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PTX10004 Packet Transport Router Hardware Guide

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PTX10004 Packet Transport Router Hardware Guide
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About This Guide

Use this guide to install hardware and perform initial software configuration, routine maintenance, and troubleshooting for the PTX10004 Packet Transport Router.

After completing the installation and basic configuration procedures covered in this guide, refer to the Junos OS documentation for information about further software configuration.

CHAPTER 1

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PTX10004 Hardware Overview

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The Juniper Networks PTX10004 Packet Transport Router addresses the business challenges of carriers and content providers to deliver more traffic at lower costs. For more information, read the following topics.

System Overview

The PTX10004 is the most compact, high-density, and power-efficient modular chassis in the PTX10000 line of modular packet-routing transport routers. At only 7 U in height, the PTX10004 is designed for today's space-constrained facilities. Like the larger PTX10008 router, the PTX10004 supports Juniper's 400GbE architecture with inline Media Access Control Security (MACsec) on all ports for point-to-point security on Ethernet links. Each PTX10K-LC1201-36CD line card has a throughput of up to 14.4 Tbps, giving the chassis an effective switching capacity of 57.6 Tbps. That throughput means a fully equipped PTX10004 can support 576 10GbE, 576 25GbE, 144 40GbE, 576 100GbE, or 144 400GbE interfaces in a single chassis. The PTX10004 supports the same feature set and runs the same Junos OS Evolved operating system as the PTX10008.

Benefits

The PTX10004 Packet Transport Router is the small-footprint complement to the larger PTX10008 modular chassis with these benefits:

- **Ease of deployment**—The PTX10004 features a compact 7-U modular chassis for sites with limited space or power.
- **Modular, flexible design**—The PTX10004 uses the custom silicon line-cards (14.4 Tbps and 9.6 Tbps throughput) and power supplies found in the larger PTX10008 modular chassis.
- **Proven fabric and chassis design**—The PTX10004 has the same updated fabric and chassis design features found on the PTX10008 router.

Chassis Description

The PTX10004 router is 7-U tall. You can fix up to six PTX10004 routers in a standard 42-U rack with adequate cooling and power. All key PTX10004 router components are field-replaceable units (FRUs). Figure 1 on page 4 illustrates the key components visible from the front of the chassis, Figure 2 on

page 4 illustrates the components that are visible from the rear of the chassis, and Figure 3 on page 5 illustrates the components that are internal to the chassis.

Figure 1: PTX10004 Chassis Front

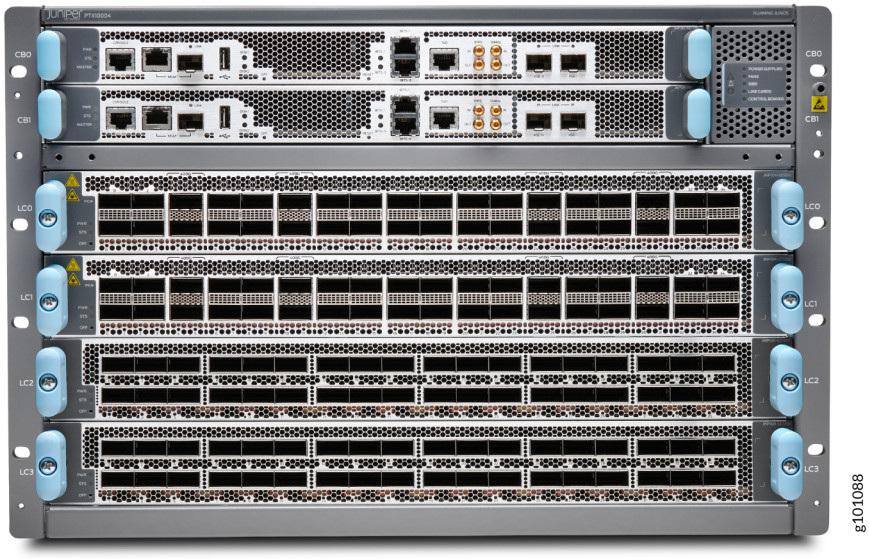
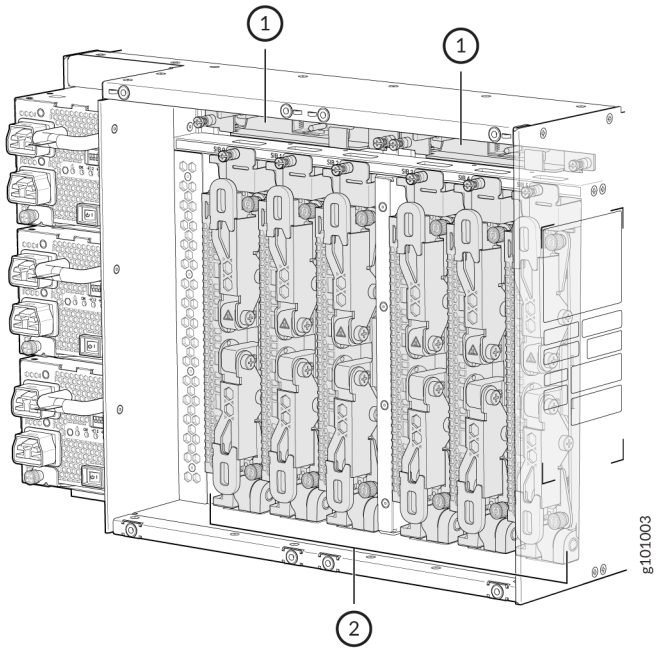


Figure 2: PTX10004 Chassis Rear



Figure 3: PTX10004 Chassis Internal Components



1– Fan tray controllers	2– Switch fabric

See "PTX10004 Chassis Physical Specifications" on page 19 and "PTX10004 Field-Replaceable Units" on page 21.

Switch Fabric

Switch Interface Boards (SIBs) create the switch fabric for the PTX10004. Each SIB has a set of connectors to mate the line cards and the Routing and Control Board (RCB) to the switch fabric. See Figure 4 on page 6 for an example of the JNP10004-SF3.

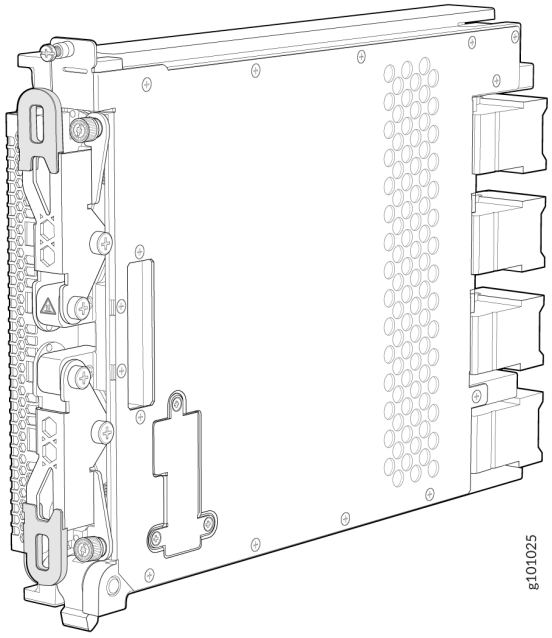
For the JNP10004 switch fabric, three SIBs provide the minimum switching functionality to a PTX10004 router; six SIBs provide full throughput. SIBs are installed between the line cards and the fan trays inside the chassis. Each PTX10004 SIB has four connectors that match to a line-card slot, eliminating the need for a backplane. See "PTX10004 Switch Interface Board Description" on page 57.

You can order the PTX10004 with different SIB configurations that allow you to grow your system as needed. See Table 1 on page 6. For full 400 Gbps deployments, we recommend the PTX10004-PREM3 configuration. See "PTX10004 Components and Configurations" on page 11 for a full description of these configuration options.

Table 1: Switch Fabric Configuration Overview

Configuration	Number of SIBs	Forwarding Capacity
PTX10004-BASE3	3	28.8 Tbps
PTX10004–PREM2	4	38.4 Tbps
PTX10004-PREM3	6	57.6 Tbps

Figure 4: JNP10004-SF 3 SIB



Routing and Control Board

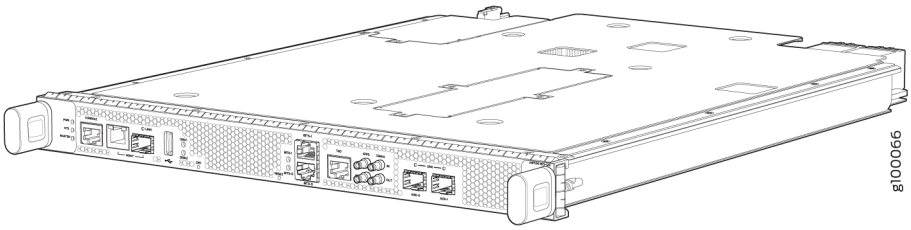
The Routing and Control Board (RCB) contains a Routing Engine and is responsible for system management and system control in the PTX10004. See "PTX10004 Routing and Control Board Components and Descriptions" on page 50. RCBs are field-replaceable units (FRUs) that are installed in the front of the chassis in the slots labeled **CB0** and **CB1**.

The supported models of RCB for JNP10004-SF3 fabric systems are:

- JNP10K-RE1-E, 64 gigabytes of memory
- JNP10K-RE1-E128, 128 gigabytes of memory

These RCBs runs Junos OS Evolved. See Figure 5 on page 7.

Figure 5: JNP10K-RE1-E and JNP10K-RE1-E128



The base configuration has a single RCB. The fully redundant configurations have two RCBs. The RCB also contains Precision Time Protocol (PTP) ports and four Media Access Control Security (MACsec) capable ports. See "PTX10004 Components and Configurations" on page 11.

Line Cards

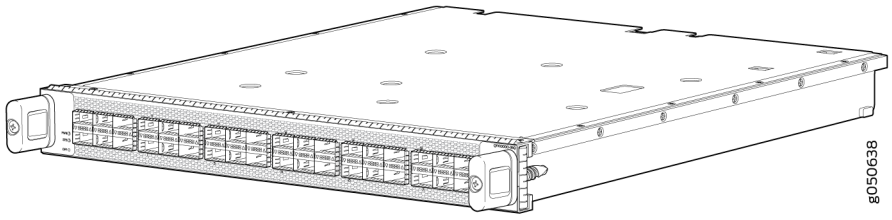
The PTX10004 has four horizontal line-card slots. The line cards combine a Packet Forwarding Engine and Ethernet interfaces enclosed in a single assembly. The PTX10004 line-card architecture is based on a number of identical, independent Packet Forwarding Engine slices. Line cards are FRUs that can be installed in the line-card slots labeled **0** through **3** (top to bottom) on the front of the chassis. All line cards are hot-removable and hot-insertable. After the hot insertion, you need to bring the card online (see "Take a PTX10004 Line Card Online or Offline" on page 202).

The PTX10004 supports:

- PTX10K-LC1201-36CD—a 36-port multiple-speed line card that can be configured as 400GbE, 200GbE, 100GbE, 50GbE, 25GbE, or 10GbE Ethernet ports.
- PTX10K-LC1202-36MR—A 36-port line card (thirty-two 100GbE ports and four 400GbE ports). The 400-Gigabit Ethernet ports can be configured as either 400-Gigabit uplinks or channelized to 4 independent 100-Gigabit downstream ports.

See Figure 6 on page 8 for an example of a PTX10004 line card.

Figure 6: PTX10K-LC1201-36CD Line Card

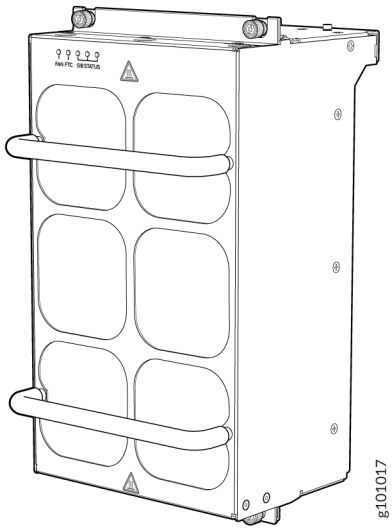


Cooling System

The cooling system in a PTX10004 consists of two fan trays (see Figure 7 on page 8) and two fan tray controllers (see Figure 8 on page 9).

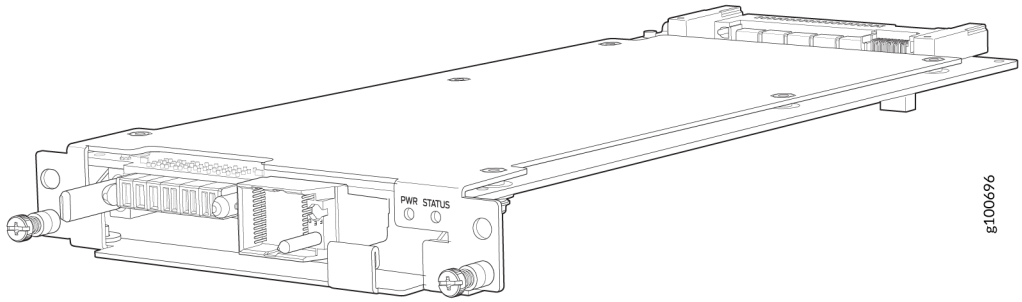
The JNP10004-FAN2 fan tray contains an array of six fans and operates as a single hot-removable and hot-insertable field-replaceable unit (FRU). The fan trays install vertically on the rear of the chassis and provide front-to-back chassis cooling. See "PTX10004 Cooling System and Airflow" on page 27.

Figure 7: Fan Tray JNP10004-FAN2



There is a corresponding fan tray controller, JNP10004-FTC2, for each JNP10004-FAN2 fan tray. See Figure 8 on page 9.

Figure 8: Fan Tray Controller JNP10004-FTC2



Power Supplies

The PTX10004 router support AC, DC, high-voltage alternating current (HVAC), and high-voltage direct current (HVDC), by offering the following power supplies:

- JNP10K-PWR-AC2
- JNP10K-PWR-DC2

Power supplies for the PTX10004 are load-sharing hot-removable and hot-insertable FRUs. The router operates with three power supplies. Each power supply has an internal fan for cooling. You can install the power supplies in any slot. See Figure 9 on page 10 and Figure 10 on page 10.

CAUTION: Do not mix power supply models in the same chassis in a running environment.

Figure 9: JNP10K-PWR-AC2 Power Supply

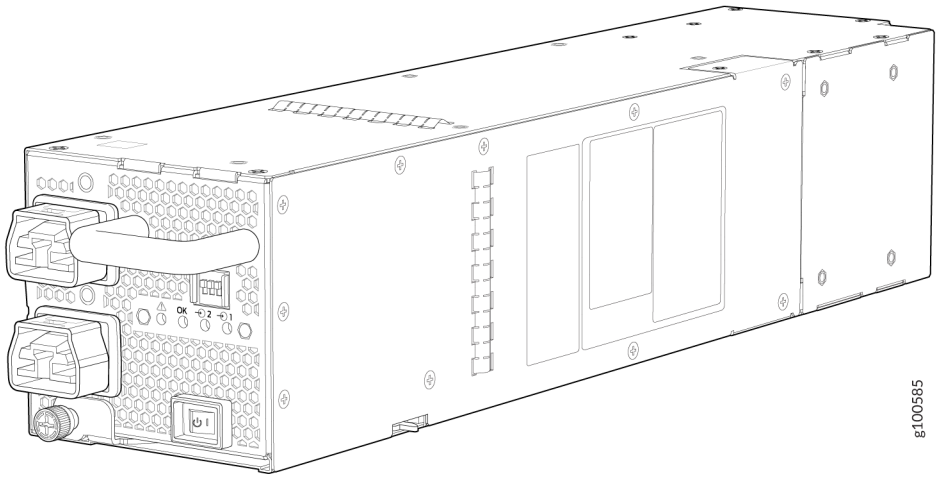


Figure 10: JNP10K-PWR-DC2 Power Supply

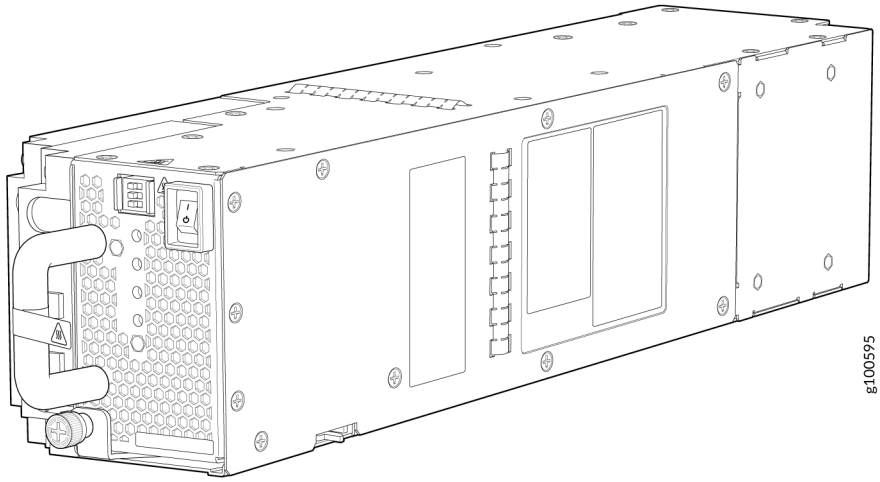


Table 2 on page 11 provides an overview of the differences between the power supplies.

Table 2: Power Supply Overview

Power Supply Model	Input Type	Wattage
JNP10K-PWR-AC2	AC, HVAC, or HVDC	5000 W, single feed; 5500 W, dual feed
JNP10K-PWR-DC2	DC only	2750 W, single feed; 5500 W, dual feed

The PTX10004 supports four PTX10K-LC1201-36CD line cards in non-redundant mode. If you populate all four slots with this line card, a power alarm is raised, which is expected behavior.

Software

The Juniper Networks PTX10004 packet transport router runs on the Junos OS Evolved operating system, which provides Layer 3 routing services. Junos OS Evolved is the next-generation Junos OS. It has the same CLI, the same features, and, in some cases, even the same processes as in the previous versions of Junos OS. However, its infrastructure is entirely modernized.

SEE ALSO

- PTX10004 Cooling System and Airflow | 27
- PTX10004 Field-Replaceable Units | 21
- PTX10004 Power System | 41

PTX10004 Components and Configurations

IN THIS SECTION

- PTX10004 Configurations | 11

PTX10004 Configurations

Table 3 on page 12 lists the hardware configurations for a PTX10004 modular chassis and the components included in each configuration.

Table 3: PTX10004 Hardware Configurations

Router Configuration	Configuration Components
Base AC configuration PTX10004-BASE3	• Chassis (JNP10004-CHAS) • One RCB (JNP10K-RE1-E or JNP10K-RE1-E128) • Two fan tray controllers (JNP10004-FTC2) • Two fan trays (JNP10004-FAN2) • Three AC power supplies (JNP10K-PWR-AC2) • Three SIBs (JNP10004-SF3) • Three SIB covers (JNP10004-SF3-BLNK) • Four line-card covers (JNP10K-LC-BLNK) • One RCB cover • Front door (JNP10004-FRNT-PNL)
Base DC configuration PTX10004-BASE3	• Chassis (JNP10004-CHAS) • One RCB (JNP10K-RE1-E or JNP10K-RE1-E128) • Two fan tray controllers (JNP10004-FTC2) • Two fan trays (JNP10004-FAN2) • Three DC power supplies (JNP10K-PWR-DC2) • Three SIBs (JNP10004-SF3) • Three SIB covers (JNP10004-SF-BLNK2) • Four line-card covers (JNP10K-LC-BLNK) • One RCB cover • Front door (JNP10004-FRNT-PNL)

Table 3: PTX10004 Hardware Configurations *(Continued)*

Router Configuration	Configuration Components
Redundant AC configuration PTX10004-PREM2	• Chassis (JNP10004-CHAS) • Two RCBs (JNP10K-RE1-E or JNP10K-RE1-E128) • Two fan tray controllers (JNP10004-FTC2) • Two fan trays (JNP10004-FAN2) • Three AC power supplies (JNP10K-PWR-AC2) • Four SIBs (JNP10004-SF3) • Two SIB covers (JNP10004-SF-BLNK2)) • Four line-card covers (JNP10K-LC-BLNK) • Front door (JNP10004-FRNT-PNL)
Redundant DC configuration PTX10004-PREM2	• Chassis (JNP10004-CHAS) • Two RCBs (JNP10K-RE1-E or JNP10K-RE1-E128) • Two fan tray controllers (JNP10004-FTC2) • Two fan trays (JNP10004-FAN2) • Three DC power supplies (JNP10K-PWR-DC2) • Four SIBs (JNP10004-SF3) • Four line-card covers (JNP10K-LC-BLNK) • Front door (JNP10004-FRNT-PNL)

Table 3: PTX10004 Hardware Configurations *(Continued)*

Router Configuration	Configuration Components
Fully redundant AC configuration PTX10004-PREM3	• Chassis (JNP10004-CHAS) • Two RCBs (JNP10K-RE1-E or JNP10K-RE1-E128) • Two fan tray controllers (JNP10004-FTC2) • Two fan trays (JNP10004-FAN2) • Three AC power supplies (JNP10K-PWR-AC2) • Six SIBs (JNP10004-SF3) • Four line-card covers (JNP10K-LC-BLNK) • Front door (JNP10004-FRNT-PNL)
Fully redundant DC configuration PTX10004-PREM3	• Chassis (JNP10004-CHAS) • Two RCBs (JNP10K-RE1-E or JNP10K-RE1-E128) • Two fan tray controllers (JNP10004-FTC2) • Two fan trays (JNP10004-FAN2) • Three DC power supplies (JNP10K-PWR-DC2) • Six SIBs (JNP10004-SF3) • Four line-card covers (JNP10K-LC-BLNK) • Front door (JNP10004-FRNT-PNL)

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

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

SEE ALSO

PTX10004 Routing and Control Board Description | 50

JNP10K-PWR-AC2 Power Supply | 42

JNP10K-PWR-DC2 Power Supply | 44

PTX10004 Switch Interface Board Description | 57

PTX10004 Component Redundancy

The PTX10004 router is designed so that no single point of failure can cause the entire system to fail. The following major hardware components in the redundant configuration provide redundancy:

- Routing and Control Board (RCB)—The RCB consolidates the Routing Engine function with the control plane function in a single unit. The PTX10004 router can have one or two RCBs. When two RCBs are installed, one functions as the primary and the other functions as the backup. If the primary RCB (or either of its components) fails, the backup can take over as the primary. See "PTX10004 Routing and Control Board Description" on page 50.

- Switch Interface Boards (SIBs)—The PTX10004 has six SIB slots for the JNP10004-SF3 SIBs. The switch fabric requires a minimum of three SIBs (BASE3 configuration) to provide the minimum switching functionality to a PTX10004 router. You can install up to six SIBs (PREM3 configuration), which is required for 14.4 Tbps line card support. However, a fully-loaded PTX10004 chassis with PTX10K-LC1201-36CD line cards is not a redundant configuration. See the "PTX10004 Switch Interface Board Description" on page 57.

- Power supplies—The system requires three power supplies for minimum operation (two RCBs, two fan trays, three SIBs, and no line cards). The three power supplies provide *n*+1 redundancy for systems running 4.8-Tbps line cards and can tolerate a failure of a single power supply without system interruption. If one power supply fails in a fully redundant system, the other power supplies can provide full power to the PTX10004 router indefinitely. However, configurations that run 14.4-Tbps line cards in all four line-card slots don't have redundant power. You can populate and run the 14.4-Tbps line cards but a power alarm is raised, which is expected behavior.

The PTX10004 router also supports power source redundancy. Four sets of lugs are provided for the JNP10K-PWR-DC2 cables, and two AC power cords are provided for each JNP10K-PWR-AC2 power supply.

- Cooling system—The PTX10004 has two fan trays, which are controlled by the fan tray controller. Each fan tray has a corresponding fan tray controller. If one of the fans in a JNP10004-FAN2 fan tray fails, under most conditions the fan tray rebalances the remaining fans to continue. The fan tray continues to operate indefinitely and provide sufficient cooling even when a single rotor fails in a fan, provided the room temperature is within the operating range. See "PTX10004 Cooling System and Airflow" on page 27.

PTX10004 Hardware and CLI Terminology Mapping

This topic describes the hardware terms used in PTX10004 router documentation and the corresponding terms used in the Junos OS CLI. See Table 4 on page 16.

