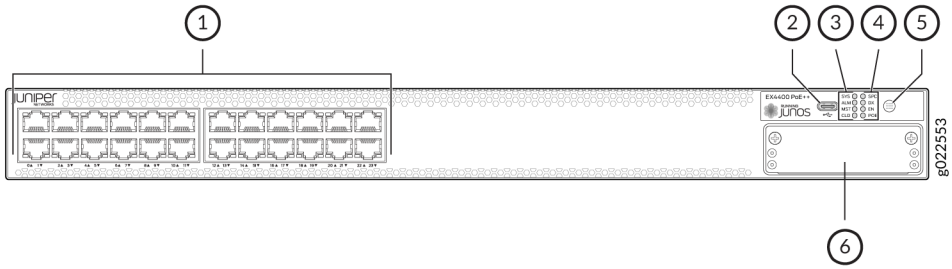


1–RJ-45 ports	4–Port mode LEDs (labeled **SPD**, **DX**, and **EN**)
2–USB Type C Console port	5–Mode button
3–Chassis status LEDs (labeled **SYS**, **ALM**, **MST**, and **CLD**)	6–Extension module slot

NOTE: Junos OS Release 21.1R1 does not support the **CLD** LED.

Figure 6 on page 22 shows the components on the front panel of an EX4400-24P switch.

Figure 6: Components on the Front Panel of an EX4400-24P Switch

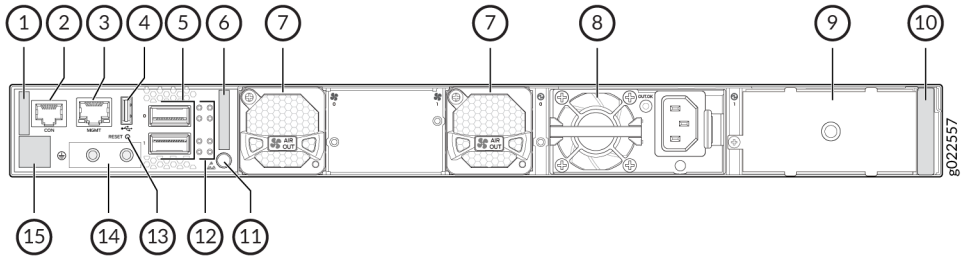


1–RJ-45 ports. These ports support PoE-bt.	4–Port mode LEDs (labeled **SPD**, **DX**, **EN**, and **POE**)
2–USB Type C Console port	5–Mode button
3–Chassis status LEDs (labeled **SYS**, **ALM**, **MST**, and **CLD**)	6–Extension module slot

NOTE: Junos OS Release 21.1R1 does not support the **CLD** LED.

Figure 7 on page 23 shows the components on the rear panel of an EX4400-24T switch with an AC power supply.

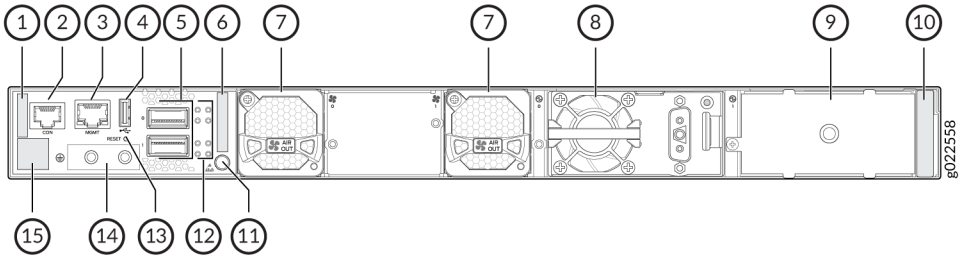
Figure 7: Components on the Rear Panel of an EX4400-24T Switch with an AC Power Supply



1–Serial number ID label	9–Empty slot for power supply
2–Console port (labeled **CON**)	10–Power supply rating label
3–Management port (labeled **MGMT**)	11–ESD point
4–USB port	12–QSFP28 port LEDs
5–QSFP28 ports	13–Reset button
6–CLEI code label	14–Protective earthing terminal
7–Fan module	15–Claim code label
8–550-W AC power supply	

Figure 8 on page 24 shows the components on the rear panel of an EX4400-24T switch with a DC power supply.

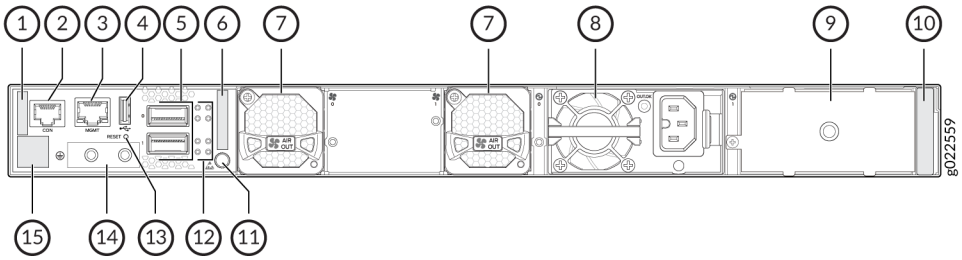
Figure 8: Components on the Rear Panel of an EX4400-24T Switch with a DC Power Supply



1–Serial number ID label	9–Empty slot for power supply
2–Console port (labeled **CON**)	10–Power supply rating label
3–Management port (labeled **MGMT**)	11–ESD point
4–USB port	12–QSFP28 port LEDs
5–QSFP28 ports	13–Reset button
6–CLEI code label	14–Protective earthing terminal
7–Fan module	15–Claim code label
8–550-W DC power supply	

Figure 9 on page 25 shows the components on the rear panel of an EX4400-24P switch. This model supports only 1050-W AC power supply.

Figure 9: Components on the Rear Panel of an EX4400-24P Switch



1–Serial number ID label	9–Empty slot for power supply
2–Console port (labeled **CON**)	10–Power supply rating label
3–Management port (labeled **MGMT**)	11–ESD point
4–USB port	12–QSFP28 port LEDs
5–QSFP28 ports	13–Reset button
6–CLEI code label	14–Protective earthing terminal
7–Fan module	15–Claim code label
8–1050-W AC power supply	

Components on the Front and Rear Panels of EX4400-48T and EX4400-48P Switches

Figure 10 on page 25 shows the front view of an EX4400-48T switch with 48 RJ-45 ports.
Figure 11 on page 25 shows the front view of an EX4400-48P switch with 48 RJ-45 ports that support PoE-bt.

Figure 10: Front View of an EX4400-48T Switch

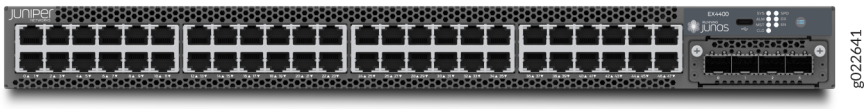


Figure 11: Front View of an EX4400-48P Switch

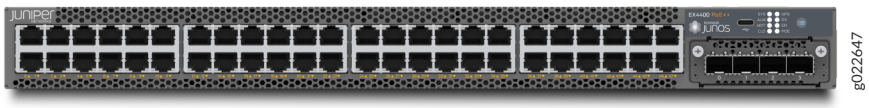


Figure 12 on page 26 shows the rear view of an EX4400-48T and EX4400-48P switch with AC power supplies.

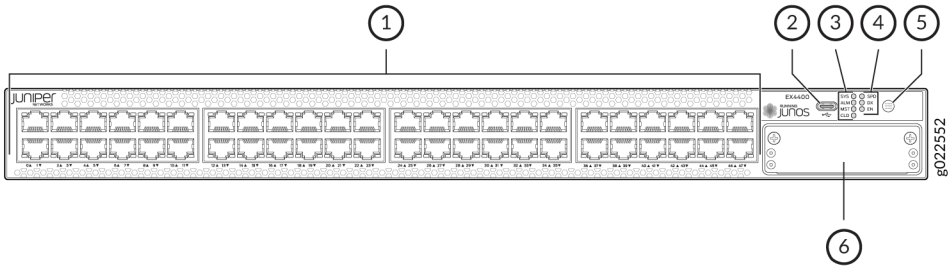
Figure 12: Rear View of an EX4400-48T and EX4400-48P Switch with AC Power Supplies

Figure 13 on page 26 shows the rear view of an EX4400-48T switch with DC power supplies.

Figure 13: Rear View of an EX4400-48T Switch with DC Power Supplies

Figure 14 on page 26 shows the components on the front panel of an EX4400-48T switch.

Figure 14: Components on the Front Panel of an EX4400-48T Switch

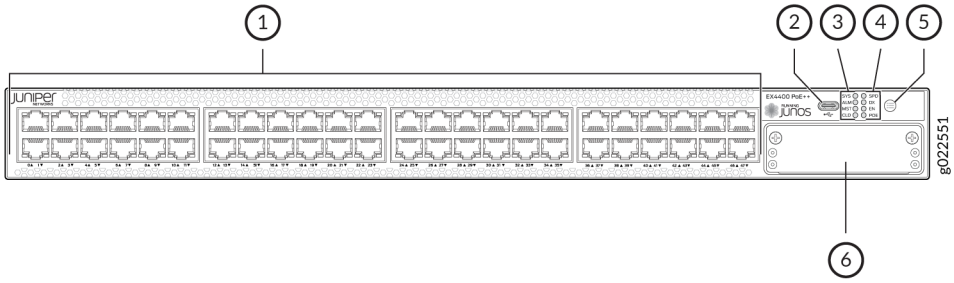


1–RJ-45 ports	4–Port mode LEDs (labeled **SPD**, **DX**, and **EN**)
2–USB Type C Console port	5–Mode button
3–Chassis status LEDs (labeled **SYS**, **ALM**, **MST**, and **CLD**)	6–Extension module slot

NOTE: Junos OS Release 21.1R1 does not support the **CLD** LED.

Figure 15 on page 27 shows the components on the front panel of an EX4400-48P switch.

Figure 15: Components on the Front Panel of an EX4400-48P Switch

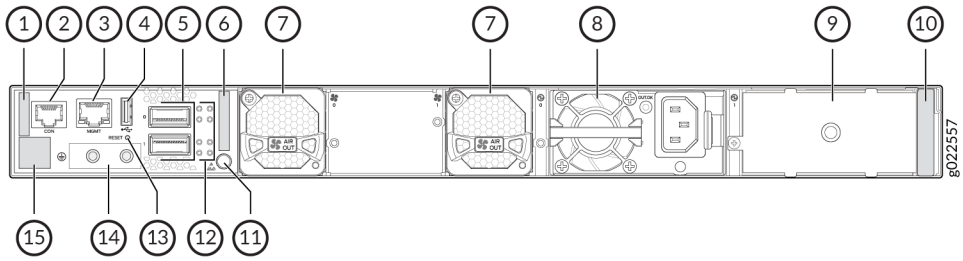


1–RJ-45 ports. These ports support PoE-bt.	4–Port mode LEDs (labeled **SPD**, **DX**, **EN**, and **POE**)
2–USB Type C Console port	5–Mode button
3–Chassis status LEDs (labeled **SYS**, **ALM**, **MST**, and **CLD**)	6–Extension module slot

NOTE: Junos OS Release 21.1R1 does not support the **CLD** LED.

Figure 16 on page 27 shows the components on the rear panel of an EX4400-48T switch with an AC power supply.

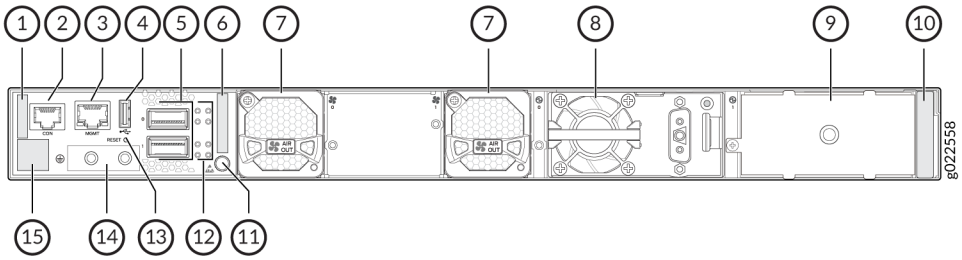
Figure 16: Components on the Rear Panel of an EX4400-48T Switch with an AC Power Supply



1–Serial number ID label	9–Empty slot for power supply
2–Console port (labeled **CON**)	10–Power supply rating label
3–Management port (labeled **MGMT**)	11–ESD point
4–USB port	12–QSFP28 port LEDs
5–QSFP28 ports	13–Reset button
6–CLEI code label	14–Protective earthing terminal
7–Fan module	15–Claim code label
8–550-W AC power supply	

Figure 17 on page 28 shows the components on the rear panel of an EX4400-48T switch with a DC power supply.

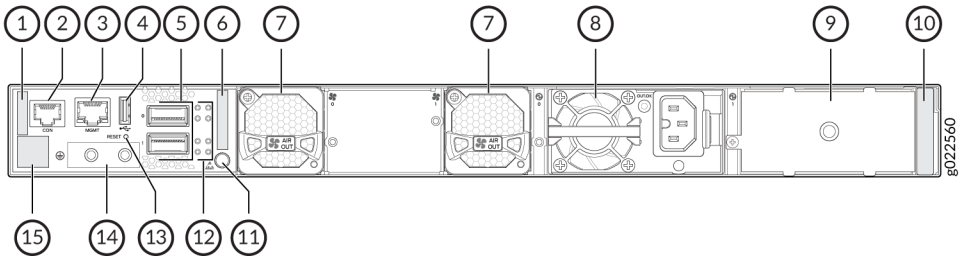
Figure 17: Components on the Rear Panel of an EX4400-48T Switch with a DC Power Supply



1–Serial number ID label	9–Empty slot for power supply
2–Console port (labeled **CON**)	10–Power supply rating label
3–Management port (labeled **MGMT**)	11–ESD point
4–USB port	12–QSFP28 port LEDs
5–QSFP28 ports	13–Reset button
6–CLEI code label	14–Protective earthing terminal
7–Fan module	15–Claim code label
8–550-W DC power supply	

Figure 18 on page 29 shows the components on the rear panel of an EX4400-48P switch. This model supports only 1600-W AC power supply.

Figure 18: Components on the Rear Panel of an EX4400-48P Switch



1–Serial number ID label	9–Empty slot for power supply
2–Console port (labeled **CON**)	10–Power supply rating label
3–Management port (labeled **MGMT**)	11–ESD point
4–USB port	12–QSFP28 port LEDs
5–QSFP28 ports	13–Reset button
6–CLEI code label	14–Protective earthing terminal
7–Fan module	15–Claim code label
8–1600-W AC power supply	

Components on the Front and Rear Panels of EX4400-48F Switches

Figure 19 on page 29 shows the front view of an EX4400-48F switch with 36 small form-factor pluggable (SFP) ports and 12 small form-factor pluggable plus (SFP+) ports.

Figure 19: Front View of an EX4400-48F Switch

Figure 20 on page 29 shows the rear view of an EX4400-48F switch with AC power supplies.

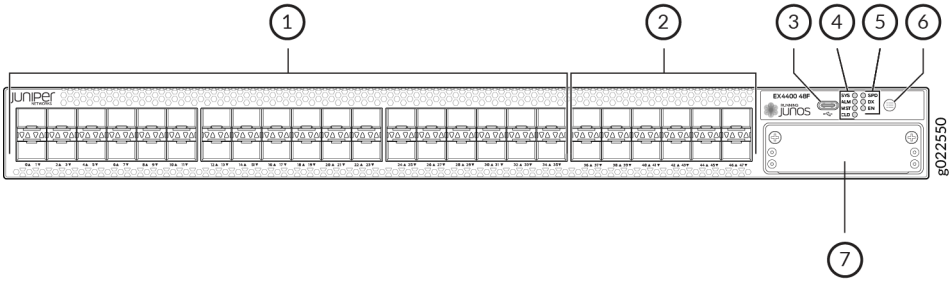
Figure 20: Rear View of an EX4400-48F Switch with AC Power Supplies

Figure 21 on page 30 shows the rear view of an EX4400-48F switch with DC power supplies.

Figure 21: Rear View of an EX4400 Switch with DC Power Supplies

Figure 22 on page 30 shows the components on the front panel of an EX4400-48F switch.

Figure 22: Components on the Front Panel of an EX4400-48F Switch

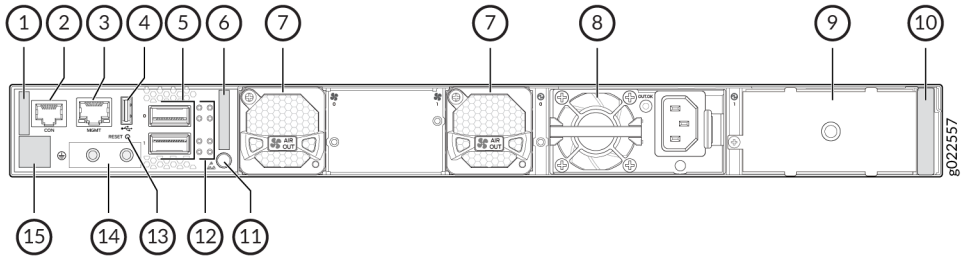


1–SFP ports	5–Port mode LEDs (labeled **SPD**, **DX**, and **EN**)
2–SFP+ ports	6–Mode button
3–USB Type C Console port	7–Extension module slot
4–Chassis status LEDs (labeled **SYS**, **ALM**, **MST**, and **CLD**)	

NOTE: Junos OS Release 21.1R1 does not support the **CLD** LED.

Figure 23 on page 31 shows the components on the rear panel of an EX4400-48F switch with an AC power supply.

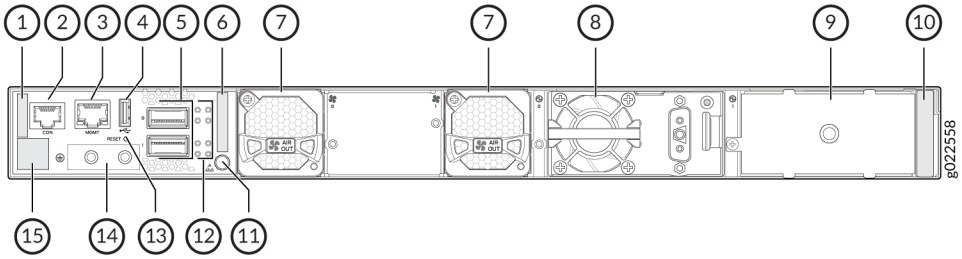
Figure 23: Components on the Rear Panel of an EX4400-48F Switch with an AC Power Supply



1–Serial number ID label	9–Empty slot for power supply
2–Console port (labeled **CON**)	10–Power supply rating label
3–Management port (labeled **MGMT**)	11–ESD point
4–USB port	12–QSFP28 port LEDs
5–QSFP28 ports	13–Reset button
6–CLEI code label	14–Protective earthing terminal
7–Fan module	15–Claim code label
8–550-W AC power supply	

Figure 24 on page 32 shows the components on the rear panel of an EX4400-48F switch with a DC power supply.

Figure 24: Components on the Rear Panel of an EX4400-48F Switch with a DC Power Supply



1–Serial number ID label	9–Empty slot for power supply
2–Console port (labeled **CON**)	10–Power supply rating label
3–Management port (labeled **MGMT**)	11–ESD point
4–USB port	12–QSFP28 port LEDs
5–QSFP28 ports	13–Reset button
6–CLEI code label	14–Protective earthing terminal
7–Fan module	15–Claim code label
8–550-W DC power supply	

Extension Modules

EX4400 switches provide one slot for installing an optional extension module. You can use the extension module ports to connect the switch to other devices. For more information about extension modules, see "Extension Modules in EX4400 Switches" on page 42.

Virtual Chassis

You can interconnect a maximum of 10 EX4400 switches to form a Virtual Chassis by using the QSFP28 ports on the rear panel. By default, each of the two QSFP28 ports is configured as two logical 50-Gbps VCP interfaces. You can operate the interconnected switches as a single, logical device with a single IP address. For more information about Virtual Chassis, see *Understanding EX Series Virtual Chassis*.

The QSFP28 ports are configured as Virtual Chassis ports (VCPs) by default. You can configure them as network ports and operate them as 100GbE network ports by using QSFP28 transceivers and by using the CLI command **request virtual-chassis mode**.

Channelization in EX4400 Switches

When the two 100GbE QSFP28 ports on the rear panel of EX4400 switches are configured to operate as network ports, they support channelization. You can channelize the ports into interfaces by installing

QSFP28 transceivers or QSFP+ transceivers, connecting breakout cables, and by using CLI configuration (see *Port Settings*).

EX4400 Cooling System

The cooling system in EX4400 switches consists of two fan modules for the chassis and a single built-in fan in each power supply. The airflow direction depends on the fan modules and power supplies installed in the switch. You can order fan modules and power supplies that support front-to-back (air enters through the front panel of the switch) or back-to-front airflow (air enters through the rear panel of the switch). The fan modules 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.

EX4400 Power System

EX4400-24T, EX4400-48T, and EX4400-48F models switches support two 550-W AC or DC power supplies with front-to-back or back-to-front airflow directions. EX4400-24P switches support two 1050-W AC power supplies with front-to-back airflow. EX4400-48P switches support two 1600-W AC power supplies with front-to-back airflow. Power supplies for EX4400 switches are fully redundant, load-sharing, and hot-removable and hot-insertable FRUs when the second power supply is installed and running. You can remove and replace either one of them without powering off the switch or disrupting switch functions. We ship EX4400 switches with one power supply preinstalled in the rear panel of the chassis. Each power supply is cooled by its own internal cooling system.

CAUTION:

Do not mix:

- AC and DC power supplies in the same chassis.
- Power supplies with different airflow directions in the same chassis.
- Fan modules with different airflow directions in the same chassis.
- Power supplies and fan modules with different airflow directions in the same chassis.

If you install power supplies or fan modules with different airflow directions, Junos OS raises an alarm.

EX4400 Switch Models

The EX4400 switch is available in models with or without IEEE 802.3bt Power over Ethernet (PoE-bt) capability. EX4400-24P and EX4400-48P provide PoE-bt. EX4400 switches run on either AC or DC power and support either back-to-front or front-to-back airflow. Table 4 on page 34 lists the components shipped with EX4400 switch models.

Table 4: EX4400 Switch Models, Shipped Components, and First Junos OS Release

Model Number	Built-In Ports	Ports That Support PoE-bt	Fan Modules	Power Supply	First Junos OS Release
EX4400 -24T	24 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	0	Two fan modules with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	A 550-W AC power supply with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	21.1R1
EX4400 -24T-AFI	24 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	0	Two fan modules with back-to-front airflow (indicated by the **AIR IN** label and the Juniper Azure Blue handle)	A 550-W AC power supply with back-to-front airflow (indicated by the **AIR IN** label and the Juniper Azure Blue handle)	21.1R1
EX4400 -24T-DC	24 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	0	Two fan modules with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	A 550-W DC power supply with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	21.1R1
EX4400 -24T-DC-AFI	24 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	0	Two fan modules with back-to-front airflow (indicated by the **AIR IN** label and the Juniper Azure Blue handle)	A 550-W DC power supply with back-to-front airflow (indicated by the **AIR IN** label and the Juniper Azure Blue handle)	21.1R1
EX4400 -24T-S	24 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	0	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	21.1R1

Table 4: EX4400 Switch Models, Shipped Components, and First Junos OS Release *(continued)*

Model Number	Built-In Ports	Ports That Support PoE-bt	Fan Modules	Power Supply	First Junos OS Release
EX4400 -24P	24 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	24	Two fan modules with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle).	A 1050-W AC power supply with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	21.1R1
EX4400 -24P-S	24 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	24	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	21.1R1
EX4400 -48T	48 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	0	Two fan modules with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	A 550-W AC power supply with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	21.1R1
EX4400 -48T-AFI	48 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	0	Two fan modules with back-to-front airflow (indicated by the **AIR IN** label and the Juniper Azure Blue handle)	A 550-W AC power supply with back-to-front airflow (indicated by the **AIR IN** label and the Juniper Azure Blue handle)	21.1R1
EX4400 -48T-DC	48 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	0	Two fan modules with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	A 550-W DC power supply with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	21.1R1
EX4400 -48T-DC-AFI	48 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	0	Two fan modules with back-to-front airflow (indicated by the **AIR IN** label and the Juniper Azure Blue handle)	A 550-W DC power supply with back-to-front airflow (indicated by the **AIR IN** label and the Juniper Azure Blue handle)	21.1R1
EX4400 -48T-S	48 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	0	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	21.1R1

Table 4: EX4400 Switch Models, Shipped Components, and First Junos OS Release *(continued)*

Model Number	Built-In Ports	Ports That Support PoE-bt	Fan Modules	Power Supply	First Junos OS Release
EX4400 -48P	48 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	48	Two fan modules with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle).	A 1600-W AC power supply with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	21.1R1
EX4400 -48P-S	48 1GbE RJ-45 ports and 2 100GbE QSFP28 ports	48	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	21.1R1
EX4400 -48F	36 1GbE SFP ports, 12 10GbE SFP+ ports, and 2 100GbE QSFP28 ports	0	Two fan modules with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	A 550-W AC power supply with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	21.1R1
EX4400 -48F-AFI	36 1GbE SFP ports, 12 10GbE SFP+ ports, and 2 100GbE QSFP28 ports	0	Two fan modules with back-to-front airflow (indicated by the **AIR IN** label and the Juniper Azure Blue handle)	A 550-W AC power supply with back-to-front airflow (indicated by the **AIR IN** label and the Juniper Azure Blue handle)	21.1R1
EX4400 -48F-DC	36 1GbE SFP ports, 12 10GbE SFP+ ports, and 2 100GbE QSFP28 ports	0	Two fan modules with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	A 550-W DC power supply with front-to-back airflow (indicated by the **AIR OUT** label and the Juniper Gold handle)	21.1R1
EX4400 -48F-DC-AFI	36 1GbE SFP ports, 12 10GbE SFP+ ports, and 2 100GbE QSFP28 ports	0	Two fan modules with back-to-front airflow (indicated by the **AIR IN** label and the Juniper Azure Blue handle)	A 550-W DC power supply with back-to-front airflow (indicated by the **AIR IN** label and the Juniper Azure Blue handle)	21.1R1

Table 4: EX4400 Switch Models, Shipped Components, and First Junos OS Release *(continued)*

Model Number	Built-In Ports	Ports That Support PoE-bt	Fan Modules	Power Supply	First Junos OS Release
EX4400 -48F-S	36 1GbE SFP ports, 12 10GbE SFP+ ports, and 2 100GbE QSFP28 ports	0	We don't ship fan modules for this model by default; you must order two fan modules separately.	We don't ship power supplies for this model by default; you must order them separately.	21.1R1

NOTE: Extension modules and transceivers are not part of the shipping configuration. If you want to purchase any of these components, power supplies, or fan modules for your switch, you must order them separately and register them (see "Register Products—Mandatory to Validate SLAs" on page 103).

EX4400 Switch Hardware and CLI Terminology Mapping

This topic describes the hardware terms used in EX4400 switch documentation and the corresponding terms used in the Junos OS CLI (see Table 5 on page 37).

Table 5: CLI Equivalents of Terms Used in the Documentation for EX4400 Switches

Hardware Item (CLI)	Description (CLI)	Value	Item In Documentation	Additional Information
Chassis	One of the following: • EX4400-24T • EX4400-24P • EX4400-48T • EX4400-48P • EX4400-48F	–	Switch chassis	"EX4400 Switch Models" on page 34

Table 5: CLI Equivalents of Terms Used in the Documentation for EX4400 Switches *(continued)*

Hardware Item (CLI)	Description (CLI)	Value	Item In Documentation	Additional Information
Routing Engine (*n*)	One of the following: • RE-EX4400-24T • RE-EX4400-24P • RE-EX4400-48T • RE-EX4400-48P • RE-EX4400-48F	*n* is a value in the range 0 through 9. • In a standalone switch, the default value is 0. • In a Virtual Chassis configuration, the values correspond to the member IDs of switches configured in the primary role and the backup role in the Virtual Chassis.	Routing Engine	–
FPC (*n*)	Abbreviated name of the Flexible PIC Concentrator (FPC) One of the following: • EX4400-24T • EX4400-24P • EX4400-48T • EX4400-48P • EX4400-48F	*n* is a value in the range 0 through 9.		*Understanding Interface Naming Conventions*
		In a standalone switch, the default value is 0.	In this case, FPC refers to the switch itself.	
		In a Virtual Chassis configuration, the values correspond to the assigned member IDs of switches in the Virtual Chassis.	In this case, the FPC number refers to the member ID assigned to the switch.	

Table 5: CLI Equivalents of Terms Used in the Documentation for EX4400 Switches *(continued)*

Hardware Item (CLI)	Description (CLI)	Value	Item In Documentation	Additional Information
PIC (*n*)	Abbreviated name of the Physical Interface Card (PIC)	*n* is a value in the range 0 through 2.		*Understanding Interface Naming Conventions*
	One of the following: • EX4400-24T or EX4400-24P switch: 24x10M/100M/1G • EX4400-48T or EX4400-48P switch: 48x10M/100M/1G • EX4400-48F switch: 36x 1G SFP, 12x 1G/10G SFP/SFP+	PIC 0	PIC 0 stands for built-in network ports numbered **0** through **23** or **0** through **47**	"EX4400 Switches Hardware Overview" on page 18
	One of the following: • 2x100G QSFP28 VCP • 2x100G QSFP28	PIC 1	QSFP28 ports numbered **0** and **1**	"EX4400 Switches Hardware Overview" on page 18
	One of the following: • 4x10G SFP+ • 4x25G SFP28	PIC 2	Extension module installed in the switch	"Extension Modules in EX4400 Switches" on page 42
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 and Cables Supported on EX4400 Switches" on page 87
Power supply (*n*)	One of the following: • JPSU-550-C-AC-AFO • JPSU-550-C-AC-AFI • JPSU-550-	*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 EX4400 Switches on page 63 • DC Power Supply in EX4400 Switches on page 72

Table 5: CLI Equivalents of Terms Used in the Documentation for EX4400 Switches *(continued)*

Hardware Item (CLI)	Description (CLI)	Value	Item In Documentation	Additional Information
	C-DC-AFO • JPSU-550-C-DC-AFI • JPSU-1050-C-AC-AFO • JPSU-1600-C-AC-AFO			
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 module	"Cooling System and Airflow in an EX4400 Switch" on page 54

Chassis Physical Specifications for EX4400 Switches

The EX4400 switch chassis is a rigid sheet-metal structure that houses all components of the switch. Table 6 on page 40 summarizes the physical specifications of the EX4400 switch chassis.

Table 6: Physical Specifications of the EX4400 Switch Chassis

Description	Value
Chassis height	1.72 in. (4.37 cm)
Chassis width	17.39 in. (44.16 cm) The outer edges of the front-mounting brackets extend the width to 19 in. (48.2 cm).
Chassis depth	• With no power supply, fan module, or extension module installed: 15.71 in. (39.9 cm) • With power supply and fan module installed: 16.93 in. (43 cm) The cables and power supply cords you connect to the switch extend the depth. • With power supply, fan module, and extension module installed: 17.35 in. (44.07 cm)

Table 6: Physical Specifications of the EX4400 Switch Chassis *(continued)*

Description	Value
Weight	• Switch with no power supply, fan module, or extension module installed: 13 lb (5.9 kgs) • Fan module: 0.26 lb (0.12 kg) • 550 W AC power supply: 1.76 lb (0.8 kg) • 550 W DC power supply: 1.65 lb (0.75 kg) • 1050 W AC power supply: 1.98 lb (0.9 kg) • 1600 W AC power supply: 2 lb (0.91 kg) • 4x10GbE SFP+ extension module (model number: EX4400-EM-4S): 0.2 lb (0.09 kg) • 4x25GbE SFP28 extension module (model number: EX4400-EM-4Y): 0.29 lb (0.13 kg) We ship the switch with one power supply, two fan modules, one cover for the empty extension module slot, and one cover for the empty power supply slot preinstalled.

You can mount an EX4400 switch:

- On a two-post rack or on two posts of a 19-in. four-post rack by using the two-post mounting brackets provided with the switch.
- Flush with the front posts of a 19-in. four-post rack by using a separately orderable four-post rack mount kit.
- In a recessed position inside a 19-in. four-post rack by using the recessed-mounting brackets provided with a separately orderable four-post rack mount kit.
- On a desk or other level surface by using the rubber feet provided with the switch.
- On a wall by using a separately orderable wall mount kit.

Field-Replaceable Units in EX4400 Switches

Field-replaceable units (FRUs) are components that you can replace at your site. The FRUs in EX4400 switches are hot-removable and hot-insertable: You can remove and replace them without powering off the switch or disrupting switch functions. The FRUs in EX4400 switches are:

- Power supplies
- Fan modules

- Extension 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.

Extension Modules in EX4400 Switches

EX4400 switches provide a slot to install an optional extension module. Extension modules are hot-insertable and hot-removable field-replaceable units (FRUs): You can remove and replace them without powering off the switch or disrupting switch functions.

You can install an extension module horizontally in the extension module slot on the front panel of the switch. By installing an extension module, you add more ports to your switch, thereby increasing the port density of the switch.

Table 7 on page 43 shows the extension modules supported on EX4400 switches, their descriptions, and the first Junos OS release the extension modules support.

Table 7: Extension Modules Supported on EX4400 Switches

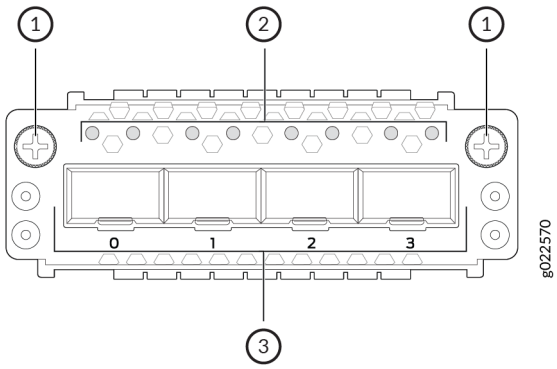
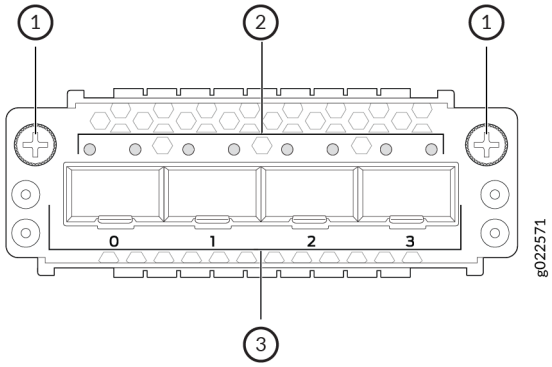
Extension Module	Description	First Junos OS Release
4x10GbE SFP+ extension module (model number: EX4400-EM-4S)	You can install up to four 1GbE SFP transceivers or 10GbE SFP+ transceivers in the 4x10GbE SFP+ extension module. Do not install SFP transceivers and SFP+ transceivers in the extension module at the same time. **Figure 25: 4x10GbE SFP+ Extension Module for EX4400 Switches**  1–Captive screws 2–LEDs 3–SFP+ ports	21.1R1

Table 7: Extension Modules Supported on EX4400 Switches *(continued)*

Extension Module	Description	First Junos OS Release
4x25GbE SFP28 extension module (model number: EX4400-EM-4Y)	The 4x25GbE SFP28 extension module supports Media Access Control Security (MACsec). You can install up to four 10GbE SFP+ transceivers or 25GbE SFP28 transceivers in the extension module. Do not install SFP+ transceivers and SFP28 transceivers in the extension module at the same time. **Figure 26: 4x25GbE SFP28 Extension Module for EX4400 Switches**  1–Captive screws 3–SFP28 ports 2–LEDs	21.1R1

Extension modules and transceivers are not part of the shipping configuration. You must order them separately.

When you install an extension module in the switch or replace an extension module with another extension module, the switch detects the ports on the extension module. The switch creates the required interfaces when you install transceivers in these ports.

Depending on the transceiver you install, you can operate:

- The 4x10GbE SFP+ extension module ports either in 10-gigabit or in 1-gigabit mode.
- The 4x25GbE SFP28 extension module ports either in 25-gigabit or in 10-gigabit mode.

The operating speed of the extension modules is shown in the output of the **show chassis pic fpc-slot *slot number* pic-slot *slot number*** command.

Each port on the extension modules has a pair of LEDs that indicate the link activity and status of the port (see "LEDs on the RJ-45, SFP, and SFP+ Network Ports, QSFP28 Ports, and Extension Module Ports on EX4400 Switches" on page 47 for details about the LEDs).

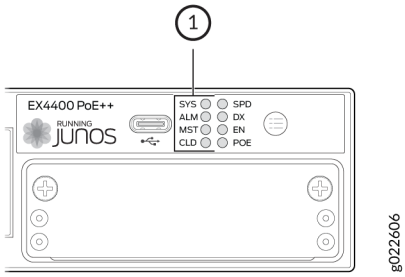
EX4400 Chassis

IN THIS SECTION

Chassis Status LEDs on EX4400 Switches

EX4400 switches have four chassis status LEDs (labeled **SYS**, **ALM**, **MST**, and **CLD**) on the right-hand side of the front panel (see Figure 27 on page 45).

Figure 27: Chassis Status LEDs in EX4400 Switches



1–Chassis status LEDs

NOTE: Junos OS Release 21.1R1 does not support the **CLD** LED.

Table 8 on page 46 describes the chassis status LEDs labeled **SYS**, **ALM**, and **MST** on an EX4400 switch, their colors and states, and the status they indicate. You can view the colors of the LEDs remotely through the CLI by issuing the **show chassis led** operational mode command. All LEDs can be lit simultaneously.

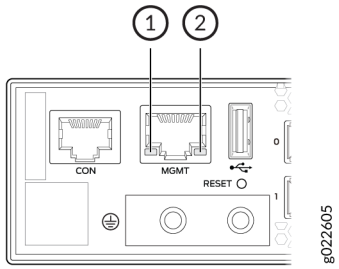
Table 8: SYS, ALM, and MST Chassis Status LEDs on EX4400 Switches

LED Label	Color	State and Description
SYS	Green	• On steadily—Junos OS for EX Series switches is loaded on the switch. • Blinking—The switch is booting.
	Unlit	The switch is powered off or is halted.
ALM	Red	There is a major hardware fault, such as a temperature alarm or a power failure alarm, and the switch is halted. A major alarm indicates a critical error condition that requires immediate attention (see "Chassis Component Alarm Conditions on EX4400 Switches" on page 181).
	Amber	There is a minor alarm, such as a software or a hardware error. Power off the switch and then power it on. Monitor the switch to see whether it is working properly. A minor alarm indicates a noncritical condition that requires monitoring or maintenance. A minor alarm that is left unchecked might cause interruption in service or performance degradation.
	Unlit	There is no alarm or the switch is halted.
MST	Green	In a standalone switch: • On steadily—The switch is functioning normally. • Off—The switch is powered off or is halted.
		In a Virtual Chassis configuration: • On steadily—The switch is the primary switch in the Virtual Chassis configuration. • Blinking—The switch is the backup in the Virtual Chassis configuration. • Off—The switch is a linecard member in the Virtual Chassis configuration or the switch is halted.

LEDs on the Management Port on EX4400 Switches

The management port—labeled **MGMT**—on the rear panel of EX4400 switches has two LEDs that indicate link activity and status of the port (see Figure 28 on page 47).

Figure 28: LEDs on the Management Port on EX4400 Switches



1–Link activity LED	2–Status LED

Table 9 on page 47 describes the LEDs.

Table 9: LEDs on the Management Port on EX4400 Switches

LED	State and Description
Link activity	• On steadily—The port and the link are active, but there is no link activity. • Blinking—The port and the link are active, and there is link activity. • Off—The port is not active.
Status	Indicates the speed: • On steadily—Link speed is 1000 Mbps. • Blinking—Link speed is 100 Mbps. • Off—Link speed is 10 Mbps.

LEDs on the RJ-45, SFP, and SFP+ Network Ports, QSFP28 Ports, and Extension Module Ports on EX4400 Switches

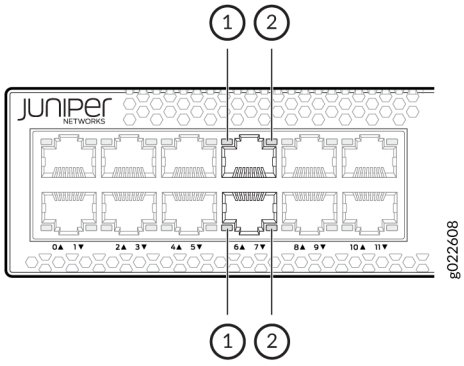
IN THIS SECTION

The RJ-45, small form-factor pluggable (SFP), and small form-factor pluggable plus (SFP+) network ports, SFP+ and SFP28 extension module ports, and QSFP28 ports on EX4400 switches have LEDs that show the link activity and status of the port.

LEDs on the Network Ports

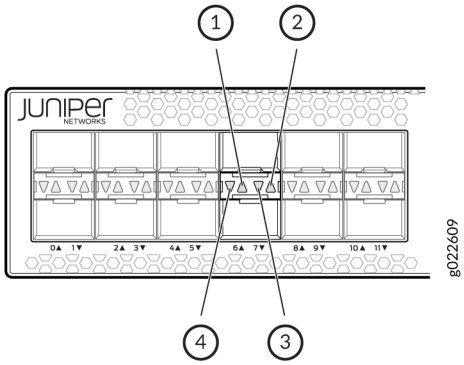
Figure 29 on page 48 shows the LEDs on the RJ-45 network ports on EX4400-24T, EX4400-24P, EX4400-48T, and EX4400-48P switches. Figure 30 on page 48 shows the LEDs on the SFP network ports on EX4400-48F switches. Figure 31 on page 49 shows the LEDs on the SFP+ network ports on EX4400-48F switches. Table 10 on page 49 describes the link activity LED on the network ports.

Figure 29: LEDs on the RJ-45 Network Ports on EX4400-24T, EX4400-24P, EX4400-48T, and EX4400-48P Switches



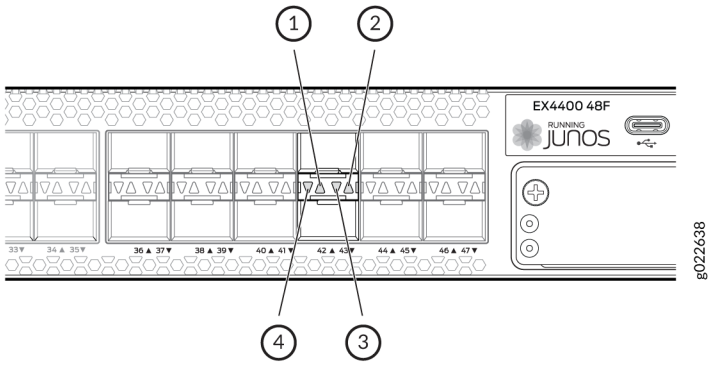
1–Link activity LED	2–Status LED

Figure 30: LEDs on the SFP Network Ports on EX4400-48F Switches



1–Link activity LED for the upper port	3–Status LED for the lower port
2–Status LED for the upper port	4–Link activity LED for the lower port

Figure 31: LEDs on the SFP+ Network Ports on EX4400-48F Switches



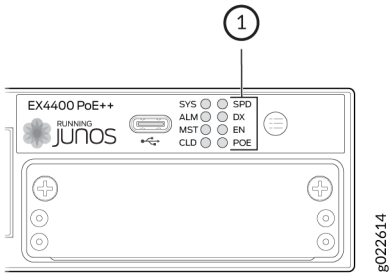
1–Link activity LED for the upper port	3–Status LED for the lower port
2–Status LED for the upper port	4–Link activity LED for the lower port

Table 10: Link Activity LED on the Network Ports

Color	State and Description
Green	• On steadily—The port and the link are active, but there is no link activity. • Blinking—The port and the link are active, and there is link activity. • Off—The port is not active.

EX4400 switches have network port mode LEDs labeled **SPD**, **DX**, and **EN** on the right-hand side of the front panel; models with ports that support PoE-bt have an additional mode LED labeled **POE** (see Figure 32 on page 49). These LEDs indicate the status of the network ports. Use the mode button on the right-hand side of the front panel to toggle the status LEDs to show the different port parameters for the network ports; the port parameter is indicated by the LED that is lit. Table 11 on page 50 describes the status LEDs.

Figure 32: Port Mode LEDs on EX4400 Switches



1–Port Mode LEDs	

Table 11: Status LEDs on the RJ-45, SFP, and SFP+ Network Ports

LED	Color	State and Description

SPD	Green	Indicates the speed at which the RJ-45, SFP, and SFP+ network ports operate.
		• The speed indicators for EX4400-24T, EX4400-24P, EX4400-48T, and EX4400-48P are:
		  ◦ On steadily—1000 Mbps
		  ◦ Blinking—100 Mbps
		  ◦ Unlit—10 Mbps
		• The speed indicator for the SFP ports on EX4400-48F is:
		  ◦ On steadily—1000 Mbps
		  ◦ Blinking—100 Mbps
		• The speed indicators for the SFP+ ports on EX4400-48F are:
		  ◦ On steadily—10 Gbps
		  ◦ Blinking—1000 Mbps

DX	Green	Indicates the duplex mode. The status indicators are: • On steadily—The port is set to full-duplex mode. • Unlit—The port is set to half-duplex mode.
EN	Green	Indicates the administrative status. The status indicators are: • On steadily—The port is administratively enabled. • Unlit—The port is administratively disabled.
POE	Green	Indicates the PoE-bt mode for ports that support PoE-bt. The status indicators are: • On steadily—PoE-bt is enabled on the port, and a device is drawing power. • Blinking—PoE-bt is enabled on the port, but no power is drawn from the port. • Unlit—PoE-bt is not enabled on the port.

Table 12 on page 51 describes the beacon functionality on the status LEDs on the RJ-45, SFP, and SFP+ network ports when you execute the **request chassis beacon** command.

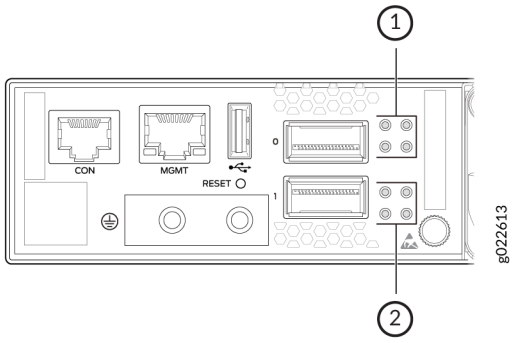
Table 12: Beacon Functionality on the Status LEDs on the RJ-45, SFP, and SFP+ Network Ports

LED	Color	State	Description
Status LEDs on all the ports	Green	Blinking, irrespective of the mode the ports are operating in.	Helps identify the switch.
Status LED on the applicable port			Helps identify the port.

LEDs on the QSFP28 Ports

Figure 33 on page 51 and Figure 34 on page 52 show the LEDs for the QSFP28 ports. The top left LEDs are lit green when the ports operate as Virtual Chassis ports. Table 10 on page 49 describes the LED when the ports are configured as network ports.

Figure 33: LEDs for the QSFP28 Ports



1–LEDs for the upper port	2–LEDs for the lower port

Figure 34: Link Activity LEDs for the QSFP28 Ports

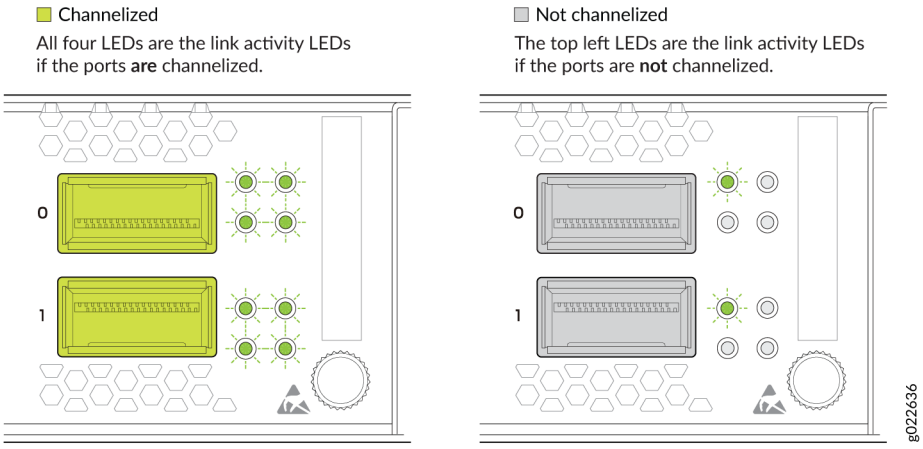


Table 13: Link Activity LED on the QSFP28 Ports

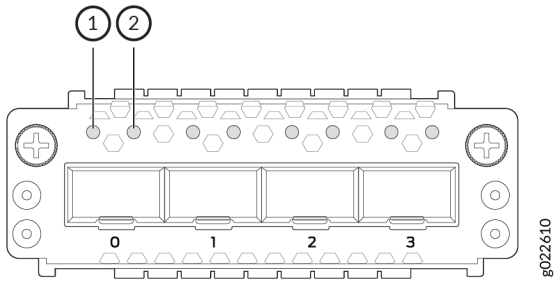
LED	Color	State and Description
Link activity (non-channelized ports)	Green	• On steadily—A 100-Gbps link is established, but there is no link activity. • Blinking—A 100-Gbps link is established, and there is link activity. • Off—There is no link.
All four (channelized ports)	Green	• On steadily—A 4x25-Gbps channelized link is established, but there is no link activity. • Blinking—A 4x25-Gbps channelized link is established, and there is link activity. • Off—There is no link.
	Amber	• On steadily—A 4x10-Gbps channelized link is established, but there is no link activity. • Blinking—A 4x10-Gbps channelized link is established, and there is link activity. • Off—There is no link.

LEDs on the Extension Module Ports

Figure 35 on page 53 shows the LEDs on the 4x10GbE SFP+ extension module ports. Table 14 on page 53 describes the link activity LED on those ports and Table 15 on page 53 describes the status LED on those ports.

Figure 36 on page 54 shows the LEDs on the 4x25GbE SFP28 extension module ports. Table 14 on page 53 describes the link activity LED on those ports and Table 16 on page 54 describes the status LED on those ports.

Figure 35: LEDs on the 4x10GbE SFP+ Extension Module Ports



1–Link activity LED	2–Status LED

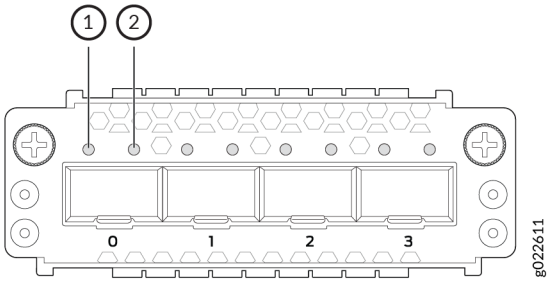
Table 14: Link Activity LED on the Extension Module Ports

Color	State and Description
Green	• On steadily—The port and the link are active, but there is no link activity. • Blinking—The port and the link are active, and there is link activity. • Unlit—The port is not active.

Table 15: Status LED on the 4x10GbE SFP+ Extension Module Ports

Color	State and Description
Green	Indicates the speed. The speed indicators are: • On steadily—10 Gbps • One blink per second—1000 Mbps • Unlit—The port is not active.

Figure 36: LEDs on the 4x25GbE SFP28 Extension Module Ports



1–Link activity LED	2–Status LED

Table 16: Status LED on the 4x25GbE SFP28 Extension Module Ports

Color	State and Description
Green	Indicates the speed. The speed indicators are: • On steadily—10 Gbps • Three blinks per second—25 Gbps • Unlit—The port is not active.

Cooling System and Airflow in an EX4400 Switch

IN THIS SECTION

The cooling system in an EX4400 switch consists of two fan modules for the chassis and a single built-in fan in each power supply. The airflow direction depends on the fan modules and power supplies installed

in the switch. You can order an EX4400 switch that supports front-to-back (air enters through the front panel of the switch) or back-to-front airflow (air enters through the rear panel of the switch).

Fan Modules

The fan modules 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.

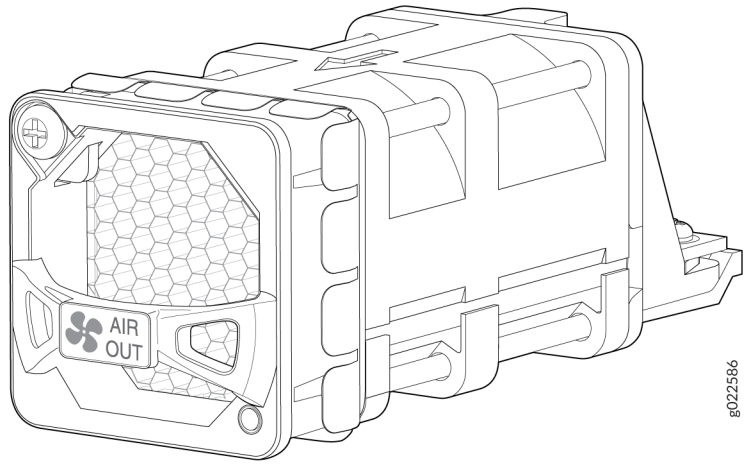
We ship EX4400 switches with two fan modules (1+1 redundancy) preinstalled in the rear panel of the switch. The fan module slots are numbered **0** and **1** and each slot has a fan icon next to it.

The fan modules are available in two models that have different airflow directions:

- Front-to-back (cold air enters through the vents on the front panel of the switch and hot air exhausts through the vents on the rear panel), indicated by the **AIR OUT** label and the Juniper Gold handle.
- Back-to-front (cold air enters through the vents on the rear panel of the switch and hot air exhausts through the vents on the front panel), indicated by the **AIR IN** label and the Juniper Azure Blue handle.

Figure 37 on page 55 shows the fan module used in an EX4400 switch.

Figure 37: Fan Module Used in an EX4400 Switch



NOTE: You must install all the fan modules for optimal functioning of the switch.

If the switch is operational while you are replacing fan modules, you must remove only one fan module at a time. The switch continues to operate for 60 seconds without thermal shutdown while you are replacing a fan module.

CAUTION:

Do not mix:

- Fan modules with different airflow directions in the same chassis.
- Power supplies with different airflow directions in the same chassis.
- Power supplies and fan modules with different airflow directions in the same chassis.

If you install power supplies or fan modules with different airflow directions, Junos OS raises an alarm.

Under normal operating conditions, the fan modules operate at a moderate speed. Temperature sensors in the chassis monitor the temperature within the chassis.

If a fan module fails or if the ambient temperature inside the chassis rises above the acceptable range, Junos OS raises an alarm. If the temperature inside the chassis rises above the threshold temperature, the system shuts down automatically.

EX4400 Switches with Front-to-Back Airflow

In the EX4400 switch models that have front-to-back airflow, cold air enters the chassis through the vents on the front panel and hot air exhausts the chassis through the vents on the rear panel.

- Figure 38 on page 57 shows the front-to-back airflow in an EX4400-24T switch.
- Figure 39 on page 57 shows the front-to-back airflow in an EX4400-24P switch.
- Figure 40 on page 58 shows the front-to-back airflow in an EX4400-48T switch.
- Figure 41 on page 58 shows the front-to-back airflow in an EX4400-48P switch.
- Figure 42 on page 59 shows the front-to-back airflow in an EX4400-48F switch.