Table 4: CLI Equivalents of Terms Used in Documentation for PTX10004 Routers

Hardware Item (CLI)	Description (CLI)	Value (CLI)	Item In Documentation	Additional Information
Chassis	PTX10004	–	Router chassis	"PTX10004 Chassis Physical Specifications" on page 19
Fan tray	JNP10004-FAN2	`Fan Tray 0/1 Fan n` *n* is a value in the range of 0–11. The value corresponds to the individual fan number in the fan tray.	Fan tray	"PTX10004 Cooling System and Airflow" on page 27

Table 4: CLI Equivalents of Terms Used in Documentation for PTX10004 Routers *(Continued)*

Hardware Item (CLI)	Description (CLI)	Value (CLI)	Item In Documentation	Additional Information
FPC (*n*)	Abbreviation for the Flexible PIC Concentrator (FPC) On PTX10004, an FPC is equivalent to a line card.	*n* is a value in the range of 0–3 for the PTX10004. The value corresponds to the line-card slot number in which the line card is installed.	Line card (The router doesn't have actual FPCs—the line cards are the FPC equivalents on the router.)	*Understanding Interface Naming Conventions*
PIC (*n*)	–	Value of *n* is always 0.	–	*Understanding Interface Naming Conventions*
PSM (*n*)	Abbreviation for power supply module One of the following: • JNP10K-PWR-AC2 • JNP10K-PWR-DC2	*n* is a value in the range of 0–2. The value corresponds to the power-supply slot number.	AC, DC, HVAC, or HVDC power supply	One of the following: • "JNP10K-PWR-AC2 Power Supply" on page 42 • "JNP10K-PWR-DC2 Power Supply" on page 44
Routing Engine	RE (*n*)	*n* is a value in the range of 0–1. Multiple line items appear in the CLI if more than one RCB is installed in the chassis.	RCB	"PTX10004 Routing and Control Board Components and Descriptions" on page 50

Table 4: CLI Equivalents of Terms Used in Documentation for PTX10004 Routers *(Continued)*

Hardware Item (CLI)	Description (CLI)	Value (CLI)	Item In Documentation	Additional Information

SIB (*n*)	This field indicates:
	• State of the fabric plane:
	  • Active
	  • Spare
	  • Check
	• Status of the Packet Forwarding Engine in each fabric plane:
	  • Links OK
	  • Error
		n is a value in the range of 0–5.	Fabric plane	*show chassis fabric sibs*

Xcvr (*n*)	Abbreviation for the transceiver	*n* is a value equivalent to the number of the port in which the transceiver is installed.	Optical transceivers	"PTX10004 Optical Transceiver and Cable Support" on page 102

PTX10004 Chassis

IN THIS SECTION

- PTX10004 Chassis Physical Specifications | **19**
- PTX10004 Field-Replaceable Units | **21**

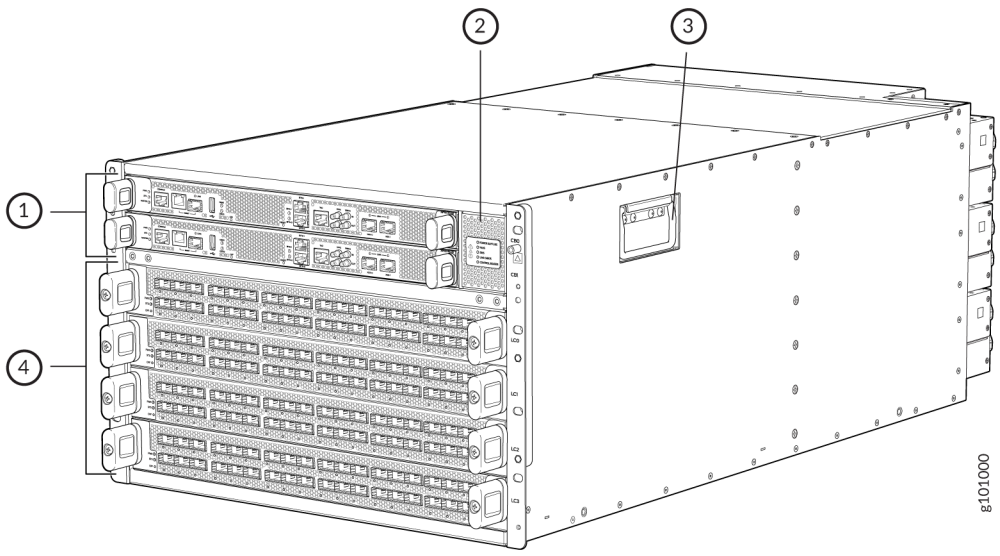
PTX10004 Status Panel | 23
PTX10004 Optional Equipment | 26

The PTX10004 chassis houses the hardware components. The chassis components include the fan trays, fan tray controllers, power supplies, Routing and Control Boards (RCBs), line cards, an optional cable management system, and the status panel.

PTX10004 Chassis Physical Specifications

The PTX10004 modular chassis is a rigid sheet-metal structure that houses the other router components. You can mount up to six PTX10004 routers in a standard 19-in. 4-post rack (42 U) provided the rack can handle the combined weight and there is adequate power and cooling. See Figure 11 on page 19 to help identify the major components and see Table 5 on page 20 for the physical specifications of the chassis of these components.

Figure 11: Front View of the PTX10004



1– RCBs	3– Handles
2– Status panel	4– Line cards

WARNING: The handles on each side of the chassis facilitate the fine-tune positioning of the chassis on the base brackets. Do not use the handles to lift the chassis, even when the chassis is empty. See "Mount the PTX10004 by Using the JNP10004-RMK-4POST Rack Mount Kit" on page 124 for instructions on properly moving a loaded chassis.

Table 5: PTX10004 Router Physical Specifications

Description	Weight	Height	Width	Depth
Chassis, spare	110 lb (50 kg) 173 lb (78 kg) with pallet	12.2 in. (33 cm)	17.4 in. (44.2 cm) **NOTE**: The outer edges of the chassis flange extend the width to 19 in. (48.3 cm).	34.8 in. (88.4 cm) chassis only
Chassis PTX10004-BASE3 AC or DC configuration	240 lb (109 kg) 303 lb (137 kg) with pallet	12.2 in. (33 cm)	17.4 in. (44.2 cm) **NOTE**: The outer edges of the chassis flange extend the width to 19 in. (48.3 cm).	36.6 in. (92.96 cm) with JNP10004-FAN2 fan trays 42.7 in. (108.5 cm) with EMI door
Chassis PTX10004-PREM2 AC or DC configuration	260 lb (117 kg) 323 lb (147 kg) with pallet	12.2 in. (33 cm)	17.4 in. (44.2 cm) **NOTE**: The outer edges of the chassis flange extend the width to 19 in. (48.3 cm).	36.6 in. (92.96 cm) with JNP10004-FAN2 fan trays 42.7 in. (108.5 cm) with EMI door
Chassis redundant PTX10004-PREM3 AC or DC configuration	272 lb (123 kg) 335 lb (152 kg) with pallet	12.2 in. (33 cm)	17.4 in. (44.2 cm) **NOTE**: The outer edges of the chassis flange extend the width to 19 in. (48.3 cm).	36.6 in. (92.96 cm) with JNP10004-FAN2 fan trays 42.7 in. (108.5 cm) with EMI door

Table 5: PTX10004 Router Physical Specifications *(Continued)*

Description	Weight	Height	Width	Depth
JNP10K-LC1201 line card	29.2 lb (13.2 kg)	12.2 in. (33 cm)	17.2 in. (43.7 cm)	21.3 in. (54.1 cm)
PTX10K-LC1202-36MR	21 lb (9.5 kg)	1.9 in. (4.8 cm)	17.2 in. (43.68 cm)	21.3 in. (54.1 cm)

PTX10004 Field-Replaceable Units

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

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

Table 6 on page 21 lists the FRUs and their types for the PTX10004 routers.

Table 6: FRUs in a PTX10004

FRU	Type
Power supplies	Hot-insertable and hot-removable.
Fan trays	Hot-insertable and hot-removable.
Fan tray controllers	Hot-insertable and hot-removable.

Table 6: FRUs in a PTX10004 *(Continued)*

FRU	Type
Routing and Control Boards (RCBs)	Redundant configuration: • Primary RCB is hot-pluggable. • Backup RCB is hot-insertable and hot-removable. Base configuration: • Removal of the RCB causes the router to shut down. To prevent traffic disruption, take the chassis offline. If a temporary disruption is acceptable, you can install a replacement RCB in the second slot. The system restarts to elect a primary RCB and a backup RCBs If necessary, you can manually switch the primary and backup RCB using the `request chassis routing-engine master switch` command.
Switch Interface Boards (SIBs)	SIBs are hot-insertable and hot-removable. We recommend that you take SIBs offline before removing them to avoid traffic loss while the router fabric is being reconfigured. Use the following command: `user@router> request chassis sib slot slot-number offline`
Line cards	Hot-insertable. We recommend that you take line cards offline before removing them. Use the following command: `user@router> request chassis fpc-slot slot-number offline`
Optical transceivers See "PTX10004 Optical Transceiver and Cable Support" on page 102 for how to find detailed specifications and the Junos OS release in which the transceivers were introduced.	Hot-insertable and hot-removable.

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

NOTE: If you have a Juniper 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 an existing component with the same type of component.

SEE ALSO

PTX10004 Components and Configurations | **11**

PTX10004 Optical Transceiver and Cable Support | **102**

PTX10004 Status Panel

The PTX10004 status panel shows the overall status of the chassis.

PTX10004 chassis ship with an enhanced power bus to future-proof the chassis for potential power growth.

The status panel indicates the chassis status through a set of five bicolor LEDs. It has an Azure blue stripe along the left side of the LEDs. See Figure 12 on page 24 for a chassis status panel.

Figure 12: Status Panel on the Chassis

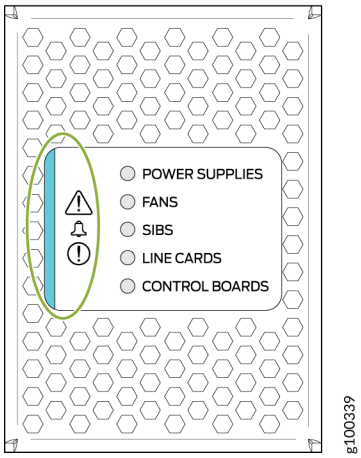


Table 7 on page 24 describes the status panel LEDs.

Table 7: Status Panel LEDs on a PTX10004

Name	Color	State	Description
! Minor alarm (Triangle warning symbol)	Yellow	Off	No minor alarms are active.
		On steadily	A minor alarm is active.
Alarm (Bell symbol)	Yellow	Off	No minor alarms are active.
		On steadily	A minor alarm is active.
	Red	Off	No major alarms are active.
		On steadily	A major alarm is active.
! Major alarm (Circle warning symbol)	Red	Off	No major alarms are active.

Table 7: Status Panel LEDs on a PTX10004 *(Continued)*

Name	Color	State	Description
		On steadily	A major alarm is active.
POWER SUPPLIES	Green	On steadily	All of the power supplies are online and operating normally.
	Yellow	Blinking	One or more of the power supplies has an error.
	None	Off	None of the power supplies is receiving power.
FANS	Green	On steadily	The fans and the fan tray controllers are online and operating normally.
	Yellow	Blinking	There is an error in a fan or in one of the fan tray controllers.
	None	Off	The fan tray controllers and fan trays are not receiving power.
SIBS	Green	On steadily	At least one installed Switch Interface Board (SIB) is online.
	Yellow	Blinking	There is a hardware error in one or more SIBs.
	None	Off	All the SIBs are offline.
LINE CARDS	Green	On steadily	At least one installed line card is online.
	Yellow	Blinking	There is a hardware error in one or more line cards.

Table 7: Status Panel LEDs on a PTX10004 *(Continued)*

Name	Color	State	Description
	None	Off	All the line cards are offline.
CONTROL BOARDS	Green	On steadily	All installed Routing and Control Boards (RCBs) are online.
	Yellow	Blinking	One or more RCBs have an error condition.
	None	Off	The installed RCBs are offline.

PTX10004 Optional Equipment

The PTX10004 routers offer a cable management system (JLC-CBL-MGMT-KIT) as an optional equipment. An ESD front door (JNP10004-FRNT-PNL) without an air filter comes standard with each configuration.

SEE ALSO

Install the PTX10004 Cable Management System | **208**

Install the Front Door on a PTX10004 Router | **131**

RELATED DOCUMENTATION

How to Troubleshoot PTX10004 Error Conditions | **233**

PTX10004 Cooling System

IN THIS SECTION

- PTX10004 Cooling System and Airflow | 27
- PTX10004 Fan Tray LEDs and Fan Tray Controller LEDs | 34

The PTX10004 cooling system components work together to keep all components within the acceptable temperature range. If the maximum temperature specification is exceeded and the system cannot be adequately cooled, the Routing and Control Board (RCB) shuts down some or all of the hardware components.

PTX10004 Cooling System and Airflow

IN THIS SECTION

- Fan Tray | 27
- Fan Tray Controller | 30
- Airflow Direction in the PTX10004 | 34

The cooling system in a PTX10004 chassis consists of dual fan trays (JNP10004-FAN2) with matching dual fan tray controllers (JNP10004-FTC2). Each fan tray requires a companion fan tray controller to be installed and operational to be hot-insertable and hot-removable.

Fan Tray

The JNP10004-FAN2 fan tray contains an array of internal fans, a non-removable control board, and LEDs.

The two fan trays install vertically, side by side, next to the power supplies on the FRU side of the chassis. Two handles on each front faceplate facilitate handling of the fan tray. See Figure 13 on page 28 and Figure 14 on page 28.

Figure 13: JNP10004-FAN2 Fan Tray

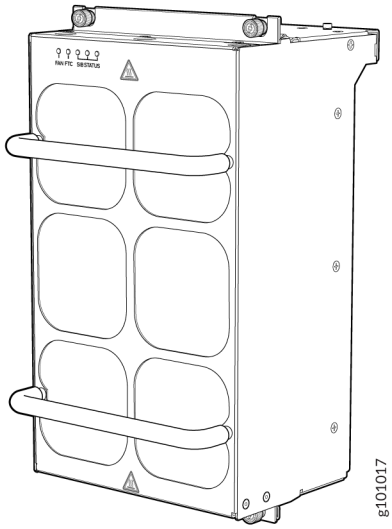
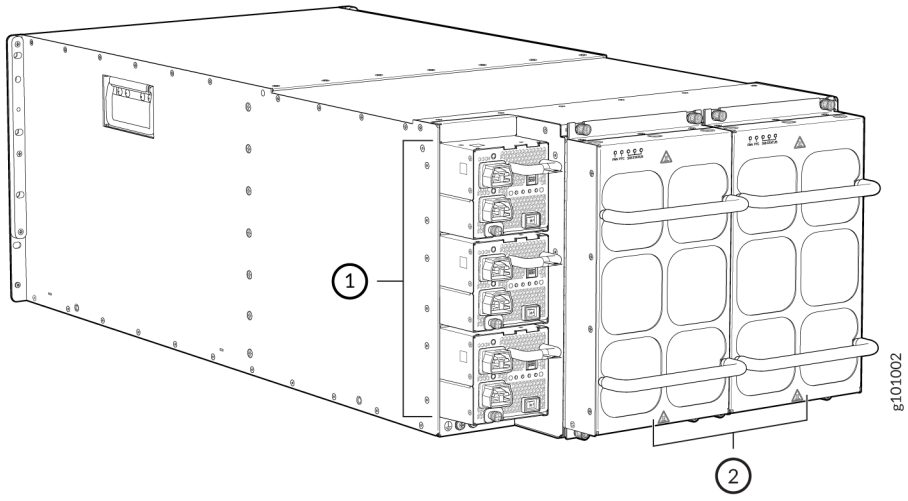


Figure 14: Installed Fan Trays on a PTX10004



1– Power supplies	2– Fan trays

See Table 8 on page 29 for the physical specifications of the fan trays.

Table 8: Fan Tray Specifications

Specification	JNP10004-FAN2
Corresponding fan tray controller model	JNP10004-FTC2
Number of fans per fan tray	6
Number of fans per chassis	12
Fan numbering	0 through 11
Volume flow at 100%	948 CFM for both fan trays
Introduced in Junos OS Release	20.3R1-EVO
Height	12.08 in. (30.68 cm)
Width	6.6 in. (16.8 cm)
Depth	5.5 in. (13.97 cm) without handles, 6.85 in. (17.4 cm) with handles
Weight	9.8 lb (4.45 kg)

The array of fans in both models operate as a single unit. If an individual fan in the array fails, the entire fan tray must be replaced. However, the fan tray continues to operate indefinitely and provides sufficient cooling even when a single rotor fails in a fan, provided the room temperature is within the operating range.

If you want to replace an existing fan tray while the router is running, remove only one fan tray. The router continues to operate for a limited time with a single operating fan tray without triggering a thermal alarm.

CAUTION: To avoid a thermal alarm, do not remove both fan trays while the router is operating.

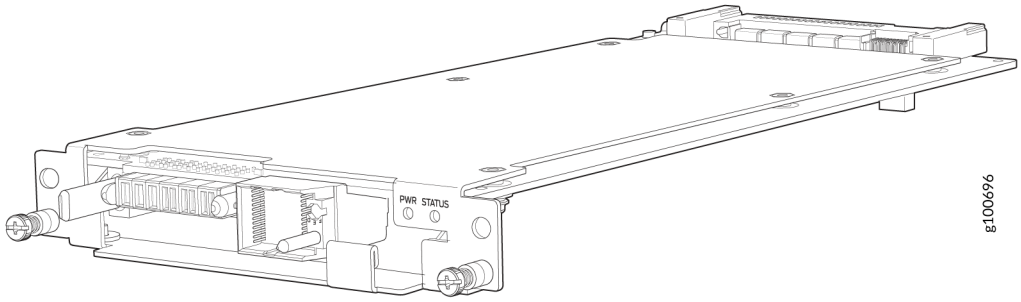
The internal fan control board in each fan tray contains the LEDs for the associated fan tray controllers and the LEDs for the three SIBs directly behind the fan tray.

Fan Tray Controller

The PTX10004 supports two fan tray controllers to provide the control logic and power to hot-insert and hot-remove a fan tray:

- JNP10004-FTC2—Supports model JNP10004-FAN2; see Figure 15 on page 30.

Figure 15: Fan Tray Controller JNP10004-FTC2



WARNING: Do not mix the fan tray controller models. Use only the supported fan tray model for each fan tray controller. See Table 9 on page 30.

Table 9: Fan Tray Controller Specifications

Specification	JNP10004-FTC2
Corresponding fan tray model	JNP10004-FAN2
Introduced in Junos OS Release	20.3R1-EVO
Height	1.5 in. (3.81 cm)
Width	6.5 in. (15.24 cm)
Depth	12.4 in. (31.5 cm)

Table 9: Fan Tray Controller Specifications *(Continued)*

Specification	JNP10004-FTC2
Weight	1.1 lb (0.5 kg)

The system continually monitors the temperature of critical parts across the chassis and adjusts the chassis fan speed according to the temperature. Junos OS controls the fan speed. Under normal operating conditions, the fans in the fan tray run at less than full speed. If one fan tray controller fails or appears missing (such as when a SIB is being replaced), the other fan tray controller sets the fans to full speed. This allows the router to continue to operate normally as long as the remaining fans cool the chassis sufficiently. Use the `show chassis fan` command to see the status of individual fans and fan speed. The following examples show the fan status for a system running JNP10004-FAN2.

```
user@system> show chassis fan
Item                      Status   % RPM     Measurement
      Fan Tray 0 Fan 0          Ok       59%       6300 RPM
      Fan Tray 0 Fan 1          Ok       55%       7500 RPM
      Fan Tray 0 Fan 2          Ok       60%       6450 RPM
      Fan Tray 0 Fan 3          Ok       54%       7350 RPM
      Fan Tray 0 Fan 4          Ok       59%       6300 RPM
      Fan Tray 0 Fan 5          Ok       55%       7500 RPM
      Fan Tray 0 Fan 6          Ok       59%       6300 RPM
      Fan Tray 0 Fan 7          Ok       54%       7350 RPM
      Fan Tray 0 Fan 8          Ok       60%       6450 RPM
      Fan Tray 0 Fan 9          Ok       54%       7350 RPM
      Fan Tray 0 Fan 10         Ok       59%       6300 RPM
      Fan Tray 0 Fan 11         Ok       54%       7350 RPM
      Fan Tray 1 Fan 0          Ok       59%       6300 RPM
      Fan Tray 1 Fan 1          Ok       55%       7500 RPM
      Fan Tray 1 Fan 2          Ok       59%       6300 RPM
      Fan Tray 1 Fan 3          Ok       55%       7500 RPM
      Fan Tray 1 Fan 4          Ok       60%       6450 RPM
      Fan Tray 1 Fan 5          Ok       55%       7500 RPM
      Fan Tray 1 Fan 6          Ok       59%       6300 RPM
      Fan Tray 1 Fan 7          Ok       54%       7350 RPM
      Fan Tray 1 Fan 8          Ok       60%       6450 RPM
      Fan Tray 1 Fan 9          Ok       54%       7350 RPM
      Fan Tray 1 Fan 10         Ok       54%       5850 RPM
      Fan Tray 1 Fan 11         Ok       50%       6750 RPM
```

To determine the cooling of all the components in the system, use the `show chassis environment` command.

```
user@system> show chassis environment
Class Item                            Status     Measurement
Temp  PSM 0                           Ok         31 degrees C / 87 degrees F
      PSM 1                           Ok         30 degrees C / 86 degrees F
      CB 0 Intake A Temp Sensor       Ok         29 degrees C / 84 degrees F
      CB 0 Intake B Temp Sensor       Ok         30 degrees C / 86 degrees F
      CB 0 Exhaust A Temp Sensor      Ok         32 degrees C / 89 degrees F
      CB 0 Exhaust B Temp Sensor      Ok         33 degrees C / 91 degrees F
      CB 0 Middle Temp Sensor         Ok         34 degrees C / 93 degrees F
      CB 1 Intake A Temp Sensor       Ok         28 degrees C / 82 degrees F
      CB 1 Intake B Temp Sensor       Ok         28 degrees C / 82 degrees F
      CB 1 Exhaust A Temp Sensor      Ok         31 degrees C / 87 degrees F
      CB 1 Exhaust B Temp Sensor      Ok         31 degrees C / 87 degrees F
      CB 1 Middle Temp Sensor         Ok         33 degrees C / 91 degrees F
      Fan Tray 0 Inlet Temp Sensor    Ok         26 degrees C / 78 degrees F
      Fan Tray 0 Outlet Temp Sensor   Ok         32 degrees C / 89 degrees F
      Fan Tray 1 Inlet Temp Sensor    Ok         27 degrees C / 80 degrees F
      Fan Tray 1 Outlet Temp Sensor   Ok         32 degrees C / 89 degrees F
      FPC 3 BT-0 HBM-0 Temperature    Ok         53 degrees C / 127 degrees F
      FPC 3 BT-0 HBM-1 Temperature    Ok         54 degrees C / 129 degrees F
      FPC 3 BT-1 HBM-0 Temperature    Ok         53 degrees C / 127 degrees F
      FPC 3 BT-1 HBM-1 Temperature    Ok         53 degrees C / 127 degrees F
      FPC 3 BT-2 HBM-0 Temperature    Ok         53 degrees C / 127 degrees F
      FPC 3 BT-2 HBM-1 Temperature    Ok         55 degrees C / 131 degrees F
      FPC 3 BT-3 HBM-0 Temperature    Ok         60 degrees C / 140 degrees F
      FPC 3 BT-3 HBM-1 Temperature    Ok         57 degrees C / 134 degrees F
      FPC 3 BT-4 HBM-0 Temperature    Ok         54 degrees C / 129 degrees F
      FPC 3 BT-4 HBM-1 Temperature    Ok         54 degrees C / 129 degrees F
      FPC 3 BT-0 Temp Sensor 1        Ok         83 degrees C / 181 degrees F
      FPC 3 BT-0 Temp sensor 0        Ok         87 degrees C / 188 degrees F
      FPC 3 BT-1 Temp Sensor 0        Ok         79 degrees C / 174 degrees F
      FPC 3 BT-1 Temp Sensor 1        Ok         78 degrees C / 172 degrees F
      FPC 3 BT-2 Temp Sensor 0        Ok         81 degrees C / 177 degrees F
      FPC 3 BT-2 Temp Sensor 1        Ok         81 degrees C / 177 degrees F
      FPC 3 CPU Temperature           Ok         60 degrees C / 140 degrees F
      FPC 3 DDR4 A                    Ok         44 degrees C / 111 degrees F
      FPC 3 DDR4 B                    Ok         38 degrees C / 100 degrees F
      FPC 3 Intake-A Temp sensor      Ok         42 degrees C / 107 degrees F
      FPC 3 Intake-B Temp sensor      Ok         36 degrees C / 96 degrees F
      FPC 3 BT-3 Temp Sensor 0        Ok         86 degrees C / 186 degrees F
```

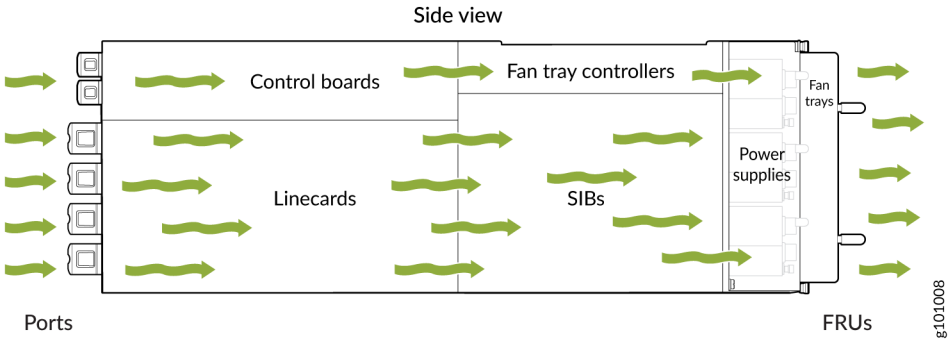
```
      FPC 3 BT-3 Temp Sensor 1       Ok         85 degrees C / 185 degrees F
      FPC 3 BT-4 Temp Sensor 0       Ok         72 degrees C / 161 degrees F
      FPC 3 BT-4 Temp Sensor 1       Ok         73 degrees C / 163 degrees F
      FPC 3 Exhaust-A Temp Sensor    Ok         53 degrees C / 127 degrees F
      FPC 3 Exhaust-B Temp Sensor    Ok         53 degrees C / 127 degrees F
      FPC 3 Exhaust-C Temp Sensor    Ok         48 degrees C / 118 degrees F
      FPC 3 PEX Temp Sensor          Ok         72 degrees C / 161 degrees F
      Unknown 0 FTC I2CS temp_sensor Ok         31 degrees C / 87 degrees F
      Unknown 1 FTC I2CS temp_sensor Ok         32 degrees C / 89 degrees F
      SIB 0 Exhaust-1 temp sensor    Ok         38 degrees C / 100 degrees F
      SIB 0 Exhaust-2 temp sensor    Ok         40 degrees C / 104 degrees F
      SIB 0 Intake-1 temp sensor     Ok         28 degrees C / 82 degrees F
      SIB 0 Intake-2 temp sensor     Ok         28 degrees C / 82 degrees F
      SIB 0 Intake-3 temp sensor     Ok         34 degrees C / 93 degrees F
      SIB 0 Exhaust-3 temp sensor    Ok         43 degrees C / 109 degrees F
      SIB 0 ZF1 temp sensor          Ok         56 degrees C / 132 degrees F
      SIB 0 Intake-4 temp sensor     Ok         32 degrees C / 89 degrees F
      SIB 0 PEXSW Temp Sensor        Ok         34 degrees C / 93 degrees F
      Routing Engine 0 CPU Temperature Ok       37 degrees C / 98 degrees F
Fan   Fan Tray 0 Fan 0               Ok         6450 RPM
      Fan Tray 0 Fan 1               Ok         7350 RPM
      Fan Tray 0 Fan 2               Ok         6450 RPM
      Fan Tray 0 Fan 3               Ok         7350 RPM
      Fan Tray 0 Fan 4               Ok         6300 RPM
      Fan Tray 0 Fan 5               Ok         7350 RPM
      Fan Tray 0 Fan 6               Ok         6300 RPM
      Fan Tray 0 Fan 7               Ok         7350 RPM
      Fan Tray 0 Fan 8               Ok         6450 RPM
      Fan Tray 0 Fan 9               Ok         7500 RPM
      Fan Tray 0 Fan 10              Ok         6450 RPM
      Fan Tray 0 Fan 11              Ok         7500 RPM
      Fan Tray 1 Fan 0               Ok         6300 RPM
      Fan Tray 1 Fan 1               Ok         7350 RPM
      Fan Tray 1 Fan 2               Ok         6300 RPM
      Fan Tray 1 Fan 3               Ok         7500 RPM
      Fan Tray 1 Fan 4               Ok         6450 RPM
      Fan Tray 1 Fan 5               Ok         7350 RPM
      Fan Tray 1 Fan 6               Ok         6300 RPM
      Fan Tray 1 Fan 7               Ok         7350 RPM
      Fan Tray 1 Fan 8               Ok         6300 RPM
      Fan Tray 1 Fan 9               Ok         7350 RPM
```

```
Fan Tray 1 Fan 10              Ok          5700 RPM
Fan Tray 1 Fan 11              Ok          6900 RPM
```

Airflow Direction in the PTX10004

The air intake to cool the chassis is located on the port (line card) side of the chassis. Air flows into the chassis from the ports in the Routing and Control Boards (RCBs) and line cards, through the Switch Interface Boards (SIBs), and exits from the fan trays and the power supplies. See Figure 16 on page 34.

Figure 16: Airflow Through a PTX10004



The fan tray continues to operate indefinitely and provide sufficient cooling even when a single rotor fails, provided the room temperature is within the operating range. You can check the status of fans by viewing the LEDs on each fan tray. See "PTX10004 Fan Tray LEDs and Fan Tray Controller LEDs" on page 34.

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

In addition to the fans in the fan trays, there is an internal fan in each power supply that also helps to cool components, such as the line cards.

PTX10004 Fan Tray LEDs and Fan Tray Controller LEDs

IN THIS SECTION

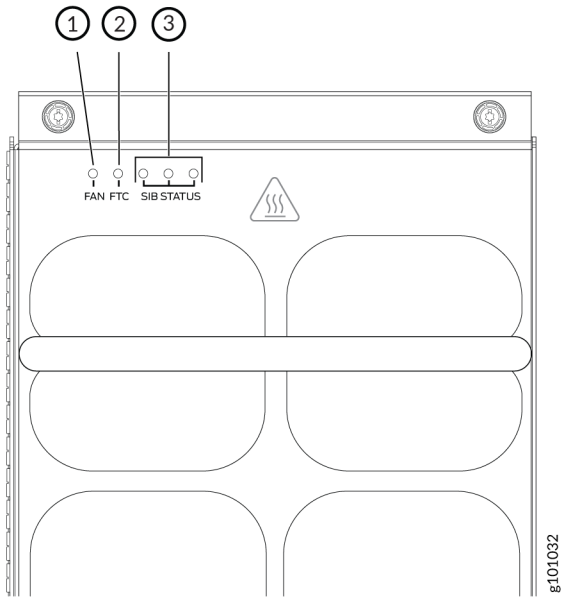
- Fan Tray LEDs | 35
- Fan Tray Controller LEDs | 40

Each fan tray has a set of LEDs, and each corresponding fan tray controller also has a set of LEDs.

Fan Tray LEDs

Each fan tray has a set of five LEDs that represent the status of the fans in the fan tray, the fan tray controller, and three of the Switch Interface Boards (SIBs). The LEDs are located on the top left corner of each fan tray. Figure 17 on page 35 shows the location of the LEDs on JNP10004-FAN2 fan trays.

Figure 17: Fan Tray JNP10004-FAN2 LEDs



1– Fan status LED	3– SIB status LEDs (SIB 0 through SIB 2 for the left fan tray and SIB 3 through SIB 5 for the right fan tray)
2– Fan tray controller status LED	

Table 10 on page 36 describes the functions of the fan tray LEDs.

Table 10: Fan Tray LEDs on a PTX10004

Name	Color	State	Description
FAN (fan status)	Green	On steadily	All fans are operating normally. The system has verified that the fan tray is engaged, that the airflow is in the correct direction, and that all fans are operating correctly.
	Green	Blinking	The fan tray is starting up. The fan tray is not ready.
	Amber	Blinking	An error has been detected in one or more fans in the fan tray. Replace the fan tray as soon as possible. Either the fan has failed or it has become disconnected. To maintain proper airflow through the chassis, leave the fan tray installed in the chassis until you are ready to replace it.
	Amber	Blipping	Beacon is enabled.
	None	Off	The fan is not receiving power from the fan tray controller. All fans are off.
FTC (fan tray controller status)	Green	On steadily	Power is on. The fan tray controller is online and is operating normally.
	Amber	Blinking	An error has been detected in the fan tray controller. Replace the fan tray controller as soon as possible. The fan tray controller is located behind the fan tray above the SIBs. To maintain proper airflow through the chassis, leave the fan tray installed in the chassis until you are ready to replace the fan tray controller.

Table 10: Fan Tray LEDs on a PTX10004 *(Continued)*

Name	Color	State	Description
	Amber	Blipping	Beacon is enabled.
	None	Off	The fan tray controller is not receiving power.
SIB Status (SIB 0 status)	Green	On steadily	The left-most SIB in the chassis is online.
	Amber	Blinking	An error has been detected in SIB 0. Replace the SIB as soon as possible. The SIB is located behind the left fan tray and is the left-most SIB in the chassis. To maintain proper airflow through the chassis, leave the fan tray installed in the chassis until you are ready to replace the SIB.
	Amber	Blipping	Beacon is enabled.
	None	Off	The SIB is offline.
SIB Status (SIB 1 status)	Green	On steadily	The center SIB behind the left fan tray is online.
	Amber	Blinking	An error has been detected in SIB 1. Replace the SIB as soon as possible. The SIB is located behind the left fan tray and is the middle SIB in the group of 3. To maintain proper airflow through the chassis, leave the fan tray installed in the chassis until you are ready to replace the SIB.
	None	Off	The SIB is offline.

Table 10: Fan Tray LEDs on a PTX10004 *(Continued)*

Name	Color	State	Description
SIB Status (SIB 2 status)	Green	On steadily	The right-most SIB behind the left fan tray is online.
	Amber	Blinking	An error has been detected in SIB 2. Replace the SIB as soon as possible. The SIB is located behind the left fan tray and is the right-most SIB in the group of 3. To maintain proper airflow through the chassis, leave the fan tray installed in the chassis until you are ready to replace the SIB.
	Amber	Blipping	Beacon is enabled.
	None	Off	The SIB is offline.
SIB Status (SIB 3 status)	Green	On steadily	The left-most SIB behind the right fan tray is online.
	Amber	Blinking	An error has been detected in SIB 3. Replace the SIB as soon as possible. The SIB is located behind the right fan tray and is the left-most SIB of the group of 3. To maintain proper airflow through the chassis, leave the fan tray installed in the chassis until you are ready to replace the SIB.
	Amber	Blipping	Beacon is enabled.
	None	Off	The SIB is offline.
SIB Status (SIB 4 status)	Green	On steadily	The center SIB behind the right fan tray is online.

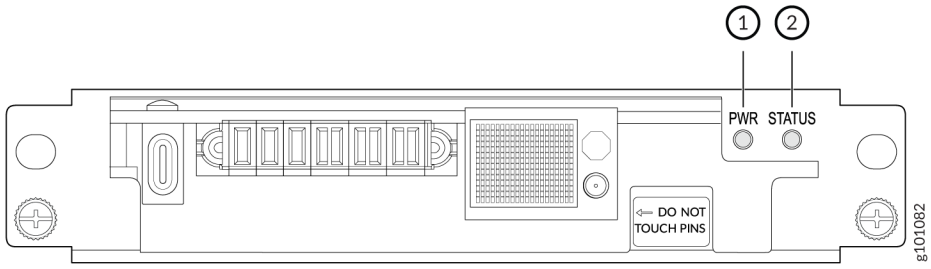
Table 10: Fan Tray LEDs on a PTX10004 ***(Continued)***

Name	Color	State	Description
	Amber	Blinking	An error has been detected in SIB 4. Replace the SIB as soon as possible. The SIB is located behind the right fan tray and is the middle SIB in the group of 3. To maintain proper airflow through the chassis, leave the fan tray installed in the chassis until you are ready to replace the SIB.
	Amber	Blipping	Beacon is enabled.
	None	Off	The SIB is offline.
SIB Status (SIB 5 status)	Green	On steadily	The right-most SIB behind the right fan tray is online.
	Amber	Blinking	An error has been detected in SIB 5. Replace the SIB as soon as possible. The SIB is located behind the right fan tray and is the right-most SIB in the group of 3. To maintain proper airflow through the chassis, leave the fan tray installed in the chassis until you are ready to replace the SIB.
	Amber	Blipping	Beacon is enabled.
	None	Off	The SIB is offline.

Fan Tray Controller LEDs

The fan tray controller LEDs are visible only when the associated fan tray is removed. The fan tray controller LEDs are located on the right of the controller panel. Figure 18 on page 40 shows the location of the LEDs on the JNP10004-FTC2 fan tray controller faceplate.

Figure 18: Fan Tray Controller LEDs on a PTX10004



1– Fan tray controller power

2– Fan tray controller status

Table 11 on page 40 describes the functions of the fan tray controller LEDs.

Table 11: Fan Tray Controller LEDs on a PTX10004

Name	Color	State	Description
PWR (fan tray controller power)	Green	On steadily	The fan tray controller has power and is operating normally.
	Amber	Blinking	A power error has been detected in the fan tray controller. Replace the fan tray controller as soon as possible. To maintain proper airflow through the chassis, leave the fan tray installed in the chassis until you are ready to replace the fan tray controller.
	None	Off	The fan tray controller is not powered on or is not receiving power.
STATUS (fan tray controller status)	Green	On steadily	The fan tray controller is online and is operating normally.

Table 11: Fan Tray Controller LEDs on a PTX10004 *(Continued)*

Name	Color	State	Description
	Amber	Blinking	An error has been detected in the fan tray controller. Replace the fan tray controller as soon as possible. To maintain proper airflow through the chassis, leave the fan tray installed in the chassis until you are ready to replace the fan tray controller.
	None	Off	The fan tray controller is not receiving power.

SEE ALSO

Install and Remove PTX10004 Cooling System Components | **158**

PTX10004 Power System

IN THIS SECTION

- JNP10K-PWR-AC2 Power Supply | **42**
- JNP10K-PWR-DC2 Power Supply | **44**
- JNP10K-PWR-AC2 Power Supply LEDs | **46**
- JNP10K-PWR-DC2 Power Supply LEDs | **48**

You can install up to three power supplies in a PTX10004 router in the slots labeled **PSU0** through **PSU2** (top to bottom) located in the rear of the chassis. The JNP10K-PWR-AC2 is designed for AC, high-voltage alternating current (HVAC) and high-voltage direct current (HVDC) environments and can be set for single or dual feeds and high or low output settings. The JNP10K-PWR-DC2 power supply is two DC power supplies bundled in a single housing. Both models can provide up to 5500 W of output power.

The JNP10K-PWR-AC2 and JNP10K-PWR-DC2 power supplies share power.

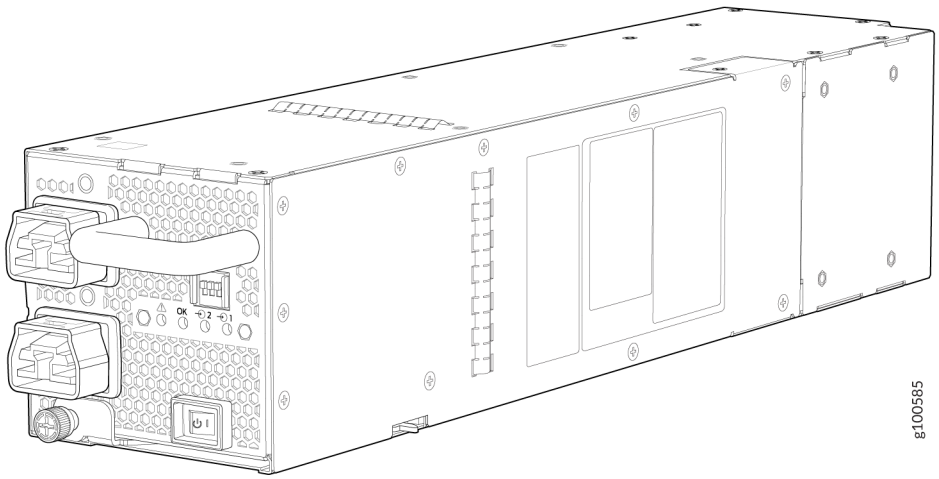
JNP10K-PWR-AC2 Power Supply

The JNP10K-PWR-AC2 power supply is a high-capacity model that is designed to support AC, high-voltage AC (HVAC), or high-voltage DC (HVDC) systems in either a 20-A or a 30-A mode; see Figure 19 on page 42. The power supply feeds AC input and provides DC output of 5000 W with a single feed and 5500 W with a dual feed. The operating input voltage range is 180 to 305 VAC for AC systems and 190 to 410 VDC for DC systems.

The number of power feeds and whether the power supplies provide high-output (30-A) or low-output (20-A) power are configured using a set of dual inline package (DIP) switches on the faceplate of the power supply. If one power supply in the chassis is set to low power, the power budget for the chassis is reduced to low power, regardless of their DIP switch settings or the output results in the CLI. This design safeguards against accidentally setting the power supply to 30 A in a facility that can provide only 20 A and tripping the facility circuit breaker. We recommend that you don't mix DIP switch settings in your system. See Table 12 on page 43 for information about the input and output voltages when you use the DIP switches.

The JNP10K-PWR-AC2 power supply has internal fans that contribute to chassis cooling. Consequently, all three power supplies must be present in a running chassis to have the adequate airflow. While all power supplies are required to be present in the chassis, they do not necessarily need to be all connected to power. If a power supply is installed in a slot but not connected to a power source, it draws power from the chassis to power the internal fans in the power supplies.

Figure 19: JNP10K-PWR-AC2 Power Supply



WARNING: Extreme burn danger—Do not handle an HVAC or HVDC power supply running in the chassis without heat protective gloves, such as welder's gloves. The JNP10K-PWR-AC2 can reach temperatures in the range of 158°F to 176°F (70°C to 80°C) under running conditions.

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

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

CAUTION: Use a 2-pole circuit breaker rated at 25 A in the building installation and the system, or as per local electrical code.

Table 12: DIP Switch Settings for JNP10K-PWR-AC2 Power Supplies

INP0 (Switch 1)	INP1 (Switch 2)	H/L (High Input 30 A/ Low Input 20 A)	Output Power
On	On	On (30 A)	5500 W
On	On	Off (20 A)	3000 W
On	Off	On (30 A)	5000 W
Off	On	On (30 A)	5000 W
On	Off	Off (20 A)	2700 W
Off	On	Off (20 A)	2700 W

CAUTION: It is important to connect both input feeds of the JNP10K-PWR-AC2 power supply to AC mains before loading the system with power.

JNP10K-PWR-DC2 Power Supply

The JNP10K-PWR-DC2 power supply provides two power supplies in a single housing that accepts either 60 A or 80 A using four redundant input power feeds. The two internal power supplies (PS_0 and PS_1) each have redundant input feeds: A0 and/or B0 for PS_0 and A1 and/or B1 for PS_1. You configure the input using a set of three DIP switches on the power supply faceplate that sets the combined output power for both internal power supplies. The output depends on the settings of these DIP switches. See Table 13 on page 44 and Figure 20 on page 45.

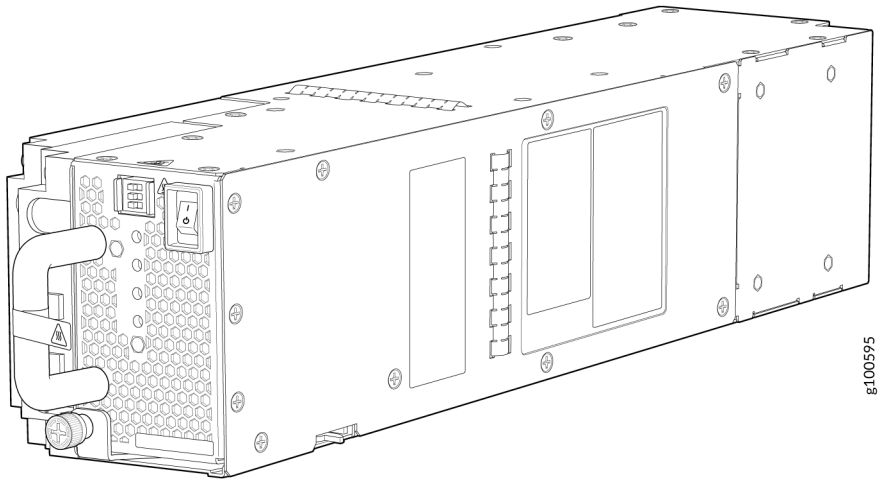
Table 13: DIP Switch Settings for JNP10K-PWR-DC2 Power Supplies

INP0 (Switch 1)	INP1 (Switch 2)	H/L (High Input 80 A/ Low Input 60 A)	Output Power
On	On	On (80 A)	5500 W
On	On	Off (60 A)	4400 W
On	Off	On (80 A)	2750 W
Off	On	On (80 A)	2750 W
On	Off	Off (60 A)	2200 W

Table 13: DIP Switch Settings for JNP10K-PWR-DC2 Power Supplies *(Continued)*

INP0 (Switch 1)	INP1 (Switch 2)	H/L (High Input 80 A/ Low Input 60 A)	Output Power
Off	On	Off (60 A)	2200 W

Figure 20: JNP10K-PWR-DC2 Power Supply



The JNP10K-PWR-DC2 power supply has internal fans that contribute to chassis cooling. Consequently, all three power supplies must be present in a running chassis to have the adequate airflow. While all power supplies are required to be present in the chassis, they do not necessarily need to be all connected to power. If a power supply is installed in a slot but not connected to a power source, it draws power from the chassis to power the internal fans in the power supplies.

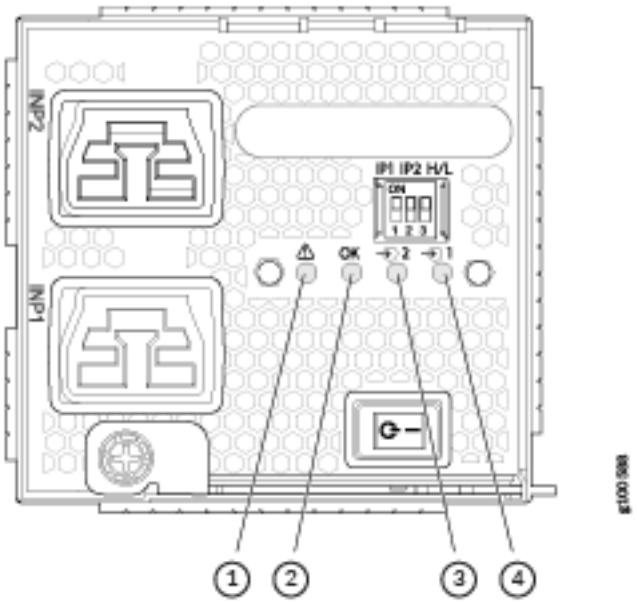
WARNING: The router is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal on the chassis that must be connected to earth ground permanently to ground the chassis adequately and protect the operator from electrical hazards.

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

JNP10K-PWR-AC2 Power Supply LEDs

The JNP10K-PWR-AC2 power supply has four LEDs on its faceplate: **!**, **OK**, **2**, and **1**. These LEDs display information about the status of the power supply. See Figure 21 on page 46.

Figure 21: LEDs on a JNP10K-PWR-AC2 Power Supply



1– **!** Fault	3– **2** INP2–Source input 1
2– **OK** Power OK	4– **1** INP1–Source input 0

NOTE: Physical markings on the power supply are **1** and **2**. These markings correspond to INP0 and INP1 in the `show chassis power` output (see Table 14 on page 46).

Table 14: Physical Markings on Chassis Versus show chassis power Command

Physical Marking on JNP10K-PWR-AC2	show chassis power Command
INP1	INP0
INP2	INP1

Table 15 on page 47 describes the LEDs on a JNP10K-PWR-AC2 power supply.

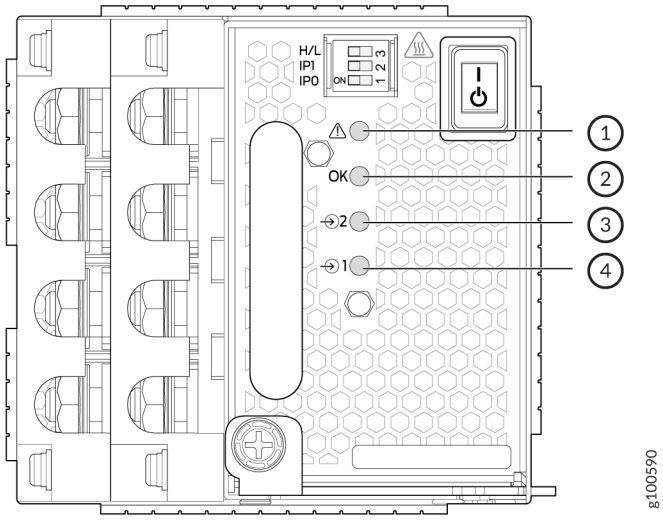
Table 15: JNP10K-PWR-AC2 LEDs on a PTX10004

LED	Color	State	Description
1 or (INP0 in CLI output)	Yellow	Blinking	The input voltage is present, but a fault is detected.
	Green	Solid	The power supply is functioning properly.
	Unlit	Off	The power supply is switched off; voltage is zero.
2 or (INP1 in CLI output)	Yellow	Blinking	The input voltage is present, but a fault is detected.
	Green	Solid	The power supply is functioning properly.
	Unlit	Off	The power supply is switched off; voltage is zero.
OK (Power OK)	Green	Solid	The power supply is functioning properly.
	Yellow	Blinking	The power supply output has detected a fault.
! (Fault)	Red	Solid	The power supply has failed and must be replaced.
	Unlit	Off	The power supply is functioning normally.

JNP10K-PWR-DC2 Power Supply LEDs

A JNP10K-PWR-DC2 power supply has four LEDs on its faceplate: **1**, **2**, **OK**, and the symbol for fault, **!**. These LEDs display information about the status of the power supply. See Figure 22 on page 48.

Figure 22: LEDs on a JNP10K-PWR-DC2 Power Supply



1– **!** Fault	3– **2** Power source input 1
2– **OK** Power OK	4– **1** Power source input 0

Table 16 on page 48 describes the LEDs on a JNP10K-PWR-DC2 power supply.

Table 16: LEDs on a JNP10K-PWR-DC2 Power Supply

LED	Color	State	Description
1 (`INP0` in CLI output) or **2** (`INP1` in CLI output)	Green	Solid	The DC power is within normal operating range (–40 VDC to –72 VDC).
	Yellow	Blinking	The DC power input voltage is not within normal operating range.
	Unlit	Off	The power supply is switched off.

Table 16: LEDs on a JNP10K-PWR-DC2 Power Supply *(Continued)*

LED	Color	State	Description
OK (Power OK)	Green	Solid	The DC power output is within normal operating range.
	Yellow	Blinking	The power supply output is out of the power limits.
! (Fault)	Red	Solid	The power supply has failed and must be replaced.
	Unlit	Off	The power supply is functioning normally. Or, only one input is powered and the enable switch for the input that is not powered is set to **ON**. See "Install a JNP10K-PWR-DC2 Power Supply" on page 175 for more information about the enable switches.

NOTE: If the **1** or **2** and the **OK** LED are unlit, the power cables are not installed properly or the power supply has failed.

If the **1** or **2** LED is lit green and the **OK** LED is unlit, the power supply is not installed properly or the power supply has an internal failure.

If the **!** LED is blinking, add a power supply to balance the power demand and supply.

RELATED DOCUMENTATION

PTX10004 Power Planning | **84**

Install and Remove PTX10004 Power System Components | **167**

PTX10004 Routing and Control Board Components and Descriptions

IN THIS SECTION

- PTX10004 Routing and Control Board Description | 50
- PTX10004 Routing and Control Board LEDs | 53

The Routing and Control Board (RCB) is an integrated board and a single field-replaceable unit (FRU) that provides Routing Engine and Control Board (CB) functionality. The Routing Engine performs all route-processing functions, whereas the CB performs chassis control and management plane functionality. The RCB provides control plane functions. You can install one or two RCBs on the router. Each RCB functions as a unit.

PTX10004 Routing and Control Board Description

IN THIS SECTION

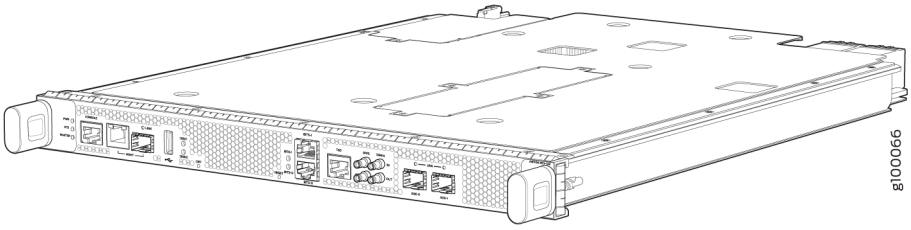
- Routing and Control Board Functions | 51
- Routing and Control Board Components | 51
- Routing and Control Board Physical Specifications | 52

The PTX10004 Routing and Control Board (RCB) is responsible for system management (see Figure 23 on page 51). The chassis can run with one or two RCBs. We ship the base configuration with one RCB, and you can expand the configuration with a second RCB for a fully redundant system. When two RCBs are installed, one functions as the primary RCB and the second as a backup. If the primary RCB is removed, the backup RCB becomes the primary if graceful Routing Engine switchover (GRES) is configured.