Figure 38: Front-to-Back Airflow Through an EX4400-24T Switch Chassis

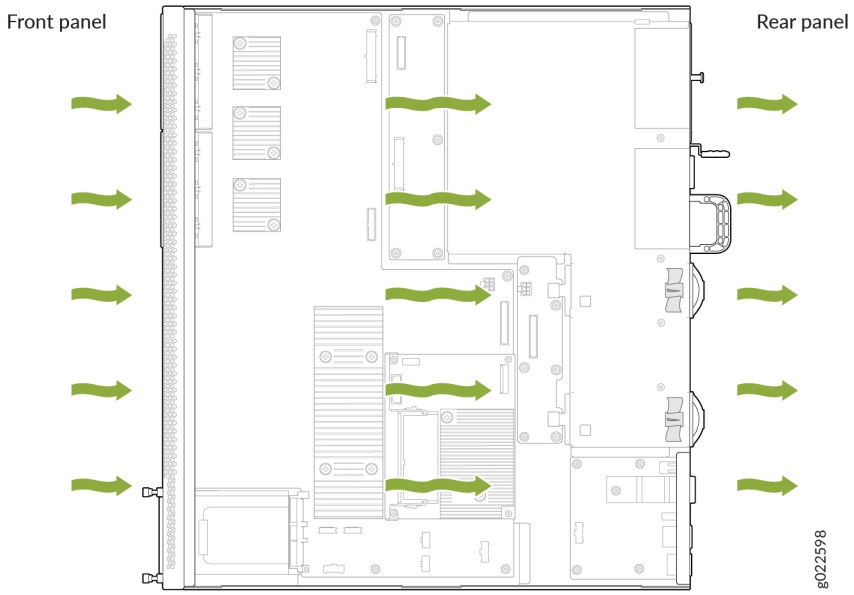


Figure 39: Front-to-Back Airflow Through an EX4400-24P Switch Chassis

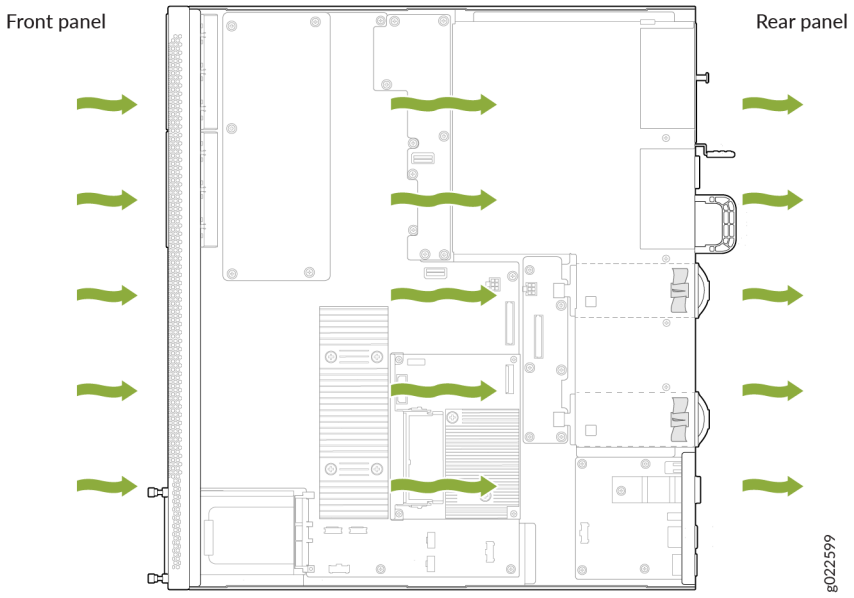


Figure 40: Front-to-Back Airflow Through an EX4400-48T Switch Chassis

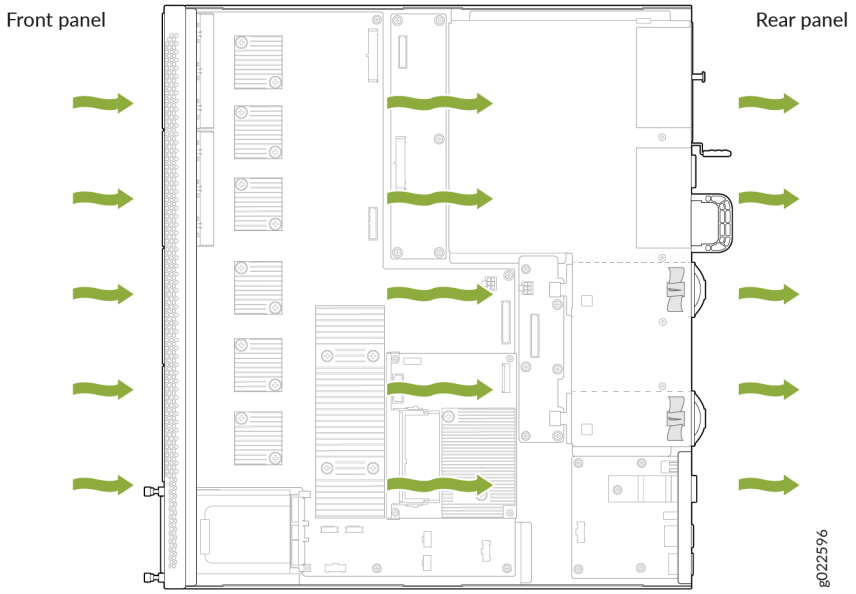


Figure 41: Front-to-Back Airflow Through an EX4400-48P Switch Chassis

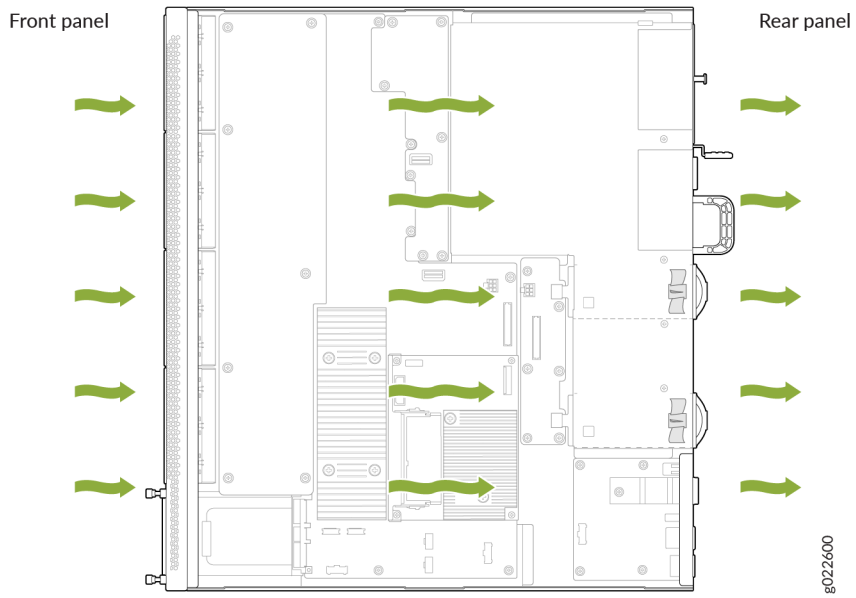
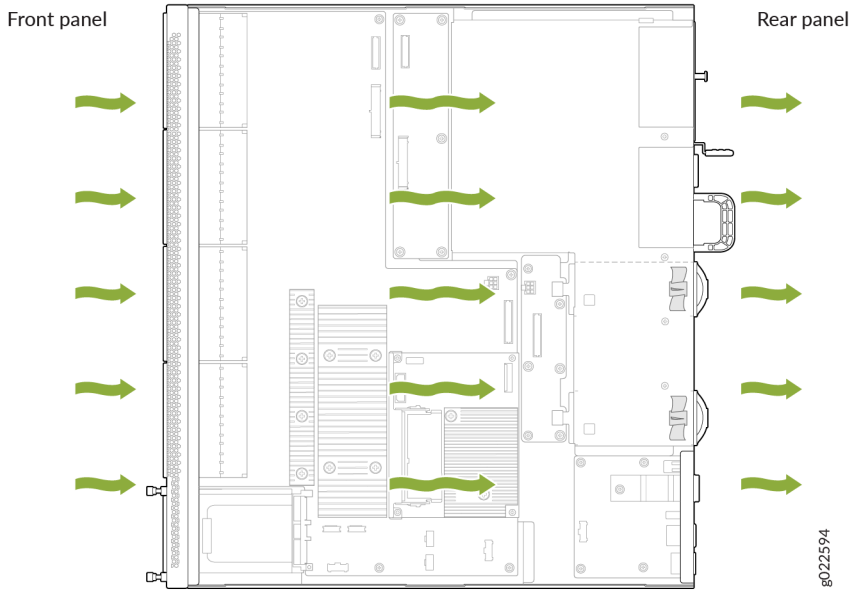


Figure 42: Front-to-Back Airflow Through an EX4400-48F Switch Chassis



Mixing components with different airflow directions in the same chassis hampers the performance of the cooling system of the switch and leads to overheating of the chassis.

EX4400 Switches with Back-to-Front Airflow

In the EX4400 switch models that have back-to-front airflow, cold air enters the chassis through the vents on the rear panel of the switch and hot air exhausts the chassis through the vents on the front panel.

- Figure 43 on page 60 shows the back-to-front airflow in an EX4400-24T switch.
- Figure 44 on page 60 shows the back-to-front airflow in an EX4400-48T switch.
- Figure 45 on page 61 shows the back-to-front airflow in an EX4400-48F switch.

Figure 43: Back-to-Front Airflow Through an EX4400-24T Switch Chassis

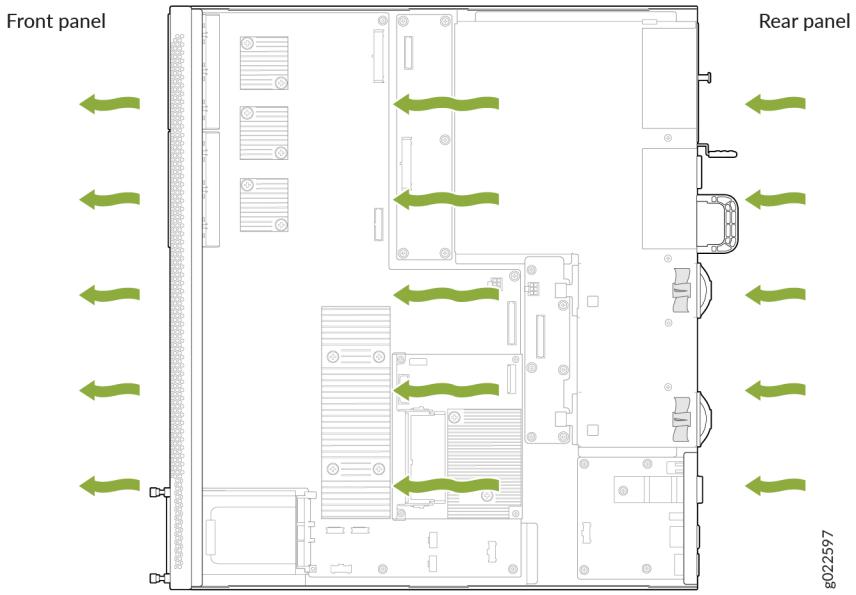


Figure 44: Back-to-Front Airflow Through an EX4400-48T Switch Chassis

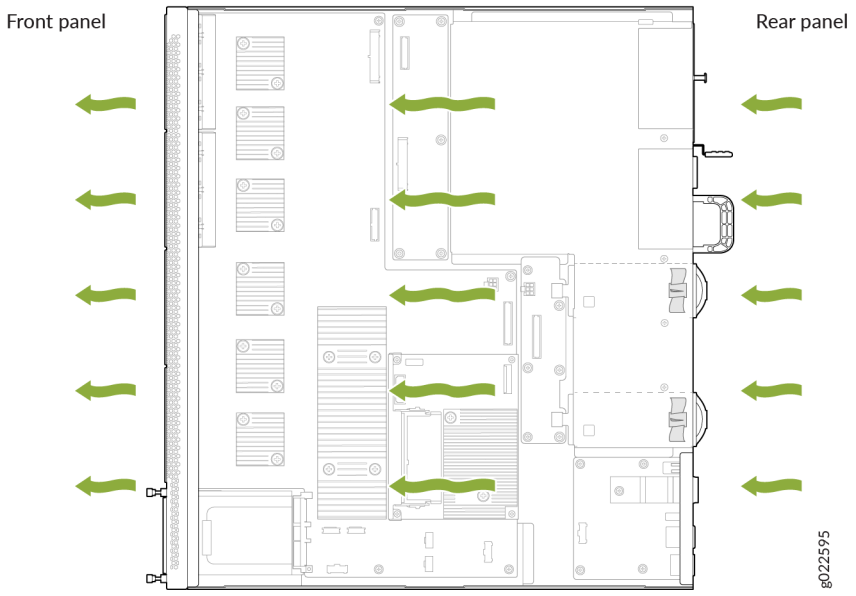
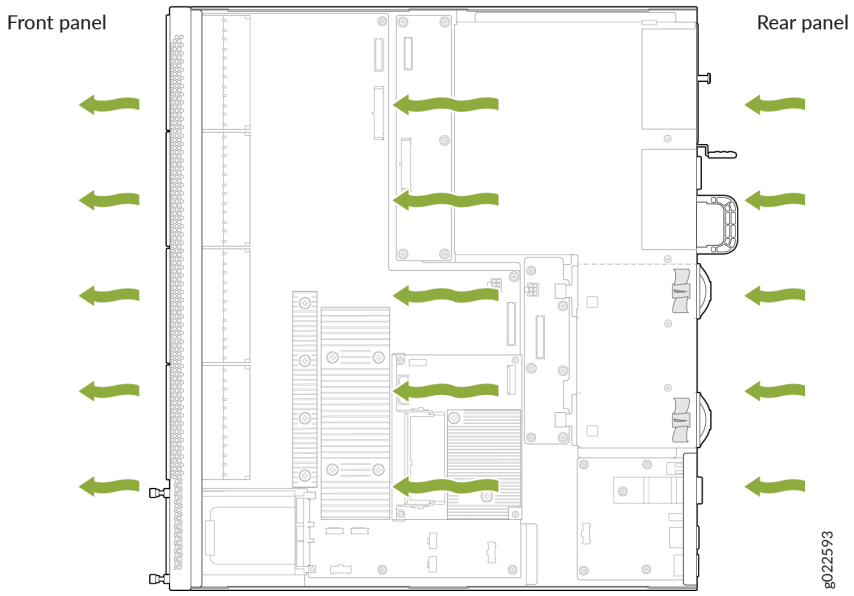


Figure 45: Back-to-Front Airflow Through an EX4400-48F Switch Chassis

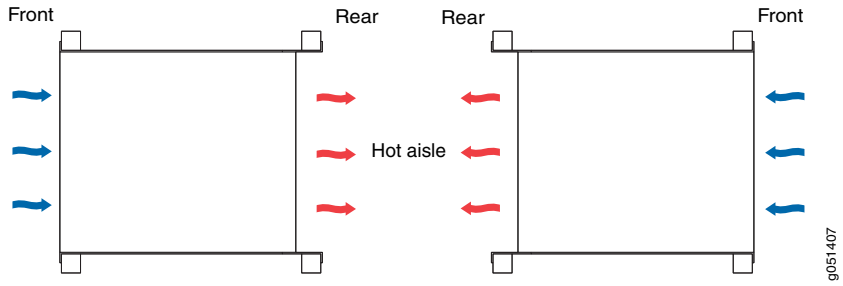


Mixing components with different airflow directions in the same chassis hampers the performance of the cooling system of the switch and leads to overheating of the chassis.

How to Position the Switch

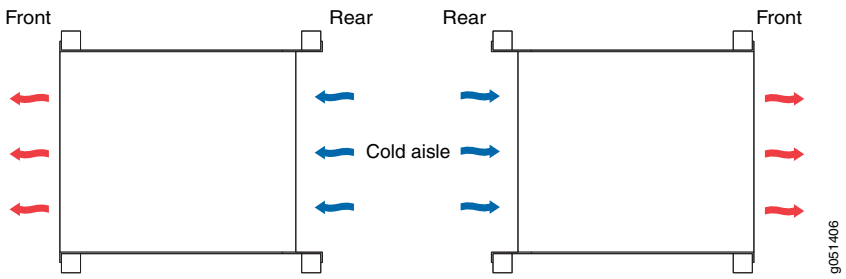
Position the switch with front-to-back airflow in such a manner that the **AIR OUT** labels on the fan modules and power supplies are next to the hot aisle (see Figure 46 on page 61).

Figure 46: Deployment of Switches with Front-to-Back Airflow Through the Switch Chassis



Position the switch with back-to-front airflow in such a manner that the **AIR IN** labels on the fan modules and power supplies are next to the cold aisle (see Figure 47 on page 62).

Figure 47: Deployment of Switches with Back-to-Front Airflow Through the Switch Chassis



Fan Module Status

Each fan module has a status LED on it that indicates the status of the fan module (see Figure 48 on page 62).

Figure 48: Fan Module LED

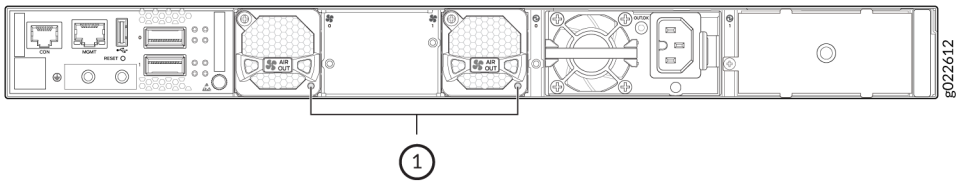


Table 17 on page 62 describes the LED.

Table 17: Fan Module Status LED

State	Description
Lit green	The fan module is functioning normally.
Unlit	Indicates one of the following: • The fan module is not installed properly. • The fan module is not functioning normally. • The airflow direction of the fan module does not match with the airflow direction of the other components installed in the switch.

EX4400 Power System

IN THIS SECTION

AC Power Supply in EX4400 Switches

IN THIS SECTION

We ship the EX4400 switches with one power supply preinstalled in the rear panel of the switches. You can install up to two power supplies in an EX4400 switch. The power supply slots are numbered **0** and **1** and each slot has a power icon next to it. The power supplies support front-to-back or back-to-front airflow directions. They are fully redundant, load-sharing, and hot-removable and hot-insertable field-replaceable units (FRUs) when the second power supply is installed and running: You can remove and replace either one of them without powering off the switch or disrupting switch functions. This topic describes the AC power supplies that EX4400 switches support.

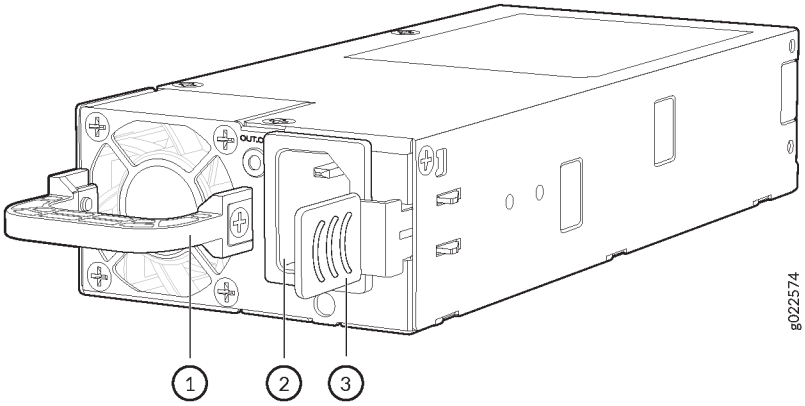
Do not mix:

- AC and DC power supplies in the same chassis.
- Power supplies with different airflow directions in the same chassis.
- Fan modules with different airflow directions in the same chassis.
- Power supplies and fan modules with different airflow directions in the same chassis.

Characteristics of the AC Power Supply

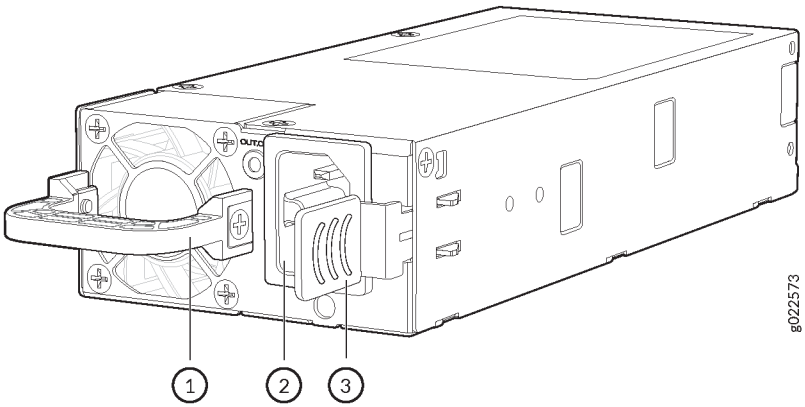
The AC power supplies for EX4400 switches come in 550-W, 1050-W, and 1600-W models. EX4400-24T, EX4400-48T, and EX4400-48F switches support 550-W AC power supplies (see Figure 49 on page 64). EX4400-24P switches support 1050-W AC power supplies (see Figure 50 on page 64). EX4400-48P switches support 1600-W AC power supplies (see Figure 51 on page 65). The AC power supplies support IEEE 802.3bt Power over Ethernet (PoE-bt) in EX4400-24P and EX4400-48P models.

Figure 49: 550-W AC Power Supply for EX4400 Switches



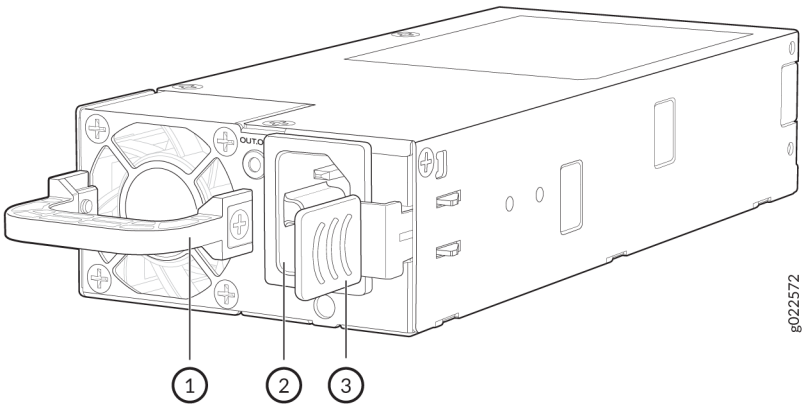
1–Power supply handle	3–Power supply ejector lever
2–Power supply inlet	

Figure 50: 1050-W AC Power Supply for EX4400 Switches



1–Power supply handle	3–Power supply ejector lever
2–Power supply inlet	

Figure 51: 1600-W AC Power Supply for EX4400 Switches



1–Power supply handle	3–Power supply ejector lever
2–Power supply inlet	

Table 18 on page 65 lists the details of the 550-W, 1050-W, and 1600-W AC power supplies used in EX4400 switches.

Table 18: Details of the AC Power Supplies in EX4400 Switches

Details		550-W AC Power Supply	1050-W AC Power Supply	1600-W AC Power Supply
Model number		• JPSU-550-C-AC-AFO • JPSU-550-C-AC-AFI	JPSU-1050-C-AC-AFO	JPSU-1600-C-AC-AFO
Minimum installed in chassis		1	1	1
Maximum installed in chassis		2	2	2
AC appliance inlet **NOTE:** Each AC appliance inlet requires a dedicated AC power feed.	Number	1	1	1
	Type	IEC-320-C13	IEC-320-C15	IEC-320-C15
Power supply status LED		**OUT.OK**	**OUT.OK**	**OUT.OK**

To prevent electrical injury while installing or removing AC power supplies, carefully follow instructions in "Install a Power Supply in an EX4400 Switch" on page 159 and "Remove a Power Supply from an EX4400 Switch" on page 157.

Specifications of the AC Power Supplies Used in EX4400 Switches

- Table 19 on page 66 provides the power supply specifications of the 550-W AC power supplies.
- Table 20 on page 66 provides the power supply specifications of the 1050-W AC power supplies.
- Table 21 on page 66 provides the power supply specifications of the 1600-W AC power supplies.

Table 19: Specifications of the 550-W AC Power Supplies Used in EX4400 Switches

Item	Specification
AC input voltage	• Low-voltage line: 100–127 VAC • High-voltage line: 200–240 VAC
AC input line frequency	47–63 Hz
AC input current rating	• Low-voltage line: 7.1 A • High-voltage line: 3.4 A
Output power	550 W

Table 20: Specifications of the 1050-W AC Power Supplies Used in EX4400 Switches

Item	Specification
AC input voltage	• Low-voltage line: 100–120 VAC • High-voltage line: 200–240 VAC
AC input line frequency	50–60 Hz
AC input current rating	• Low-voltage line: 12 A • High-voltage line: 6.05 A
Output power	1050 W

Table 21: Specifications of the 1600-W AC Power Supplies Used in EX4400 Switches

Item	Specification
AC input voltage	• Low-voltage line: 100–120 VAC • High-voltage line: 200–240 VAC

Table 21: Specifications of the 1600-W AC Power Supplies Used in EX4400 Switches *(continued)*

Item	Specification
AC input line frequency	50–60 Hz
AC input current rating	• Low-voltage line: 12 A • High-voltage line: 9 A
Output power	1600 W

AC Power Supply Airflow

Each power supply has its own fan and is cooled by its own internal cooling system. EX4400 switches support power supplies with the following airflow directions:

- Front-to-back (cold air enters through the vents on the front panel of the switch and hot air exhausts through the vents on the rear panel), indicated by the **AIR OUT** label and the Juniper Gold handle.
- Back-to-front (cold air enters through the vents on the rear panel of the switch and hot air exhausts through the vents on the front panel), indicated by the **AIR IN** label and the Juniper Azure Blue handle.

Table 22 on page 67 lists the AC power supply models and the direction of airflow in them.

Table 22: Airflow Direction in AC Power Supply Models for EX4400 Switches

Model	Direction of Airflow
• JPSU-550-C-AC-AFO • JPSU-1050-C-AC-AFO • JPSU-1600-C-AC-AFO	Front-to-back—that is, cold air enters the chassis through the vents on the front panel of the chassis and hot air exhausts through the vents on the rear panel of the chassis, indicated by the **AIR OUT** label and the Juniper Gold handle.
JPSU-550-C-AC-AFI	Back-to-front—that is, cold air enters the chassis through the vents on the rear panel of the chassis and hot air exhausts through the vents on the front panel of the chassis, indicated by the **AIR IN** label and the Juniper Azure Blue handle.

Specifications of the Power Cord for AC Power Supplies for EX4400 Switches

Each AC power supply has a single AC appliance inlet that requires a dedicated AC power feed. A detachable AC power cord is supplied with each AC power supply. We ship the 550-W AC power supplies with AC power cords with the C13 coupler type and the 1050-W and the 1600-W AC power supplies with the C15 coupler type 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.

NOTE: In North America, AC power cords must not exceed 14.75 ft (4.5 m) in length, to comply with National Electrical Code (NEC) Section 400-8 (NFPA 75, 5-2.2) and Canadian Electrical Code (CEC) Section 4-010(3).

Table 23 on page 68 lists the AC power cords specifications provided for the 550-W power supplies for each country or region.

Table 23: AC Power Cord Specifications for 550-W AC Power Supplies for EX4400-24T, EX4400-48T, and EX4400-48F Switches

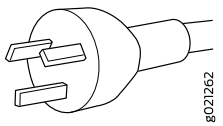
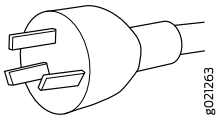
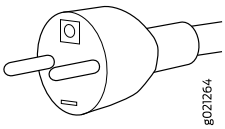
Country/ Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Argentina	250 VAC, 10 A, 50 Hz	IRAM 2073 Type RA/3	CBL-EX-PWR-C13-AR	No graphic available
Australia	250 VAC, 10 A, 50 Hz	AS/NZS 3112 Type SAA/3	CBL-EX-PWR-C13-AU	 g021262
Brazil	250 VAC, 10 A, 50 Hz	NBR 14136 Type BR/3	CBL-EX-PWR-C13-BR	No graphic available
China	250 VAC, 10 A, 50 Hz	GB 1002-1996 Type PRC/3	CBL-EX-PWR-C13-CH	 g021263
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII Type VIIG	CBL-EX-PWR-C13-EU	 g021264
India	250 VAC, 10 A, 50 Hz	IS 1293 Type IND/3	CBL-EX-PWR-C13-IN	No graphic available

Table 23: AC Power Cord Specifications for 550-W AC Power Supplies for EX4400-24T, EX4400-48T, and EX4400-48F Switches *(continued)*

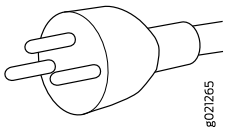
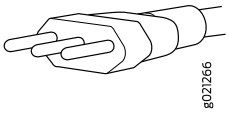
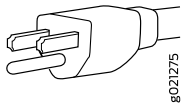
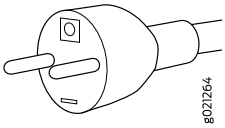
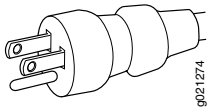
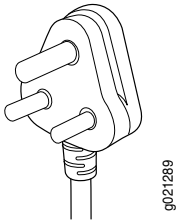
Country/ Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Israel	250 VAC, 10 A, 50 Hz	SI 32/1971 Type IL/3G	CBL-EX-PWR-C13-IL	 g021265
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16 Type I/3G	CBL-EX-PWR-C13-IT	 g021266
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	SS-00259 Type VCTF	CBL-EX-PWR-C13-JP	 g021275
Korea	250 VAC, 10 A, 50 Hz or 60 Hz	CEE (7) VII Type VIIGK	CBL-EX-PWR-C13-KR	 g021264
North America	125 VAC, 13 A, 60 Hz	NEMA 5-15 Type N5-15	CBL-EX-PWR-C13-US	 g021274
South Africa	250 VAC, 10 A, 50 Hz	SABS 164/1:1992 Type ZA/3	CBL-EX-PWR-C13-SA	 g021289
Switzerland	250 VAC, 10 A, 50 Hz	SEV 6534-2 Type 12G	CBL-EX-PWR-C13-SZ	No graphic available

Table 23: AC Power Cord Specifications for 550-W AC Power Supplies for EX4400-24T, EX4400-48T, and EX4400-48F Switches *(continued)*

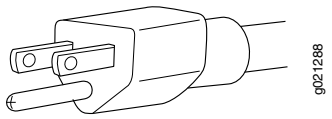
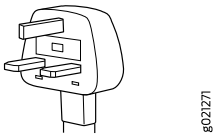
Country/ Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Taiwan	125 VAC, 10 A, 50 Hz	NEMA 5-15P Type N5-15P	CBL-EX-PWR-C13-TW	 g021288
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A Type BS89/13	CBL-EX-PWR-C13-UK	 g021271

Table 24 on page 70 lists the AC power cords specifications provided for the 1050-W and 1600-W power supplies for each country or region.