PTX10004 routers support the following Routing Engines:

- JNP10K-RE1-E (64 GB, standard)
- JNP10K-RE1-E128 (128 GB, spare)

Figure 23: JNP10K-RE1-E and JNP10K-RE1-E128



Routing and Control Board Functions

The RCB integrates the control plane and Routing Engine functions into a single management unit. Each RCB provides all the functions needed to manage the operation of the modular chassis:

- System control functions such as environmental monitoring
- Routing Layer 2 and Layer 3 protocols
- Communication to all components such as line cards, Switch Interface Boards (SIBs), and power and cooling
- Transparent clocking
- Alarm and logging functions

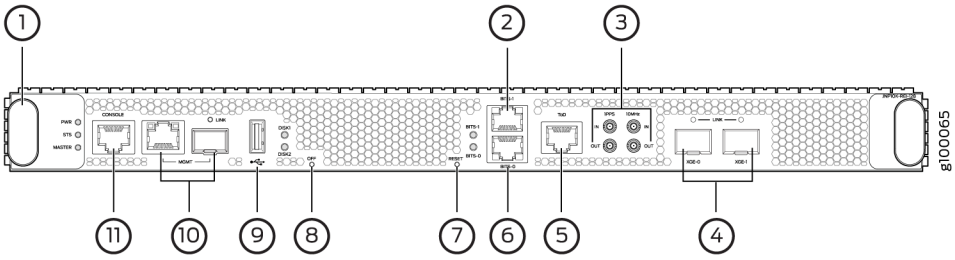
Routing and Control Board Components

Each RCB consists of the following internal components:

- 10 Core 2.2 GHz CPU
- 64 GB SDRAM or 128 GB SDRAM
- 2x 200GB M.2 SSD

Other standard features are shown in Figure 24 on page 52.

Figure 24: Routing and Control Board Faceplate (JNP10K-RE1-E and JNP10K-RE1-128E)



1– Handle	7– Reset button
2– **BITS-1** clock port	8– **OFF** LED
3– GPS clock ports (**1PPS** and **10MHz**)	9– USB port
4– **XGE-0** and **XGE-1** not used (reserved ports)	10– Management (**MGMT**) ports
5– **ToD**—Time-of-day (TOD) port	11– Console (**CONSOLE**) port
6– **BITS-0** clock port	

Routing and Control Board Physical Specifications

Table 17 on page 52 shows the physical specifications for either model of the RCB.

Table 17: (JNP10K-RE1-E and JNP10K-RE1-128E Physical Specifications

Height	Width	Depth	Weight
1.3 in. (3.3 cm)	15.05 in. (38.2 cm)	18.96 in. (48.2 cm)	12.2 lb (5.54 kg)

SEE ALSO

How to Hold a Routing and Control Board | **151**

How to Store a Routing and Control Board | **152**

Figure 62 | **154**

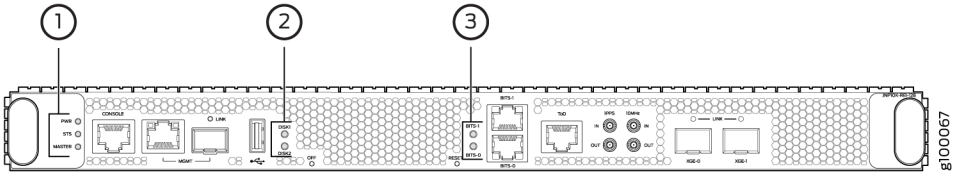
PTX10004 Routing and Control Board LEDs

IN THIS SECTION

- Routing and Control Board Status Panel LEDs | 53
- PTX10004 Management Port LEDs | 54
- Clock LEDs | 56

The JNP10K-RE1-E Routing and Control Board (RCB) has various types of LED indicators (see Figure 25 on page 53).

Figure 25: JNP10K-RE1-E Routing and Control Board LEDs

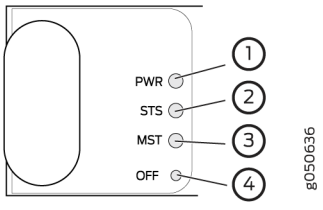


1– RCB status panel	3– Clock—**BITS-0** and **BITS-1**
2– SSD—**DISK1** and **DISK2**	

Routing and Control Board Status Panel LEDs

The RCB status panel LEDs indicate the state of the RCB (see Figure 26 on page 53).

Figure 26: Routing and Control Board Status Panel LEDs and Button



1– Power (**PWR**) LED	3– Primary (**MST**) LED

2– Status (**STS**) LED	4– Offline (**OFF**) button

Table 18 on page 54 describes the LEDs on the RCB status panel.

Table 18: Routing and Control Board Status LEDs

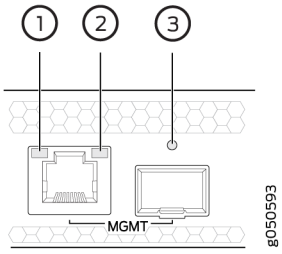
LED	Color	State	Description
PWR (Power)	Green	On steadily	The RCB is receiving adequate power.
	Yellow	Blinking	The RCB has detected an error.
	None	Unlit	The RCB is not powered up.
STS (Status)	Green	On steadily	The RCB is online and functioning correctly.
	Green	Blinking	The beacon feature is enabled.
	Yellow	On steadily	The RCB is booting.
	Yellow	Blinking	The RCB has detected an error.
	None	Unlit	The RCB is not receiving power.
MST (Primary)	Green	On steadily	The RCB is the primary RCB.
	None	Unlit	The RCB is the backup RCB.

PTX10004 Management Port LEDs

The two management ports on the RCB of a PTX10004 have LEDs that indicate link status and link activity. These two ports, located on the RCB panel between the clocking connections and the USB port, are both labeled **MGMT**. The left management port (RJ-45) is for 10/100/1000 BASE-T connections, and the right port (SFP) is for 10/100/1000 BASE-T and small form-factor pluggable (SFP)

1000 BASE-X connections (see Figure 27 on page 55). The copper (RJ-45) port has separate LEDs for status and activity. The fiber (SFP) port has a combination link and activity LED.

Figure 27: Management Port LEDs on a PTX10004



1– Status (RJ-45)	3– Link/activity/status (SFP)
2– Activity (RJ-45)	

Table 19 on page 55 describes the RJ-45 management port LEDs, and Table 20 on page 56 describes the SFP status LED.

Table 19: RJ-45 Management Port LEDs on a PTX10004 Routing and Control Board

LED	Color	State	Description
Port speed	Unlit	Off	The port speed is 10 MB.
	Green	Blinking	The port speed is 100 MB.
	Green	On steadily	The port speed is 1000 MB.
Link/Activity/Status	Unlit	Off	No link is established, there is a fault, or the link is down.
	Green	On steadily	A link is established.
		Blinking	There is link activity.
	Yellow	Blinking or flickering	The beacon feature is enabled.

Table 20: SFP Management Port LED on a PTX10004 Routing and Control Board

LED	Color	State	Description
Link/Activity/Status	Unlit	Off	No transceiver is present.
	Green	On steadily	A link is established. The interface is up.
	Green	Blinking or flickering	The beacon feature is enabled.
	Yellow	Blinking	An error has occurred.

XGE0 and **XGE1** are not used.

Clock LEDs

The clock LEDs indicate whether clocking is active.

Table 21 on page 56 describes the clock LEDs.

Table 21: Routing and Control Board Clock Status LEDs

LED	Color	State	Description
Clock LEDs—**BITS-0** and **BITS-1**	Red	Off	Clock is active.
		On steadily	Clock is not working.

SEE ALSO

Install a PTX10004 Routing and Control Board | 152

Remove a PTX10004 Routing and Control Board | 155

PTX10004 Switch Fabric

IN THIS SECTION

- PTX10004 Switch Interface Board Description | 57

The PTX10004 Switch Interface Boards (SIBs) form the switch fabric for the router.

PTX10004 Switch Interface Board Description

Switch Interface Boards (SIBs) create the switch fabric for the PTX10004. The router contains between three and six SIBs that are installed vertically, mid-chassis, between the line cards and the RCBs in the front and the fan trays in the rear.

The SIBs make up the PTX10004 switching plane that supports the 14.4-Tbps line card and operates in Junos OS Evolved systems. Each SIB has four connectors that correspond to a matching connector on one of the four line cards; see Figure 28 on page 58.

Figure 28: JNP10004 Switch Interface Board

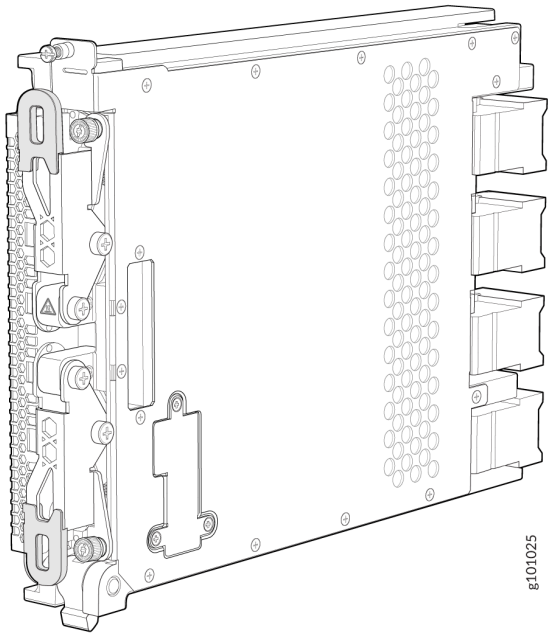


Table 22: SIB Specifications

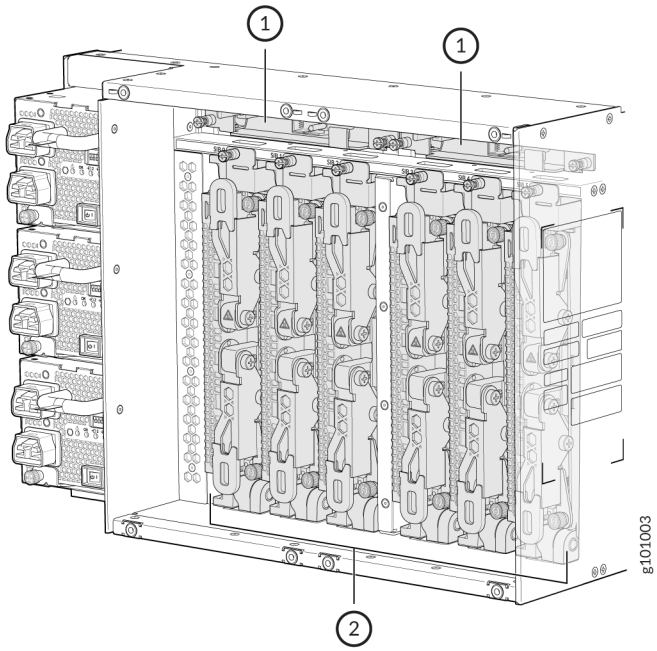
Specification	JNP10004-SF3
Operating system	Junos OS Evolved Release 20.4R1 and later
Supported line cards	PTX10K-LC1201-36CD, PTX10K-LC1202-36MR
Number of SIBs required for operation	All systems require a minimum of 3 SIBs; a system populated with 14.4Tbps line cards requires 6 SIBs
Height	9.43 in. (23.95 cm)
Width	1.77 in. (4.48 cm)

Table 22: SIB Specifications *(Continued)*

Specification	JNP10004-SF3
Depth	13.22 in. (33.02 cm)
Weight	9.81 lb (4.45 kg)

SIBs are hot-removable and hot-insertable field-replaceable units (FRUs). They are not visible from the outside of the router chassis. You must remove one of the fan trays to view the SIBs. For instructions on removing the fan trays, see "Remove a PTX10004 Fan Tray" on page 160. The SIBs are numbered **SIB0** to **SIB5** from left to right. See Figure 29 on page 59.

Figure 29: SIBs Installed in a PTX10004



1– Fan tray controllers

2– SIBs

SEE ALSO

Install a PTX10004 Switch Interface Board | **190**

Remove a PTX10004 Switch Interface Board | **195**

PTX10004 Line Card Components and Descriptions

IN THIS SECTION

- PTX10K-LC1201-36CD Line Card | 60
- PTX10K-LC1202-36MR Line Card | 66
- PTX10004 Cable Management System | 72

The line cards in PTX10004 routers combine a Packet Forwarding Engine and Ethernet interfaces in a single assembly. Line cards are field-replaceable units (FRUs) that can be installed in the line-card slots on the front of the router chassis. The line cards are hot-insertable and hot-removable—you can remove and replace them without powering off the router or disrupting router functions.

PTX10K-LC1201-36CD Line Card

IN THIS SECTION

- Overview | 61
- Network Ports | 62
- Channelization | 62
- Network LEDs | 64
- Line Card Status LEDs | 65

The PTX10K-LC1201-36CD line card is a 36-port line card that provides a line rate throughput of 14.4 Tbps. The line card has 36 QSFP56-DD ports capable of supporting 400-Gbps speed (see Figure 30 on page 61). You can channelize the ports to operate at 200-Gbps, 100-Gbps, 50-Gbps, 25-Gbps, or 10-Gbps speed by using breakout cables.

The line card is designed to operate using the newer Routing Engines, the JNP10004-SF3 switch fabric, the JNP10008-SF3 switch fabric, or the JNP10016-SF3 switch fabric; the JNP10K-PWR-AC2 or JNP10K-PWR-DC2 power supply; the JNP10004-FAN2, the JNP10008-FAN2, or the JNP10016-FAN

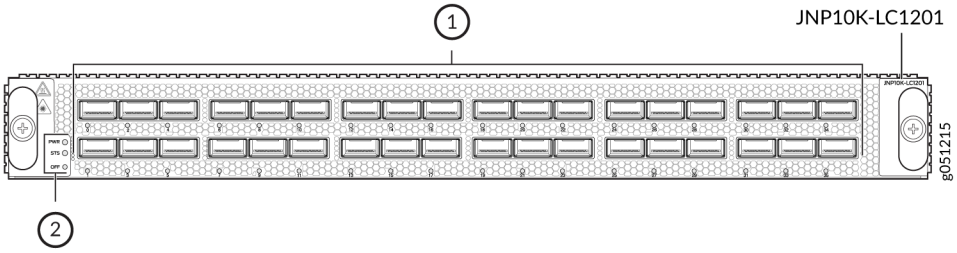
fan tray; and the JNP10004-FTC2, the JNP10008-FTC2, or the JNP10016-FTC2 fan tray controller. These components require Junos OS Evolved.

Overview

The PTX10K-LC1201-36CD line card houses Packet Forwarding Engine based on Juniper Networks' custom ASICs to deliver a 400GbE solution for data centers.

You can install the PTX10K-LC1201-36CD line card in the PTX10004, PTX10008, and PTX10016 chassis horizontally at the front of the chassis.

Figure 30: PTX10K-LC1201-36CD Port Panel



1– Network ports and LEDs	2– Power LED (PWR), status LED (STS), and offline button (OFF)

PTX10004 routers running Junos OS Evolved Release 20.3R1 with Junos Continuity and later support the PTX10K-LC1201-36CD line card. PTX10008 routers running Junos OS Evolved Release 19.4R1-S1 and later support the PTX10K-LC1201-36CD line card. PTX10016 routers running Junos OS Evolved Release 21.2R2 and later support the PTX10K-LC1201-36CD line card. The PTX10K-LC1201-36CD line card interoperates with the PTX10K-LC1202-36MR line card on a PTX10004, PTX10008, or PTX10016 router (see Table 23 on page 61).

Table 23: Components Required for the PTX10K-LC1202-36CD Line Cards

Component (Field Replaceable Unit)	Part Number for the PTX10004	Part Number for the PTX10008	**Part Number for the PTX10016**
Switch fabric	JNP10004-SF3	JNP10008-SF3	JNP10016-SF3
RCB	JNP10K-RE1-E, JNP10K-RE1-128G-E, or JNP10K-RE1-ELT	JNP10K-RE1-E, JNP10K-RE1-ELT or JNP10K-RE1-128G-E	JNP10K-RE1-E, JNP10K-RE1-ELT or JNP10K-RE1-128G-E

Table 23: Components Required for the PTX10K-LC1202-36CD Line Cards *(Continued)*

Component (Field Replaceable Unit)	Part Number for the PTX10004	Part Number for the PTX10008	**Part Number for the PTX10016**
Fan tray	JNP10004-FAN2	JNP10008-FAN2	JNP10016-FAN2
Fan tray controller	JNP10004-FTC2	JNP10008-FTC2	JNP10016-FTC2
Power supply	JNP10K-PWR-AC2 or JNP10K-PWR-DC2	JNP10K-PWR-AC2 or JNP10K-PWR-DC2	JNP10K-PWR-AC2 or JNP10K-PWR-DC2

Network Ports

The QSFP56-DD ports support:

- 400GbE transceivers (QSFP56-DD)
- 400GbE active optic cables (QSFP56-DD AOCs)
- 4 x 100GbE transceivers (QSFP56-DD)
- 2 x 100GbE transceivers (QSFP28-DD)
- 100GbE transceivers (QSFP28)
- 100GbE AOCs (QSFP28)
- 40GbE transceivers (QSFP+)
- 40GbE to 10GbE QSA (Junos OS Release 20.2R1 and later)

Channelization

All 36 ports of the PTX10K-LC1201-36CD line card default to 400GbE. You can either set all the ports to a specific speed and channelization or you can channelize each port individually. The CLI syntax to channelize a port on the PTX10K-LC1201-36CD is release dependent.

For software releases from Junos OS Evolved Release 19.4R1-S1 to Junos OS Evolved Release 20.1R2:

1. Use the `pic-mode` and `speed` options on the Junos OS Evolved operational `set chassis` command:

```
user@host>set chassis fpc slot slot-number pic 0 pic-mode speed 400g|200g|100g|50g|40g|25g|10g
```

In this example, `fpc slot` represents the line card slots. There is a single PIC in the PTX10K-LC1201-36CD; it is always numbered zero. The `pic-mode` option indicates you are configuring all of ports on the PIC and not an individual port. With the `speed` options, you can configure 100-Gbps or 40-Gbps speed on all 36 ports, or you can configure four 10-Gbps channels on each of the 36 ports.

For example, to set 100-Gbps speed on all ports in slot 2:

```
user@host> set chassis fpc 2 pic 0 pic-mode speed 100g
```

To individually configure a port, you need to specify both the speed and number of subports (channels).

```
user@host> set chassis fpc 0-7 pic 0 port 0-35 speed 400g|200g|100g|50g|40g|25g|10g number-of-subports 1-8
```

For example, to channelize port 15 in slot 0 to 4 downstream 100GbE interfaces:

```
user@host> set chassis fpc 0 pic 0 port 15 speed 100g number-of-subports 4
```

The resulting interfaces would be:

```
et-0/0/15:0
et-0/0/15:1
et-0/0/15:2
et-0/0/15:3
```

NOTE: If you do not specify the `number-of-subports` when configuring an individual port, the system will default to a value of 1. The same example, without the `number-of-subports` option, would then result in one downstream 100GbE interface.

For software releases Junos OS Evolved Release 20.1R2 and later, the `speed` and `number-of-subports` options are in the `interfaces` hierarchy. For example, to channelize port 15 in slot 0 to 4 downstream 100GbE interfaces:

```
[edit-interfaces]
user@host> et-0/0/15
 {speed 100g;
number-of-subports 4;
}
et-0/0/15:0 {unit 0}
et-0/0/15:1 {unit 0}
et-0/0/15:2 {unit 0}
et-0/0/15:3 {unit 0}
```

After saving and committing the changes, the resulting interfaces would be:

```
et-0/0/15:0
et-0/0/15:1
et-0/0/15:2
et-0/0/15:3
```

Network LEDs

Each network port has a single tricolored LED that indicates link activity and status. The red, amber, or green LED has different interpretations depending on whether the port is channelized, not channelized, or whether the beacon is activated (see Table 24 on page 64). If the beacon feature is activated on the port, the port blinks.

Table 24: PTX10K-LC1201-36CD Network LEDs

Port Status	Normal State	Description
Nonchannelized	Unlit, off	A transceiver is not present in the port or the link is down because of a loss of signal.
	Green, on steadily	A link is established.

Table 24: PTX10K-LC1201-36CD Network LEDs *(Continued)*

Port Status	Normal State	Description
	Amber, on steadily	The link is down because of a remote error or because the port was disabled through the CLI.
	Red, on steadily	The link is down because of a hardware failure or a local error.
Channelized	Unlit, off	All channels are down because of loss of signal.
	Green, on steadily	A link is established and all channels are up.
	Amber, on steadily	Applies to all other cases.
	Red, on steadily	The port has a hardware failure.

Line Card Status LEDs

The line card has a power (**PWR**) LED and a status (**STS**) LED (see Table 25 on page 65).

Table 25: Line Card Status LEDs

LED	State	LED Indication	Beacon/Port Location On
Power **PWR**	Power is not present.	Off	Off
	The line card has power and is operating correctly.	Green, on steadily	Green, on steadily
	The line card has a fault condition.	Red, on steadily	Red, on steadily
Status **STS**	The line card is disabled or offline.	Off	Off
	The line card is online and operating correctly.	Green, on steadily	Green, blinking

Table 25: Line Card Status LEDs *(Continued)*

LED	State	LED Indication	Beacon/Port Location On
	The line card is booting.	Green, blinking	Green, blinking
	The line card has a fault condition.	Red, on steadily	Red, blinking

PTX10K-LC1202-36MR Line Card

IN THIS SECTION

- Overview | **66**
- Components Required for PTX10K-LC1202-36MR | **67**
- Network Ports and Channelization | **68**
- Bandwidth Support | **69**
- Network LEDs | **70**
- Line Card Status LEDs | **70**

Overview

The PTX10K-LC1202-36MR is a 36-port line card that provides a line rate throughput of 4.8 Tbps. The line card has thirty-two QSFP28 ports, each capable of supporting a maximum speed of 100 Gbps, and four QSFP56-DD ports, each capable of supporting a maximum speed of 400 Gbps (see Figure 31 on page 67).

In a pure 100-Gbps port speed configuration, the line card supports a throughput of 3.6 Tbps (each of the 36 ports runs at 100-Gbps speed).

In a mixed-speed configuration of 100 Gbps and 400 Gbps, the line card supports a line rate throughput of 4.8 Tbps (thirty-two 100-Gbps ports and four 400-Gbps ports).

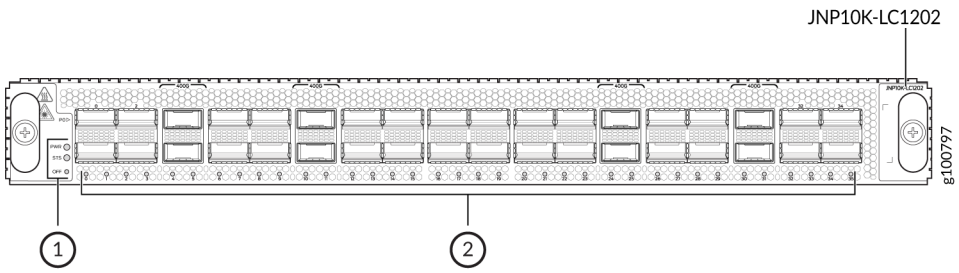
The line card is designed to operate using the newer Routing Engines, the JNP10004-SF3 switch fabric, the JNP10008-SF3 switch fabric, or the JNP10016-SF3 switch fabric; the JNP10K-PWR-AC2 or JNP10K-PWR-DC2 power supply; the JNP10004-FAN2, the JNP10008-FAN2, or JNP10016-FAN fan

tray; and the JNP10004-FTC2, the JNP10008-FTC2, or the JNP10016-FTC2 fan tray controller. These components require Junos OS Evolved.

The PTX10K-LC1202-36MR line card houses Packet Forwarding Engines based on Juniper Networks' custom ASICs. The line card has two custom ASICs, each hosting two Packet Forwarding Engines. The line card supports a maximum throughput of 1.2 Tbps per Packet Forwarding Engine.

You can install the PTX10K-LC1202-36MR line card in the PTX10004, PTX10008, and PTX10016 chassis horizontally at the front of the chassis.

Figure 31: PTX10K-LC1202-36MR Port Panel



1– Power LED (PWR), status LED (STS), and offline button (OFF)	2– Network ports and LEDs

Components Required for PTX10K-LC1202-36MR

PTX10004 routers running Junos OS Evolved Release 20.3R1 with Junos Continuity and later support the PTX10K-LC1202-36MR line card. PTX10008 routers running Junos OS Evolved Release 20.3R1 and later (with Junos Continuity) support the PTX10K-LC1202-36MR line card. PTX10016 routers running Junos OS Evolved Release 21.2R2 and later support the PTX10K-LC1202-36MR line card. The PTX10K-LC1202-36MR line card interoperates with the PTX10K-LC1201-36CD line card on a PTX10004, PTX10008, or PTX10016 router.

See Table 26 on page 67 for the required hardware components for PTX10K-LC1202-36MR line cards.

Table 26: Components Required for the PTX10K-LC1202-36MR Line Cards

Component (FRU)	Part Number for the PTX10004	Part Number for the PTX10008	Part Number for the PTX10016
Switch fabric	JNP10004-SF3	JNP10008-SF3	JNP10016-SF3

Table 26: Components Required for the PTX10K-LC1202-36MR Line Cards *(Continued)*

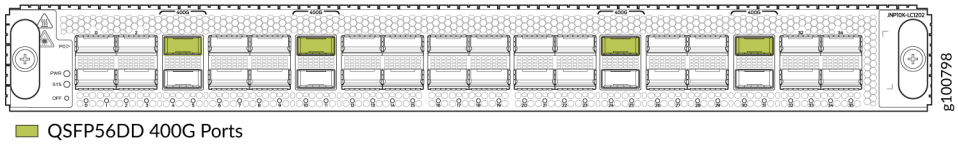
Component (FRU)	Part Number for the PTX10004	Part Number for the PTX10008	Part Number for the PTX10016
RCB	JNP10K-RE1-E, JNP10K-RE1-E128, or JNP10K-RE1-ELT	JNP10K-RE1-E, JNP10K-RE1-ELT, or JNP10K-RE1-128G-E	JNP10K-RE1-E, JNP10K-RE1-ELT, or JNP10K-RE1-128G-E
Fan tray	JNP10004-FAN2	JNP10008-FAN2	JNP10016-FAN2
Fan tray controller	JNP10004-FTC2	JNP10008-FTC2	JNP10016-FTC2
Power supply	JNP10K-PWR-AC2 or JNP10K-PWR-DC2	JNP10K-PWR-AC2 or JNP10K-PWR-DC2	JNP10K-PWR-AC2 or JNP10K-PWR-DC2

Network Ports and Channelization

On the PTX10K-LC1202-36MR line card, the ports 4, 10, 24, and 30 are 400GbE (QSFP56-DD) ports, while the rest are 100GbE (QSFP28) ports.

Figure 32 on page 68 shows the 400GbE ports highlighted.

Figure 32: PTX10K-LC1202-36MR—Network Ports



By using breakout cables, you can channelize the PTX10K-LC1202-36MR ports.

The QSFP56-DD ports (ports 4, 10, 24, and 30) on the line card support the following transceivers:

- 1x400GbE transceivers (QSFP56-DD)
- 4x100GbE transceivers (QSFP56-DD)
- 2x100GbE transceivers (QSFP28-DD)
- 8x25GbE transceivers (QSFP28-DD)

- 1x100GbE transceivers (QSFP28)
- 4x25GbE transceivers (QSFP28)
- 4x10GbE transceivers (QSFP+)
- 40GbE to 10GbE QSA, starting in Junos OS Evolved Release 20.4R1 and later.

The QSFP28 ports (ports 0 through 3, 5 through 9, 11 through 23, 25 through 29, and 31 through 35) on the line card support the following transceivers:

- 1x100GbE transceivers (QSFP28)
- 4x25GbE transceivers (QSFP28)
- 4x10GbE transceivers (QSFP+)

NOTE: The ports 1, 3, 19, and 21 are disabled if the preceding ports (0, 2, 18, and 20) are not in 100-Gbps mode. This means, of the 36 ports on the PTX10K-LC1202-36MR line card, only 32 ports are available to be configured as 4x25 Gbps and 4x10 Gbps ports.

You can configure port speeds at the interface level using the CLI command `set interfaces` *`interface-name`* `number-of-sub-ports` *`number-of-sub-ports`* .

Bandwidth Support

Table 27 on page 69 explains the bandwidth supported by a PTX10K-LC1202-36MR line card.

Table 27: PTX10K-LC1202-36MR Bandwidth

Router Configuration	Number of Switch Fabric Cards Used	Bandwidth per Slot Without Fabric Redundancy	Bandwidth per Slot with *N*+1 Fabric Redundancy
PREM3 configuration	6	–	4.8 Tbps
PREM2 configuration	4	3.6 Tbps	2.8 Tbps
BASE3 configuration	3	2.8 Tbps	1.6 Tbps

Network LEDs

Each network port has a single tricolored LED that indicates link activity and status. The red, amber, or green LED has different interpretations depending on whether the port is channelized or not channelized, or whether the beacon feature is activated (see Table 28 on page 70.) If the beacon feature is activated on the port, the port blinks.

Table 28: PTX10K-LC1202-36MR Network LEDs

Port Status	State	Description
Nonchannelized	Unlit, off	A transceiver is not present in the port, or the link is down because of a loss of signal.
	Green, on steadily	A link is established.
	Amber, on steadily	The link is down because of a remote error or because the port was disabled through the CLI.
	Red, on steadily	The link is down because of a hardware failure or a local error.
Channelized	Unlit, off	All channels are down because of loss of signal.
	Green, on steadily	A link is established and all channels are up.
	Amber, on steadily	Applies to all other cases.
	Red, on steadily	The port has a hardware failure.

Line Card Status LEDs

The line card has a power (**PWR**) LED and a status (**STS**) LED (see Table 29 on page 71).

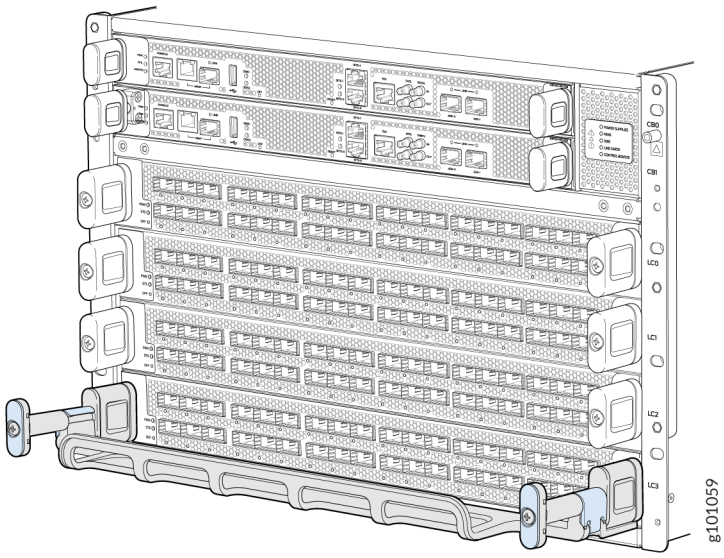
Table 29: Line Card Status LEDs

LED	State	LED Indication	Beacon/Port Location On
Power **PWR**	Power is not present.	Off	Off
	The line card has power and is operating correctly.	Green, on steadily	Green, on steadily
	The line card has a fault condition.	Red, on steadily	Red, on steadily
Status **STS**	The line card is disabled or offline.	Off	Off
	The line card is online and operating correctly.	Green, on steadily	Green, blinking
	The line card is booting.	Green, blinking	Green, blinking
	The line card has a fault condition.	Red, on steadily	Red, blinking

PTX10004 Cable Management System

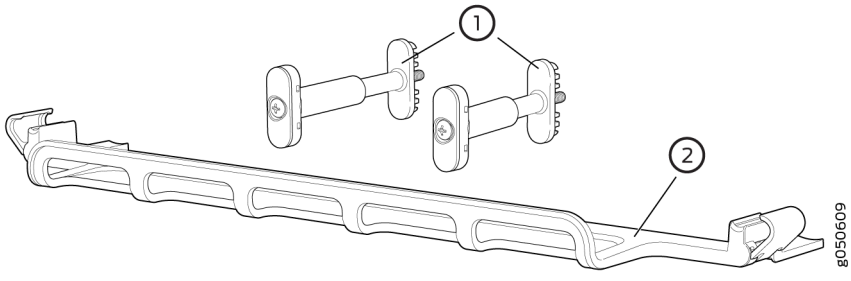
You can use the PTX10004 cable management system (see Figure 33 on page 72) to route optical cables away from the line-card ports for better airflow through the chassis. Using this optional system also makes it easier to use cable ties or strips to organize the cabling.

Figure 33: PTX10004 Cable Management System



The cable management system comprises a set of handle extensions and a tray that snaps to the extensions (see Figure 34 on page 72) for an individual line card. You can use the handle extensions with or without the cable tray. You don't need to remove the handle extensions if you want to remove a line card.

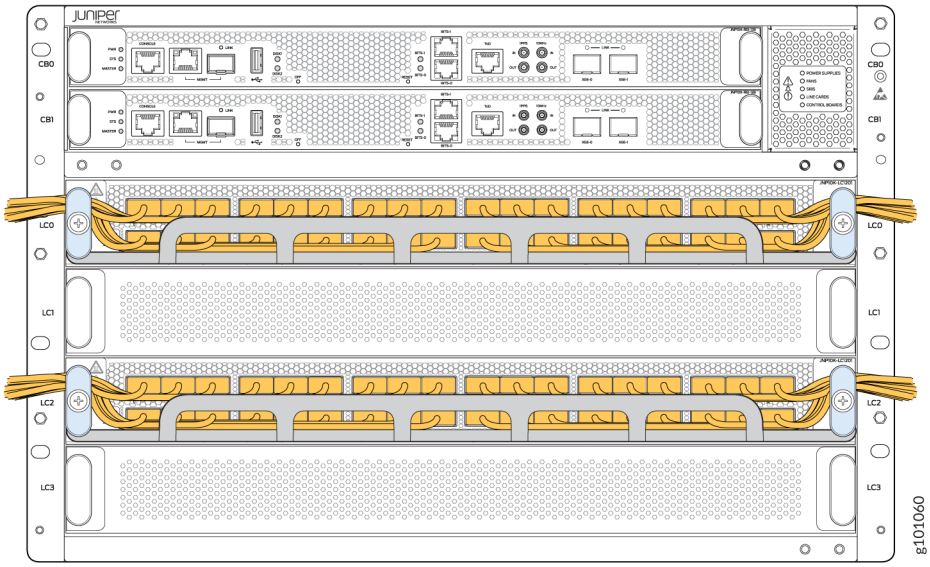
Figure 34: Cable Management Parts



1– Handle extensions	2– Cable tray

Cables are draped across or under the handle extensions and then secured with cable wraps (see Figure 35 on page 73).

Figure 35: Two Cable Management Systems Installed on a PTX10004



SEE ALSO

- Install the PTX10004 Cable Management System | **208**

2

CHAPTER

Site Planning, Preparation, and Specifications

PTX10004 Site Preparation Overview | 75

PTX10004 Power Planning | 84

PTX10004 Transceiver and Cable Specifications | 101

PTX10004 Console and Management Cable Specifications and Pinouts | 107

PTX10004 Site Preparation Overview

IN THIS SECTION

- PTX10004 Site Preparation Checklist | 75
- PTX10004 Environmental Requirements and Specifications | 76
- PTX10004 General Site Guidelines | 78
- PTX10004 Site Electrical Wiring Guidelines | 78
- PTX10004 Rack Requirements | 80
- PTX10004 Clearance Requirements for Airflow and Hardware Maintenance | 83

The following sections describe the guidelines, the specifications, and the requirements to install a PTX10004 router.

PTX10004 Site Preparation Checklist

The checklist in Table 30 on page 75 summarizes the tasks you must perform to prepare a site for the PTX10004.

Table 30: Site Preparation Checklist

✓	Item or Task	For More Information
	Environment	
☐	Verify that environmental factors such as temperature and humidity do not exceed router tolerances.	"PTX10004 Environmental Requirements and Specifications" on page 76
	Power	
☐	Measure the distance between external power sources and the router installation site.	

Table 30: Site Preparation Checklist *(Continued)*

✓	Item or Task	For More Information
☐	Calculate the power consumption and requirements.	"PTX10004 Power Planning" on page 84
	Rack	
☐	Verify that your rack meets the minimum requirements for the installation of the router.	"PTX10004 Rack Requirements" on page 80
☐	Plan rack location, including required space clearances.	"PTX10004 Clearance Requirements for Airflow and Hardware Maintenance" on page 83
☐	Secure the rack to the floor and building structure.	
	Cables	
☐	Acquire cables and connectors: • Determine the number of cables needed based on your planned configuration. • Review the maximum distance allowed for each cable. Choose the length of cable based on the distance between the hardware components being connected.	The list of supported transceivers for the PTX10004 line cards is located at https://apps.juniper.net/hct/product/#prd=PTX10004.
☐	Plan the cable routing and management.	

PTX10004 Environmental Requirements and Specifications

The PTX10004 router must be installed in a four-post rack. It must be housed in a dry, clean, well-ventilated, and temperature-controlled environment.

Follow these environmental guidelines:

- Ensure that the site is as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the router cooling system.

- Maintain ambient airflow for normal router operation. If the airflow is blocked or restricted, or if the intake air is too warm, the router might overheat, leading to the router temperature monitor shutting down the device to protect the hardware components.

Environmental tolerances for altitude and operating temperature are dependent on:

- The type of ESD front door installed.
- The wattage of the type of optics being used, either 14 W or 21 W optics.
- The line card slot. Slot 0 has a slightly different airflow and cooling.

Table 31: PTX10004 Environmental Tolerances

Description	Tolerance
Altitude	No performance degradation for a fully-loaded chassis running 14-W optics or lower without the front door air filter. (32° to 115° (0° to 46° C) at sea level
Relative humidity	• Normal operation ensured in relative humidity range of 5% through 90%, noncondensing. • Short-term operation ensured in relative humidity range of 5% through 93%, noncondensing. **NOTE**: As defined in NEBS GR-63-CORE, Issue 3, short-term events can be up to 96 hours in duration but not more than 15 days per year.
Non-operating temperature	Nonoperating storage temperature in shipping container: —40° F through 158° F (—40° C through 70° C).
Seismic	Designed to comply with Zone 4 earthquake requirements according to NEBS GR-63-CORE, Issue 3.

NOTE: Install PTX10004 routers 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.

PTX10004 General Site Guidelines

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

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

- Keep the area around the chassis free from dust and conductive material, such as metal flakes.
- Follow prescribed airflow guidelines to ensure that the cooling system functions properly and that exhaust from other equipment doesn't blow into the intake vents of the device.
- Follow the prescribed electrostatic discharge (ESD) prevention procedures to prevent damage to 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.

SEE ALSO

Prevention of Electrostatic Discharge Damage | 283

PTX10004 Site Electrical Wiring Guidelines

Table 32 on page 79 describes the factors you must consider while you plan the electrical wiring at your site.



CAUTION: It is particularly important to provide a properly grounded and shielded environment and to use electrical surge-suppression devices.

Table 32: Site Electrical Wiring Guidelines

Site Wiring Factor	Guidelines
Signaling limitations	To ensure that signaling functions optimally: • Install wires correctly. Improperly installed wires can emit radio interference. • Do not exceed the recommended distances or pass wires between buildings. The potential for damage from lightning strikes increases if wires exceed recommended distances or if wires pass between buildings. • Shield all conductors. The electromagnetic pulse (EMP) caused by lightning can damage unshielded conductors and destroy electronic devices.
Radio frequency interference (RFI)	To reduce or eliminate the emission of RFI from your site wiring: • Use a twisted-pair cable with a good distribution of grounding conductors. • Use a high-quality twisted-pair cable with one ground conductor for each data signal when applicable, if you must exceed the recommended distances.
Electromagnetic compatibility (EMC)	Provide a properly grounded and shielded environment and use electrical surge-suppression devices. Strong sources of electromagnetic interference (EMI) can cause the following damage: • 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 **TIP**: If your site is susceptible to problems with EMC, particularly from lightning or radio transmitters, you might want to seek expert advice.



WARNING: The intrabuilding port(s) of the equipment or subassembly is suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding port(s) of the equipment or subassembly MUST NOT be metallically connected to

interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE), and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metallically to OSP wiring.

PTX10004 Rack Requirements

The PTX10004 router chassis is designed to be installed in four-post racks.

Rack requirements consist of:

- Rack type
- Rack mount kit hole spacing
- Rack size and strength
- Rack connection to the building structure

Table 33 on page 81 provides the rack requirements and specifications for the PTX10004.

Table 33: Rack Requirements for the PTX10004

Rack Requirement	Guidelines
Rack type: four-post	Use a four-post rack that provides bracket holes or hole patterns spaced at 1-U (1.75 in. or 4.45 cm) increments and that meets the size and strength requirements to support the weight and seismic requirements. We recommend that you use a Telect DR1250-84436 rack or an equivalent rack. A U is the standard rack unit defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310–D) published by the Electronics Industries Association (EIA). You can mount up to six PTX10004 routers in a four-post rack if: • The rack is 42 U or taller. • The rack meets the strength requirements to support the weight and seismic requirements. • The facility can provide adequate power and cooling. **TIP**: Always mount devices starting at the bottom of the rack.
Rack mount kit hole spacing	The holes in the rack mount kit are spaced at 1 U (1.75 in. or 4.45 cm), so that the router can be mounted in any rack that provides holes spaced at that distance.

Table 33: Rack Requirements for the PTX10004 *(Continued)*

Rack Requirement	Guidelines

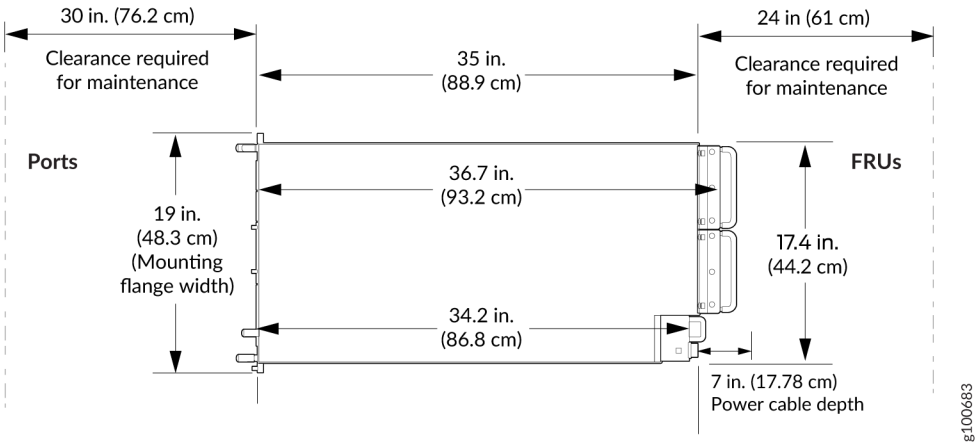
Rack size and strength	• Ensure that the rack complies with the standards for a 19-in. wide rack as defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310–D) published by the EIA.
	• Use one of the standard rack lengths as defined in the four-part *Equipment Engineering (EE); European telecommunications standard for equipment practice* (document numbers ETS 300 119-1 through 119-4) published by the European Telecommunications Standards Institute (ETSI)(http://www.etsi.org).
	  • 23.62 in. (600 mm)
	  • 30.0 in. (762 mm)
	  • 31.5 in. (800 mm)
	• Ensure that the rack rails are spaced widely enough to accommodate the external dimensions of the router chassis. The outer edges of the flange extend the chassis width to 19 in. (48.26 cm).
	• Ensure that the rack is strong enough to support the weight of the router and cabling.
	• Ensure that the spacing of rails and adjacent racks allows for proper clearance around the router and rack. "PTX10004 Clearance Requirements for Airflow and Hardware Maintenance" on page 83

Rack connection to building structure	• Secure the rack to the building structure. • If earthquakes are a possibility in your geographical area, secure the rack to the floor. • Secure the rack to the ceiling as well as wall or floor for maximum stability.

PTX10004 Clearance Requirements for Airflow and Hardware Maintenance

When you plan the site for a PTX10004 router installation, you must allow sufficient clearance around the installed chassis for cooling and maintenance. See Figure 36 on page 83 for a top view of clearance for the PTX10004.

Figure 36: Clearance Requirements



Follow these guidelines:

- For the cooling system to function properly, the airflow around the chassis must be unrestricted. See "PTX10004 Cooling System and Airflow" on page 27 for more information about the airflow through the chassis.
- If you plan to mount a PTX10004 in a rack with other equipment, ensure that the exhaust from other equipment doesn't blow into the intake vents of the chassis.
- Leave at least 30 in. (76.2 cm) in front of the chassis and at least 24 in. (61 cm) behind the PTX10004 for service personnel to remove and install hardware components. To be NEBS GR-63 compliant, allow at least 30 in. (76.2 cm) in front of the rack and 24 in. (61 cm) behind the rack.

RELATED DOCUMENTATION

General Safety Guidelines and Warnings | 258

Rack-Mounting and Cabinet-Mounting Warnings | 266

Mount the PTX10004 by Using the JNP10004-RMK-4POST Rack Mount Kit | 124

PTX10004 Power Planning

IN THIS SECTION

- Power Requirements for PTX10004 Components | 84
- Calculate Power Requirements for a PTX10004 Router | 85
- JNP10K-PWR-AC2 Power Specifications | 91
- PTX10004 Power Cable Specifications | 92
- JNP10K-PWR-DC2 Power Specifications | 99
- PTX10004 Grounding Cable and Lug Specifications | 100

Use the information in this topic to calculate the power consumption for the PTX10004 and plan your configuration's power requirements.

Power Requirements for PTX10004 Components

Table 34 on page 84 lists the power requirements for different hardware components of a PTX10004 router under typical voltage conditions and optics. For power requirements for chassis configurations, see "Power Requirements for PTX10004 Components" on page 84.

Table 34: Power Requirements for PTX10004 Components

Component	Description	Power Requirements (Watts)	
		At 25° C	At 46° C
JNP10004-SF3	PTX10004 SIB	325 W	350 W
JNP10004-FAN2	PTX10004 fan tray	450 W	650 W
JNP10K-RE1-E	PTX10004 enhanced RCB	100 W	150 W

Table 34: Power Requirements for PTX10004 Components *(Continued)*

Component	Description	Power Requirements (Watts)	
		At 25° C	At 46° C
PTX10K-LC1201-36CD	36-port QSFP56-DD line card (without optical transceivers)	1600 W	1775 W
PTX10K-LC1202-36MR	36-port line card (thirty-two 100GbE ports and four 400GbE ports).	740 W	750 W

Calculate Power Requirements for a PTX10004 Router

IN THIS SECTION

- How to Calculate the Power Consumption of Your PTX10004 Configuration | **86**
- How to Calculate the Number of Power Supplies Required for Your PTX10004 Configuration | **88**

Use the information in this topic to calculate power requirements of your PTX10004 configuration and the number of power supplies required for different PTX10004 router configurations.

CAUTION: To ensure adequate power and to avoid raising a power alarm, we recommend that you maintain *n* +1 power supplies in your router at all times. Replace failed power supplies immediately to prevent unexpected failures.

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

NOTE: The calculations in this topic represent the maximum power requirements that you need to budget for your PTX10004 router configuration. The actual power consumption of your router will be less than the calculated results shown here and will vary based on the hardware and software configuration of your router, the amount of traffic passing through the line cards, and environmental variables such as room temperature.

Before you begin these calculations:

- Ensure that you understand the different router configurations. See "PTX10004 Components and Configurations" on page 11.
- Ensure that you know the power requirements of different router components. See "Power Requirements for PTX10004 Components" on page 84.

This topic describes these tasks:

How to Calculate the Power Consumption of Your PTX10004 Configuration

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

NOTE: The calculations in this topic represent the maximum power requirements that you need to budget for your PTX10004 router configuration. The actual power consumption of your router will be less than the calculated results shown here and will vary based on the hardware and software configuration of your router, the amount of traffic passing through the line cards, and environmental variables such as room temperature.

To calculate maximum system power consumption:

1. Determine the maximum power consumption of the base chassis components (that is, the components other than the line cards). Use Table 35 on page 86 if your router is configured as either for the standard base or the redundant configuration.

   Table 35: Chassis Power Consumption for Standard Configurations

Chassis Component	BASE3 Configuration	PREM2 Configuration	PREM3 Configuration
Fan tray	1300 W	1300 W	1300 W

Table 35: Chassis Power Consumption for Standard Configurations *(Continued)*

Chassis Component	BASE3 Configuration	PREM2 Configuration	PREM3 Configuration
RCB	150 W	300 W	300 W
SIB	1050 W	1400 W	2100 W
Total	**2500 W**	**3000 W**	**3700 W**

2. Calculate the maximum internal power consumption of the entire router by adding in the power requirements of each line card. See Table 36 on page 87 for a chart of the power needed for line cards.

   Table 36: Line Card Power Consumption

Number of Line Cards	PTX10K-LC1201-36CD
1	1775 W
2	3550 W
3	5325 W
4	7100 W

   For example, for a PTX10004 with three PTX10K-LC1201-36CD line cards, the maximum power consumption is:

   = 3 (power consumed by PTX10K-LC1201-36CD in watts)

   = 3 (1775 W)

   = 5325 W

3. Add the power consumption from Step 1 and the total line card consumption from Step 2.

   To continue from the previous example, add the wattage from two PTX10K-LC1201-36CD line cards to a PREM2 configuration.

   (5325 W) + (3000 W)

= 8325 W required

How to Calculate the Number of Power Supplies Required for Your PTX10004 Configuration

The minimum power configuration for PTX10004 routers is three power supplies. However, using the calculated minimum power configuration doesn't prevent the system from raising a power alarm. To ensure you don't log power alarms with a fully loaded chassis, you must configure your router for dual feed and high-power settings.

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

1. Determine the power available from the power supplies. The power supplies have s a set of three DIP switches on the faceplate that allows you to configure the power supply for either the high power (30 A) or low power (20 A) input mode. Table 37 on page 88 and Table 38 on page 89 showsthe power available for the installed power supplies.

   Table 37: Total Power Available

Power Supply Module Models	With Two Power Supplies	With Three Power Supplies
JNP10K-PWR-AC2 dual feed, high power (30-A) setting	11,000 W	16,500 W
JNP10K-PWR-AC2 single feed, high power (30-A) setting	10,000 W	15,000 W
JNP10K-PWR-AC2, dual feed, low power (20-A) setting	6,000 W	9,000 W
JNP10K-PWR-AC2, single feed, low power (20-A) setting	5,400 W	8,100 W
JNP10K-PWR-DC2 dual feed, high power (80-A) setting	11,000 W	16,500 W
JNP10K-PWR-DC2 dual feed, low power (60-A) setting	8,800 W	13,200 W

Table 37: Total Power Available *(Continued)*

Power Supply Module Models	With Two Power Supplies	With Three Power Supplies
JNP10K-PWR-DC2 single feed, high power (80-A) setting	5,500 W	8,250 W
JNP10K-PWR-DC2 single feed, low power (60-A) setting	4,400 W	6,600 W

Table 38: Power Voltages Settings for JNP10K-PWR-AC2 and JNP10K-PWR-DC2 Power Supplies

INP0 (Switch 1)	INP1 (Switch 2)	H/L (High Input/ Low Input Switch 3)	Output Power
JNP10K-PWR-AC2			
On	On	On (High 30 A)	5500 W
On	On	Off (Low 20 A)	3000 W
On	Off	On (High 30 A)	5000 W
Off	On	On (High 30 A)	5000 W
On	Off	Off (Low 20 A)	2700 W
Off	On	Off (Low20 A)	2700 W
JNP10K-PWR-DC2			
On	On	On (High 80 A)	5500 W
On	On	Off (Low 60 A)	4400 W

Table 38: Power Voltages Settings for JNP10K-PWR-AC2 and JNP10K-PWR-DC2 Power Supplies *(Continued)*

INP0 (Switch 1)	INP1 (Switch 2)	H/L (High Input/ Low Input Switch 3)	Output Power
On	Off	On (High 80 A)	2750 W
Off	On	On (High 80 A)	2750 W
On	Off	Off (Low 60 A)	2200 W
Off	On	Off (Low 60 A)	2200 W

NOTE: If any JNP10K-PWR-AC2 power supply is set to 20 A, then the power budget for all power supplies installed in the system becomes 20 A, regardless of whether other power supplies are set at 30 A. This design is to prevent overloading of the power supply that is set to 20 A. See Table 62 on page 172 for details on setting the DIP switches.