Table 24: AC Power Cord Specifications for 1050-W and 1600-W Power Supplies for EX4400-24P and EX4400-48P Switches

Country/ Region	Electrical Specifications	Plug Standards	Juniper Model Number
Argentina	250 VAC, 10 A, 50 Hz	IRAM 2073 Type RA/3	CBL-PWR-C15M-HITEMP-AR
Australia	250 VAC, 10 A, 50 Hz	AS/NZZS 3112-2000 Type SAA/3	CBL-PWR-C15M-HITEMP-AU
Brazil	250 VAC, 10 A, 50 Hz	NBR 14136 Type BR/3	CBL-PWR-C15M-HITEMP-BR
China	250 VAC, 10 A, 50 Hz	GB2099, GB1002 Type PRC/3	CBL-PWR-C15M-HITEMP-CH
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII Type VIIG	CBL-PWR-C15M-HITEMP-EU
Israel	250 VAC, 10 A, 50 Hz	SI 32 Type IL/3G	CBL-PWR-C15M-HITEMP-IL
India	250 VAC, 10 A, 50 Hz	SABS 164/1:1992 Type ZA/3	CBL-PWR-C15M-HITEMP-IN
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16 Type I/3G	CBL-PWR-C15M-HITEMP-IT
Japan	125 VAC, 15 A, 50 Hz or 60 Hz	JIS 8303 Type 498GJ	CBL-PWR-C15M-HITEMP-JP

Table 24: AC Power Cord Specifications for 1050-W and 1600-W Power Supplies for EX4400-24P and EX4400-48P Switches *(continued)*

Country/ Region	Electrical Specifications	Plug Standards	Juniper Model Number
Korea	250 VAC, 10 A, 50 Hz	CEE (7) VII Type VIIG	CBL-PWR-C15M-HITEMP-KR
South Africa	250 VAC, 10 A, 50 Hz	SABS 164/1:1992 Type ZA/3	CBL-PWR-C15M-HITEMP-SA
North America	125 VAC, 15 A, 60 Hz	NEMA 5-15 Type N5/15	CBL-PWR-C15M-HITEMP-US
North America	250 VAC, 15 A, 60 Hz	NEMA 6-15 Type N6/15	CBL-PWR-C15M-HITEMP-US (250)
Switzerland	250 VAC, 10 A, 50 Hz	SEV 1011 / 6534-2 Type 12G	CBL-PWR-C15M-HITEMP-SZ
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A Type BS89/13	CBL-PWR-C15M-HITEMP-UK

CAUTION: The AC power cord for the EX4400 switch is intended for use with this switch only. Do not use the cord with any other product.

CAUTION: Power cords must not block access to switch components.

PoE-bt Budget Planning

Table 25 on page 71 lists the PoE-bt power available in an EX4400-24P switch.

Table 25: PoE-bt Power Available in an EX4400-24P Switch

Power Supply				
PSU_0	PSU_1	Input Voltage	Available PoE-bt Power	Ports Enabled for PoE-bt
1050 W	–	110 V	788 W	8
		230 V	788 W	8

Table 25: PoE-bt Power Available in an EX4400-24P Switch *(continued)*

Power Supply		Input Voltage	Available PoE-bt Power	Ports Enabled for PoE-bt
PSU_0	PSU_1			
1050 W	1050 W	110 V	1440 W	16
		230 V	1440 W	16

Table 26 on page 72 lists the PoE-bt power available in an EX4400-48P switch.

Table 26: PoE-bt Power Available in an EX4400-48P Switch

Power Supply		Input Voltage	Available PoE-bt Power	Ports Enabled for PoE-bt
PSU_0	PSU_1			
1600 W	–	110 V	768 W	8
		230 V	1290 W	14
1600 W	1600 W	110 V	1440 W	16
		230 V	1800 W	20

DC Power Supply in EX4400 Switches

IN THIS SECTION

We ship the EX4400 switches with one power supply installed in the rear panel of the switches. You can install up to two power supplies in an EX4400 switch. The power supply slots are numbered **0** and **1** and each slot has a power icon next to it. The power supplies support front-to-back or back-to-front airflow directions. They are fully redundant, load-sharing, and hot-removable and hot-insertable field-replaceable

units (FRUs) when the second power supply is installed and running: You can remove and replace either one of them without powering off the switch or disrupting switch functions. This topic describes the DC power supplies that EX4400 switches support.

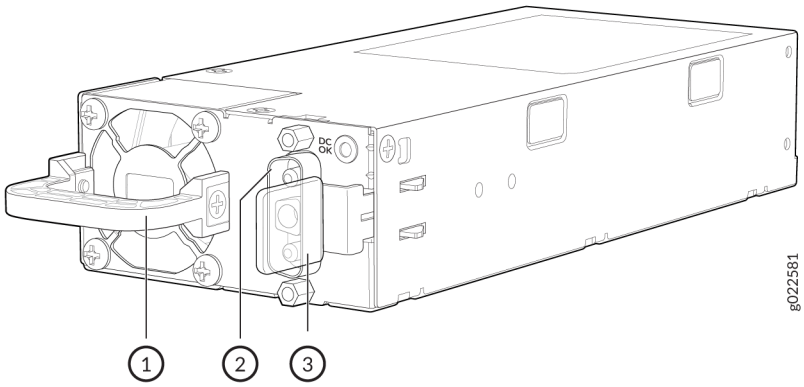
Do not mix:

- AC and DC power supplies in the same chassis.
- Power supplies with different airflow directions in the same chassis.
- Fan modules with different airflow directions in the same chassis.
- Power supplies and fan modules with different airflow directions in the same chassis.

Characteristics of the DC Power Supply

DC-powered EX4400-24T, EX4400-48T, and EX4400-48F switches support 550-W DC power supplies (see Figure 52 on page 73).

Figure 52: 550 W DC Power Supply for EX4400 Switches



1–Power supply handle	3–Power supply ejector lever
2–Power supply inlet	

Table 27 on page 73 lists the details of the 550-W DC power supplies used in EX4400 switches.

Table 27: Details of the DC Power Supplies in EX4400 Switches

Details	550-W DC Power Supplies
Model number	• JPSU-550-C-DC-AFO • JPSU-550-C-DC-AFI
Minimum installed in chassis	1

Table 27: Details of the DC Power Supplies in EX4400 Switches *(continued)*

Details	550-W DC Power Supplies
Maximum installed in chassis	2
Power supply status LED	**DC.OK**

To prevent electrical injury while installing or removing DC power supplies, carefully follow instructions in "Install a Power Supply in an EX4400 Switch" on page 159 and "Remove a Power Supply from an EX4400 Switch" on page 157.

Specifications of the DC Power Supplies Used in EX4400 Switches

Table 28 on page 74 provides the power supply specifications of the 550-W DC power supplies.

Table 28: Specifications of the 550-W DC Power Supplies Used in EX4400 Switches

Item	Specification
DC input voltage	Rated operating voltage: –48 VDC through –60 VDC
DC input current rating	13 A
Output power	550 W

DC Power Supply Airflow

Each power supply has its own fan and is cooled by its own internal cooling system. EX4400 switches support power supplies with the following airflow directions:

- Front-to-back (cold air enters through the vents on the front panel of the switch and hot air exhausts through the vents on the rear panel), indicated by the **AIR OUT** label and the Juniper Gold handle.
- Back-to-front (cold air enters through the vents on the rear panel of the switch and hot air exhausts through the vents on the front panel), indicated by the **AIR IN** label and the Juniper Azure Blue handle.

Table 29 on page 75 lists the DC power supply models and the direction of airflow in them.

Table 29: Airflow Direction in DC Power Supply Models for EX4400 Switches

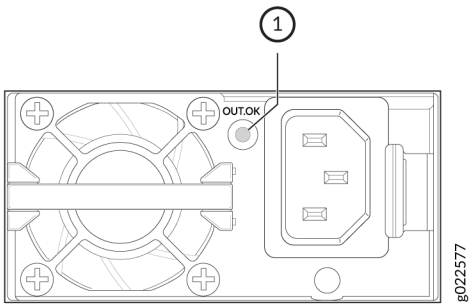
Model	Direction of Airflow
JPSU-550-C-DC-AFO	Front-to-back—that is, cold air enters the chassis through the vents on the front panel of the chassis and hot air exhausts through the vents on the rear panel of the chassis, indicated by the **AIR OUT** label and the Juniper Gold handle.
JPSU-550-C-DC-AFI	Back-to-front—that is, cold air enters the chassis through the vents on the rear panel of the chassis and hot air exhausts through the vents on the front panel of the chassis, indicated by the **AIR IN** label and the Juniper Azure Blue handle.

Power Supply LEDs in EX4400 Switches

The power supplies for EX4400 switches have one LED that indicates its state.

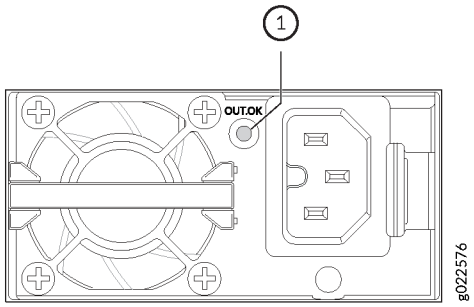
- Figure 53 on page 75 shows the LED on the 550-W AC power supply for EX4400 switches.
- Figure 54 on page 76 shows the LED on the 1050-W AC power supply for EX4400 switches.
- Figure 55 on page 76 shows the LED on the 1600-W AC power supply for EX4400 switches.
- Figure 56 on page 76 shows the LED on the 550-W DC power supply for EX4400 switches.

Figure 53: LED on the 550-W AC Power Supply for EX4400 Switches



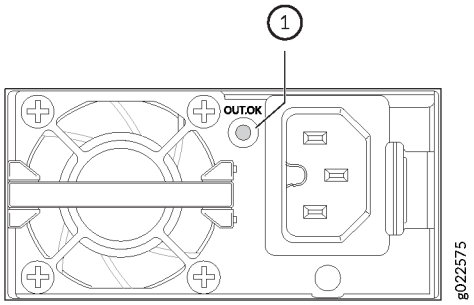
1—Power supply LED

Figure 54: LED on the 1050-W AC Power Supply for EX4400 Switches



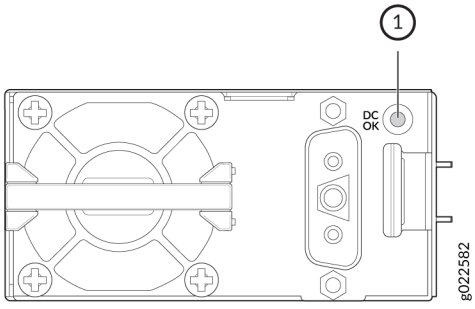
1—Power supply LED

Figure 55: LED on the 1600-W AC Power Supply for EX4400 Switches



1—Power supply LED

Figure 56: LED on the 550-W DC Power Supply for EX4400 Switches



1—Power supply LED

Table 30 on page 77 describes the power supply LED.

Table 30: Power Supply LED in EX4400 Switches

Color	State	Description
Green	On steadily	The power supply is receiving input and is providing proper output to the switch.
	Blinking	The fan in the power supply has failed or there is an internal communication failure in the power supply; you must replace it.
	Unlit	Indicates one of the following: • The power cord might not be installed properly. • The power supply is not receiving power correctly. Verify that the input voltage range is correct. • The power supply is in standby mode. • The ambient temperature is high and the power supply has shut down. Ensure that the temperature is between 32° F and 113° F (between 0° C and 45° C). • There is a critical failure in the power supply and it has shut down. You must replace it.

CHAPTER 2

Site Planning, Preparation, and Specifications

Site Preparation Checklist for EX4400 Switches

The checklist in Table 31 on page 79 summarizes the tasks you need to perform when preparing a site for EX4400 switch installation.

Table 31: 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 EX4400 Switches" on page 81		
Power			
Measure the distance between external power sources and the switch installation site.	"Clearance Requirements for Airflow and Hardware Maintenance for EX4400 Switches" on page 86		
Locate sites to connect system grounding.			
Calculate the power consumption and requirements.	• AC Power Supply in EX4400 Switches on page 63 • DC Power Supply in EX4400 Switches on page 72		
Hardware Configuration			
Choose the number and types of switches you want to install.	"EX4400 Switches Hardware Overview" on page 18		
Rack or Cabinet			
Verify that the rack or cabinet meets the minimum requirements for installing the switch.	• Rack Requirements on page 83 • Cabinet Requirements on page 84		
Plan rack or cabinet location, including required space clearances.			
Secure the rack or cabinet to the floor and building structure.			

Table 31: 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 the cable based on the distance between the hardware components being connected. **NOTE:** The Ethernet cables to connect to the RJ-45 network ports on EX4400-24P and EX4400-48P switches provide 90-W power over 4-pair wire. To ensure that the cables do not exceed the rated temperature and ampacity and to ensure proper operation, the cables must meet the following specifications related to deployment, temperature rise, category, IEEE, UL, NEC, and local electric codes: • The cables must be rated for IEEE 802.3 BT, TIA standards, and UL-LP. • The cables must follow NEC 725.144 article and local electric code. • The operating temperature of the cable must be rated at 15° C more than the ambient temperature.			
Plan the cable routing and management.			

EX4400 Site Guidelines and Requirements

IN THIS SECTION

Environmental Requirements and Specifications for EX4400 Switches

You must install the switch in a rack or cabinet. You must house it in a dry, clean, well-ventilated, and temperature-controlled environment.

Follow these environmental guidelines:

- Keep the site 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 device to protect the hardware components.

Table 32 on page 82 provides the required environmental conditions for normal switch operation for EX4400.

Table 32: EX4400 Environmental Tolerances

Switch	Altitude	Relative Humidity	Temperature	Seismic
EX4400	No performance degradation up to 6000 feet at 104° F (1828.8 meters at 40° C)	Normal operation ensured in relative humidity range of 5% through 90%, noncondensing	• Normal operation ensured in temperature range of 32° F through 113° F (0° C through 45° C) • Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C)	Complies with Zone 4 earthquake according to NEBS GR-63-CORE, Issue 5.

NOTE: Install the EX4400 only in restricted-access 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. Only skilled and instructed persons must access the device.

General Site Guidelines

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

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

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

Site Electrical Wiring Guidelines

Table 33 on page 83 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 33: 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

Table 34 on page 84 provides the rack requirements and specifications.

Table 34: 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 you can mount the device 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 | 218

Cabinet Requirements

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

Cabinet requirements consist of:

- Cabinet size
- Clearance requirements
- Cabinet airflow requirements

Table 35 on page 85 provides the cabinet requirements and specifications.

Table 35: Cabinet Requirements and Specifications

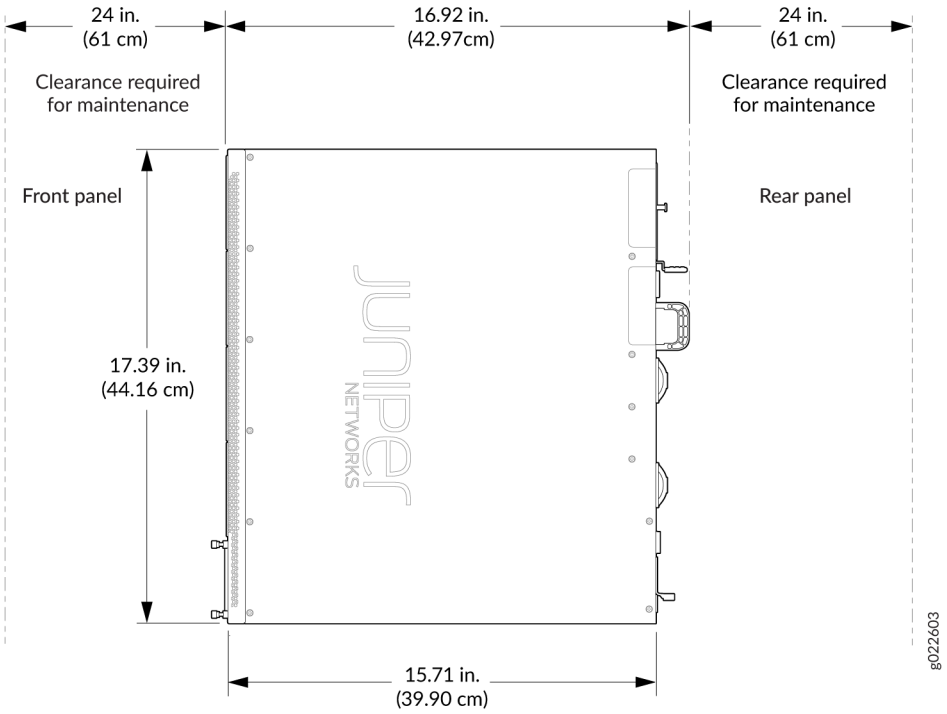
Cabinet Requirement	Guidelines
Cabinet size	• The minimum depth of the cabinet is 36 in. (91.4 cm). Large cabinets improve airflow and reduce chances of overheating.
Cabinet clearance	• The outer edges of the front mounting brackets extend the width of the chassis to 19 in. (48.2 cm). • The minimum total 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 EX4400 Switches

When planning the site for installing an EX4400 switch, follow these clearance requirements (see Figure 57 on page 86):

- For the cooling system to function properly, ensure that the airflow around the chassis is unrestricted.
- If you are mounting the switch on a rack or cabinet along with other equipment, ensure that the hot air exhaust from other equipment does not blow into the cold air intake vents of the chassis.
- Leave at least 6 in. (15.2 cm) clearance in front of and behind the chassis for airflow.
- 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.
- Leave at least 24 in. (61 cm) clearance in front of and behind the switch for service personnel to remove and install hardware components.

Figure 57: Clearance Requirements for Airflow and Hardware Maintenance for EX4400 Switches



EX4400 Network Cable and Transceiver Planning

IN THIS SECTION

Pluggable Transceivers and Cables Supported on EX4400 Switches

You can find the list of transceivers supported on EX4400 switches and information about those transceivers at the Hardware Compatibility Tool page for EX4400.

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 transceivers installed in EX4400 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 ports configured as Virtual Chassis ports (VCPs).

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, SFP, SFP+, QSFP+, and QSFP28 ports.

- Table 36 on page 88—10/100/1000-Mbps BASE-T Ethernet RJ-45 network port connector pinout information
- Table 37 on page 88—SFP port connector pinout information
- Table 38 on page 90—SFP+ port connector pinout information
- Table 39 on page 91—QSFP+ and QSFP28 ports connector pinout information

Table 36: 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 37: SFP Port Connector Pinout Information

Pin	Signal	Description
1	VeeT	Module transmitter ground

Table 37: SFP Port Connector Pinout Information *(continued)*

Pin	Signal	Description
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
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 38: SFP+ 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
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 39: QSFP+ and QSFP28 Ports Connector Pinout Information

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 39: QSFP+ and QSFP28 Ports Connector Pinout Information *(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

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

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.

How to Calculate the Fiber-Optic Cable Power Budget for EX Series Switches

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

How to Calculate the Fiber-Optic Cable Power Margin for EX Series Switchess in

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 "How to Calculate the Fiber-Optic Cable Power Budget for EX Series Switches" on page 94).

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 40 on page 95 (here, the link is 2 km long and multimode, and the (P_B) is 13 dBm):

   Table 40: 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

Table 40: Estimated Values for Factors Causing Link Loss *(continued)*

Link-Loss Factor	Estimated Link-Loss Value	Sample (LL) Calculation Values
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
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.

EX4400 Management Cable Specifications and Pinouts

IN THIS SECTION

Management Cable Specifications

Table 41 on page 97 lists the specifications for the cables that connect the console and management ports to management devices.

Table 41: 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 126
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 125
Mini-USB Type-B console port	Mini-USB cable with standard-A and Mini-USB Type-B (5-pin) connector	Mini-USB	
USB Type C Console port	USB cable with Type C connector	Type C	

USB Port Specifications for an EX Series Switch

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

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

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

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

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

RJ-45 Management Port Connector Pinout Information

Table 42 on page 98 provides the pinout information for the RJ-45 connector for the management port on Juniper Networks devices.

Table 42: 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

Table 42: RJ-45 Management Port Connector Pinout Information *(continued)*

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

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

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

Table 43 on page 99 provides the pinout information for the RJ-45 to DB-9 serial port adapter.

Table 43: RJ-45 to DB-9 Serial Port Adapter Pinout Information

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

3

CHAPTER

Initial Installation and Configuration

Unpack and Mount the EX4400 Switch

IN THIS SECTION

Unpack an EX4400 Switch

We ship EX4400 switches in a cardboard carton, secured with foam packing material. The carton has an accessory compartment.

CAUTION: EX4400 switches are maximally protected inside the shipping carton. Do not unpack the switches until you are ready to mount the switch.

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

5. Verify the parts received against the inventory on the label attached to the carton (see "Packing List for an EX4400 Switch" on page 102).

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

Packing List for an EX4400 Switch

The switch shipment includes a packing list. Check the parts you receive with the switch against the items on the packing list. The packing list specifies the part number and provides a description of each part in your order. The parts shipped depend on the switch model you purchase (see "EX4400 Switch Models" on page 34).

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 44 on page 102 lists the parts and their quantities as listed in the standard packing list for an EX4400 switch.

Table 44: Inventory of Components Provided with an EX4400 Switch

Component	Quantity
Switch	1
Fan modules	2 preinstalled
Power supply	1 (AC or DC) preinstalled
(If you purchased a model with an AC power supply) AC power cord appropriate for your geographical location	1
(If you purchased a model with an AC power supply) AC power cord retainer	1
Covers for slots without preinstalled components	• Extension module slot cover panel: 1 • Power supply slot cover panel: 1
Two-post mounting brackets	2
Screws to attach the mounting brackets	8

Table 44: Inventory of Components Provided with an EX4400 Switch *(continued)*

Component	Quantity
Rubber feet to mount the switch on a desktop or other level surface	4
RJ-45 cable and RJ-45 to DB-9 serial port adapter	1
Documentation Roadmap	1
Juniper Networks Product Warranty	1
End User License Agreement	1

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.

Mount an EX4400 Switch on Two Posts of a Rack

This topic describes how to mount an EX4400 switch on a two-post rack or on two posts of a 19-in. four-post rack by using the two-post mounting brackets provided with the switch. (The remainder of this topic uses rack to mean rack or cabinet.)

You can also mount an EX4400 switch:

- Flush with the front posts of a 19-in. four-post rack by using a separately orderable four-post rack mount kit.
- In a recessed position inside a 19-in. four-post rack by using the recessed-mounting brackets provided with a separately orderable four-post rack mount kit.
- On a desk or other level surface by using the rubber feet provided with the switch.
- On a wall by using a separately orderable wall mount kit.

Before you mount an EX4400 switch on two posts of a rack:

- Verify that the site meets the requirements described in "Site Preparation Checklist for EX4400 Switches" on page 79.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the rack to the building structure.
- Read "General Safety Guidelines and Warnings" on page 206, with particular attention to "Chassis and Component Lifting Guidelines" on page 213.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 240).
- Remove the switch from the shipping carton (see "Unpack an EX4400 Switch" on page 101).

Ensure that you have the following parts and tools available:

- Number 2 Phillips (+) screwdriver—not provided
- Eight screws to secure the mounting brackets to the rack—not provided
- ESD grounding strap—not provided
- Two-post mounting brackets—2 (provided with the switch)
- Screws to attach the mounting brackets—Eight (provided with the switch)
- Covers for the empty extension module slot and the empty power supply slot—provided with the switch

> **NOTE:** One person must be available to lift the switch while another person 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 then mount the other units from the bottom of the rack to the top in decreasing order of the weight of the units.

To mount an EX4400 switch on two posts of a rack:

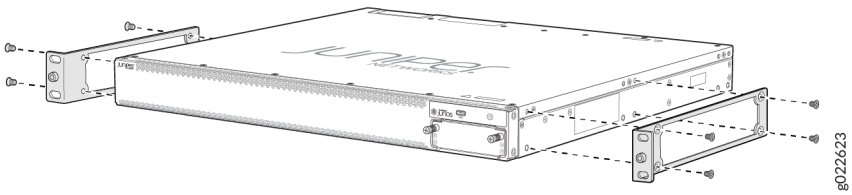
1. Place the switch on a flat, stable surface.

2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

3. Align the two-post mounting brackets (provided with the switch) along the side panel of the switch such that the front of the bracket is flush with the front panel of the switch chassis.

4. Insert the screws to attach the two-post mounting brackets (provided with the switch) into the aligned holes on the chassis (see Figure 58 on page 105). Tighten the screws.

Figure 58: Attach the Two-Post Mounting Brackets to the EX4400 Switch Chassis

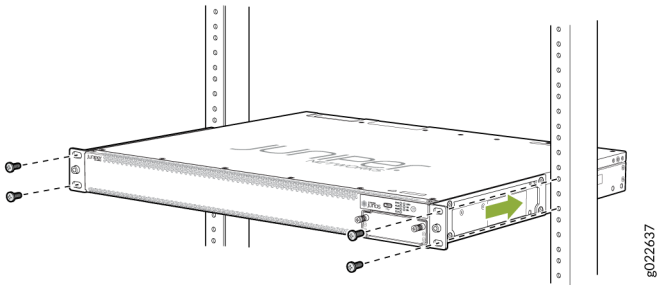


5. Decide which end of the switch you want to place at the front of the rack. Position the switch so that the **AIR IN** labels on the fan modules are next to the cold aisle and the **AIR OUT** labels on the fan modules are next to the hot aisle.

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

7. Have a second person secure the mounting brackets to the rack by using four screws appropriate for your rack. Tighten the screws (see Figure 59 on page 106).

Figure 59: Secure the EX4400 Switch to the Rack



8. 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.

9. Cover the empty extension module slot and empty power supply slot by using the covers that came with the switch.

> **NOTE:** The slot covers reduce the risk of objects or substances entering the chassis. They also ensure optimal cooling for the switch.

Mount an EX4400 Switch Flush with the Front Posts of a Four-Post Rack or Cabinet

This topic describes how to mount an EX4400 switch flush with the front posts of a 19-in. four-post rack by using a separately orderable four-post rack mount kit. (The remainder of this topic uses rack to mean rack or cabinet.)

You can also mount an EX4400 switch:

- In a recessed position inside a 19-in. four-post rack by using the recessed-mounting brackets provided with a separately orderable four-post rack mount kit.
- On a two-post rack or on two posts of a 19-in. four-post rack by using the two-post mounting brackets provided with the switch.
- On a desk or other level surface by using the rubber feet provided with the switch.
- On a wall by using a separately orderable wall mount kit.

Before you mount an EX4400 switch flush with the front posts of a 19-in. four-post rack:

- Verify that the site meets the requirements described in "Site Preparation Checklist for EX4400 Switches" on page 79.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the rack to the building structure.
- Read "General Safety Guidelines and Warnings" on page 206, with particular attention to "Chassis and Component Lifting Guidelines" on page 213.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 240).
- Remove the switch from the shipping carton (see "Unpack an EX4400 Switch" on page 101).

Ensure that you have the following parts and tools available:

- Number 2 Phillips (+) screwdriver—not provided
- Eight screws to secure the mounting brackets to the rack—not provided
- ESD grounding strap—not provided
- Front mounting bracket assembly to mount the switch flush with the front posts of a rack—2 (provided with the four-post rack mount kit)

  The front mounting bracket assembly is made up of a side rail to which an L-shaped bracket is attached.
- Flat head 4x6-mm Phillips screws to attach the front mounting bracket assembly to the chassis—12 (provided with the four-post rack mount kit)
- Rear mounting brackets—2 (provided with the four-post rack mount kit)
- Covers for the empty extension module slot and the empty power supply slot—provided with the switch

NOTE: One person must be available to lift the switch while another person 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 then mount the other units from the bottom of the rack to the top in decreasing order of the weight of the units.

To mount an EX4400 switch flush with the front posts of a 19-in. four-post rack:

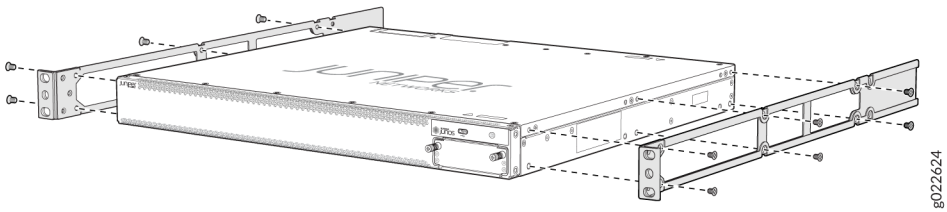
1. Place the switch on a flat, stable surface.

2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

3. Align the front mounting bracket assembly (provided with the four-post rack mount kit) along the side panel of the switch such that the front of the bracket assembly is flush with the front panel of the switch chassis.

4. Insert the flat head 4x6-mm Phillips screws to attach the front mounting bracket assembly (provided with the four-post rack mount kit) into the aligned holes on the chassis (see Figure 60 on page 108). Tighten the screws.

Figure 60: Attach the Flush Mounting Bracket Assembly to the EX4400 Switch Chassis

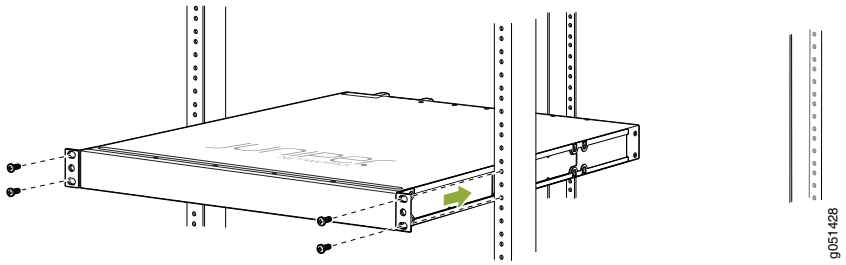


5. Decide which end of the switch you want to place at the front of the rack. Position the switch so that the **AIR IN** labels on the fan modules are next to the cold aisle and the **AIR OUT** labels on the fan modules are next to the hot aisle.

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

7. Have a second person secure the mounting brackets to the rack by using the screws appropriate for your rack. Tighten the screws (see Figure 61 on page 109).

Figure 61: Secure the EX4400 Switch to the Front Posts of a Rack

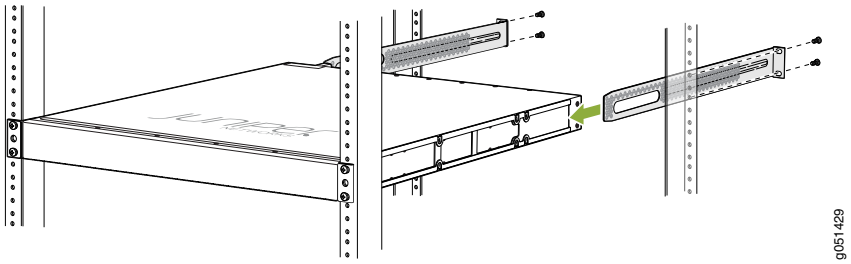


8. Slide the rear mounting bracket blades into the side rails of the front mounting bracket assembly attached to the switch chassis (see Figure 62 on page 109).

9. Ensure that the chassis is level. Align the holes of the rear mounting brackets with the threaded holes in the rear post of the rack. Align the bottom hole in both the mounting brackets with a hole in each rack rail. Align the bottom hole in both the rear mounting brackets with the bottom hole in the front mounting brackets.

10. Secure the rear mounting brackets to the rear post of the rack by using four screws appropriate for your rack (see Figure 62 on page 109).

Figure 62: Secure the EX4400 Switch to the Rear Post of the Rack by Using the Rear Mounting Brackets



11. Cover the empty extension module slot and empty power supply slot by using the covers that came with the switch.

> **NOTE:** The slot covers reduce the risk of objects or substances entering the chassis. They also ensure optimal cooling for the switch.

Mount an EX4400 Switch in a Recessed Position in a Rack or Cabinet

This topic describes how to mount an EX4400 switch in a recessed position inside a 19-in. four-post rack by using the recessed-mounting brackets provided with a separately orderable four-post rack mount kit. (The remainder of this topic uses rack to mean rack or cabinet.)

You can also mount an EX4400 switch:

- Flush with the front posts of a 19-in. four-post rack by using a separately orderable four-post rack mount kit.
- On a two-post rack or on two posts of a 19-in. four-post rack by using the two-post mounting brackets provided with the switch.
- On a desk or other level surface by using the rubber feet provided with the switch.
- On a wall by using a separately orderable wall mount kit.

Before you mount an EX4400 switch in a recessed position inside a 19-in. four-post rack:

- Verify that the site meets the requirements described in "Site Preparation Checklist for EX4400 Switches" on page 79.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the rack to the building structure.
- Read "General Safety Guidelines and Warnings" on page 206, with particular attention to "Chassis and Component Lifting Guidelines" on page 213.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 240).
- Remove the switch from the shipping carton (see "Unpack an EX4400 Switch" on page 101).

Ensure that you have the following parts and tools available:

- Number 2 Phillips (+) screwdriver—not provided
- Eight screws to secure the mounting brackets to the rack—not provided
- ESD grounding strap—not provided
- Front mounting bracket assembly to mount the switch flush with the front posts of a rack—2 (provided with the four-post rack mount kit)

  The front mounting bracket assembly is made up of a side rail to which an L-shaped bracket is attached.
- Flat head 4x6-mm Phillips screws to attach the front mounting bracket assembly to the chassis—12 (provided with the four-post rack mount kit)
- Rear mounting brackets with blades—2 (provided with the four-post rack mount kit)

- Recessed-mounting brackets to mount the switch in a recessed position from the front posts of a rack—2 (provided with the four-post rack mount kit)
- Flat head 4-40 Phillips screws to attach the recessed-mounting brackets to the side rails of the bracket assembly—6 (provided with the four-post rack mount kit)
- Covers for the empty extension module slot and the empty power supply slot—provided with the switch

NOTE: One person must be available to lift the switch while another person 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 then mount the other units from the bottom of the rack to the top in decreasing order of the weight of the units.

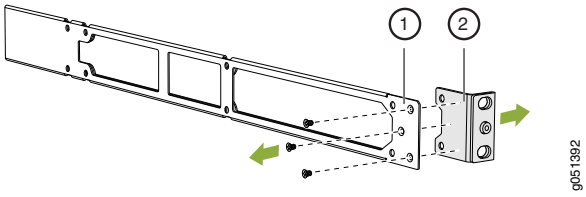
To mount an EX4400 switch in a recessed position from the front posts of a 19-in. four-post rack:

1. Place the switch 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 a site ESD point.

3. Unscrew and detach the L-shaped bracket from the side rail in the front mounting bracket assembly provided with the four-post rack mount kit (see Figure 63 on page 111).

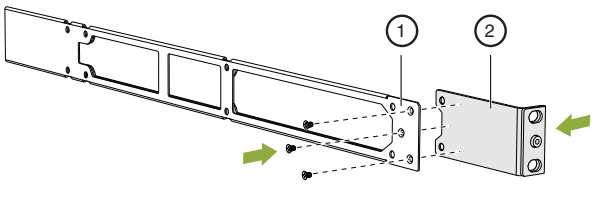
Figure 63: Unscrew and Detach the L-Shaped Bracket from the Side Rail



1—Side rail	2—L-shaped bracket

4. Attach the recessed-mounting brackets provided with the four-post rack mount kit to the side rails by using the flat head 4-40 Phillips screws provided with the four-post rack mount kit (see Figure 64 on page 112).

Figure 64: Attach the Recessed-Mounting Bracket to the Side Rail

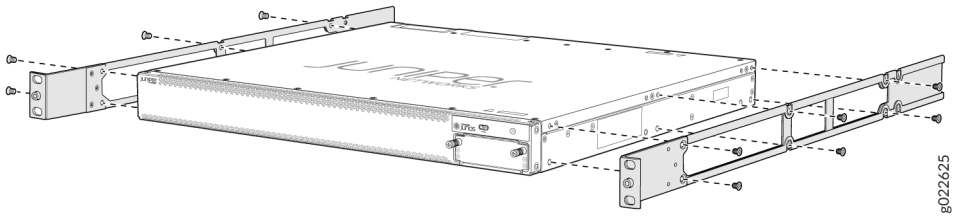


1—Side rail	2—Recessed mounting bracket

5. Align the recessed-mounting bracket assembly along the side panel of the switch.

6. Insert the flat head 4x6-mm Phillips screws to attach the recessed-mounting bracket assembly into the aligned holes on the chassis provided with the four-post rack mount kit (see Figure 65 on page 112). Tighten the screws.

Figure 65: Attach the Recessed-Mounting Bracket Assembly to the EX4400 Switch Chassis

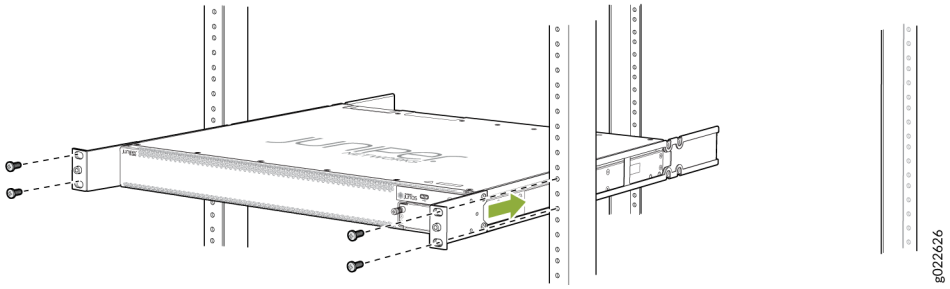


7. Decide which end of the switch you want to place at the front of the rack. Position the switch so that the **AIR IN** labels on the fan modules are next to the cold aisle and the **AIR OUT** labels on the fan modules are next to the hot aisle.

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

9. Have a second person secure the mounting brackets to the rack by using four screws appropriate for your rack. Tighten the screws (see Figure 66 on page 113).

Figure 66: Secure the EX4400 Switch to the Front Posts of a Rack

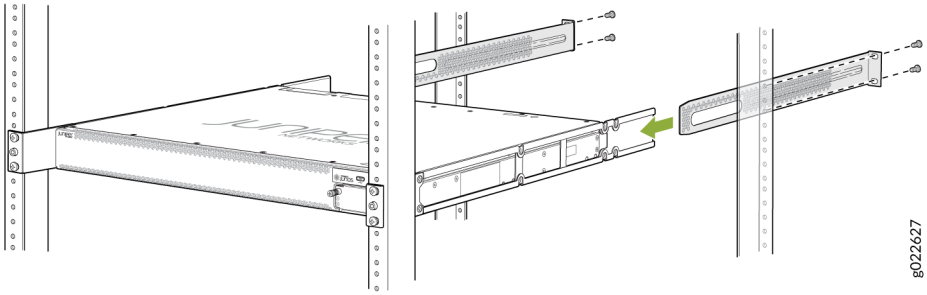


10. Slide the rear mounting bracket blades into the side rails of the recessed-mounting bracket assembly attached to the switch chassis (see Figure 67 on page 113).

11. Ensure that the chassis is level. Align the holes of the rear mounting brackets with the threaded holes in the rear post of the rack. Align the bottom hole in both the mounting brackets with a hole in each rack rail. Align the bottom hole in both the rear mounting brackets with the bottom hole in the front mounting brackets.

12. Secure the rear mounting brackets to the rear post of the rack by using four screws appropriate for your rack (see Figure 67 on page 113).

Figure 67: Secure the EX4400 Switch to the Rear Post of the Rack by Using the Rear Mounting Brackets



13. Cover the empty extension module slot and empty power supply slot by using the covers that came with the switch.

> **NOTE:** The slot covers reduce the risk of objects or substances entering the chassis. They also ensure optimal cooling for the switch.

Mount an EX4400 Switch on a Desk or Other Level Surface

You can mount an EX4400 switch on a desk or other level surface by using the four rubber feet that are provided with the switch. The rubber feet stabilize the chassis.

Before you mount an EX4400 switch on a desk or other level surface:

- Verify that the site meets the requirements described in "Site Preparation Checklist for EX4400 Switches" on page 79.
- Place the desk in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the desk to the building structure.
- Read "General Safety Guidelines and Warnings" on page 206, with particular attention to "Chassis and Component Lifting Guidelines" on page 213.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 240).
- Remove the switch from the shipping carton (see "Unpack an EX4400 Switch" on page 101).

Ensure that you have the following parts and tools available:

- ESD grounding strap—not provided
- Four rubber feet to stabilize the chassis on the desk or other level surface—provided with the switch
- Covers for the empty extension module slot and the empty power supply slot—provided with the switch

To mount the EX4400 on a desk or other level surface:

1. Turn the chassis upside down on the desk or the level surface where you intend to mount the switch.
2. Remove the sticker from the rubber feet.
3. Attach the rubber feet to the bottom of the chassis.
4. Turn the chassis right side up on the desk or the level surface.
5. Cover the empty extension module slot and empty power supply slot by using the covers that came with the switch.

> **NOTE:** The slot covers reduce the risk of objects or substances entering the chassis. They also ensure optimal cooling for the switch.

Mount an EX4400 Switch on a Wall

This topic describes how to mount an EX4400 switch on a wall by using a separately orderable wall mount kit. (The remainder of this topic uses rack to mean rack or cabinet.)

You can also mount an EX4400 switch:

- Flush with the front posts of a 19-in. four-post rack by using a separately orderable four-post rack mount kit.
- In a recessed position inside a 19-in. four-post rack by using the recessed-mounting brackets provided with a separately orderable four-post rack mount kit.
- On a two-post rack or on two posts of a 19-in. four-post rack by using the two-post mounting brackets provided with the switch.
- On a desk or other level surface by using the rubber feet provided with the switch.

Before mounting the switch on a wall:

- Verify that the site meets the requirements described in "Site Preparation Checklist for EX4400 Switches" on page 79.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the rack to the building structure.
- Read "General Safety Guidelines and Warnings" on page 206, with particular attention to "Chassis and Component Lifting Guidelines" on page 213.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 240).
- Remove the switch from the shipping carton (see "Unpack an EX4400 Switch" on page 101).

Ensure that you have the following parts and tools available:

- Number 2 Phillips (+) screwdriver—not provided
- 8-32 x 1.25 in. or M4 x 30 mm mounting screws— 4 (not provided)
- Hollow wall anchors capable of supporting the combined weight of two fully loaded switches, up to 33 lb (15 kg) (not provided), if you are mounting the switch in sheetrock (wall board with a gypsum plaster core) or in wall board not backed by wall studs.
- Wall mount brackets—2 (provided with the wall mount kit)
- Wall mount bracket screws—12 (provided with the wall mount kit)
- Covers for the empty extension module slot and the empty power supply slot—provided with the switch

WARNING: When you are mounting EX4400 switches on a wall, orient the front panel of the chassis pointing to the right side or to the left side to ensure proper airflow and meet safety requirements in the event of a fire.

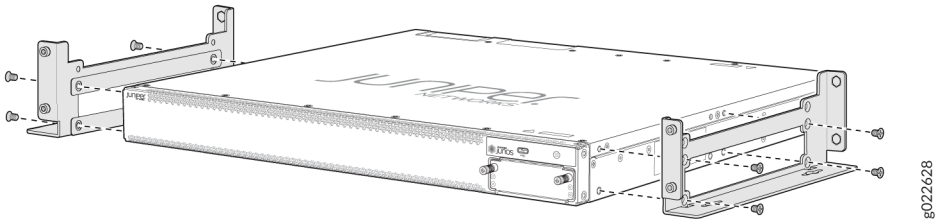
NOTE: For easier lifting, install any additional power supplies only after you mount the switch on the wall.

1. Place the switch 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 a site ESD point.

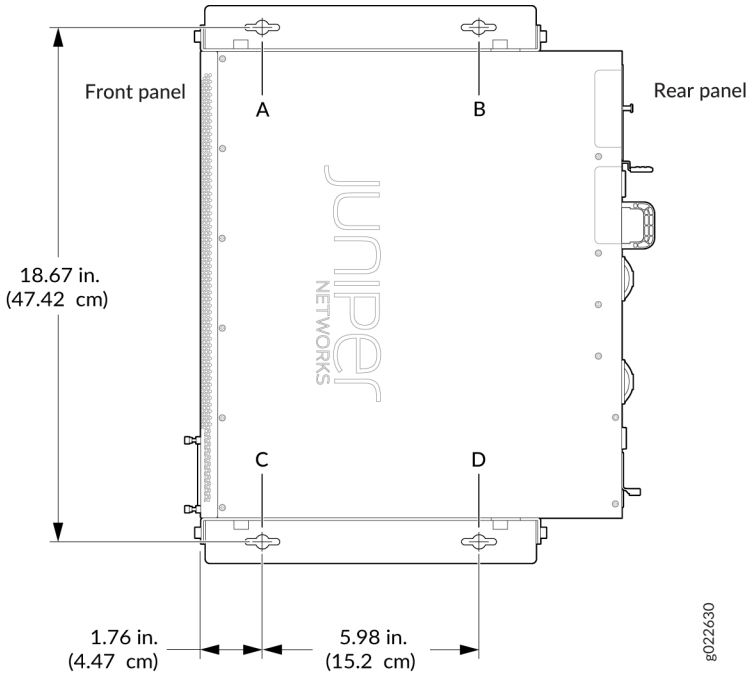
3. Attach the wall mount brackets to the sides of the chassis by using four of the wall mount bracket screws on each side (see Figure 68 on page 116). Use the screwdriver to tighten the screws.

Figure 68: Attach Wall Mount Brackets to the EX4400 Chassis



4. Insert the four mounting screws in the wall. Insert the top pair of mounting screws 15.2 cm apart, and insert the second pair of mounting screw 47.42 cm directly below the first set (see Figure 69 on page 117).

Figure 69: Measurements for Mounting an EX4400 Switch on a Wall

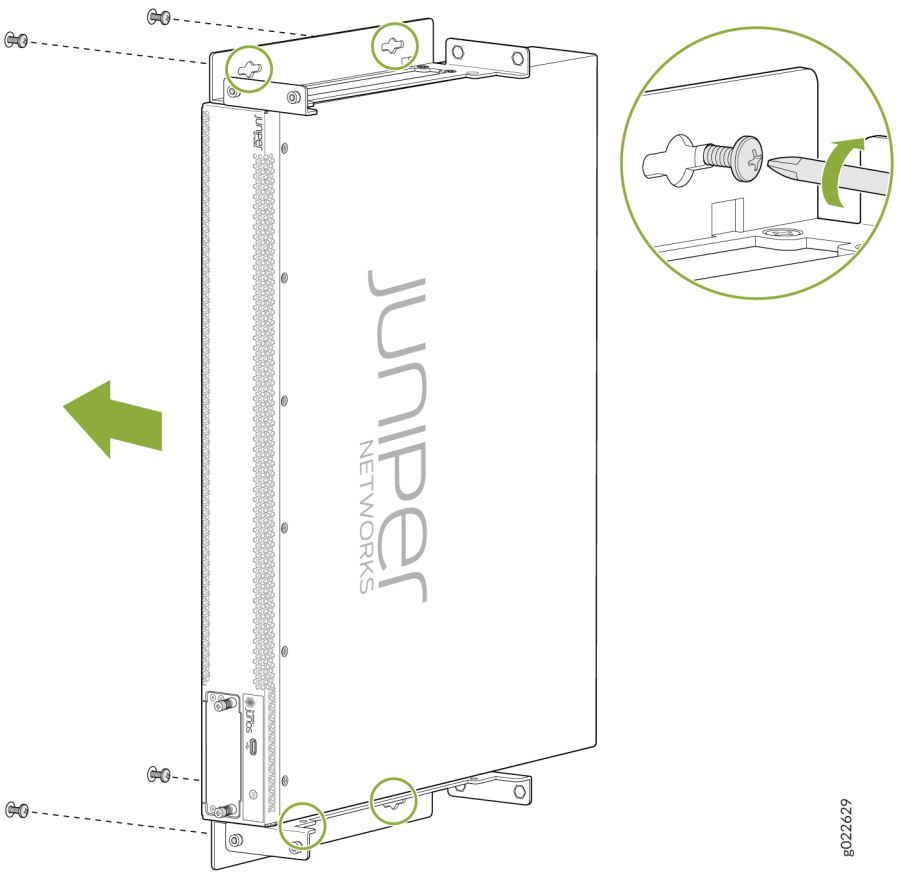


If the mounting screws are inserted in a wall board with no stud behind it, you must use dry wall anchors rated to support 75 lb (34 kg). Insert the screws into wall studs wherever possible to provide added support for the chassis.

Drive the screws only part way in, leaving about 1/4 in. (6 mm) distance between the head of the screw and the wall. Use the screwdriver to drive the screws in.

5. Grasp each side of the switch or switches, lift the switch or switches, and hang the brackets from the mounting screws (see Figure 70 on page 118).

Figure 70: Mount an EX4400 Switch on a Wall



6. Tighten the mounting screws by using the screwdriver.

7. Cover the empty extension module slot and empty power supply slot by using the covers that came with the switch.

> **NOTE:** The slot covers reduce the risk of objects or substances entering the chassis. They also ensure optimal cooling for the switch.

Connect the EX4400 to Power

IN THIS SECTION

Connect Earth Ground to an EX4400 Switch

To ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements, you must connect the switch to earth ground before you connect power to the switch.

You must install the EX4400 in a restricted-access location and ensure that the chassis is properly grounded at all times. EX4400 switches have one 2-hole protective earthing terminal on the rear panel. Under all circumstances, you must use the protective earthing terminal on the EX4400 switch chassis to ground the chassis. Alternatively, you can use any additional grounding method, such as the grounding wire in the AC power cord, if it is available. EX4400 switches are tested to meet or exceed all applicable electromagnetic compatibility (EMC) regulatory requirements with the 2-hole protective grounding terminal connected correctly as described in this topic.

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

Before you connect earth ground to a EX4400 switch, ensure that you have the following parts and tools available:

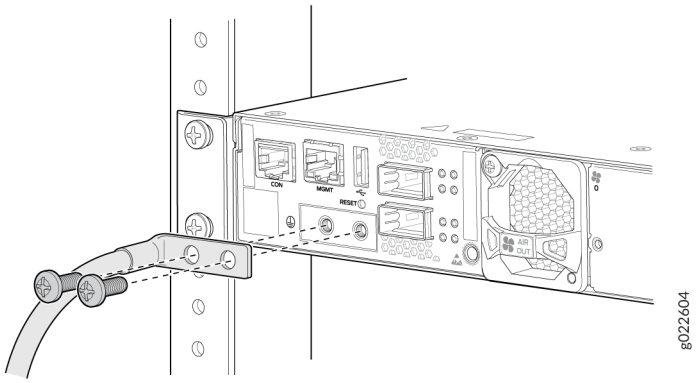
- Grounding cable: 14 AWG (1.5 mm^2), minimum 90° C wire, or as permitted by the local code—not provided
- Grounding lug: Panduit LCD10-10AF-L or equivalent—not provided
- Screws to secure the grounding lug: Two 10-32 x .25 in. screws with #10 split-lock washers—not provided
- Number 2 Phillips (+) screwdriver—not provided
- ESD grounding strap—not provided

To ground the EX4400:

1. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.

2. Place the grounding lug attached to the grounding cable over the protective earthing terminal on the rear panel (see Figure 71 on page 120).

Figure 71: Connect a Grounding Cable to an EX4400 Switch



3. Secure the grounding lug to the protective earthing terminal with the screws.

4. Dress the grounding cable. Be sure that it does not touch or block access to other switch components.

> **WARNING:** Ensure that the cable does not drape where people could trip over it.

Connect AC Power to an EX4400 Switch

We ship the EX4400 switches with one power supply preinstalled on the rear panel. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU) when the second power supply is installed and running: You can remove and replace either one of them without powering off the switch or disrupting switch functions.

Before you connect AC power to the switch:

- Ensure that you have a power cord appropriate for your geographical location available.
- Ensure that you have the power cord retainer shipped with the switch.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 240).
- Ensure that you have connected the switch chassis to earth ground.

> **CAUTION:** Before you connect power to the switch, a licensed electrician must attach a cable lug to the grounding cable that you supply. A cable with an incorrectly attached lug can damage the switch (for example, by causing a short circuit).
>
> To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power (see "Connect Earth Ground to an EX4400 Switch" on page 119).

- Ensure that you provide an external certified circuit breaker (2-pole circuit breaker or 4-pole circuit breaker based on your device) rated minimum 13 A, 16 A, or 20 A in the building installation or as per local electrical code.

To connect power to an EX4400 switch with an AC power supply:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

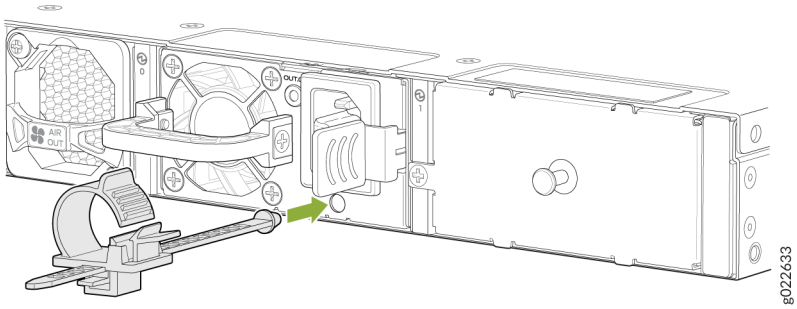
2. Ensure that the power supplies are fully inserted in the chassis.

3. Locate the power cord or cords shipped with the switch; the cords have plugs appropriate for your geographical location.

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

4. Push the end of the retainer strip into the hole below the inlet on the power supply faceplate until it snaps into place. Ensure that the loop in the retainer strip points upward (see Figure 72 on page 122).

Figure 72: Connect Retainer Strip



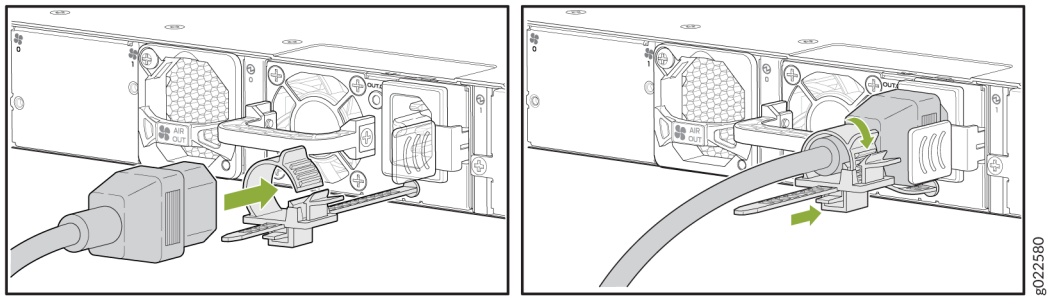
5. Press the small tab on the retainer strip to loosen the loop. Slide the loop until you have enough space to insert the power cord coupler into the inlet.

6. Insert the power cord coupler firmly into the inlet.

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

8. Press the tab on the loop and draw out the loop into a tight circle (see Figure 73 on page 122).

Figure 73: Connect Power to an EX4400 Switch with an AC Power Supply



9. If the AC power source outlet has a power switch, set it to the off position.

10. Insert the power cord plug into the AC power source outlet. The EX4400 switch powers on as soon as power is provided to the power supply. There is no power switch on the EX4400.

11. If the AC power source outlet has a power switch, set it to the on position.

12. Verify that the **OUT.OK** LED on the power supply is lit steadily green. If it is not, disconnect the power supply from the power source, and replace the power supply (see "Maintain the EX4400 Power System" on page 157).

> **CAUTION:** Do not remove the power supply until you have a replacement power supply ready: you must install the replacement power supply within one minute after removing the failed power supply to ensure proper airflow and prevent chassis overheating.

Connect DC Power to an EX4400 Switch

We ship the EX4400 switches with one power supply preinstalled on the rear panel. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU) when the second power supply is installed and running: You can remove and replace either one of them without powering off the switch or disrupting switch functions.

> **NOTE:** You must connect the battery returns of the DC power supply to frame ground.

Before you connect DC power to the switch:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 240).
- Ensure that you have connected the switch chassis to earth ground.

> **CAUTION:** Before you connect power to the switch, a licensed electrician must attach a cable lug to the grounding cable that you supply. A cable with an incorrectly attached lug can damage the switch (for example, by causing a short circuit).
>
> To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power (see "Connect Earth Ground to an EX4400 Switch" on page 119).