2. Determine the total power required for your configuration with line cards installed. The total power available to the chassis is calculated by dividing the wattage needed by the power rating, and then rounding up.

   In the previous examples, we calculated that a PTX10004 AC system requires 8325 W with three PTX10K-LC1201-36CD line cards. In this example, we calculate the total power available for JNP10K-PWR-AC2 power supplies set for dual feed and low power in a PREM2 configuration:

   = (8325 W) / (3000 W) dual input, low power

   = 2.78

   Round up the result to three JNP10K-PWR-AC power supplies. A PREM2 redundant AC system then has sufficient power supplies.

3. Calculate how much power the power supplies need. To determine the power required, multiply the number of power supplies by the power supply wattage and divide by the efficiency of the power supply. The efficiency rate accounts for the loss of energy within the power supply and is 89 percent for power supplies running in PTX10004 routers.

JNP10K-PWR-AC2 Power Specifications

The JNP10K-PWR-AC2 power supply supports AC, high-voltage alternating current (HVAC), and high-voltage direct current (HVDC).

Table 39 on page 91 lists the power specifications for the AC power supply (JNP10K-PWR-AC2) used in a PTX10004 chassis.

Table 39: Power Specifications for a JNP10K-PWR-AC2 Power Supply

Specification	Value
AC input voltage	180–305 VAC
DC input voltage	190–410 VDC
Input current rating	28.5 A
DC output power	12.3 V, 5500 W with dual feed and 5000 W with single feed

Table 40 on page 91 shows the physical specifications for a JNP10K-PWR-AC2 power supply.

Table 40: Physical Specifications for a JNP10K-PWR-AC2 Power Supply

Specification	Value
Height	3.5 in. (8.89 cm)
Width	3.6 in. (9.14 cm)
Depth	15.1 in. (38.35 cm)
Weight	11.4 lb (5.17 kg)

PTX10004 Power Cable Specifications

IN THIS SECTION

- JNP10K-PWR-AC2 Power Cable Specifications | 92
- JNP10K-PWR-AC2 Power Cable Specifications for 30-A Input | 96

Most sites distribute power through a main conduit that leads to frame-mounted power distribution panels, one of which can be located at the top of the rack that houses the router. An AC power cord connects each power supply to the power distribution panel.

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

The PTX10004 AC, high-voltage alternating current (HVAC), and high-voltage direct current (HVDC) power supplies have specific cord requirements. Use the following sections to determine the cable requirements based on the model of your power supply and any mode settings:

- For JNP10K-PWR-AC2 with 20-A input, see "JNP10K-PWR-AC2 Power Cable Specifications" on page 92.
- For JNP10K-PWR-AC2 with 30-A input, see "JNP10K-PWR-AC2 Power Cable Specifications for 30-A Input" on page 96.

JNP10K-PWR-AC2 Power Cable Specifications

The JNP10K-PWR-AC2 power supply operates in two modes:

- 20-A input with 3000-W output; see Table 41 on page 93 for a list of appropriate cables. One end of the cable has a type SAF-D-GRID Series (3-5958P4) Anderson APP-400 connector, rated 30A/400V/105C. An example of the connector is shown in Figure 37 on page 96.
- 30-A input with 5500-W output; see "JNP10K-PWR-AC2 Power Cable Specifications for 30-A Input" on page 96 for a list of appropriate cables and connectors for 30-A input. One end of the cable has a type SAF-D-GRID Series (3-5958P4) Anderson APP-400 connector, rated 30A/400V/105C, while the other end of the cable is bare wire.

WARNING: Do not run JNP10K-PWR-AC2 power supplies using 16-A or 20-A cables if connected to 30-A input.

CAUTION: You can prevent AC power cables from being exposed to hot air exhaust by always routing the power cables away from the fan trays and power supplies.

Table 41: JNP10K-PWR-AC2 Power Cable Specifications for 20-A Input

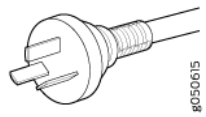
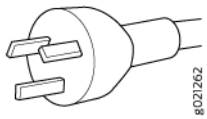
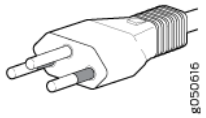
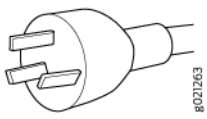
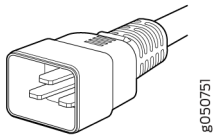
Locale	Cord Set Rating	Plug Standard	Spare Juniper Model Number	Graphic
Argentina	16 A, 250 VAC	IRAM 2073 Type RA/3	CBL-JNP-SG4-AR	 g050615
Australia and New Zealand	15 A, 250 VAC	AS/NZS 3112	CBL-JNP-SG4-AU	 g021262
Brazil	16 A, 250 VAC	NBR 14136 Type BR/3	CBL-JNP-SG4-BR	 g050616
China	16 A, 250 VAC	GB2099	CBL-JNP-SG4-CH	 g021263
China, Europe, and Japan	16 A, 250 VAC	C20 to Anderson 3-5958p4	CBL-JNP-SG4-C20-CH	 g050751

Table 41: JNP10K-PWR-AC2 Power Cable Specifications for 20-A Input *(Continued)*

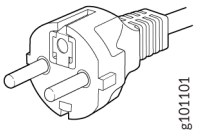
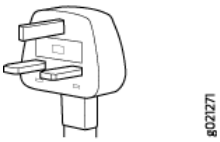
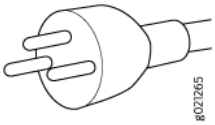
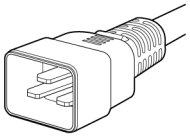
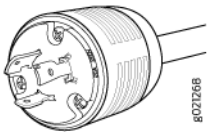
Locale	Cord Set Rating	Plug Standard	Spare Juniper Model Number	Graphic
Europe (except Italy, Switzerland, and United Kingdom)	20 A, 250 VAC	CEE 7/7	CBL-JNP-SG4-EU	 g101101
Great Britain	13 A, 250 VAC	BS1363	CBL-JNP-SG4-UK	 g021271
India	16 A, 250 VAC	SANS 164/1	CBL-JNP-SG4-SA	 g021270
Israel	16 A, RA, 250 VAC	SI 32/1971 Type IL/3C	CBL-JNP-SG4-IL	 g021265
Italy	16 A, 250 VAC	CEI 23-16	CBL-JNP-SG4-IT	 g021266
North America	20 A, 250 VAC	3-5958P4 to IEC 60320 C20	CBL-JNP-SG4-C20	 g050751
	16 A, 250 VAC	Locking NEMA L6-20P	CBL-JNP-SG4-US-L	 g021268

Table 41: JNP10K-PWR-AC2 Power Cable Specifications for 20-A Input *(Continued)*

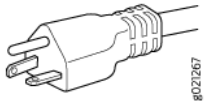
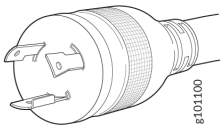
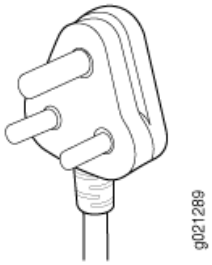
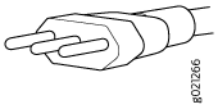
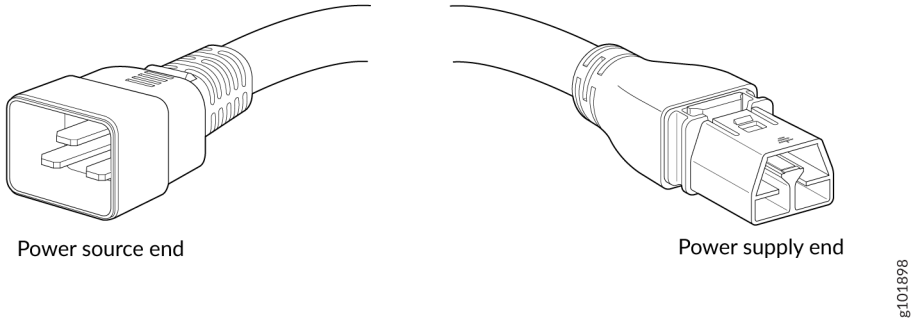
Locale	Cord Set Rating	Plug Standard	Spare Juniper Model Number	Graphic
		NEMA 6-20P	CBL-JNP-SG4-US	
	20 A, 277 V	NEMA I7-20P	CBL-JNP-SG4-HVAC	
South Africa	16 A, 250 VAC	SANS 164/1	CBL-JNP-SG4-SA	
Switzerland	16 A, 250 VAC	CEI 23-50	CBL-JNP-SG4-SZ	

Figure 37: Bare Cable with Anderson Connector



JNP10K-PWR-AC2 Power Cable Specifications for 30-A Input

The JNP10K-PWR-AC2 AC or HVDC power supplies require a high-current cable assembly when set for 30-A input. One end of the cable has a type SAF-D-GRID Series (3-5958P4) Anderson APP-400 connector, rated 30A/400V/105C, while the other end of the cable is bare wire. See Figure 38 on page 97 and Table 42 on page 97. These cables are separately orderable and are not shipped automatically with JNP10K-PWR-AC2 orders. An example of the right-angle cable and connector is shown in Figure 40 on page 98.

For connection to AC systems, Juniper provides a cable with either a NEMA 30-A connector (Figure 38 on page 97) or an IEC 330P6W connector (Figure 39 on page 97).

Figure 38: NEMA 30-A Locking Connector

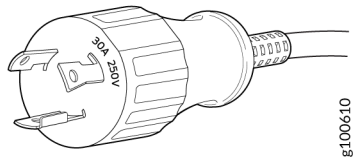


Figure 39: IEC 330P6W Connector

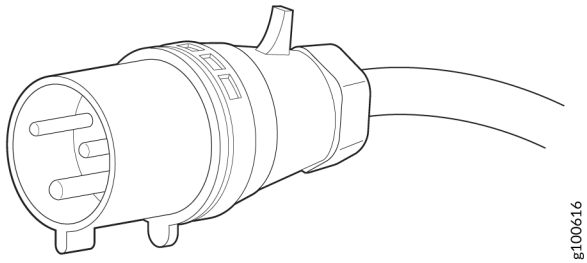


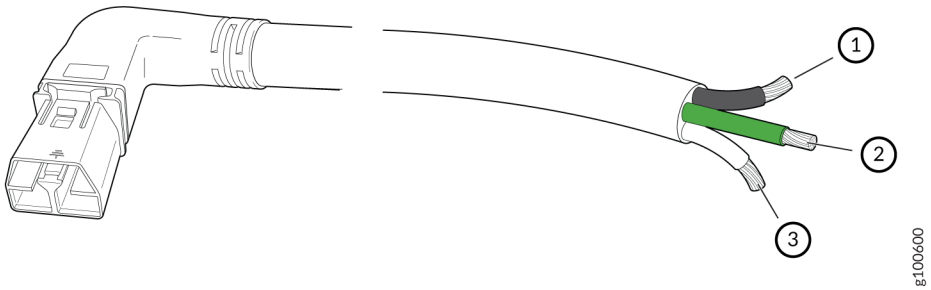
Table 42: 30-A Cabling Options

Option	Locale	Cord Set Rating	Plug Standards	Connector	Spare Juniper Model Number
AC/HVDC power cord	Any	30 A 400 VAC	UL 950 and IEC 60950	Anderson/straight to bare wire	CBL-PWR2-BARE
	Any	30 A 400 VAC	UL 950 and IEC 60950	Anderson/right-angle to bare wire	CBL-PWR2-BARE-RA
AC power cord	Continental Europe	30 A 250 VAC	UL 950 and IEC332P6	Anderson/right-angle to IEC 332P6	CBL-PWR2-332P6W-RA
	Continental Europe	30 A 250 VAC	UL 950 and IEC332P6	Anderson/straight to IEC332P6	CBL-PWR2-332P6W

Table 42: 30-A Cabling Options *(Continued)*

Option	Locale	Cord Set Rating	Plug Standards	Connector	Spare Juniper Model Number
	North America	30 A 250 VAC	IEC330P6	Anderson/right-angle to IEC 330P6	CBL-PWR2-330P6W-RA
	North America	30 A 250 VAC	IEC330P6	Anderson/straight to IEC 330P6	CBL-PWR2-330P6W
	North America	30 A 250 VAC	UL 498 and CSA	Anderson/right-angle to L6-30P (NEMA-30A)	CBL-PWR2-L6-30P-RA
	North America	30 A 250 VAC	UL 498 and IEC5958P4	Anderson/straight to L6-30P (NEMA-30A)	CBL-PWR2-L6-30P
AC jumper power cord	Any	30 A 400 VAC	UL and CSA	Anderson/straight to Anderson	CG-CBL-APP-400-02

Figure 40: Right-Angle, Bare Cable with Anderson Connector



1– Black wire –“+” or “-” for HVDC and “Hot or neutral” for AC	3– White wire – “+” or “-” for HVDC and “Hot or neutral” for AC
2– Green wire - Ground	

JNP10K-PWR-DC2 Power Specifications

Table 43 on page 99 lists the power specifications for the high-voltage direct current (HVDC) power supply used in PTX10004 routers.

Table 43: Power Specifications for the JNP10K-PWR-DC2 Power Supply

Item	Specifications
DC input voltage	• Minimum operating voltage: –40 VDC • Nominal operating voltage: –48 VDC • Operating voltage range: –40 VDC through –72 VDC
DC input current rating	• 76-A maximum at minimum operating voltage (-40 VDC) with 80-A DIP switch setting and 5500-W output load • 64-A maximum at nominal operating voltage (–48 VDC) with 80-A DIP switch setting and 5500-W output load • 60-A maximum at minimum operating voltage (-40 VDC) with 60-A DIP switch setting and 4400-W output load • 50-A maximum at nominal operating voltage (-48 VDC) with 60-A DIP switch setting and 4400-W output load
Output power	• 2200 W for low-input (60-A) single feed • 4400 W for low-input (60-A) dual feed • 2750 W for high-input (80-A) single feed • 5500 W for high-input (80-A) dual feed

Table 44 on page 100 shows the physical specifications for a JNP10K-PWR-DC2 power supply.

Table 44: Physical Specifications of a JNP10K-PWR-DC2 Power Supply

Specification	Value
Height	3.5 in. (8.89 cm)
Width	3.6 in. (9.14 cm)
Depth	16.05 in. (40.77 cm)
Weight	8.1 lb (3.67 kg)

PTX10004 Grounding Cable and Lug Specifications

The router must be adequately grounded before power is connected to ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements. To ground a PTX10004 chassis, connect a grounding cable to earth ground and then attach it to the chassis grounding point on the rear of the chassis beneath.

You must install the PTX10004 in a restricted-access location and ensure that the chassis is always properly grounded. The PTX10004 has a two-hole protective grounding terminal provided on the chassis. Under all circumstances, use this grounding connection to ground the chassis. For AC-powered systems, you must also use the grounding wire in the AC power cord along with the two-hole grounding lug connection. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.

WARNING: To comply with GR-1089 requirements, all intrabuilding copper cabling used for SFP+, QSFP+, and higher must be shielded and grounded at both ends.

CAUTION: Before router installation begins, a licensed electrician must attach a cable lug to the grounding cables that you supply. See "Connect the PTX10004 Router to Earth Ground" on page 134. A cable with an incorrectly attached lug can damage the router.

Before you connectthe router to earth ground, review the following information:

- Two threaded inserts (PEM nuts) are provided on the lower rear of the chassis to connect the router to earth ground. The protective earthing terminals are spaced at 0.63 in. (16 mm) centers.
- The grounding lug required is a Panduit LCD6-10A-L or equivalent (provided). The grounding lug accommodates 6 AWG (13.3 mm^2) stranded wire. If one or more JNP10K-PWR-DC2 power supplies are installed in the chassis and set for high input (80 A), use the Panduit LCD4-14A-L or equivalent (provided). This lug accommodates 4 AWG (21.1mm^2) stranded wire. The 4 AWG (21.1 mm^2) stranded wire should be rated 90° C or as permitted by local electrical code.
- The grounding cable that you provide for a PTX10004 must be the same size as, or heavier than, the input wire of each power supply. Minimum recommendations are 6 AWG (13.3 mm^2) stranded copper wire, Class B; 90° C wire, or as permitted by local code.

SEE ALSO

Connect AC Power to a PTX10004 | **136**

Connect DC Power to a PTX10004 | **137**

RELATED DOCUMENTATION

JNP10K-PWR-AC2 Power Supply | **42**

JNP10K-PWR-DC2 Power Supply | **44**

PTX10004 Transceiver and Cable Specifications

IN THIS SECTION

- PTX10004 Optical Transceiver and Cable Support | **102**
- PTX10004 Cable Specifications for Console and Management Connections | **102**
- PTX10004 Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion | **103**
- Calculate the Fiber-Optic Cable Power Budget for a PTX Series Router | **105**
- Calculate the Fiber-Optic Cable Power Margin for a PTX Series Router | **105**

Review fiber-optic cable characteristics and plan the power budget and power margin for fiber-optic cables connected to your device by using the information in the following topics.

PTX10004 Optical Transceiver and Cable Support

You can find information about the pluggable transceivers supported on your Juniper Networks device by using the Hardware Compatibility Tool. In addition to transceiver and connector type, the optical and cable characteristics—where applicable—are documented for each transceiver. The Hardware Compatibility Tool enables you to search by product, displaying all the transceivers supported on that device, or category, by interface speed or type. The list of supported transceivers for the PTX10004 is located at https://pathfinder.juniper.net/hct/product/#prd=PTX10004.

CAUTION: The Juniper Networks Technical Assistance Center (JTAC) provides complete support for Juniper-supplied optical modules and cables. However, JTAC does not provide support for third-party optical modules and cables that are not qualified or supplied by Juniper Networks. If you face a problem running a Juniper device that uses third-party optical modules or cables, JTAC may help you diagnose host-related issues if the observed issue is not, in the opinion of JTAC, related to the use of the third-party optical modules or cables. Your JTAC engineer will likely request that you check the third-party optical module or cable and, if required, replace it with an equivalent Juniper-qualified component.

Use of third-party optical modules with high-power consumption (for example, coherent ZR or ZR+) can potentially cause thermal damage to or reduce the lifespan of the host equipment. Any damage to the host equipment due to the use of third-party optical modules or cables is the users' responsibility. Juniper Networks will accept no liability for any damage caused due to such use.

PTX10004 Cable Specifications for Console and Management Connections

Table 45 on page 103 lists the specifications for the cables that connect the PTX10004 router to a management device.

NOTE: The PTX10004 can be configured with small form-factor pluggable (SFP) management ports that support 1000BASE-SX transceivers.

Table 45: Cable Specifications for Console and Management Connections for the PTX10004 Routers

Port on PTX10004 Router	Cable Specification	Cable Supplied	Maximum Length	Device Receptacle
Console port	RS-232 (EIA-232) serial cable	One 7-foot (2.13-meter) long RJ-45 patch cable and RJ-45 to DB-9 adapter	2.13 meters	RJ-45
Management port	Category 5 cable or equivalent suitable for 1000BASE-T operation	One 7-foot (2.13-meter) long RJ-45 patch cable	100 meters	RJ-45

SEE ALSO

PTX10004 Console and Management Cable Specifications and Pinouts | **107**

Connect a PTX10004 Router to a Network for Out-of-Band Management | **139**

Connect a PTX10004 Router to a Management Console | **140**

PTX10004 Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion

IN THIS SECTION

- Signal Loss in Multimode and Single-Mode Fiber-Optic Cables | **104**
- Attenuation and Dispersion in Fiber-Optic Cables | **104**

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. The PTX10004 router uses various types of network cables, including multimode and single-mode fiber-optic cables.

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

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 reflect 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 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.

For information about the maximum transmission distance and supported wavelength range for the types of single-mode and multimode fiber-optic cables that are connected to the PTX Series, see Hardware Compatibility Tool. Exceeding the maximum transmission distances can result in significant signal loss, which causes unreliable transmission.

Attenuation and Dispersion in Fiber-Optic Cables

An optical data link functions correctly if the 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 transmissions. 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 caused by the different speeds of light rays.
- Modal dispersion, which is 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 the 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.

Calculate the Fiber-Optic Cable Power Budget for a PTX Series Router

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 don't operate at the worst-case levels.

To calculate the worst-case estimate for the 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 referenced to 1 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

Calculate the Fiber-Optic Cable Power Margin for a PTX Series Router

Before you begin to calculate the power margin, calculate the power budget.

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 don't 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.

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

1. Determine the maximum value for LL by adding estimated values for applicable link-loss factors; for example, use the sample values for various factors as provided in Table 46 on page 106 (here, the link is 2 km long and multimode, and the (P_B) is 13 dBm).

   Table 46: Estimated Values for Factors Causing Link Loss

Link-Loss Factor	Estimated Link-Loss Value	Sample Link-Loss Calculation Values
Higher-order mode losses	Multimode—0.5 dBm	0.5 dBm
	Single mode—None	0 dBm
Modal and chromatic dispersion	Multimode—None, if product of bandwidth and distance is less than 500 MHz/km	0 dBm
	Single mode—None	0 dBm
Connector	0.5 dBm	This example assumes five connectors. Loss for five connectors: 5 (0.5 dBm) = 2.5 dBm.
Splice	0.5 dBm	This example assumes two splices. Loss for two splices: 2 (0.5 dBm) = 1 dBm.
Fiber attenuation	Multimode—1 dBm/km	This example assumes the link is 2-km long. Fiber attenuation for 2 km: 2 km (1 dBm/km) = 2 dBm.

Table 46: Estimated Values for Factors Causing Link Loss *(Continued)*

Link-Loss Factor	Estimated Link-Loss Value	Sample Link-Loss Calculation Values
	Single-mode—0.5 dBm/km	This example assumes the link is 2-km long. Fiber attenuation for 2 km: 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 specifications for your receiver to find the maximum receiver input power.

PTX10004 Console and Management Cable Specifications and Pinouts

IN THIS SECTION

- Console Port Connector Pinouts for a PTX10004 | **108**
- USB Port Specifications for the PTX10004 | **109**

- Management Port Connector Pinouts for the PTX10004 | **110**

The following sections describe the console port, the USB port, and the management port connections and specifications for the PTX10004 router.

Console Port Connector Pinouts for a PTX10004

The console port (labeled **CON**) on the Routing and Control Board (RCB) panel is an RS-232 serial interface that uses an RJ-45 connector to connect to a console management device. The default baud rate for the console port is 9600 baud.

Table 47 on page 108 provides the pinout information for the RJ-45 console connector. An RJ-45 cable and RJ-45 to DB-9 adapter are supplied with the PTX10004 routers.

NOTE: If your laptop or PC does not have a DB-9 connector pin (plug) and you want to connect your laptop or PC directly to a PTX10004 router, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter supplied with the device and a USB to DB-9 plug adapter. You must provide the USB to DB-9 plug adapter.

Table 47: Console Port Connector Pinouts for the PTX10004 Routers

Pin	Signal	Description
1	RTS output	Request to send
2	DTR output TOD output for PTP applications	Data terminal ready Time of day for Precision Time Protocol (PTP). You can use DTR pins as a TOD universal asynchronous receiver/transmitter (UART) by using breakout cables.
3	TxD output	Transmit data

Table 47: Console Port Connector Pinouts for the PTX10004 Routers *(Continued)*

Pin	Signal	Description
4	Signal ground	Signal ground
5	Signal ground	Signal ground
6	RxD input	Receive data
7	DCD input TOD output for PTP applications	Data carrier detect Time of day for PTP. You can use DCD pins as a TOD UART by using breakout cables.
8	CTS input	Clear to send

SEE ALSO

Connect a PTX10004 Router to a Management Console | 140

USB Port Specifications for the PTX10004

The following Juniper Networks USB flash drives have been tested and are officially supported for the USB port in the PTX10004 routers:

- RE-USB-1G-S—1-gigabyte (GB) USB flash drive
- RE-USB-2G-S—2-GB USB flash drive
- RE-USB-4G-S—4-GB USB flash drive

CAUTION: Any USB memory product not listed as supported for the PTX10004 routers has not been tested by Juniper Networks. The use of any unsupported USB memory product could expose your device 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.

CAUTION: Remove the USB flash drive before upgrading Junos OS or rebooting PTX10004 routers. Failure to do so could expose your device to unpredictable behavior.

NOTE: USB flash drives used with the PTX10004 router must support USB 2.0 or later.

Management Port Connector Pinouts for the PTX10004

The 1000BASE-T RJ-45 management ports use an RJ-45 connector to connect a management device for out-of-band management.

Table 48 on page 110 provides the pinout information of the RJ-45 management port connector. An RJ-45 cable is supplied with the PTX10004 router.

Table 48: RJ-45 Management Port Connector Pinouts for the PTX10004

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

Table 48: RJ-45 Management Port Connector Pinouts for the PTX10004 *(Continued)*

Pin	Signal	Description
7	TRP4+	Transmit/receive data pair 4
8	TRP4–	

SEE ALSO

PTX10004 Routing and Control Board LEDs | 53

CHAPTER 3

Initial Installation and Configuration

PTX10004 Installation Overview | 113

Unpack the PTX10004 Router | 114

Mount the PTX10004 by Using the JNP10004-RMK-4POST Rack Mount Kit | 124

Install the Front Door on a PTX10004 Router | 131

Connect the PTX10004 to Power | 133

Connect the PTX10004 to External Devices | 139

Perform the Initial Configuration for the PTX10004 | 146

PTX10004 Installation Overview

The PTX10004 is a rigid sheet-metal router-chassis that houses the other hardware components such as the Routing and Control boards (RCBs), Switch Interface Boards (SIBs), power supplies, fan trays, and line cards. The router chassis ships in a cardboard box that has a two-layer wooden pallet base. The router chassis is bolted to the pallet base. You can install a PTX10004 router in a standard 19-in. (483-mm) equipment rack by using the supplied rack mount kit.

Perform the following steps to install the PTX10004:

1. Unpack the router following the instructions in "Unpack the PTX10004 Shipping Pallet" on page 114.
2. Mount the chassis in the rack following the instructions in "Mount the PTX10004 by Using the JNP10004-RMK-4POST Rack Mount Kit" on page 124.