Ensure that you have the following parts and tools available:

- DC power source cord with a connector—provided
- Number 2 Phillips (+) screwdriver—not provided

To connect power to an EX4400 switch with a DC power supply:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

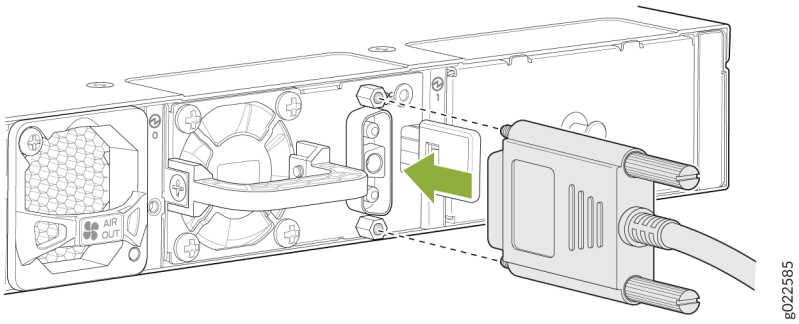
   CAUTION: The connection between each power source and power supply must include a circuit breaker.

2. Ensure that the input circuit breaker is open so that the voltage across the DC power source cord leads is 0 V and that the cord leads do not become active while you are connecting DC power.

3. Ensure that the power supplies are fully inserted in the chassis.

4. Insert the power cord coupler firmly into the inlet and tighten the screws on the coupler by using the screwdriver (see Figure 74 on page 124).

Figure 74: Connect Power to an EX4400 Switch with a DC Power Supply



5. Connect the power cord to the power source. The EX4400 switch powers on as soon as power is provided to the power supply. There is no power switch on the EX4400.

   We've designed the EX4400 switch to operate with a DC power supply that has a single, nonredundant feed input. For source redundancy, you must install two DC power supplies in the EX4400; connect one source to one power supply and connect another source to the second power supply. This configuration provides the commonly deployed feed redundancy for the system.

6. Close the input circuit breaker.

7. Verify that the **DC.OK** LED on the power supply is lit steadily green. If it is not, disconnect the power supply from the power source, and replace the power supply (see "Maintain the EX4400 Power System" on page 157).

> **CAUTION:** Do not remove the power supply until you have a replacement power supply ready: you must install the replacement power supply within one minute after removing the failed power supply to ensure proper airflow and prevent chassis overheating.

Connect the EX4400 to External Devices

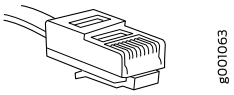
IN THIS SECTION

Connect a Device to a Network for Out-of-Band Management

You can monitor and manage the device 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 75 on page 125 shows the RJ-45 connector of the Ethernet cable supplied with the device.

Figure 75: RJ-45 Connector on an Ethernet Cable

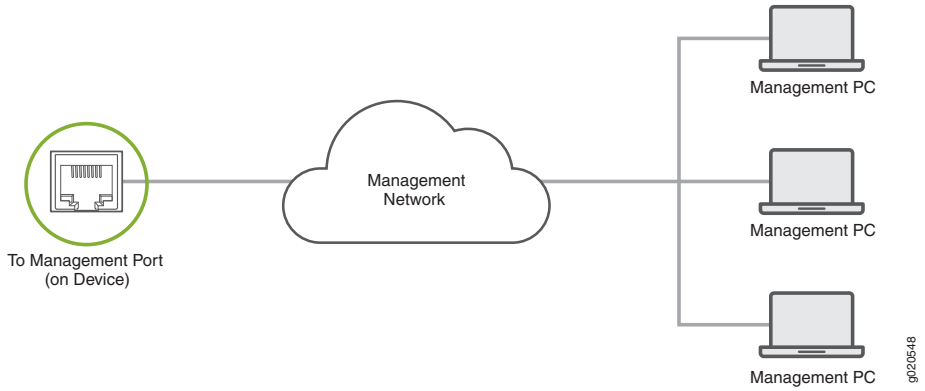


To connect a device to a network for out-of-band management (see Figure 76 on page 126):

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 76: Connect a Device to a Network for Out-of-Band Management



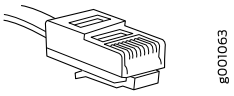
Connect a Device to a Management Console Using an RJ-45 Connector

You can configure and manage the device by 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 77 on page 126 shows the RJ-45 connector of the Ethernet cable.

Figure 77: 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 78 on page 127 and Figure 79 on page 127):

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 78 on page 127) or management console (see Figure 79 on page 127).

Figure 78: Connect a Device to a Management Console Through a Console Server

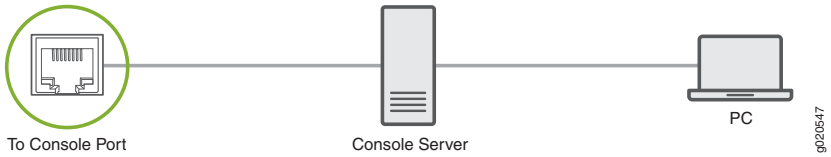


Figure 79: Connect a Device Directly to a Management Console

Connect the EX4400 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 226).

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

Figure 80 on page 130 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 a site ESD point.

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.

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.

5. Using both hands, carefully insert the transceiver in the empty port. The connectors must face the chassis. 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.

6. 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.

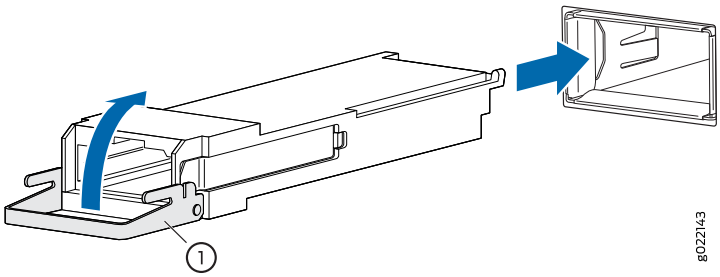
CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

7. 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 80: Install a Transceiver



1—Ejector lever

Install a QSFP28 Transceiver

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the device or disrupting the device functions.

NOTE: After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.

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

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

Before you install a transceiver in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see "Laser and LED Safety Guidelines and Warnings" on page 226).

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

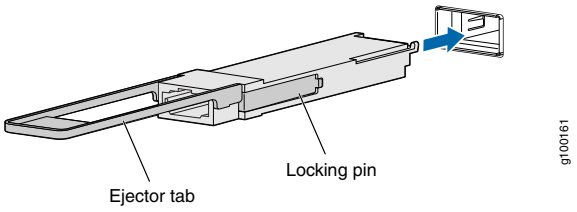
To install a QSFP28 transceiver (see Figure 81 on page 131):

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

2. Verify that a rubber safety cap covers the QSFP28 transceiver.

3. Orient the transceiver in front of the port so that the QSFP28 connector faces the appropriate direction.

Figure 81: Install a QSFP28 Transceiver



4. Slide the transceiver into the slot until the locking pins lock in place. If there is resistance, remove the transceiver and flip it so that the connector faces the other direction.

5. Remove the rubber safety cap from the transceiver and the end of the cable, and insert the cable into the transceiver.

WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.

CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

6. If there is a cable management system, arrange the cable in the cable management system to prevent the cable from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.

CAUTION: Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.

CAUTION: Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

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 226).

To connect a fiber-optic cable to an optical transceiver installed in a device:

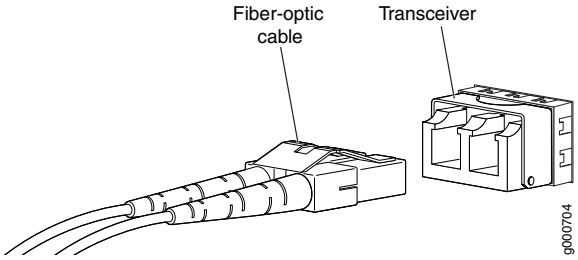
WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

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 82 on page 133).

Figure 82: 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.

Configure Junos OS on the EX4400

IN THIS SECTION

EX4400 Default Configuration

Each EX Series switch is programmed with a factory-default configuration that contains the values set for each configuration parameter when the switch is shipped. The default configuration file sets values for system parameters such as **syslog** and **commit**, configures Ethernet switching on all interfaces, enables IGMP snooping, and enables the LLDP and RSTP protocols.

NOTE:

- The factory-default configuration file has more interfaces for models that have more ports.
- The **poe** statement appears only in models with ports that support PoE-bt.

When you commit changes to the configuration, a new configuration file is created, which becomes the active configuration. You can always revert to the factory-default configuration. See "Revert to the Factory-Default Configuration for the EX Series Switch" on page 147.

The following is the factory-default configuration file for an EX4400-24P switch with 24 ports that support PoE-bt. The factory-default configuration file for the other EX4400 models is similar.

```
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;
    }
}
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-0/2/1 {
    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;
        }
    }
}
et-0/2/0 {
    unit 0 {
```

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

Connect and Configure an EX4400 Switch

We ship the EX4400 switch with Junos OS preinstalled and ready to be configured when the switch is powered on. You must perform the initial configuration of the EX4400 through the console port (labeled **CON**) on the rear panel of the switch by using the command-line interface (CLI).

Before you connect and configure an EX4400, set the following parameter values on the console server or PC:

- Baud Rate—9600
- Data—8
- Flow Control—None
- Parity—None
- Stop Bits—1
- DCD State—Disregard

Ensure that you have the following parts and tools available:

- An Ethernet cable with an RJ-45 connector attached—provided
- An RJ-45 to DB-9 serial port adapter—provided
- A laptop or PC, with a serial port—not provided

Have the following information available before you configure custom settings for the switch:

- Root password
- IP address of the default gateway
- IP address of the management port
- IP address of a DNS server
- (Optional) Hostname
- (Optional) IP address of a backup router
- (Optional) SNMP read community, location, and contact to configure SNMP parameters
- (Optional) Static routes to remote subnets with access to the management port
- (Optional) Static routes to remote prefixes with access to the management port

This procedure describes how to perform the initial configuration on the switch and to connect it to the network. For the complete information about enabling the switch to forward traffic, including examples, see the Junos OS configuration guides.

To perform the initial configuration on the switch and to connect it to the network:

1. Power on the switch.

2. Connect the console port (labeled **CON**) on the rear panel of the switch to a management host such as a laptop or PC by using an RJ-45 to DB-9 serial port adapter.

3. At the Junos OS login prompt, type **root** to log in. You don't need to enter a password. If the software boots before you connect to the console port, you might need to press the Enter key for the prompt to appear.

   ```
   login: root
   ```

4. Start the CLI.

   ```
   root@:RE:0% cli
   root>
   ```

5. Enter configuration mode.

   ```
   root> configure
   [edit]
   root#
   ```

6. Add a password to the root administration user account. Enter a plain-text password, an encrypted password, or an SSH public key string.

```
[edit]
root# set system root-authentication plain-text-password
New password: password
Retype new password: password
```

or

```
[edit]
root# set system root-authentication encrypted-password encrypted-password
```

or

```
[edit]
root# set system root-authentication ssh-ecdsa public-key
```

or

```
[edit]
root# set system root-authentication ssh-ed25519 public-key
```

or

```
[edit]
root# set system root-authentication ssh-rsa public-key
```

7. (Optional) Configure the hostname of the switch. If the name includes spaces, enclose the name in double quotation marks (“ ”).

```
[edit]
root# set system host-name host-name
```

8. (Optional) Create a user account.

```
[edit]
root# set system login user user-name authentication plain-text-password
New password: password
Retype new password: password
```

9. (Optional) Set the user account class to super-user.

```
[edit]
root# set system login user user-name class super-user
```

10. (Optional) Configure the domain name of the switch.

```
[edit]
root# set system domain-name domain-name
```

11. Configure the default gateway.

```
[edit]
root# set routing-options static route 0/0 next-hop address
```

12. Configure the IP address and prefix length for the management interface on the switch.

```
[edit]
root# set interfaces me0 unit 0 family inet address address/prefix-length
```

> **NOTE:** The management port **me0** (labeled **MGMT**) is located on the rear panel of the switch.

13. (Optional) Configure the IP address of a backup router, which is used only while the routing protocol is not running.

```
[edit]
root# set system backup-router address
```

14. Configure the IP address of a DNS server.

```
[edit]
root# set system name-server address
```

15. (Optional) Configure the static routes to remote subnets with access to the management port. Access to the management port is limited to the local subnet.

```
[edit]
root# set routing-options static route remote-subnet next-hop destination-IP retain no-readvertise
```

16. (Optional) Configure the static routes to remote prefixes with access to the management port.

```
[edit]
root# set routing-options static route remote-prefix next-hop destination-IP retain no-readvertise
```

17. Configure the SSH service.

```
[edit]
root# set system services ssh root-login allow
```

18. Configure in-band management or out-of-band management:

- With in-band management, you can configure a network port interface as the management interface and connect it to the management device. In this scenario, you can do either of the following:
  - Use the automatically created VLAN named *default* for management of all data interfaces as members of the default VLAN. Specify the management IP address and the default gateway.
  - Create a new management VLAN. Specify the VLAN name, VLAN ID, management IP address, and default gateway. Select the ports that must be part of this VLAN.
- With out-of-band management, you use a dedicated management channel 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.

19. (Optional) Specify the SNMP read community, location, and contact to configure SNMP parameters.

20. (Optional) Specify the system date and time. Select the time zone from the list. The configured parameters are displayed.

21. Enter **yes** to commit the configuration. The configuration is committed as the active configuration for the switch.

22. (Optional) Display the configuration to verify that it is correct.

23. (Optional) Configure additional properties by adding the necessary configuration statements.

24. Commit the configuration to activate it on the switch.

```
[edit]
root# commit
```

25. When you have finished configuring the switch, exit configuration mode.

```
[edit]
root@switch# exit
root@switch>
```

You can now log in by using the CLI and continue configuring the switch.

Revert to the Factory-Default 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 about completing the initial configuration using either the CLI or the J-Web interface, see *Connecting and Configuring an EX Series Switch (CLI Procedure)* or *Connecting and Configuring an EX Series Switch (J-Web Procedure)*.

You can revert to the factory-default configuration by using the **Menu** button to the right of the LCD panel on switches with an 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 settings.

These procedures are described in the following sections:

Revert 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 does 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 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.

Revert to the Factory-Default Configuration Using the Factory Reset/Mode Button on EX2300, EX3400, EX4300-48MP, and EX4400 Switches

To set the EX2300 switches (except the EX2300-24MP and EX2300-48MP switches), EX2300-C switches, EX3400 switches, EX4300-48MP switches, and EX4400 switches to the factory-default configuration, use the Factory Reset/Mode button located on the far right 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 177).

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 green.

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 blinks green.

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 following 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 following commands:

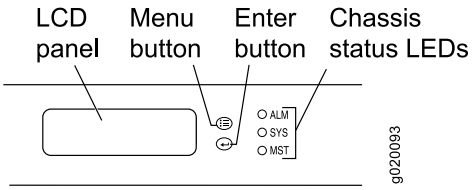
1. [edit]
   user@switch# **delete chassis config-button no-clear**

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

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

To set EX Series switches that have an LCD panel to the factory-default configuration, 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 other sections in this topic.

Figure 83: 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 177, *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 RESTORE DEFAULT? message appears.

5. Press **Enter**. The panel 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)* or *Connecting and Configuring an EX Series Switch (J-Web Procedure)*.

Revert 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 on a secondary device. Using the zeroize command will destroy Junos OS and OAM partitions and the switch may not boot. To recover from a failed software installation, see *Recovering from a Failed Software Installation*.

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.
   ```

4

CHAPTER

Maintain Components

Maintain the EX4400 Cooling System

IN THIS SECTION

Remove a Fan Module from an EX4400 Switch

We ship EX4400 switches with 1+1 redundant fan modules preinstalled in the rear panel. The fan modules in EX4400 switches are hot-removable and hot-insertable field-replaceable unit (FRU) installed in the rear panel of the switch: You can remove and replace them without powering off the switch or disrupting switch functions.

Before you remove a fan module:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 240).
- Ensure that you have the following parts and tools available:
  - Number 2 Phillips (+) screwdriver—not provided
  - An antistatic bag or an antistatic mat—not provided
  - ESD grounding strap—not provided
  - A replacement fan module

To remove a fan module:

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

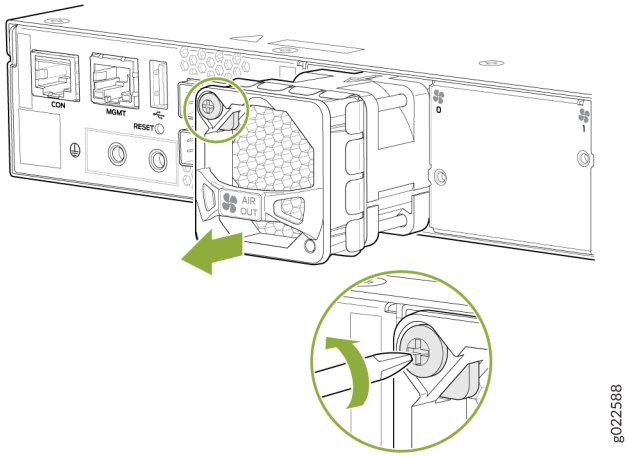
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

3. Loosen the captive screws on the front bezel of the fan module by using 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.

4. Grasp the handle on the fan module and pull it firmly to slide the fan module out of the chassis (see Figure 84 on page 154).

Figure 84: Remove a Fan Module from the EX4400 Switch



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

CAUTION:

Do not mix:

- Fan modules with different airflow directions in the same chassis.
- Power supplies and fan modules with different airflow directions in the same chassis.

If you install power supplies or fan modules with different airflow directions, Junos OS raises an alarm.

6. Install the replacement fan.

NOTE: You must install all the fan modules and they must be operational for optimal functioning of the switch.

Install a Fan Module in an EX4400 Switch

We ship EX4400 switches with 1+1 redundant fan modules preinstalled in the rear panel. The fan modules in EX4400 switches are hot-removable and hot-insertable field-replaceable unit (FRU) installed in the rear panel of the switch: You can remove and replace them without powering off the switch or disrupting switch functions.

CAUTION:
Do not mix:

- Fan modules with different airflow directions in the same chassis.
- Power supplies and fan modules with different airflow directions in the same chassis.

If you install power supplies or fan modules with different airflow directions, Junos OS raises an alarm.

Before you install a fan module in the switch:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 240).
- Ensure that you have the correct fan module. If the label on the installed power supply is **AIR IN**, you must install a fan module with the label **AIR IN**. If the label on the installed power supply is **AIR OUT**, you must install a fan module with the label **AIR OUT**.
- Ensure that you have the following parts and tools available:
  - Number 2 Phillips (+) screwdriver—not provided
  - ESD grounding strap—not provided

To install a fan module:

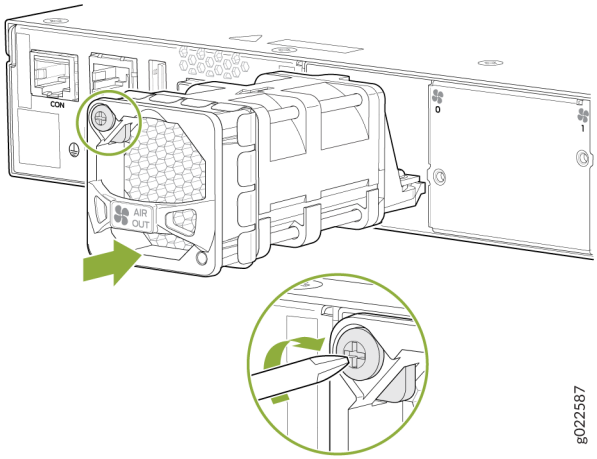
1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

2. Remove the fan module from its bag.

3. 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.

4. Tighten the captive screws on the front bezel of the fan module by using the screwdriver (see Figure 85 on page 156.

Figure 85: Install a Fan Module in the EX4400 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.

NOTE: You must install all the fan modules and they must be operational for optimal functioning of the switch.

Maintain the EX4400 Power System

IN THIS SECTION

Remove a Power Supply from an EX4400 Switch

We ship EX4400 switches with one AC or DC power supply preinstalled in the rear panel. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU) when the second power supply is installed and running: You can remove and replace either one of them without powering off the switch or disrupting switch functions.

Before you remove a power supply from an EX4400 switch:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 240).
- Ensure that you have the following parts and tools available:
  - Number 2 Phillips (+) screwdriver—not provided
  - An antistatic bag or an antistatic mat—not provided
  - An ESD grounding strap—not provided
  - A replacement power supply

CAUTION: Replace the power supply with a new power supply within one minute of removal to prevent chassis overheating.

To remove a power supply:

1. Place the antistatic bag or the 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 a site ESD point.

NOTE: If only one power supply is installed in your EX4400, you need to power off the switch before removing the power supply.

3. Disconnect power to the switch:
   - AC power supply—If the AC power source outlet has a power switch, set it to the off position. If the AC power source outlet does not have a power switch, gently pull out the plug end of the power cord connected to the power source outlet.
   - DC power supply—Switch the circuit breaker on the panel board that services the DC circuit to the off position.
4. Remove the power source cable from the power supply faceplate:
   - AC power supply—Detach the power cord retainer by using your hands, and gently pull out the power cord.
   - DC power supply—Loosen the screws securing the DC power source cable by using the screwdriver, and gently pull out the power cord.
5. Push the ejector lever toward the handle until it stops.
6. Grasp the power supply handle and pull firmly to slide the power supply halfway out of the chassis.
7. Place one hand under the power supply to support it and then slide it completely out of the chassis. Take care not to touch power supply components, pins, leads, or solder connections (see Figure 86 on page 158 and Figure 87 on page 159).

Figure 86: Remove an AC Power Supply from the EX4400 Switch

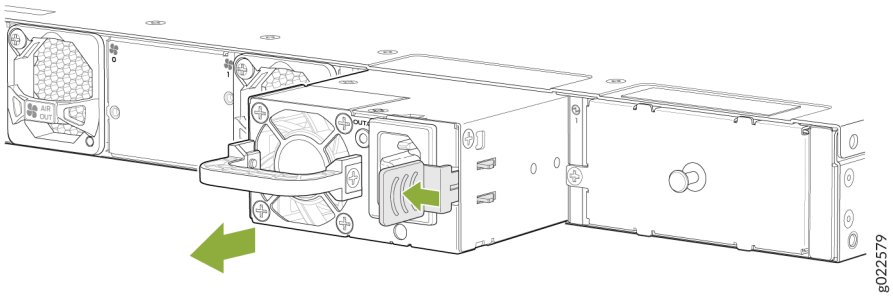
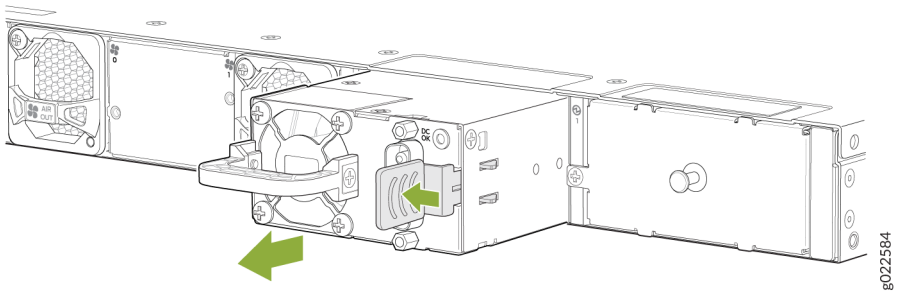


Figure 87: Remove a DC Power Supply from the EX4400 Switch



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

9. Install the replacement power supply.

> **NOTE:** You must install both the power supplies and they must be operational for optimal functioning of the switch.

Install a Power Supply in an EX4400 Switch

We ship EX4400 switches with one AC or DC power supply preinstalled in the rear panel. Each power supply is a hot-removable and hot-insertable field-replaceable unit (FRU) when the second power supply is installed and running. You can remove and replace either one of them 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 airflow directions in the same chassis.
> - Power supplies and fan modules with different airflow directions in the same chassis.

Before you install a power supply:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage (see “Prevention of Electrostatic Discharge Damage” on page 240).

- Ensure that you have the correct power supply. If the label on the installed fan module is **AIR IN**, you must install a power supply with the label **AIR IN**. If the label on the installed fan module is **AIR OUT**, you must install a power supply with the label **AIR OUT**.
- Ensure that you have the following parts and tools available:
  - Number 2 Phillips (+) screwdriver—not provided
  - An ESD grounding strap—not provided

To install a power supply:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

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

3. If you are installing an AC power supply, push the end of the retainer strip into the hole below the inlet on the power supply faceplate until it snaps into place.

4. 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 (see Figure 88 on page 160 and Figure 89 on page 161).

Figure 88: Install an AC Power Supply in the EX4400 Switch

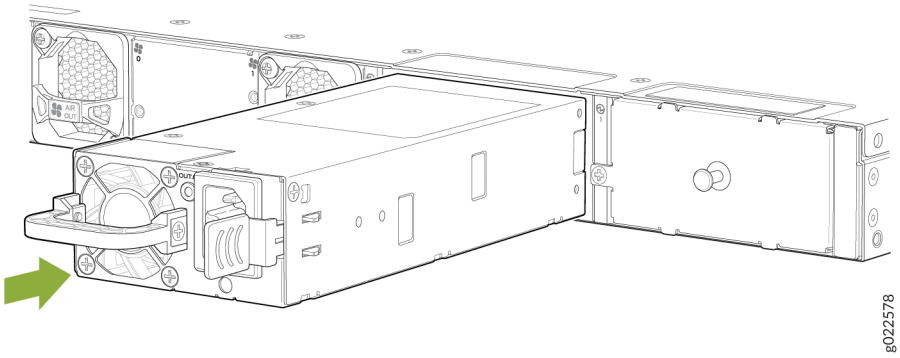
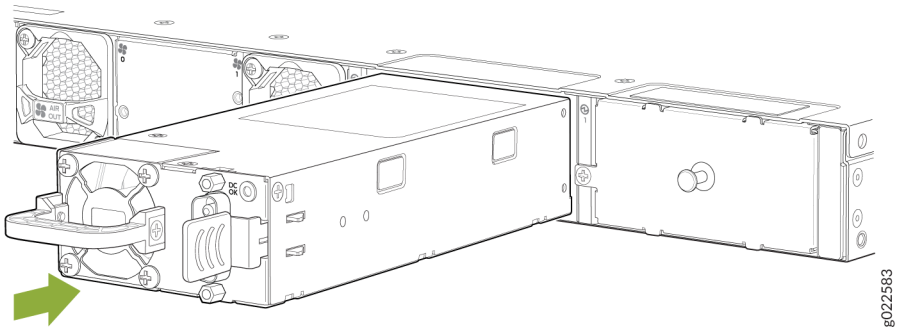


Figure 89: Install a DC Power Supply in the EX4400 Switch



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.

NOTE: You must install both the power supplies and they must be operational for optimal functioning of the switch.

Maintain the EX4400 Extension Modules

IN THIS SECTION

Remove an Extension Module from an EX4400 Switch

The extension module in EX4400 switches is a hot-removable and hot-insertable field-replaceable unit (FRU): You can remove and replace it without powering off the switch or disrupting switch functions.

Before you remove an extension module from an EX4400 switch:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 240).
- If there are any transceivers installed in the extension module, remove them before you remove the extension module. For instructions on removing transceivers, see "Maintain Transceivers" on page 166.
- Ensure that you have the following parts and tools available:
  - Number 2 Phillips (+) screwdriver—not provided
  - An antistatic bag or an antistatic mat—not provided
  - An ESD grounding strap—not provided
  - A replacement extension module or cover for the empty extension module slot

CAUTION: We recommend that you install either a replacement extension module or a cover over the empty module slot to reduce the risk of objects or substances entering the chassis and to ensure optimal cooling of the switch.

To remove an extension module:

1. Take the extension module offline by issuing the following CLI command:

   `user@switch>` **request chassis pic offline fpc-slot *slot-number* pic-slot *slot-number***

2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

3. Loosen both captive screws on the faceplate of the extension module by using your fingers. If you are unable to unscrew the captive screws by using your fingers, use the screwdriver.

CAUTION: Do not pull the extension module out of the module slot by holding the faceplate of the extension module.

4. Hold both the ejector handles or the captive screws on the extension module and gently pull the extension module toward you and out of the module slot (see Figure 90 on page 163 and Figure 91 on page 163).

Figure 90: Remove a 4x10GbE SFP+ Extension Module from the EX4400 Switch

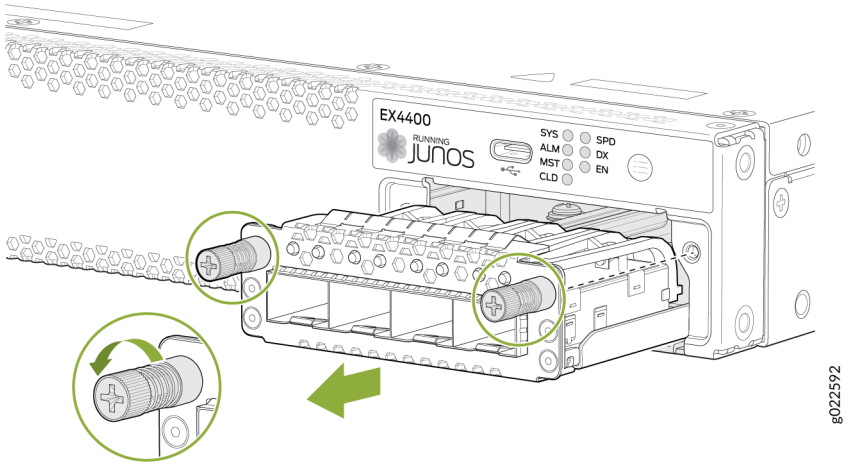
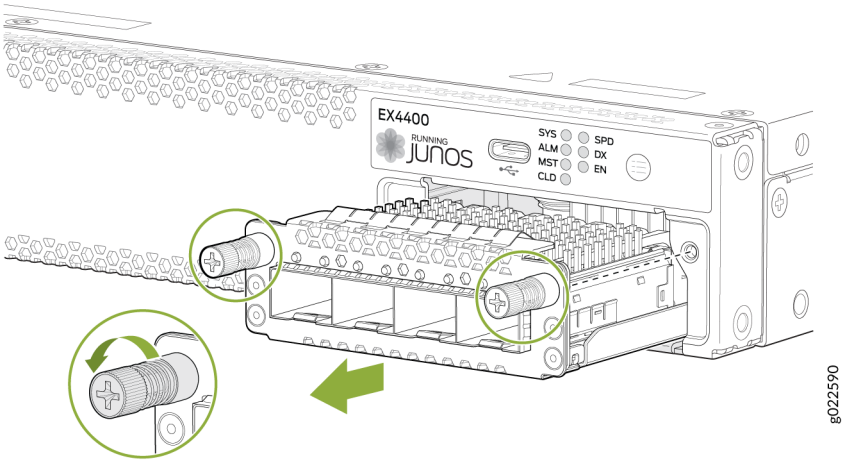


Figure 91: Remove a 4x25GbE SFP28 Extension Module from the EX4400 Switch



5. Place the extension module in an antistatic bag or on an antistatic mat placed on a flat, stable surface.

6. If you are not replacing the extension module, install the cover over the empty slot.

NOTE: After you have removed an extension module, wait for at least 10 seconds before you install an extension module. If you do not wait for at least 10 seconds, the interfaces on the extension module might not come up.

Install an Extension Module in an EX4400 Switch

You can install an extension module in the front panel of an EX4400 switch. The extension module in EX4400 switches is a hot-removable and hot-insertable unit (FRU): You can remove and replace it without powering off the switch.

NOTE: Extension modules are not part of the shipping configuration. If you want to purchase them, you must order them separately and register them (see "Register Products—Mandatory to Validate SLAs" on page 103).

Before you begin installing an extension module in the switch:

- Ensure that you have taken the necessary precautions to prevent ESD damage (see "Prevention of Electrostatic Discharge Damage" on page 240).
- Ensure that you have the following parts and tools available:
  - Number 2 Phillips (+) screwdriver—not provided
  - An ESD grounding strap—not provided (If a grounding strap is not available, follow the alternative grounding method described in Step 1 of the following procedure.)

To install an extension module:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

   If a grounding strap is not available, hold the extension module in its antistatic bag in one hand and touch the exposed, bare metal of the switch with the other hand to ground yourself and the component.

2. If the extension module slot has a cover on it, loosen both the screws on the cover by using your fingers. If you are unable to unscrew the screws by using your fingers, use the screwdriver. Hold both the screws and gently pull the cover outward, and save it for later use.

NOTE: If you are removing an extension module and installing another extension module, wait for at least 10 seconds after removing the extension module before installing the new or the same extension module. If you do not wait for at least 10 seconds, the interfaces on the extension module might not come up.

3. Taking care not to touch module components, pins, leads, or solder connections, remove the extension module from its bag.

CAUTION: Before you slide the extension module into the slot on the switch chassis, ensure the extension module is aligned correctly. Misalignment might cause the pins to bend, making the extension module unusable.

4. Using both hands, place the module in the empty slot and slide it in gently until it is fully seated.

5. Tighten both the captive screws by using your fingers or the screwdriver (see Figure 92 on page 165 and Figure 93 on page 166).

Figure 92: Install a 4x10GbE SFP+ Extension Module in the EX4400 Switch

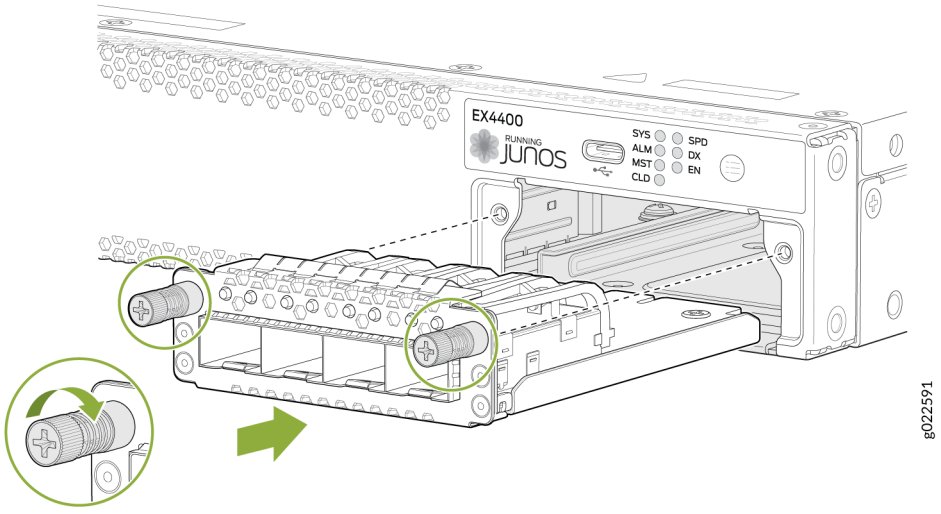
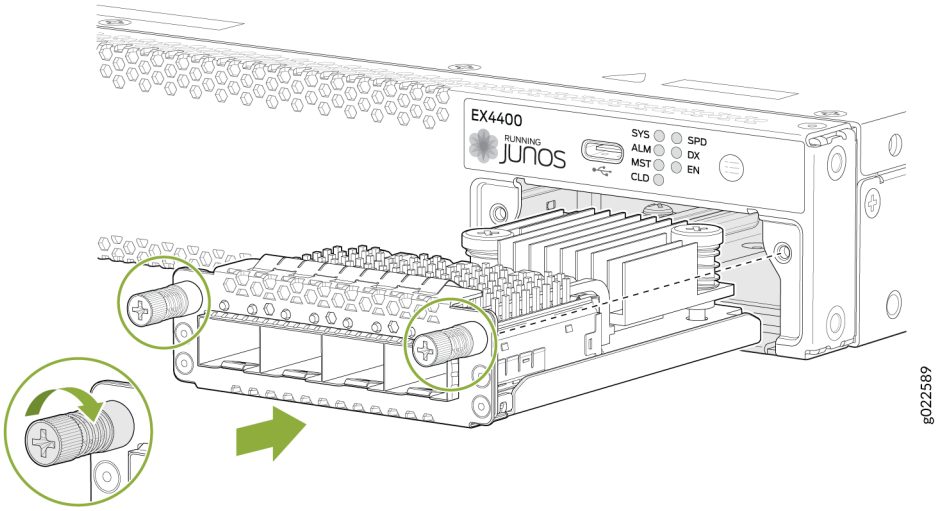


Figure 93: Install a 4x25GbE SFP28 Extension Module in the EX4400 Switch



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.

Maintain Transceivers

IN THIS SECTION

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 226).

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 94 on page 169 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 a site ESD point.

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 177). 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:

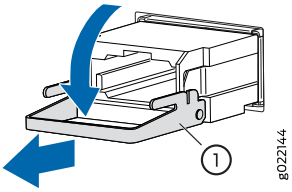
   a. By using your fingers, pull open the ejector lever on the transceiver to unlock the transceiver.

   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 94: Remove a QSFP+ Transceiver



1–Ejector lever

To remove a CFP transceiver:

   a. Loosen the screws on the transceiver by using your fingers.

   b. Grasp the screws on the transceiver and gently slide the transceiver approximately 0.5 in. (1.3 cm) straight out of the port.

   CAUTION: To prevent ESD damage to the transceiver, do not touch the connector pins at the end of the transceiver.

7. By using your fingers, grasp the body of the transceiver and pull it straight out of the port.

8. Place the transceiver in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

9. Place the dust cover over the empty port or install the replacement transceiver.

Remove a QSFP28 Transceiver

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace them without powering off the device or disrupting the device functions.

> **NOTE:** After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.

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

Before you remove a transceiver from a device, ensure that you have taken the necessary precautions for safe handling of lasers (see "Laser and LED Safety Guidelines and Warnings" on page 226).

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat
- Rubber safety caps to cover the transceiver and fiber-optic cable connector
- A dust cover to cover the port or a replacement transceiver

To remove a QSFP28 transceiver (see Figure 95 on page 171):

1. Place an antistatic bag or antistatic mat on a flat, stable surface to receive the QSFP28 transceiver. Have a rubber safety cap ready for the QSFP28 transceiver and the cable.

2. Wrap and fasten one end of an ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

3. Label the cable connected to the QSFP28 transceiver so that you can later reconnect it to the correct QSFP28 transceiver.

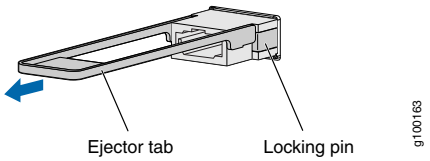
4. Disconnect the cable from the transceiver. Immediately cover the transceiver and the end of the cable with a rubber safety cap.

> **CAUTION:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

5. If there is a cable management system, arrange the cable in the cable management system to prevent it from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.

> **CAUTION:** Do not bend the fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

Figure 95: Remove a QSFP28 Transceiver



6. Pull the ejector tab straight back. The locking pins on the transceiver automatically release the transceiver.

7. Place the transceiver on the antistatic mat or in the antistatic bag.

8. Place the dust cover over the empty port or install the replacement transceiver.

Install a Transceiver

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the device or disrupting the device functions.

NOTE: After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.

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

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

Before you install a transceiver in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see "Laser and LED Safety Guidelines and Warnings" on page 226).

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

Figure 80 on page 130 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 a site ESD point.

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.

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.

5. Using both hands, carefully insert the transceiver in the empty port. The connectors must face the chassis. 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.

6. 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.

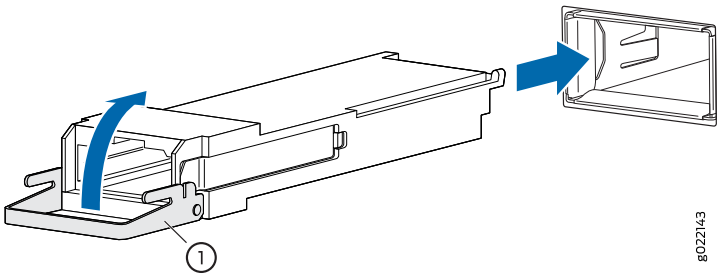
CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

7. 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 96: Install a Transceiver



1—Ejector lever

Install a QSFP28 Transceiver

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the device or disrupting the device functions.

NOTE: After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.

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

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

Before you install a transceiver in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see "Laser and LED Safety Guidelines and Warnings" on page 226).

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

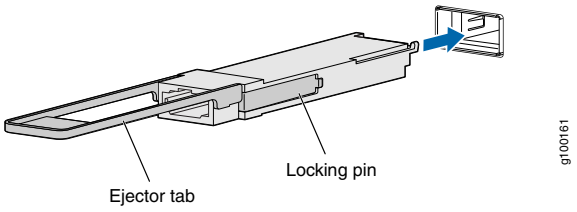
To install a QSFP28 transceiver (see Figure 81 on page 131):

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

2. Verify that a rubber safety cap covers the QSFP28 transceiver.

3. Orient the transceiver in front of the port so that the QSFP28 connector faces the appropriate direction.

Figure 97: Install a QSFP28 Transceiver



4. Slide the transceiver into the slot until the locking pins lock in place. If there is resistance, remove the transceiver and flip it so that the connector faces the other direction.

5. Remove the rubber safety cap from the transceiver and the end of the cable, and insert the cable into the transceiver.

WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.

> **CAUTION:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

6. If there is a cable management system, arrange the cable in the cable management system to prevent the cable from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.

> **CAUTION:** Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.

> **CAUTION:** Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

Maintain Fiber-Optic Cables

IN THIS SECTION

Connect a Fiber-Optic Cable

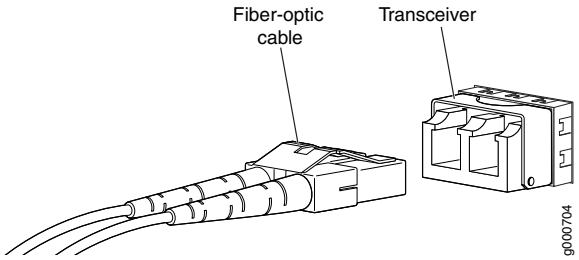
Before you connect a fiber-optic cable to an optical transceiver installed in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see "Laser and LED Safety Guidelines and Warnings" on page 226).

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 82 on page 133).

Figure 98: 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 226.

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 you attach 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

Troubleshoot Hardware

Troubleshoot the EX4400 Components

IN THIS SECTION

Chassis Component Alarm Conditions on EX4400 Switches

This topic describes the chassis component alarm conditions on EX4400 switches.

Table 45 on page 181 lists the alarms that the chassis components can generate on EX4400 switches, their severity levels, and the actions you can take to respond to them.

Table 45: Alarm Conditions on EX4400 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.

Table 45: Alarm Conditions on EX4400 Switches *(continued)*

Chassis Component	Alarm Condition	Alarm Severity	Remedy
Power supplies	A power supply is removed from the chassis.	Major (red)	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 airflow directions 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 airflow directions in the same chassis.
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).

Table 45: Alarm Conditions on EX4400 Switches *(continued)*

Chassis Component	Alarm Condition	Alarm Severity	Remedy
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, then 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).
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*.

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. The following is a sample output on an EX9208 switch. The output is similar on other EX Series switches.

   `user@switch>` **show chassis environment**

```
Class Item                           Status     Measurement
Temp  PEM 0                          OK         40 degrees C / 104 degrees F
      PEM 1                          OK         40 degrees C / 104 degrees F
      PEM 2                          Absent
      PEM 3                          Absent
      Routing Engine 0               OK         37 degrees C / 98 degrees F
      Routing Engine 0 CPU           OK         35 degrees C / 95 degrees F
      Routing Engine 1               Absent
      Routing Engine 1 CPU           Absent
      CB 0 Intake                    OK         36 degrees C / 96 degrees F
      CB 0 Exhaust A                 OK         34 degrees C / 93 degrees F
      CB 0 Exhaust B                 OK         40 degrees C / 104 degrees F
      CB 0 ACBC                      OK         39 degrees C / 102 degrees F
      CB 0 XF A                      OK         46 degrees C / 114 degrees F
      CB 0 XF B                      OK         45 degrees C / 113 degrees F
      CB 1 Intake                    Absent
      CB 1 Exhaust A                 Absent
      CB 1 Exhaust B                 Absent
      CB 1 ACBC                      Absent
      CB 1 XF A                      Absent
      CB 1 XF B                      Absent
      FPC 3 Intake                   OK         48 degrees C / 118 degrees F
      FPC 3 Exhaust A                OK         46 degrees C / 114 degrees F
      FPC 3 Exhaust B                OK         51 degrees C / 123 degrees F
      FPC 3 XL TSen                  OK         67 degrees C / 152 degrees F
      FPC 3 XL Chip                  OK         58 degrees C / 136 degrees F
      FPC 3 XL_XR0 TSen              OK         67 degrees C / 152 degrees F
```

```
      FPC 3 XL_XR0 Chip              OK         51 degrees C / 123 degrees F
      FPC 3 XL_XR1 TSen              OK         67 degrees C / 152 degrees F
      FPC 3 XL_XR1 Chip              OK         63 degrees C / 145 degrees F
      FPC 3 XQ TSen                  OK         67 degrees C / 152 degrees F
      FPC 3 XQ Chip                  OK         63 degrees C / 145 degrees F
      FPC 3 XQ_XR0 TSen              OK         67 degrees C / 152 degrees F
      FPC 3 XQ_XR0 Chip              OK         68 degrees C / 154 degrees F
      FPC 3 XM TSen                  OK         67 degrees C / 152 degrees F
      FPC 3 XM Chip                  OK         76 degrees C / 168 degrees F
      FPC 3 XF TSen                  OK         67 degrees C / 152 degrees F
      FPC 3 XF Chip                  OK         75 degrees C / 167 degrees F
      FPC 3 PLX PCIe Switch TSe      OK         51 degrees C / 123 degrees F
      FPC 3 PLX PCIe Switch Chi      OK         54 degrees C / 129 degrees F
      FPC 3 Aloha FPGA 0 TSen        OK         51 degrees C / 123 degrees F
      FPC 3 Aloha FPGA 0 Chip        OK         70 degrees C / 158 degrees F
      FPC 3 Aloha FPGA 1 TSen        OK         51 degrees C / 123 degrees F
      FPC 3 Aloha FPGA 1 Chip        OK         75 degrees C / 167 degrees F
      FPC 5 Intake                   Testing
      FPC 5 Exhaust A                Testing
      FPC 5 Exhaust B                Testing
Fans  Top Rear Fan                   OK         Spinning at intermediate-speed
      Bottom Rear Fan                OK         Spinning at intermediate-speed
      Top Middle Fan                 OK         Spinning at intermediate-speed
      Bottom Middle Fan              OK         Spinning at intermediate-speed
      Top Front Fan                  OK         Spinning at intermediate-speed
      Bottom Front Fan               OK         Spinning at intermediate-speed
```

Table 46 on page 185 lists the output fields for the **show chassis environment** command. Output fields are listed in the approximate order in which they appear.

Table 46: 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: FPCs (or line cards), Control Boards, Routing Engines, and PEMs (power entry modules or power supplies).

Table 46: show chassis environment Output Fields *(continued)*

Field Name	Field Description
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. The 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 47 on page 186 lists the output fields for the **show chassis temperature-thresholds** command. Output fields are listed in the approximate order in which they appear.

Table 47: show chassis temperature-thresholds Output Fields

Field Name	Field Description
Item	Chassis component. You can configure for the threshold information for components such as the chassis, the Routing Engines, and FPC for each slot in each FRU to display in the output. By default, information is displayed only for the chassis and the Routing Engines.

Table 47: show chassis temperature-thresholds Output Fields *(continued)*

Field Name	Field Description
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 fans are present and functioning normally. • **High**—The temperature threshold at which the fans operate at high speed or when a fan has failed or is missing. **NOTE:** An alarm is not triggered until the temperature exceeds the threshold settings for a yellow or amber alarm or a red alarm.
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 or amber alarm when the fans are running at full speed. • **Bad fan**—The temperature threshold that must be exceeded on the component to trigger a yellow or amber alarm when one or more fans have failed or are missing.
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 alarm when the fans are running at full speed. • **Bad fan**—The temperature threshold that must be exceeded on the component to trigger a red alarm when one or more fans have failed or are missing.
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 48 on page 188 lists the possible causes for the switch to generate a temperature alarm and the respective remedies.

Table 48: 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.
Fan module or fan tray has failed.	• Check the fan. • Replace the faulty fan module or fan tray. • If the two checks mentioned above 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.

CHAPTER 6

Contact Customer Support and Return the Chassis or Components

Return an EX4400 Chassis or Components

IN THIS SECTION

How to Return an EX4400 Switch or Component for Repair or Replacement

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

1. Determine the serial number of the chassis if you need to return the switch. If you need to return one or more components, determine the serial number for each component. For instructions, see "Locate the Serial Number on an EX4400 Switch or Component" on page 191.

2. Obtain a Return Material Authorization (RMA) number from Juniper Networks Technical Assistance Center (JTAC) as described in "Contact Customer Support to Obtain Return Material Authorization" on page 200.

   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 "Pack an EX4400 Switch or Component for Shipping" on page 201.

For more information about return and repair policies, see the customer support page at https://www.juniper.net/support/guidelines.html.

Locate the Serial Number on an EX4400 Switch or Component

IN THIS SECTION

If you are returning a switch or hardware component to Juniper Networks for repair or replacement, you must locate the serial number of the switch or component. You must provide the serial number to the Juniper Networks Technical Assistance Center (JTAC) when you contact them to obtain Return 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 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.

List the Switch and Components Details with the CLI

To list the switch and switch components and their serial numbers, enter the CLI command **show chassis hardware extensive**.

The following output lists the switch components and serial numbers for an EX4400-48F switch. The output is similar for the other models.

```
user@switch> show chassis hardware extensive
```

```
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                YK4319500020      EX4400-48F
 Jedec Code:   0x0000           EEPROM Version:    0x00
```

```
                                S/N:               YK4319500020
 Assembly ID:  0xf000           Assembly Version:  00.00
 Date:         00-00-0000       Assembly Flags:    0x00
 Board Information Record:
  Address 0x00: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 I2C Hex Data:
  Address 0x00: 00 00 00 00 f0 00 00 00 00 00 00 00 00 00 00 00
  Address 0x10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x20: 59 4b 34 33 31 39 35 30 30 32 30 00 00 00 00 00
  Address 0x30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Pseudo CB 1
Routing Engine 1          BUILTIN      BUILTIN          RE-EX4400-48F
 Jedec Code:   0x7fb0           EEPROM Version:    0x02
 P/N:          BUILTIN          S/N:               BUILTIN
 Assembly ID:  0xf010           Assembly Version:  01.01
 Date:         12-19-2019       Assembly Flags:    0x00
                                CLEI Code:         DUMMY_CLEI
                                FRU Model Number:  EX4400-48F-S
 Board Information Record:
  Address 0x00: ad ff 80 00 c0 bf a7 00 eb a0 ff ff ff ff ff ff
 I2C Hex Data:
  Address 0x00: 7f b0 02 fc f0 10 01 01 00 00 00 00 00 00 00 00
  Address 0x10: 00 00 00 00 42 55 49 4c 54 49 4e 00 00 00 00 00
  Address 0x20: 42 55 49 4c 54 49 4e 00 00 00 00 00 00 13 0c 07
  Address 0x30: e3 ff ff ff ad ff 80 00 c0 bf a7 00 eb a0 ff ff
  Address 0x40: ff ff ff ff 01 44 55 4d 4d 59 5f 43 4c 45 49 45
  Address 0x50: 58 34 34 30 30 2d 34 38 46 2d 53 00 00 00 00 00
  Address 0x60: 00 00 00 00 00 00 31 00 00 ff ff ff ff ff ff ff
  Address 0x70: ff ff ff f4 59 4b 34 33 31 39 35 30 30 32 30
FPC 1            REV 01   650-114385   YK4319500020      EX4400-48F
 Jedec Code:   0x7fb0           EEPROM Version:    0x02
 P/N:          650-114385       S/N:               YK4319500020
 Assembly ID:  0x0d5c           Assembly Version:  01.01
 Date:         12-19-2019       Assembly Flags:    0x00
 Version:      REV 01           CLEI Code:         DUMMY_CLEI
 ID: EX4400-48F                 FRU Model Number:  EX4400-48F-S
 Board Information Record:
  Address 0x00: ad ff 80 00 c0 bf a7 00 eb a0 ff ff ff ff ff ff
 I2C Hex Data:
  Address 0x00: 7f b0 02 fc 0d 5c 01 01 52 45 56 20 30 31 00 00
```

```
  Address 0x10: 00 00 00 00 36 35 30 2d 31 31 34 33 38 35 00 00
  Address 0x20: 59 4b 34 33 31 39 35 30 30 30 32 30 00 13 0c 07
  Address 0x30: e3 ff ff ff ad ff 80 00 c0 bf a7 00 eb a0 ff ff
  Address 0x40: ff ff ff ff 01 44 55 4d 4d 59 5f 43 4c 45 49 45
  Address 0x50: 58 34 34 30 30 2d 34 38 46 2d 53 00 00 00 00 00
  Address 0x60: 00 00 00 00 00 00 31 00 00 ff ff ff ff ff ff ff
  Address 0x70: ff ff ff f4 59 4b 34 33 31 39 35 30 30 30 32 30
  CPU                     BUILTIN      BUILTIN           FPC CPU
 Jedec Code:   0x7fb0            EEPROM Version:    0x02
 P/N:          BUILTIN           S/N:               BUILTIN
 Assembly ID:  0xf020            Assembly Version:  01.01
 Date:         12-19-2019        Assembly Flags:    0x00
 Board Information Record:
  Address 0x00: ad ff 80 00 c0 bf a7 00 eb a0 ff ff ff ff ff ff
 I2C Hex Data:
  Address 0x00: 7f b0 02 fc f0 20 01 01 00 45 56 20 30 31 00 00
  Address 0x10: 00 00 00 00 42 55 49 4c 54 49 4e 00 38 35 00 00
  Address 0x20: 42 55 49 4c 54 49 4e 00 30 30 32 30 00 13 0c 07
  Address 0x30: e3 ff ff ff ad ff 80 00 c0 bf a7 00 eb a0 ff ff
  Address 0x40: ff ff ff ff 00 44 55 4d 4d 59 5f 43 4c 45 49 45
  Address 0x50: 58 34 34 30 30 2d 34 38 46 2d 53 00 00 00 00 00
  Address 0x60: 00 00 00 00 00 00 31 00 00 ff ff ff ff ff ff ff
  Address 0x70: ff ff ff f4 59 4b 34 33 31 39 35 30 30 30 32 30
  PIC 0          REV 01   BUILTIN      BUILTIN           36x 1G SFP, 12x 1G/10G
SFP/SFP+
 Jedec Code:   0x7fb0            EEPROM Version:    0x02
 P/N:          BUILTIN           S/N:               BUILTIN
 Assembly ID:  0xf050            Assembly Version:  01.01
 Date:         12-19-2019        Assembly Flags:    0x00
 Version:      REV 01            CLEI Code:         DUMMY_CLEI
                                 FRU Model Number:  EX4400-48F-S
 Board Information Record:
  Address 0x00: ad ff 80 00 c0 bf a7 00 eb a0 ff ff ff ff ff ff
 I2C Hex Data:
  Address 0x00: 7f b0 02 fc f0 50 01 01 52 45 56 20 30 31 00 00
  Address 0x10: 00 00 00 00 42 55 49 4c 54 49 4e 00 38 35 00 00
  Address 0x20: 42 55 49 4c 54 49 4e 00 30 30 32 30 00 13 0c 07
  Address 0x30: e3 ff ff ff ad ff 80 00 c0 bf a7 00 eb a0 ff ff
  Address 0x40: ff ff ff ff 01 44 55 4d 4d 59 5f 43 4c 45 49 45
  Address 0x50: 58 34 34 30 30 2d 34 38 46 2d 53 00 00 00 00 00
  Address 0x60: 00 00 00 00 00 00 31 00 00 ff ff ff ff ff ff ff
  Address 0x70: ff ff ff f4 55 55 55 55 55 55 55 55 55 55 55 55
    Xcvr 0       REV 01   740-021487   JCG2007567        SFP-FX-PHY
    Xcvr 1       REV 01   740-021487   JCG2007472        SFP-FX-PHY
```