   Because of the weight of the chassis, mounting using a mechanical lift is preferred as the easiest and safest method.
3. Install the line cards following the instructions in "Install a PTX10004 Line Card" on page 202.
4. Connect the chassis to earth ground following the instructions in "Connect the PTX10004 Router to Earth Ground" on page 134.
5. Connect power to the power supplies following the instructions in "Connect the PTX10004 to Power" on page 133.
6. Install the ESD front door following the instructions in "Install the Front Door on a PTX10004 Router" on page 131.
7. Connect to the network.
   - To connect the router to a network for out-of-band management, follow instructions in "Connect a PTX10004 Router to a Network for Out-of-Band Management" on page 139.
   - To connect the router to a management console, follow instructions in "Connect a PTX10004 Router to a Management Console" on page 140.
8. Configure the router following the instructions in "Perform the Initial Configuration for the PTX10004" on page 146.
9. Install optional equipment such as the cable management system. See "Install the PTX10004 Cable Management System" on page 208.

RELATED DOCUMENTATION

PTX10004 Rack Requirements | 80

PTX10004 Clearance Requirements for Airflow and Hardware Maintenance | 83

Chassis and Component Lifting Guidelines | 264

Unpack the PTX10004 Router

IN THIS SECTION

- Unpack the PTX10004 Shipping Pallet | **114**
- Unpack Line Cards, Routing Control Boards, and Switch Interface Boards for the PTX10004 | **116**
- Compare the PTX10004 Order to the Packing List | **118**
- Register Products—Mandatory to Validate SLAs | **123**

To unpack the PTX10004 router and its components, read the following sections.

Unpack the PTX10004 Shipping Pallet

After you prepare the installation site as described in "PTX10004 Site Preparation Checklist" on page 75, you can unpack the router.

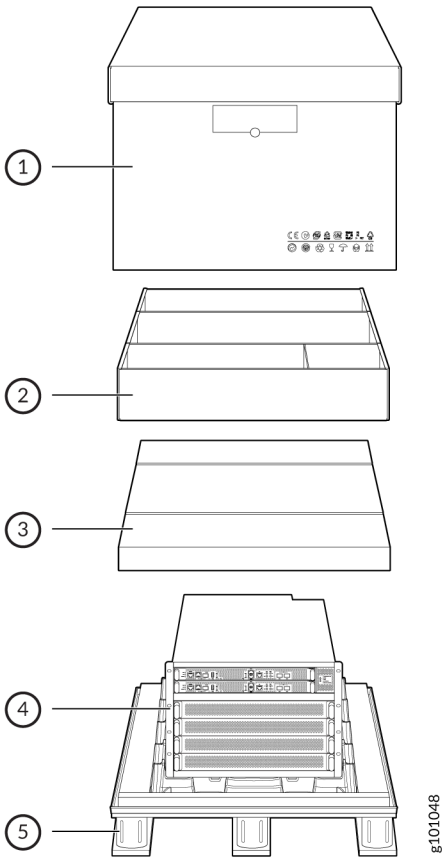
NOTE: The chassis is maximally protected inside the shipping box. Do not unpack it until you are ready to begin installation.

Before you start, be sure that you have a box cutter or packing knife to slice open the nylon straps and tape that seal the crate and boxes.

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

The shipper has the option to either ship the front panel separately or ship it along with the chassis. If the front panel arrives with the chassis, set aside the front panel box until you are ready to verify the contents of the order. See Figure 41 on page 115.

Figure 41: Shipping Crate and Accessory Box



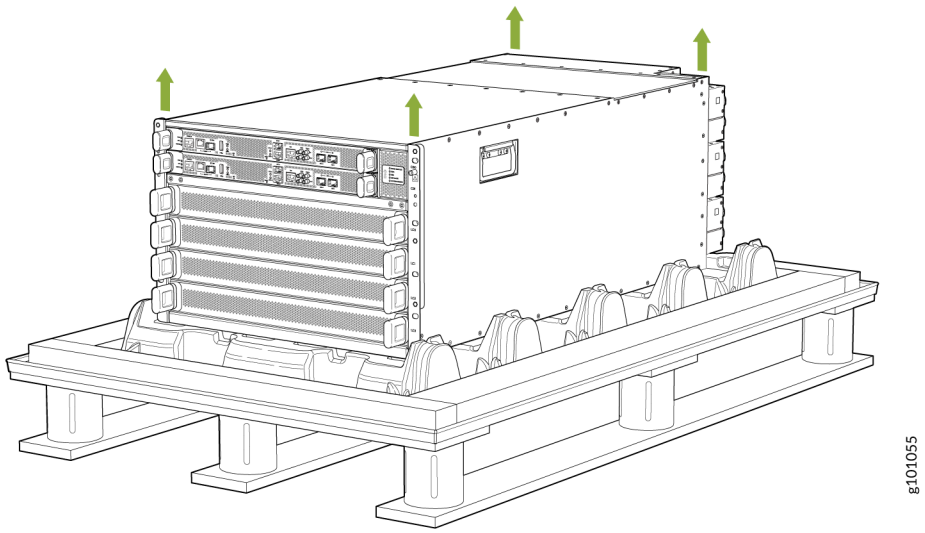
1– Cardboard shipping box	4– PTX10004 chassis
2– Cardboard accessory box	5– Wood pallet
3– Foam cover	

To unpack the chassis:

1. Move the shipping box to a staging area as close to the installation site as possible. While the chassis is bolted to the pallet, you can use a forklift or pallet jack to move the shipping box. Make sure there is enough space to remove components from the chassis.
2. Position the shipping box with the arrows pointing up.
3. Use the box cutter to slice the nylon straps that hold the shipping box to the pallet.
4. Lift the shipping box off the chassis.

5. Remove the cardboard accessory box.
6. Remove the foam padding from the top of the box.
7. Remove the plastic cover from the router chassis.
8. Use a mechanical lift or unload all of the components, except the fan tray controller, and manually lift the chassis from the shipping pallet. See Figure 42 on page 116 and No Link Title.

Figure 42: Lift the Chassis Off of the Pallet



9. Unpack the accessory box and lay out the contents so that they are ready for use.
10. Verify that your order includes all appropriate parts. See "Compare the PTX10004 Order to the Packing List" on page 118 and "PTX10004 Components and Configurations" on page 11 for information about base configurations and redundant configurations.
11. Save the shipping box and packing materials in case you need to move or ship the router at a later time.

Unpack Line Cards, Routing Control Boards, and Switch Interface Boards for the PTX10004

Before you unpack a component:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 283.
- Ensure that you know how to handle and store the component. See:

- "How to Hold a Routing and Control Board" on page 151 and "How to Store a Routing and Control Board" on page 152
- "How to Handle and Store PTX10004 SIBs" on page 188
- "How to Handle and Store PTX10004 Line Cards" on page 200

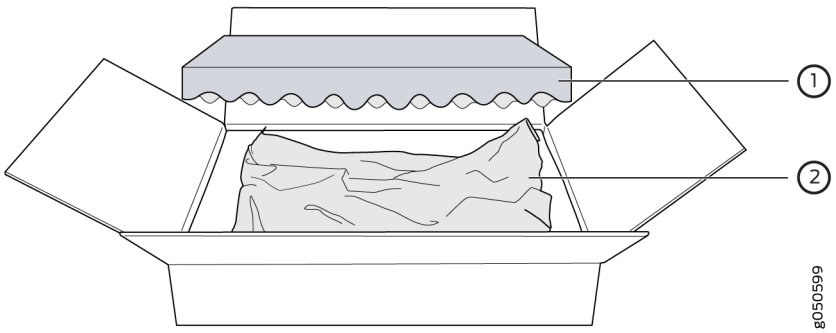
Line cards, additional Routing and Control Boards (RCBs), and additional Switch Interface Boards (SIBs) components are field-replaceable units (FRUs) that are shipped separately from the router chassis. The housing for the RCBs and line cards are rigid sheet-metal structures that house the electronics. SIBs have an exposed printed circuit board (PCB) on one side and sheet metal on the other. All these components are shipped in a cardboard carton, secured with packing material.

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

To unpack an RCB, a SIB, or a line card:

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

Figure 43: Unpack a Line Card



1– Foam packing material	2– Paper packaging and antistatic bag

SEE ALSO

Install a PTX10004 Line Card | 202

Install a PTX10004 Switch Interface Board | 190

Install a PTX10004 Routing and Control Board | 152

Compare the PTX10004 Order to the Packing List

The router chassis shipment includes a packing list. Check the parts you receive in the shipping crate against the items on the packing list. The packing list specifies the part number and description of each part in your order.

If any part on the packing list is missing, contact your customer service representative, or contact Juniper Networks 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.

Items that ship separately from the chassis are:

- Line cards
- Chassis front door kit (JNP10004-FRNT-PNL)

  NOTE: The kit is a spare part and can ship with the chassis or separately.

- Cable management kit (JLC-CBL-MGMT-KIT)

Use the following procedure to compare the sales order and packing list against the contents of the chassis shipping crate.

1. Determine the configuration. See "PTX10004 Components and Configurations" on page 11. The parts shipped depend on the configuration you order. These are the supported configurations:
   - Base configuration, AC or DC with three SIBs–PTX10004-BASE3.
   - Premium redundant configuration.
     - PTX10004-PREM2, AC or DC with four SIBs.
     - PTX10004-PREM3, AC or DC with six SIBs.
2. Compare the packing list accompanying the chassis with the configuration order.
   - For BASE3 configuration orders, see Table 49 on page 119.

- For PREM2 configuration orders, see Table 50 on page 120.
- For PREM3 configuration orders, see Table 51 on page 120.

Table 49: BASE3 Configuration Order

Component	PTX10004 Quantity
Chassis, including power bus	1
RCBs, JNP10K-RE1-E	1
Cover panel, in the RCB slot	1
Fan tray controllers	2
Fan trays	2
Power supplies	3
SIBs	3
Cover in a SIB position	3
Covers in the line-card positions	4
Dust covers for RCB ports	3
Accessory kit (see Table 52 on page 122)	1
Rack mount kit (see Table 53 on page 122)	1
Front panel kit (see Table 54 on page 123)	1
Documentation Roadmap Card	1

Table 50: PREM2 Configuration Order

Component	PTX10004 Quantity
Chassis, including power bus	1
Routing and Control Boards, JNP10K-RE1-E	2
Fan tray controllers, JNP10004-FTC2	2
Fan trays, JNP10004-FAN2	2
Power supplies: • JNP10K-PWR-AC2 • JNP10K-PWR-DC2	3
Switch Interface Boards	4
Covers in the line-card positions	4
Accessory kit (see Table 52 on page 122)	1
Rack mount kit (see Table 53 on page 122)	1
Front panel kit (see Table 54 on page 123)	1
Documentation Roadmap Card	1

Table 51: PREM3 Configuration Order

Component	PTX10004 Quantity
Chassis, including power bus	1

Table 51: PREM3 Configuration Order *(Continued)*

Component	PTX10004 Quantity
Routing and Control Boards, JNP10K-RE1-E	2
Fan tray controllers, JNP10004-FTC2	2
Fan trays, JNP10004-FAN2	2
Power supplies • JNP10K-PWR-AC2 • JNP10K-PWR-DC2	3
Switch Interface Boards	6
Covers in the line-card positions	4
Accessory kit (see Table 52 on page 122)	1
Rack mount kit (see Table 53 on page 122)	1
Front panel kit (see Table 54 on page 123)	1
Documentation Roadmap Card	1

3. Compare the contents of the accessory kit with Table 52 on page 122.

Table 52: PTX10004 Accessory Kit

Component	Quantity	
	AC Configurations	DC Configurations
Warranty card	1	1
End User License Agreement (EULA)	1	1
RJ-45 Ethernet cable	1	1
RJ-45 to DB9 rollover cable	1	1
Electrostatic discharge (ESD) wrist strap with cable	1	1
Media kit (flash drives, PCMCIA card adapter)	1	1
Chassis ground lug, 2-hole, 10-32, 6 AWG	1	1
Power cord retainer clips	6	–
DC terminal lugs, 2-hole, 10-32, 4 AWG	–	Premium = 24 Base = 12
Antistatic bags	4	4

4. Compare the contents of the rack mount kit with Table 53 on page 122.

Table 53: PTX10004 Rack Mount Kit

Component	Quantity
Mounting tray	1

Table 53: PTX10004 Rack Mount Kit *(Continued)*

Component	Quantity
Mounting blades	2
Safety restraint	1
Phillips 8-32 x .375 in. flat-head screws	12

5. Compare the contents of the ESD front door kit with Table 54 on page 123.

Table 54: JNP10004-FRNT-PNL Front Door Kit

Component	Quantity
Front door	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. Update the installation base data if any addition or change to the installation base occurs or if the installation base is moved. Juniper Networks is not responsible 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 the PTX10004 by Using the JNP10004-RMK-4POST Rack Mount Kit

You can mount a PTX10004 router in a four-post closed frame rack or a four-post open frame rack by using a rack mount kit. The rack mount kit (part number: JNP10004-RMK-4POST) is shipped by default. In this topic, we describe how to mount the router.

The router chassis weighs approximately 123 lb (56 kg) with only the fan tray controllers installed.

You can mount a PTX10004 manually or by using a mechanical lift. Because of the router's size and weight, we strongly recommend that you use a mechanical lift to mount the PTX10004.

If you are mounting the router by using a lift, ensure that you have a mechanical lift rated for 250 lbs (113.4 kg).

If you are mounting the router manually, ensure that there are at least three people to lift the chassis.

Before you mount the PTX10004 router:

- Prepare the site for installation as described in "PTX10004 Site Preparation Checklist" on page 75.
- Unpack the router as described in "Compare the PTX10004 Order to the Packing List" on page 118.
- Review the chassis lifting guidelines in "Chassis and Component Lifting Guidelines" on page 264.

Ensure that you have the following parts and tools available:

- 28 rack mount screws appropriate for your rack (not provided) to secure the mounting blades, mounting tray, chassis, and safety restraint to the rack
- A Phillips (+) screwdriver, number 1, 2, or 3, depending on the size of your rack mount screws (not provided)

The rack mount kit consists of the following components:

- One mounting tray
- Two mounting blades
- One safety restraint
- 12 Phillips 8-32 x .375 in. flat-head screws

CAUTION: Install line cards and other components in the chassis only after you mount the chassis securely.

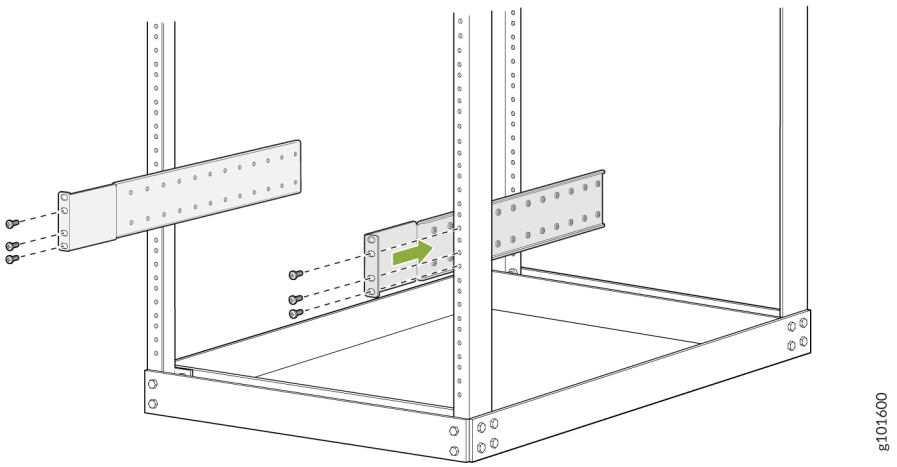
CAUTION: Before mounting the router on a rack or cabinet, have a qualified technician verify that the rack is strong enough to support the router's weight and is adequately supported at the installation site.

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

To mount the router:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end to a site ESD point.
2. Attach the mounting blades to the front rack posts by using six rack mount screws appropriate for your rack and a screwdriver (see Figure 44 on page 125).

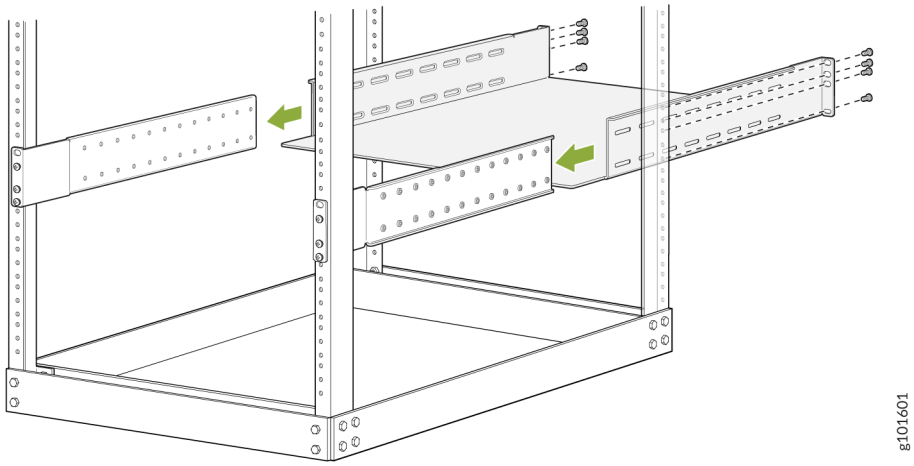
Figure 44: Attach the Mounting Blades



3. From the rear of the rack, slide the mounting tray into the rear posts of the rack such that the mounting blades align below the flanges on either sides of the mounting tray. Attach the tray to the

rear rack posts by using eight rack mount screws appropriate for your rack and a screwdriver (see Figure 45 on page 126).

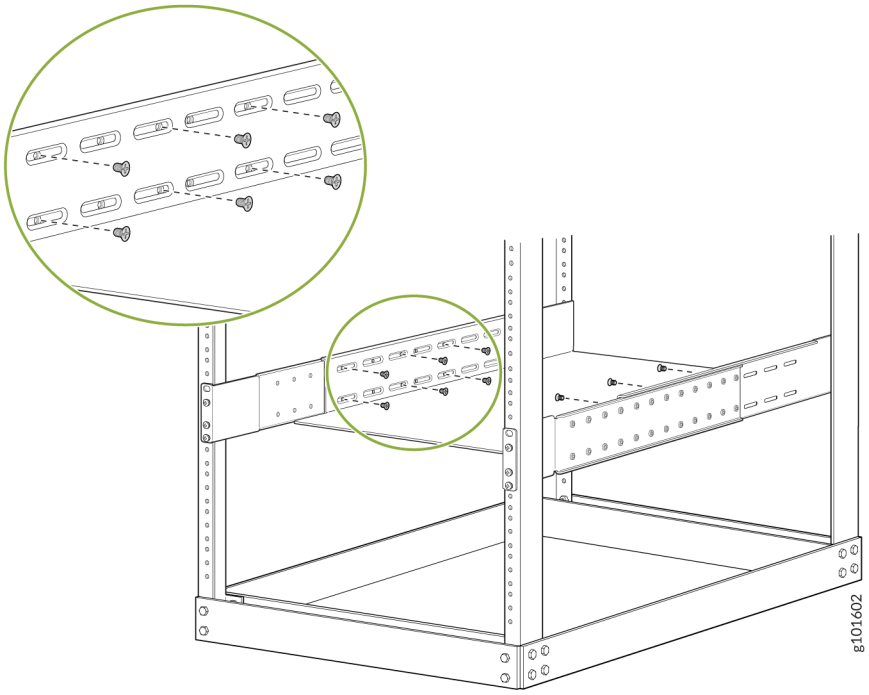
Figure 45: Attach the Mounting Tray



4. Check that the mounting tray is level.

5. Attach the tray to the mounting blades with the 12 Phillips 8-32 x .375 in. flat-head screws (see Figure 46 on page 127).

Figure 46: Attach the Mounting Blades to the Mounting Tray



6. If you are mounting the router by using a lift:

a. Load the router onto the lift, making sure it rests securely on the lift platform (see Figure 47 on page 128).

Figure 47: Load the PTX10004 onto a Mechanical Lift



b. By using the lift, align the router in front of the rack, centering it in front of the mounting tray.

c. Lift the chassis approximately 0.75 in. (1.9 cm) above the surface of the mounting tray. Align the chassis as close as possible to the mounting tray.

If you are mounting the router manually:

a. Align the router in front of the rack or cabinet, centering it in front of the mounting tray. Use a pallet jack if one is available.

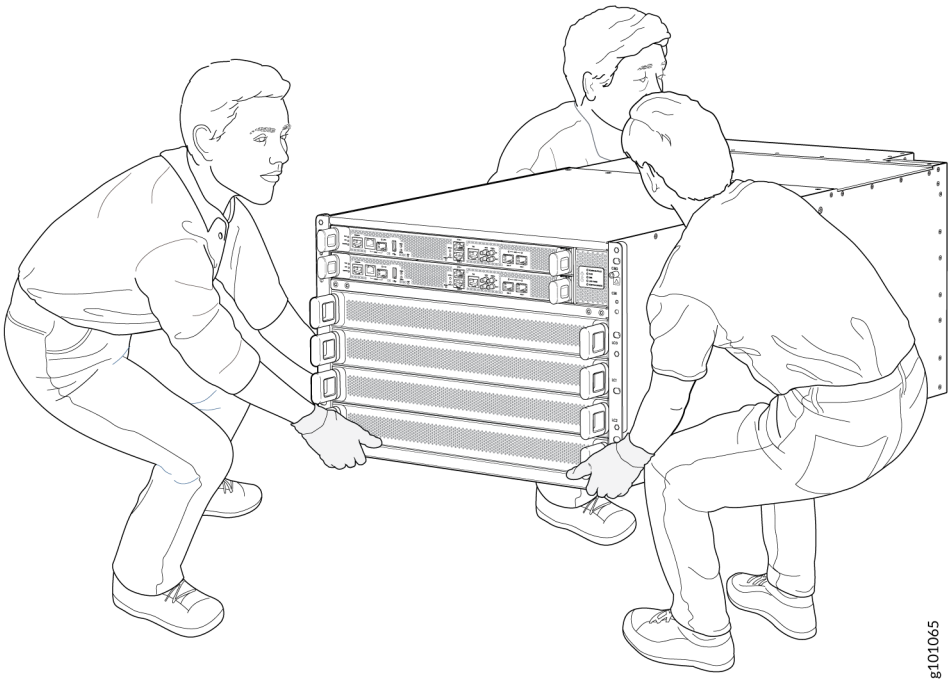
WARNING: To prevent injury, keep your back straight and lift with your legs, not your back. Do not twist your body as you lift. Balance the load evenly and be sure that your footing is firm.

CAUTION: If you are mounting more than one router, mount the first one at the bottom of the rack. Do not attempt to mount a router manually in an upper position in a rack.

NOTE: The chassis has two handles that are designed for subtle positioning of the chassis. Do not lift the chassis by the handles.

b. With one person on each side and one person in the rear, hold the bottom of the chassis and carefully lift it onto the mounting tray (see Figure 48 on page 129).

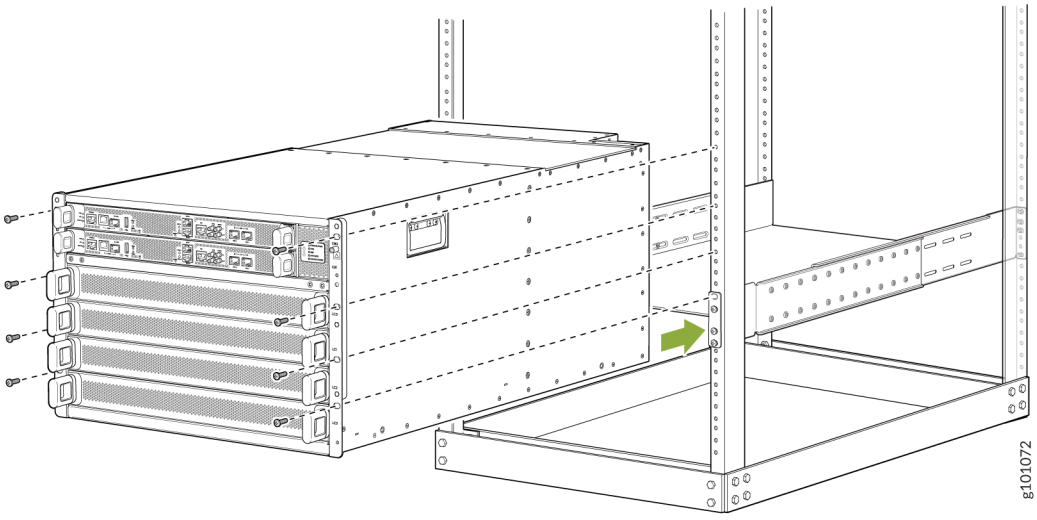
Figure 48: Lift the PTX10004 Manually



7. Carefully slide the chassis onto the mounting tray until the chassis flanges contact the rack rails. The mounting blades ensure that the holes in the chassis flanges line up with the holes in the rack rails.

8. Attach the chassis to the rack by installing eight rack mount screws through each open flange hole and rack hole (see Figure 49 on page 130).

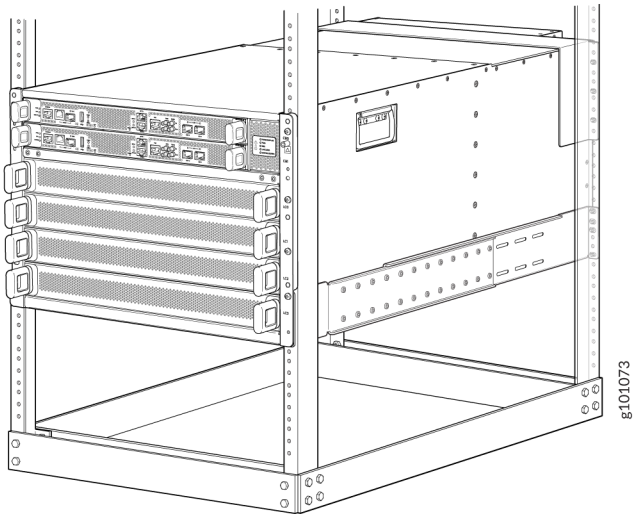
Figure 49: Attach the Chassis to the Rack



9. If you used a lift to mount the router, move the lift away from the rack.
10. Check the alignment of the router. The mounting screws on each side of the rack should line up, and the router should be level. Tighten the screws.
11. Insert the safety restraint between the rear posts of the rack. It should rest on the top of the chassis and align with the holes in the rack.