```
   Xcvr 2       REV 02   740-011613   N2PARS2           SFP-SX
   Xcvr 3                NON-JNPR     FCCODQT64000097   SFP-T
   Xcvr 4                NON-JNPR     UVK0XK0           SFP28-25G-BASE-SR
   Xcvr 5       REV 01   740-011614   AC1621SA1F7       SFP-LX10
   Xcvr 6                NON-JNPR     FCCODQT64000098   SFP-T
   Xcvr 7       REV 01   740-032293   P2PAXFD           SFP-LH
   Xcvr 8       REV 02   740-014132   PPL6B1E           SFP-T
   Xcvr 9                NON-JNPR     AD1601304UB       DUAL-SFP+-SR/SFP-SX
   Xcvr 10      0        NON-JNPR     0501280230035763  SFP-SX
   Xcvr 11      REV 01   740-032291   P2PAXEK           SFP-LH
   Xcvr 12               NON-JNPR                       UNSUPPORTED
   Xcvr 13      REV 01   740-021308   CF34KM169         SFP+-10G-SR
   Xcvr 15               NON-JNPR     A06C7WK           DUAL-SFP+-SR/SFP-SX
   Xcvr 18      REV 01   740-032292   P2PAW6N           SFP-LH
   Xcvr 19      REV 01   740-030658   ASL1HV6           SFP+-10G-USR
   Xcvr 21      REV 01   740-030128   A1LAS9C           SFP+-10G-ER
   Xcvr 22      REV 01   740-021308   ALD15Z3           SFP+-10G-SR
   Xcvr 23      REV 01   740-021308   09T511103738      SFP+-10G-SR
   Xcvr 25               NON-JNPR     A06BV81           DUAL-SFP+-SR/SFP-SX
   Xcvr 26      REV 01   740-021309   AD0912LE01W       SFP+-10G-LR
   Xcvr 27      REV 01   740-011614   C08A06993         SFP-LX10
   Xcvr 28      REV 02   740-011613   PPM47Q1           SFP-SX
   Xcvr 32      REV 01   740-031981   AD1709501W3       SFP+-10G-LR
   Xcvr 33      REV 01   740-021309   UGM01T8           SFP+-10G-LR
   Xcvr 34      REV 01   740-032295   P2PAK8C           SFP-LH
   Xcvr 41      REV 01   740-021309   JCK2004644        SFP+-10G-LR
   Xcvr 42      REV 01   740-021309   JCL2001937        SFP+-10G-LR
   Xcvr 43      REV 01   740-021309   JCK2004690        SFP+-10G-LR
   Xcvr 44      REV 01   740-021309   N2HBGBE           SFP+-10G-LR
   Xcvr 46      REV 01   740-021309   N2GC5QB           SFP+-10G-LR
 PIC 1          REV 01   650-114385   YK4319500020      2x100G QSFP28
Jedec Code:   0x7fb0            EEPROM Version:    0x02
P/N:          650-114385        S/N:               YK4319500020
Assembly ID:  0xf051            Assembly Version:  01.01
Date:         12-19-2019        Assembly Flags:    0x00
Version:      REV 01            CLEI Code:         DUMMY_CLEI
                                FRU Model Number:  EX4400-48F-S
Board Information Record:
 Address 0x00: ad ff 80 00 c0 bf a7 00 eb a0 ff ff ff ff ff ff
I2C Hex Data:
 Address 0x00: 7f b0 02 fc f0 51 01 01 52 45 56 20 30 31 00 00
 Address 0x10: 00 00 00 00 36 35 30 2d 31 31 34 33 38 35 00 00
 Address 0x20: 59 4b 34 33 31 39 35 30 30 30 32 30 00 13 0c 07
 Address 0x30: e3 ff ff ff ad ff 80 00 c0 bf a7 00 eb a0 ff ff
```

```
  Address 0x40: ff ff ff ff 01 44 55 4d 4d 59 5f 43 4c 45 49 45
  Address 0x50: 58 34 34 30 30 2d 34 38 46 2d 53 00 00 00 00 00
  Address 0x60: 00 00 00 00 00 00 31 00 00 ff ff ff ff ff ff ff
  Address 0x70: ff ff ff f4 55 55 55 55 55 55 55 55 55 55 55 55
    Xcvr 0       REV 01   740-061000   1RC4044807P       QSFP28-100G-CU1M
    Xcvr 1       REV 01   740-061001   1RC424480CC       QSFP28-100G-CU3M
  PIC 2          REV 01   650-107358   YP4319450014      4x10G SFP+
 Jedec Code:   0x7fb0            EEPROM Version:    0x02
 P/N:          650-107358        S/N:               YP4319450014
 Assembly ID:  0xf052            Assembly Version:  01.01
 Date:         11-07-2019        Assembly Flags:    0x00
 Version:      REV 01            CLEI Code:         DUMMYCLEI
                                 FRU Model Number:  EX4350-48F
 Board Information Record:
  Address 0x00: ad 01 80 00 0c 00 00 00 00 00 ff ff ff ff ff ff
 I2C Hex Data:
  Address 0x00: 7f b0 02 fe f0 52 01 01 52 45 56 20 30 31 00 00
  Address 0x10: 00 00 00 00 36 35 30 2d 31 30 37 33 35 38 00 00
  Address 0x20: 59 50 34 33 31 39 34 35 30 30 31 34 00 07 0b 07
  Address 0x30: e3 ff ff ff ad 01 80 00 0c 00 00 00 00 00 ff ff
  Address 0x40: ff ff ff ff 01 44 55 4d 4d 59 43 4c 45 49 00 45
  Address 0x50: 58 34 33 35 30 2d 34 38 46 00 00 00 00 00 00 00
  Address 0x60: 00 00 00 00 00 00 31 00 00 ff ff ff ff ff ff ff
  Address 0x70: ff ff ff 19 55 55 55 55 55 55 55 55 55 55 55 55
    Xcvr 0       REV 01   740-084670   1A1C5GA45101A     SFP28-25G-BASE-AOC-20M
    Xcvr 1       REV 01   740-084670   1A1C5GA45101A     SFP28-25G-BASE-AOC-20M
    Xcvr 2       58C 19   NON-JNPR     CN746EK142        SFP-SX
    Xcvr 3       REV 02   740-011613   AM0943SEKDD       SFP-SX
Power Supply 0   REV 00   640-107107   1EHB9410229       JPSU-550-C-AC-AFO
 Jedec Code:   0x7fb0            EEPROM Version:    0x02
 P/N:          640-107107        S/N:               1EHB9410229
 Assembly ID:  0x04d2            Assembly Version:  00.00
 Date:         10-25-2019        Assembly Flags:    0x00
 Version:      REV 00            CLEI Code:         DUMMY CLEI
 ID: JPSU-550-C-AC-AFO
 Board Information Record:
  Address 0x00: b0 01 ff ff ff ff ff ff ff ff ff ff 00 04 00 ff
 I2C Hex Data:
  Address 0x00: 7f b0 02 ff 04 d2 00 00 52 45 56 20 30 30 00 00
  Address 0x10: 00 00 00 00 36 34 30 2d 31 30 37 31 30 37 00 00
  Address 0x20: 31 45 48 42 39 34 31 30 32 32 39 00 00 19 0a 07
  Address 0x30: e3 ff ff ff b0 01 ff ff ff ff ff ff ff ff ff ff
  Address 0x40: 00 04 00 ff 01 44 55 4d 4d 59 20 43 4c 45 49 00
  Address 0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

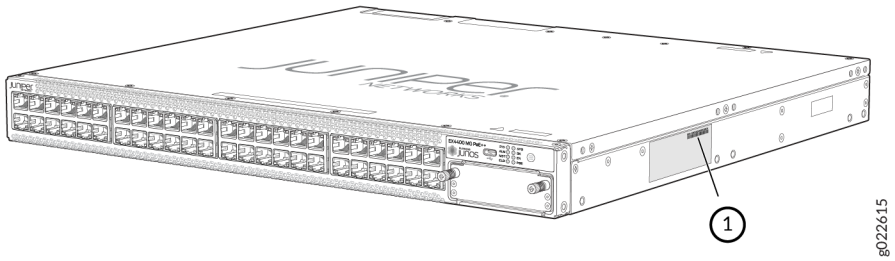
```
  Address 0x60: 00 00 00 00 00 00 41 30 30 ff ff ff ff ff ff ff
  Address 0x70: ff ff ff 61 ff ff ff ff ff ff ff ff ff ff ff ff
Fan Tray 0                                              Fan Module, Airflow Out
(AFO)
 Jedec Code:   0x7fb0           EEPROM Version:    0x00
 Assembly ID:  0xf040           Assembly Version:  00.00
 Date:         00-00-0000       Assembly Flags:    0x00
 Board Information Record:
  Address 0x00: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 I2C Hex Data:
  Address 0x00: 7f b0 00 00 f0 40 00 00 00 00 00 00 00 00 00 00
  Address 0x10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x20: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Fan Tray 1                                              Fan Module, Airflow Out
(AFO)
 Jedec Code:   0x7fb0           EEPROM Version:    0x00
 Assembly ID:  0xf040           Assembly Version:  00.00
 Date:         00-00-0000       Assembly Flags:    0x00
 Board Information Record:
  Address 0x00: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 I2C Hex Data:
  Address 0x00: 7f b0 00 00 f0 40 00 00 00 00 00 00 00 00 00 00
  Address 0x10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x20: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

For information about the **show chassis hardware** command, see *show chassis hardware*.

Locate the Chassis Serial Number ID Label on an EX4400 Switch

The serial number ID label is located on the right-hand side panel of the chassis on EX4400 switches (see Figure 99 on page 197).

Figure 99: Location of the Serial Number ID Label on EX4400 Switches



Locate the Serial Number ID Labels on FRUs in an EX4400 Switch

The power supplies, fan modules, and extension modules installed in EX4400 switches are field-replaceable units (FRUs). You must remove the FRU from the switch chassis to see its serial number ID label.

- *Power supply*—The serial number ID label is on the top of the power supply (see Figure 100 on page 197, Figure 101 on page 198, Figure 102 on page 198, and Figure 103 on page 199).

Figure 100: Location of the Serial Number ID Label on the 550-W AC Power Supply Used in EX4400 Switches

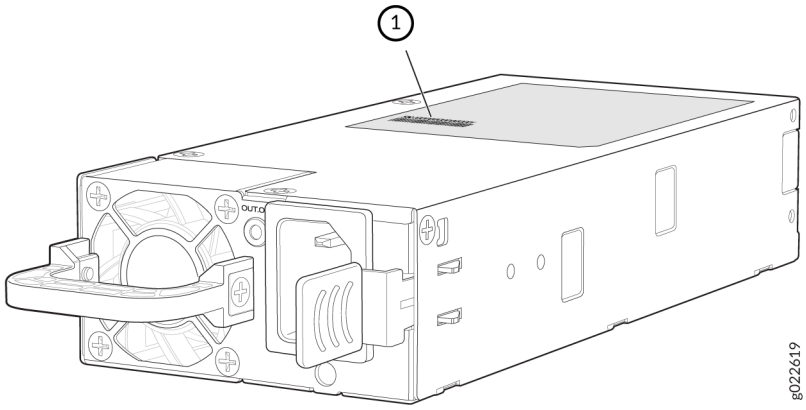


Figure 101: Location of the Serial Number ID Label on the 1050-W AC Power Supply Used in EX4400 Switches

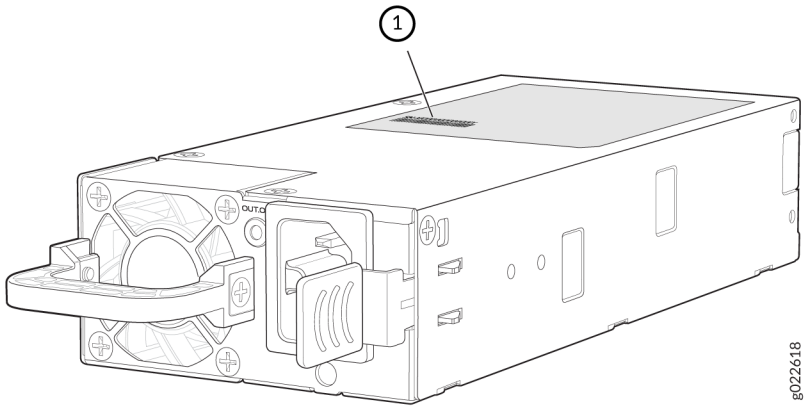


Figure 102: Location of the Serial Number ID Label on the 1600-W AC Power Supply Used in EX4400 Switches

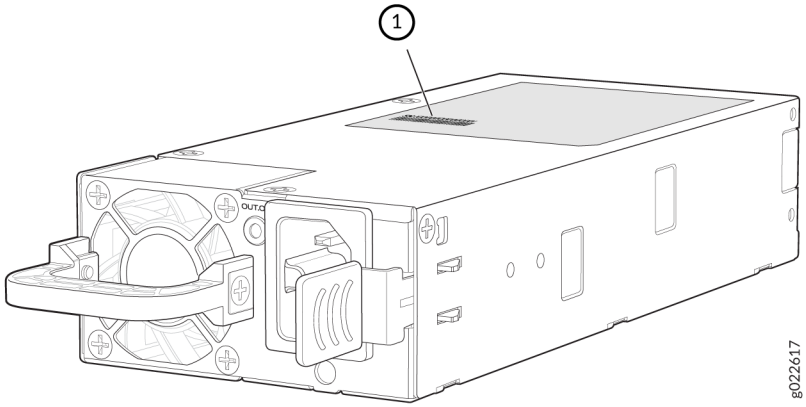
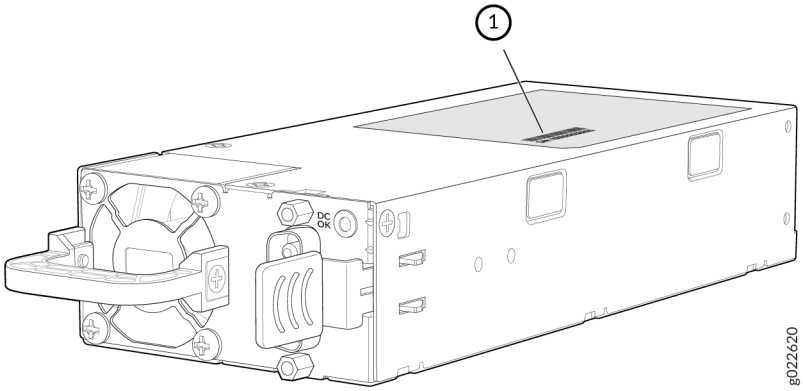
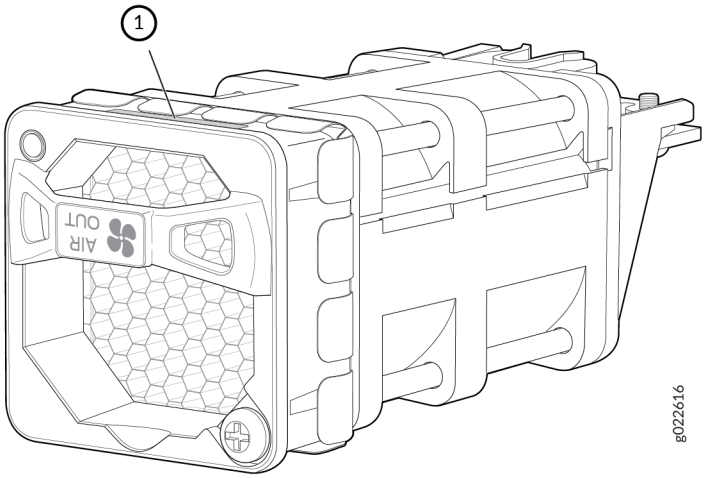


Figure 103: Location of the Serial Number ID Label on a DC Power Supply Used in EX4400 Switches



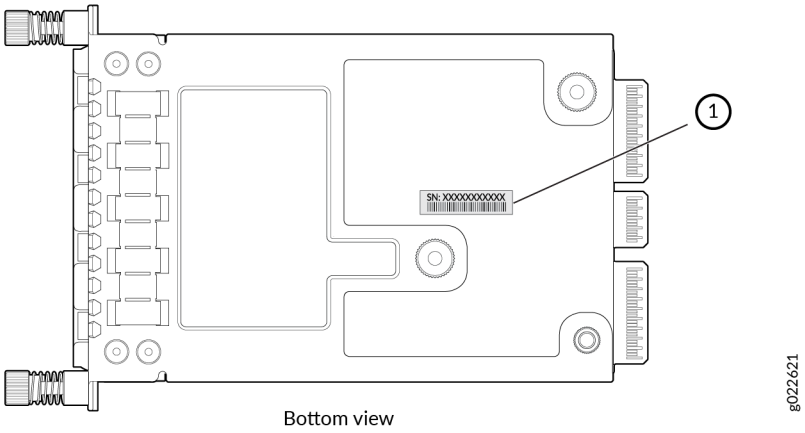
- *Fan module*—The serial number ID label is on the top of the fan module (see Figure 104 on page 199).

Figure 104: Location of the Serial Number ID Label on the Fan Module Used in EX4400 Switches



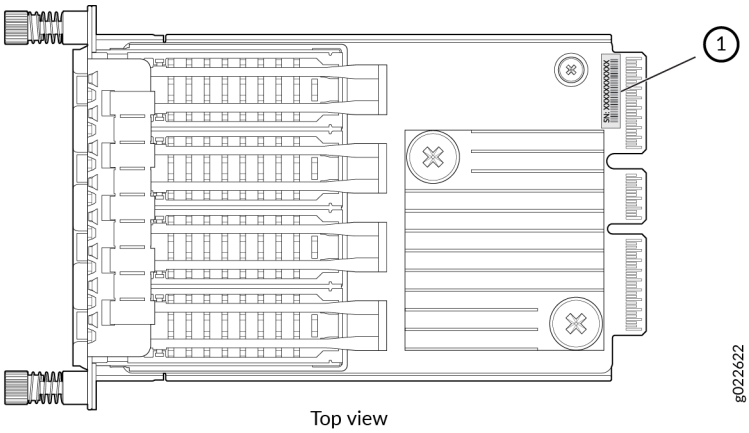
- *Extension module*—The serial number ID label is on the top of the extension module (see Figure 105 on page 200 and Figure 106 on page 200).

Figure 105: Location of the Serial Number ID Label on a 4x10GbE SFP+ Extension Module Used in EX4400 Switches



Bottom view

Figure 106: Location of the Serial Number ID Label on a 4x25GbE SFP28 Extension Module Used in EX4400 Switches



Top view

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.

Pack an EX4400 Switch or Component for Shipping

If you are returning an EX4400 switch or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you pack the switch or component, ensure that you have:

- Followed all the steps listed in “Contact Customer Support to Obtain Return Material Authorization” on page 200.
- 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 200).
- Ensure that you understand how to prevent electrostatic discharge (ESD) damage (see “Prevention of Electrostatic Discharge Damage” on page 240).

Pack an EX4400 Switch for Shipping

If you need to transport the switch to another location or return the switch to Juniper Networks, you need to pack the switch securely in its original packaging to prevent damage during transportation.

Before you pack the switch:

1. 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.

3. Remove the cables that connect the switch to external devices.

4. Remove all optical transceivers installed in the switch.

Ensure that you have the following parts and tools:

- Number 2 Phillips (+) screwdriver—not provided
- The original switch packing material (cardboard box, accessory box and its contents, and foam padding)
- An ESD grounding strap—not provided
- Antistatic bag—not provided

CAUTION: Do not pack the switch in anything except its original container, or the switch might be damaged in transit.

To pack the switch:

1. If the switch is installed in a rack or cabinet, have one person support the weight of the switch while another person unscrews and removes the mounting screws.

2. Remove the switch from the rack or cabinet and place the switch on a flat, stable surface.

3. Use the screwdriver to remove the rack mounting brackets from the switch chassis.

4. Place the switch in an antistatic bag.

5. Place the bottom portion of the packaging foam in the shipping carton.

6. Place the switch inside the cavity in the bottom packaging foam.

7. Place the top portion of the packaging foam on top of the switch.

8. If you are returning accessories or field-replaceable units (FRUs) with the switch, pack them as instructed in "Pack EX4400 Switch Components for Shipping" on page 203

9. Place the accessory box by the rear end of the chassis in the shipping carton.

10. Close the top of the cardboard shipping box and seal it with packing tape.

11. Write the RMA number on the exterior of the box to ensure proper tracking.

Pack EX4400 Switch Components for Shipping

If you need to transport a switch component to another location or return a component to Juniper Networks, you need to pack the component securely in its original packaging to prevent damage during transportation.

Ensure that you have the following parts and tools available:

- Antistatic bag, one for each component—not provided
- An ESD grounding strap—not provided

CAUTION: Do not stack switch components. Return individual components in separate boxes if they do not fit together on one level in the shipping box.

To pack the switch components:

- Place individual components in antistatic bags.
- Use the original packing materials if they are available. If the original packing materials are not available, ensure the component is adequately packed to prevent damage during transit. The packing material you use must be able to support the weight of the component.
- Ensure that the components are adequately protected by wrapping them well with packing materials. Pack the component in an oversized box (if the original box is not available) with extra packing material around the unit so that the component is prevented from moving around inside the box.
- Securely tape the box closed.
- Write the RMA number on the exterior of the box to ensure proper tracking.

CHAPTER 7

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 lb (18 kg): One person.
- 39.7 lb (18 kg) to 70.5 lb (32 kg): Two or more people.
- 70.5 lb (32 kg) to 121.2 lb (55 kg): Three or more people.
- Above 121.2 lb (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 edificio.
- 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.

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.

Laser and LED Safety Guidelines and Warnings

IN THIS SECTION

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.

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 efectuada de acordo com os regulamentos e a legislação nacional.

¡Atención! El desecho final de este producto debe realizarse según todas las leyes y regulaciones nacionales

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 107 on page 241) 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).

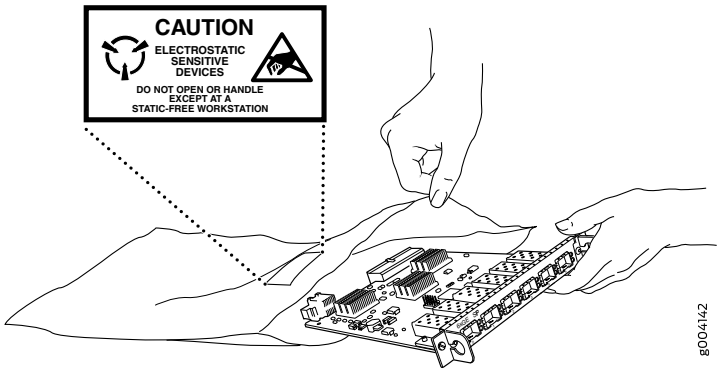
- When handling any component that is subject to ESD damage and that is removed from the device, make sure the equipment end of your ESD wrist strap is attached to the ESD point on the chassis.

  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 107 on page 241). If you are returning a component, place it in an antistatic bag before packing it.

Figure 107: 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 for EX4400 Switches

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 13 A, 16 A, or 20 A in the building installation or as per local electrical code.
- 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。

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 for EX4400 Switches

- 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.
- Provide a 13 A 2-pole breaker or a circuit breaker as per local electrical code.

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 EX4400 Switches

EX4400 complies with the following standards:

- Safety
  - CAN/CSA-C22.2 No. 60950-1 Information Technology Equipment
  - UL 60950-1 Information Technology Equipment
  - UL 62368-1 Second Edition
  - EN 60950-1 Information Technology Equipment
  - EN 62368-1 Second Edition
  - IEC 60950-1 Information Technology Equipment

  - IEC 62368-1 Second Edition
  - 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)
  - EN55032/EN55035 Electromagnetic compatibility of multimedia equipment
  - KN32/KN35 for multimedia equipment
  - BSMI CNS 13438
  - ICES-003 Class A
  - VCCI-CISPR 32
  - VCCI Class A (Japan)
  - AS/NZS CISPR 22 Class A (Australia/New Zealand)
  - CISPR 22 Class A
  - TEC/SD/DD/EMC-221/05/OCT-16
  - 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
- Energy Efficiency requirements
  - AT&T TEER (ATIS-06000015.03.2013)
  - ECR 3.0.1
  - ETSI ES 203 136 (2013-05)
  - Verizon TEEER (VZ.TPR.9205 Issue 6)
  - Amazon Customer Requirements

Compliance Statements for EMC Requirements for EX4400 Switches

IN THIS SECTION

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.

CAN ICES-003(A) / NMB-003(A)

Taiwan

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

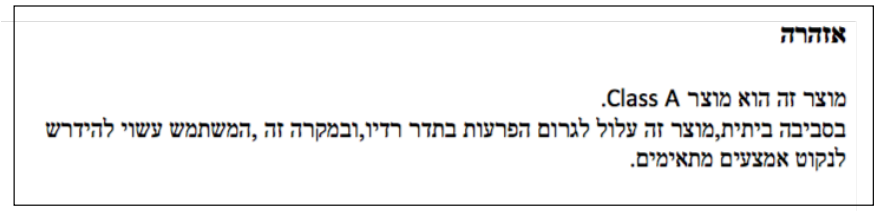
The preceding translates as follows:

This is a Class A device. In a domestic environment, this device might cause radio interference, in which case the user needs to take adequate measures.

European Community

This is a Class A device. In a domestic environment this device might cause radio interference, in which case the user needs to take adequate measures.

Israel



The preceding translates as follows:

Warning: This product is Class A. In residential environments, the product may cause radio interference, and in such a situation, the user may be required to take adequate measures.

Japan

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 판매자 또는 사용자는 이 점을 주의하시기 바라며, 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.

Acoustic Noise for EX4400 Switches

Table 49 on page 262 lists the acoustic noise measurements for EX4400 switch models taken from the front of the chassis at 23° C, in compliance with ISO 7779.

Table 49: Acoustic Noise for EX4400 Switches

Switch Model	Power Supply or Power Supplies Installed	Acoustic Noise in dB(A)
EX4400-24T	One 550-W AC power supply with front-to-back airflow	42.7
	One 550-W AC power supply with back-to-front airflow	46.08
	One 550-W DC power supply with front-to-back airflow	42.59
	One 550-W DC power supply with back-to-front airflow	46.19
	Two 550-W AC power supplies with front-to-back airflow	41.68
	Two 550-W AC power supplies with back-to-front airflow	46.03
	Two 550-W DC power supplies with front-to-back airflow	42.54
	Two 550-W DC power supplies with back-to-front airflow	46.54
EX4400-24P	One 1050-W AC power supply with front-to-back airflow	44.45
	Two 1050-W AC power supplies with front-to-back airflow	44.23
EX4400-48T	One 550-W AC power supply with front-to-back airflow	42.32
	One 550-W AC power supply with back-to-front airflow	44.78
	One 550-W DC power supply with front-to-back airflow	42.72
	One 550-W DC power supply with back-to-front airflow	44.6
	Two 550-W AC power supplies with front-to-back airflow	42.87
	Two 550-W AC power supplies with back-to-front airflow	44.64
	Two 550-W DC power supplies with front-to-back airflow	42.73
	Two 550-W DC power supplies with back-to-front airflow	44.72
EX4400-48P	One 1600-W AC power supply with front-to-back airflow	44.78
	Two 1600-W AC power supplies with front-to-back airflow	44.68

Table 49: Acoustic Noise for EX4400 Switches *(continued)*

Switch Model	Power Supply or Power Supplies Installed	Acoustic Noise in dB(A)
EX4400-48F	One 550-W AC power supply with front-to-back airflow	43.23
	One 550-W AC power supply with back-to-front airflow	44.91
	One 550-W DC power supply with front-to-back airflow	43.71
	One 550-W DC power supply with back-to-front airflow	44.93
	Two 550-W AC power supplies with front-to-back airflow	43.35
	Two 550-W AC power supplies with back-to-front airflow	44.79
	Two 550-W DC power supplies with front-to-back airflow	43.69
	Two 550-W DC power supplies with back-to-front airflow	44.61

Statements of Volatility for Juniper Network Devices

A *statement of volatility (SoV)*—sometimes known as *letter of volatility (LoV)*—identifies the volatile and non-volatile storage components in Juniper Networks devices, and describes how to remove non-volatile storage components from the device.

NOTE: Individual FRUs do not have separate SoV or LoV documents. They are covered in the SoV or LoV of the Juniper Networks device in which they are installed.

NOTE: Statements of volatility are not available for all Juniper Networks devices.

CTP Series:

- CTP150
- CTP2000

EX Series:

- EX2200 and EX2200-C
- EX2300-24P, EX2300-24T, and EX2300-24T-DC
- EX2300-48P and EX2300-48T
- EX2300-C
- EX3300
- EX3400-24P, EX3400-24T, EX3400-24T-DC
- EX3400-48P, EX3400-48T, EX3400-48T-AFI
- EX4200
- EX4300
- EX4300-48MP
- EX4400:
  - EX4400–24T
  - EX4400–24P
  - EX4400–48T
  - EX4400–48P
  - EX4400–48F
- EX4500
- EX4550
- EX4600
- EX8200
- EX9251
- EX9253
- XRE200 External Routing Engine

LN Series:

- LN1000–CC

MX Series:

- M7i
- M7i Compact Forwarding Engine Board (CFEB)
- M40e and M10i

- M320
- MX5, MX10, MX40, and MX80
- MX104
- MX204
- MX240, MX480, and MX960
- MX10003
- RE-A-2000 Route Engine
- RE-S-X6-64G Routing Engine

QFX Series:

- QFX3008-I
- QFX3100
- QFX3500
- QFX3600
- QFX5100-24Q
- QFX5100-48S
- QFX5100-48T
- QFX5110-32Q
- QFX5110-48S
- QFX5200
- QFX5200-32C
- QFX10008 and QFX10016

SRX Series:

- SRX100
- SRX110
- SRX210B
- SRX210H-POE
- SRX210H-P-MGW
- SRX220
- SRX240H
- SRX240H-POE

- SRX300
- SRX320
- SRX340 and SRX345
- SRX550
- SRX650
- SRX1400
- SRX1500
- SRX3400 and SRX3600
- SRX4200
- SRX4600
- SRX5400, SRX5600, and SRX5800
- SRX-MP-1SERIAL
- SSG-520M

T Series:

- RE-A-2000 Route Engine