12. Attach the restraint to the rack by installing six rack mount screws through each open flange hole and rack hole (see Figure 50 on page 131). Tighten the screws.

Figure 50: Attach the Safety Restraint



Install the Front Door on a PTX10004 Router

IN THIS SECTION

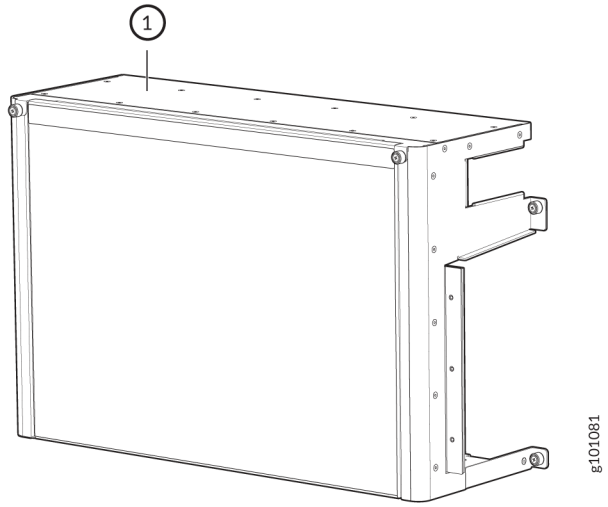
- Install the Front Door on a PTX10004 Router | **131**

Install the Front Door on a PTX10004 Router

The front door (JNP10004-FRNT-PNL) is required on the PTX10004 to protect fiber-optic cabling and to provide additional protection from electromagnetic interference (EMI). The front door can be installed with or without the optional cable management system.

Be sure to have the front door (provided with the router chassis before you begin. See Figure 51 on page 132 to identify the front door.

Figure 51: Front Door

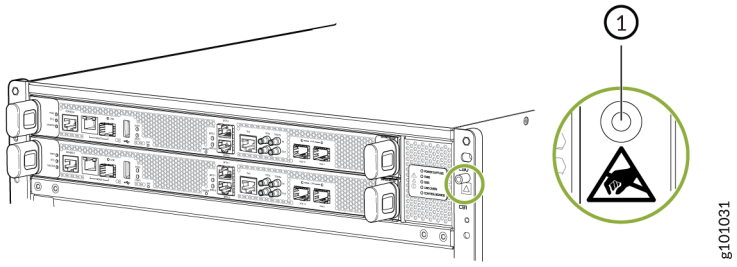


1– Front door

To install the front door:

1. Wrap and fasten one end of the Electrostatic Discharge (ESD) grounding strap around your bare wrist and connect the other end of the strap to the ESD point on the front of the chassis. See Figure 52 on page 132.

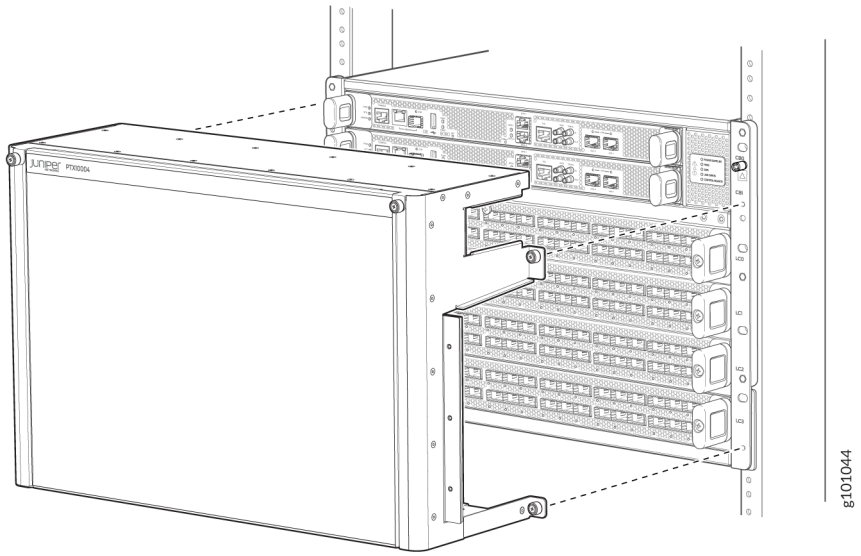
Figure 52: ESD Point for PTX10004 Chassis Front



1– ESD point

2. Insert all optics.
3. Lift the front door and align the captive screws in the door with holes in the chassis flange. Fasten the door to the chassis and rack using the captive screws using your fingers until finger tight. See Figure 53 on page 133.

Figure 53: Attach the Front Door by Using the Captive Screws



Connect the PTX10004 to Power

IN THIS SECTION

- Connect the PTX10004 Router to Earth Ground | **134**
- Connect AC Power to a PTX10004 | **136**
- Connect DC Power to a PTX10004 | **137**

The PTX10004 routers support AC, DC, high-voltage alternating current (HVAC), and high-voltage direct current (HVDC) power supplies. To connect power to a PTX10004 router, read the following procedures.

NOTE: Do not mix power supply models in the same chassis in a running environment.

Connect the PTX10004 Router to Earth Ground

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.

You must install the PTX10004 in a restricted-access location and ensure that the chassis is always properly grounded. The PTX10004 has a two-hole protective grounding terminal provided on the chassis. See Figure 55 on page 136. Under all circumstances, use this grounding connection to ground the chassis. For AC-powered systems, you must also use the grounding wire in the AC power cord along with the two-hole grounding lug connection. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.

If an external ground connection is required, ensure that a licensed electrician has attached an appropriate grounding lug to the grounding cable you supply. Using a grounding cable with an incorrectly attached lug can damage the switch.

NOTE: Mount your router in the rack before attaching the grounding lug to the router; see No Link Title.

Ensure that you have the following parts and tools available:

- An electrostatic discharge (ESD) grounding strap (provided).
- Protective earthing terminal lug (provided).
- Grounding cable for your PTX10004 (not provided)—The grounding cable must be 4 AWG (21.1 mm^2) stranded wire should be rated 75° C or per local electrical code.
- Grounding lug for your grounding cable (provided)—This bracket attaches to the lower left corner of the router chassis next to the bottom power supply, providing a protective earthing terminal for the router. The grounding lug required is a Panduit LCD4-14A-L or equivalent.
- A number 3 Pozidriv or Phillips screwdriver (not provided) to tighten the two screws that are mounted on the chassis.

The provided terminal lugs for the JNP10K-PWR-DC2 are Panduit LCD4-14A-L, or equivalent, and sized for 4 AWG (21.1 mm^2) power source cables. The 4 AWG (21.1 mm^2) stranded wire should be rated 75°

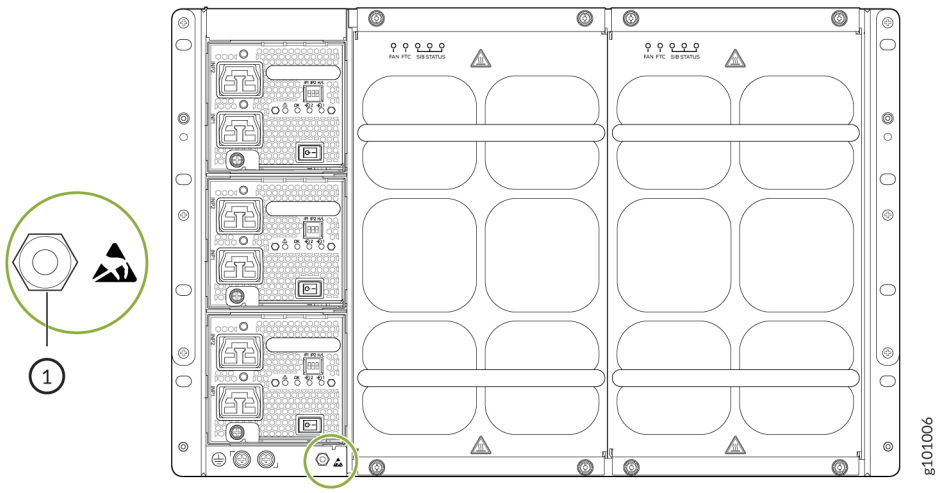
C or per local electrical code. We recommend that you install heat-shrink tubing insulation around the crimped section of the power cables and lugs.

An AC-powered PTX10004 gets additional grounding when you plug the power supply in the router into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See "PTX10004 Power Cable Specifications" on page 92.

To connect earth ground to a PTX10004:

1. Verify that a licensed electrician has attached the cable lug (provided in the accessory kit) to the grounding cable.
2. Connect the other end of the grounding cable to a proper earth ground, such as the rack in which the router is mounted.
3. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to one of the ESD points on the chassis. See Figure 54 on page 135.

Figure 54: ESD Point for the PTX10004

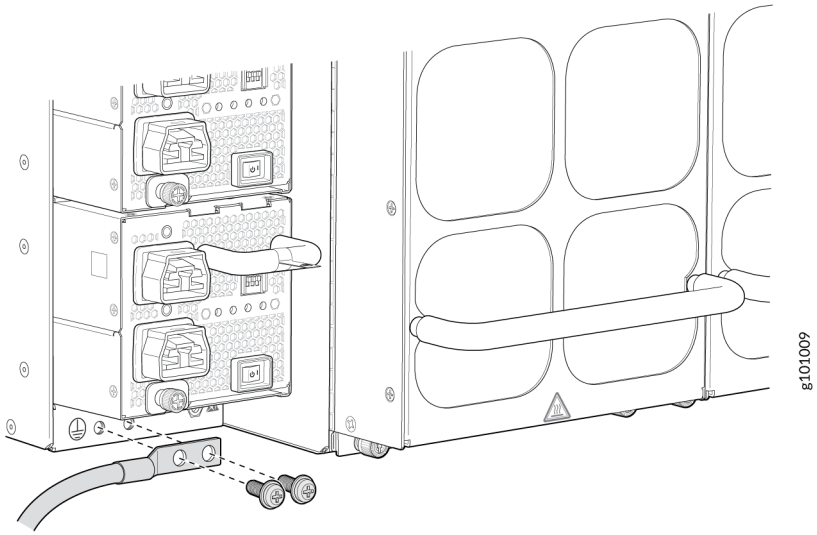


1– Grounding point

4. Remove the two M6 screws with attached washers on the chassis using either a Pozidriv or Phillips screwdriver.

5. Place the chassis grounding lug and cable over the screw holes with the cable connection pointing to the left. See Figure 55 on page 136.

Figure 55: Connect a Grounding Cable to the PTX10004



6. Place the two screws with attached washers over the grounding lug and grounding cable.
7. Tighten the two M-6 screws using a Pozidriv or Phillips screwdriver.
8. Dress the grounding cable and ensure that it doesn't touch or block access to other device components and that it doesn't drape where people can trip over it.

SEE ALSO

JNP10K-PWR-AC2 Power Supply | **42**

Install a JNP10K-PWR-AC2 Power Supply | **168**

Connect AC Power to a PTX10004

Before you begin to connect power to the router, be sure you understand how to prevent ESD damage. See "Prevention of Electrostatic Discharge Damage" on page 283.

After you ground the chassis, add power supplies, and apply power to the chassis, the system initiates the power-on sequence. This sequence can start incrementally with a single power supply, but we do not recommend that you bring up a PTX10004 system with less than three power supplies.

To connect AC power to a PTX10004 chassis:

1. Connect the chassis to earth ground (see "Connect the PTX10004 Router to Earth Ground" on page 134).

   CAUTION: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, a PTX10004 must be adequately grounded before it is connected to power.

   For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the rear panel of the PTX10004 to connect to the earth ground.

   A PTX10004 router gets additional grounding when you plug the power supply in the router into a grounded AC power outlet by using the AC power cord appropriate for your geographical location. See "PTX10004 Power Cable Specifications" on page 92.

2. Install power supplies in the router and apply power. See "Install a JNP10K-PWR-AC2 Power Supply" on page 168.

Connect DC Power to a PTX10004

Before you begin to connect power to the router be sure you understand how to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 283.

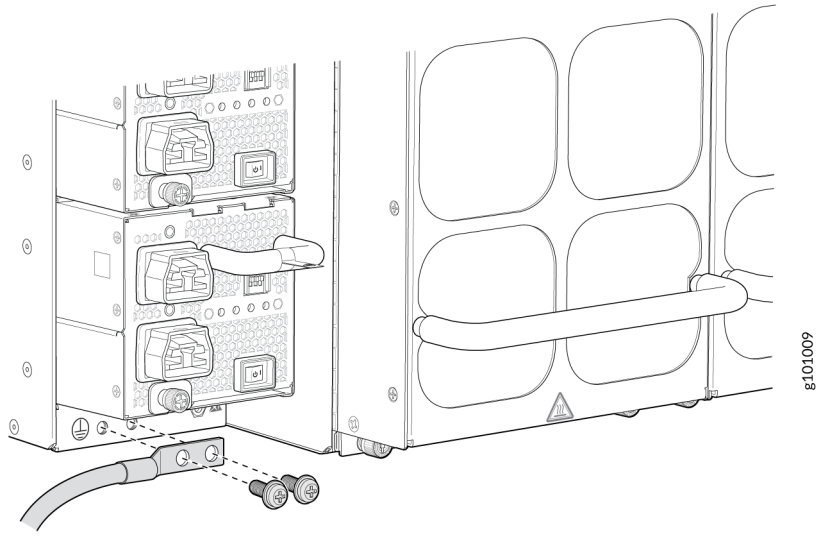
The overall process of bringing up a DC-powered chassis involves the proper cabling of the individual power supplies, adding the power supplies to the chassis, and supplying power. The power-on sequence can start incrementally with a single power supply, but it is not recommended that you bring up a PTX10004 system with less than three power supplies.

Each power supply input feed must be connected to a dedicated DC power source outlet.

To connect DC power to a PTX10004 chassis:

1. Connect the chassis to earth ground (see Figure 56 on page 138).

Figure 56: Connect a Grounding Cable to the PTX10004



> **CAUTION**: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, a PTX10004 router must be adequately grounded before it is connected to power.
>
> For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the rear panel of the PTX10004 to connect to the earth ground.

2. Connect DC power to the JNP10K-PWR-DC2 power supply and install in the chassis.

   To connect DC power to a JNP10K-PWR-DC2 power supply, see "Install a JNP10K-PWR-DC2 Power Supply" on page 175. To connect HVDC power to a JNP10K-PWR-AC2 power supply, see "Install a JNP10K-PWR-AC2 Power Supply" on page 168.

SEE ALSO

Install a JNP10K-PWR-DC2 Power Supply | **175**

Install a JNP10K-PWR-AC2 Power Supply | **168**

RELATED DOCUMENTATION

General Safety Guidelines and Warnings | 258

Grounded Equipment Warning | 270

Connect the PTX10004 to External Devices

IN THIS SECTION

- Connect a PTX10004 Router to a Network for Out-of-Band Management | 139
- Connect a PTX10004 Router to a Management Console | 140
- Connect the Router to External Clocking and Timing Devices | 141

You can manage the PTX10004 router by using the two management ports on the Routing and Control board (RCB) for out-of-band management or through the console port on the RCB. To connect a PTX10004 router to external management devices, read to the following sections.

Connect a PTX10004 Router to a Network for Out-of-Band Management

Ensure that you have an appropriate cable available. See "Management Port Connector Pinouts for the PTX10004" on page 110 and "Connect a PTX10004 Router to a Management Console" on page 140.

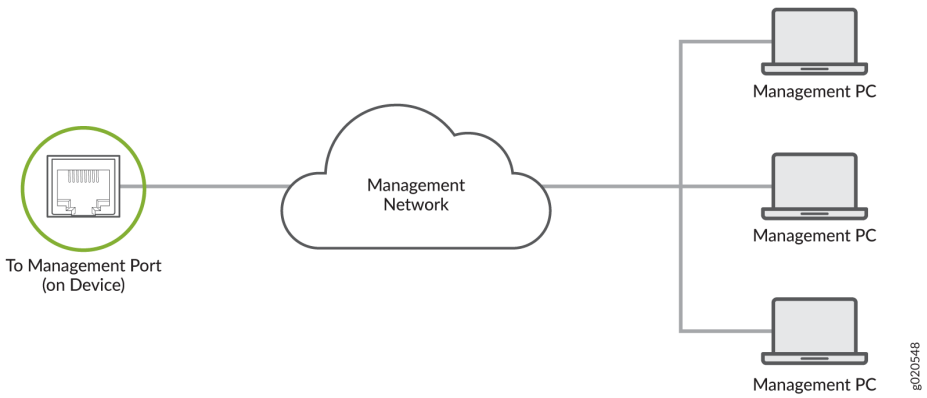
You can monitor and manage a PTX10004 using a dedicated management channel. Each PTX10004 RCB has two management ports: a 10/100/1000BASE-T RJ-45 port for copper connections and a 1GbE small form-factor pluggable (SFP) port for fiber connections. Use the management ports to connect the RCB to a network for out-of-band management.

NOTE: You cannot use the management ports to perform the initial configuration of the PTX10004. You must configure the management ports before you can successfully connect to the PTX10004 using these ports. See "Perform the Initial Configuration for the PTX10004" on page 146.

To connect a PTX10004 to a network for out-of-band management (see Figure 57 on page 140):

1. Connect one end of the cable to one of the two management ports (labeled **MGNT**) on one of the RCBs.
2. Connect the other end of the cable to the management router.

Figure 57: Connect a PTX10004 to a Network for Out-of-Band Management



Connect a PTX10004 Router to a Management Console

Ensure that you have an RJ-45 to DB-9 rollover cable available. An RJ-45 cable with an RJ-45 to DB-9 adapter is provided with the device.

> **NOTE**: If your laptop or PC does not have a DB-9 connector pin (plug) and you want to connect your laptop or PC directly to the PTX10004 router, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter supplied with the device and a USB to DB-9 plug adapter. You must provide the USB to DB-9 plug adapter.

The PTX10004 router has a console port with an RJ-45 connector. Use the console port to connect the device to a management console or to a console server.

To connect the PTX10004 router to a management console, (see Figure 58 on page 141 and Figure 59 on page 141):

1. Connect one end of the Ethernet cable to the console port (labeled **CON**).

2. Connect the other end of the Ethernet cable into the console server (see Figure 58 on page 141) or management console (see Figure 59 on page 141).

Figure 58: Connect the PTX10004 Router to a Management Console Through a Console Server

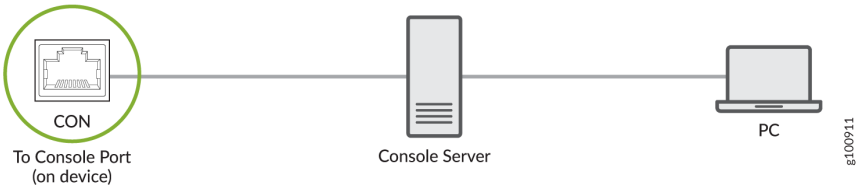


Figure 59: Connect the PTX10004 Router Directly to a Management Console



Connect the Router to External Clocking and Timing Devices

IN THIS SECTION

- Connect the Router to a 1PPS and 10MHz Timing Device | **141**
- Connect the Router to a Time-of-Day Device | **143**
- Connect the Router to a BITS External Clocking Device | **144**

The router supports external clock synchronization for Synchronous Ethernet and external inputs.

Connect the Router to a 1PPS and 10MHz Timing Device

The routing and control boards installed in the router have GPS clock ports that you can use to connect the router to a 1PPS and 10MHz timing device. Table 55 on page 142 describes the GPS clock ports on the router.

Table 55: GPS Clock Ports on the Router

Label	Description
1PPS – IN	1 PPS input port
10MHz – IN	10 MHz input port
1PPS – OUT	1 PPS output port
10MHz – OUT	10 MHz output port

You can configure the router as a timing primary device or a client device. If you configure the router as a timing primary device, the router receives inputs from the timing device through the input ports and sends outputs to a client device through the output ports. If you configure the router as a timing client device, the router receives inputs from the timing device through the input ports.

Before you connect the router to a 1PPS and 10MHz timing device, ensure that you have two cables that meet the specifications in Table 56 on page 142.

Table 56: GPS Port Cable Specifications

Specifications	Value
Cable type	Coaxial
Connectors at the router end	2x1 DIN 1.0/2.3 latching male connectors
Connectors at the timing device end	Compatible with the ports on the timing device
Maximum length	9.84 feet (3 m)
Impedance	50 ohms

To connect the router to a 1PPS and 10MHz timing device:

1. Connect one end of the cables to the input ports on the router.

If the router is a timing primary device, connect the router to a client device by using the output ports.

> **NOTE**: Ensure that the timing device supports an input or output impedance of 50 ohms, and supports input and output voltage levels that comply with ITU G.703. The timing device inputs must be 5V tolerant.

2. Connect the other end of the cables to the 1PPS and 10MHz connectors on the timing device.

Connect the Router to a Time-of-Day Device

The routing and control boards installed in the router have a time-of-day (ToD) port labeled **ToD**. You can use that port to connect the router to a ToD timing device.

Before you connect the router to a ToD timing device, ensure that you have an ESD grounding strap and a cable that meets the specifications in Table 57 on page 143.

Table 57: ToD Port Cable Specifications

Specifications	Value
Cable type	RS-232 (EIA-232) serial cable
Connector at the router end	RJ-45
Connector at the timing device end	RJ-45
Maximum length	19.69 feet (6 m)

Table 58 on page 143 provides the pinout information for the RS-232 connector for the ToD port.

Table 58: ToD Port Connector Pinouts

Pin	Description	Direction
1	Reserved	–
2	Reserved	–

Table 58: ToD Port Connector Pinouts *(Continued)*

Pin	Description	Direction
3	Transmit Data	Output
4	Signal Ground	–
5	Signal Ground	–
6	Receive Data	Input
7	Reserved	–
8	Reserved	–

To connect the router to a ToD timing device:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to one of the ESD points on the chassis.
2. Plug one end of the RJ-45 cable into the **ToD** port.
3. Plug the other end of the RJ-45 cable into the ToD timing device.
4. Configure the port.

Connect the Router to a BITS External Clocking Device

The routing and control boards installed in the router have two building-integrated timing supply (BITS) ports labeled **BITS-0** and **BITS-1**. You can use them to connect the router to a BITS timing device.

Before you connect the router to a BITS timing device, ensure that you have an ESD grounding strap and a cable that meets the specifications in Table 59 on page 144.

Table 59: BITS Port Cable Specifications

Specifications	Value
Cable type	RJ-48 shielded cable

Table 59: BITS Port Cable Specifications *(Continued)*

Specifications	Value
Connector at the router end	Autosensing RJ-48 connector

Table 60 on page 145 provides the pinout information for the RJ-48 connector for the BITS ports.

Table 60: BITS Ports Pinouts

Pin Number	Description	Direction
1	EXT_CLKA_RRING_LINE	Input
2	EXT_CLKA_RTIP_LINE	Input
3	Reserved	–
4	EXT_CLKA_TRING_LINE	Output
5	EXT_CLKA_TTIP_LINE	Output
6	Reserved	–
7	Reserved	–
8	Reserved	–

To connect the router to a BITS timing device:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to one of the ESD points on the chassis.
2. Plug one end of the RJ-45 cable into a BITS port.
3. Plug the other end of the RJ-45 cable into the BITS external clocking device.
4. Verify that the LED for the **BITS** port is lit steadily green.
5. Configure the port.

RELATED DOCUMENTATION

PTX10004 Routing and Control Board Components and Descriptions | 50

Management Port Connector Pinouts for the PTX10004 | 110

Console Port Connector Pinouts for a PTX10004 | 108

Perform the Initial Configuration for the PTX10004

IN THIS SECTION

- Before You Start | 146
- Enter Configuration Mode | 147
- Establish a Root Password and an Optional Hostname | 148
- Configure the Default Gateway and Ethernet Interface | 148
- Configure Optional Routes, Services, and Commit the Configuration | 149

You must perform the initial configuration of the PTX10004 through the console port using the CLI or through zero-touch provisioning (ZTP). To use ZTP to provision the device, you must have access to a Dynamic Host Control Protocol (DHCP) server, and a File Transfer Protocol (anonymous FTP), Hypertext Transfer Protocol (HTTP), or Trivial File Transfer Protocol (TFTP) server on which the software image and configuration files are stored. For more information about using ZTP for provisioning the device, see Understanding Zero Touch Provisioning in the *Installation and Upgrade Guide*.

These procedures step you through the configuration of the PTX10004 using the console **CONSOLE** port on the Routing and Control Board (RCB). For directions on connecting to a console server or a management server, see "Connect a PTX10004 Router to a Management Console" on page 140.

Before You Start

1. Set the following values on the console server or PC:
   - Baud Rate—9600
   - Flow Control—None

- Data—8
- Parity—None
- Stop Bits—1
- DCD State—Disregard

2. Gather the information you'll need to configure the PTX10004:
   - The password you'll set for the root user
   - The name on the system that the PTX10004 will be known as (hostname)
   - The IP address and prefix of the default gateway router
   - The IP address and prefix length information of the Ethernet interface
   - The IP address and prefix length of remote prefixes

Enter Configuration Mode

1. Check that the PTX10004 has power.
2. Connect the console port to a laptop or PC using the supplied RJ-45 cable and RJ-45 to DB-9 adapter. The console (**CONSOLE**) port is located on the RCB of the router.
3. Log in as **root**. There is no password. If the software booted before you connected to the console port, you might need to press the Enter key for the prompt to appear.

```
Amnesiac <ttyd0>
login: root
```

4. Start the CLI.

```
root@% cli
```

5. Enter configuration mode.

```
root> configure
```

Establish a Root Password and an Optional Hostname

1. Add a password to the root administration user account.

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

2. (Optional) Configure the name of the router. If the name includes spaces, enclose the name in quotation marks (“ ”).

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

Configure the Default Gateway and Ethernet Interface

1. Configure the default gateway.

```
[edit]
root@# set system management-instance
root@# set routing-instances mgmt_junos routing-options static route prefix/prefix-length next-hop
default-gateway-ip-address
```

2. Configure the IP address and prefix length for the router management interface.

```
[edit]
root@# set interfaces re0:mgmt-0 unit 0 family inet address ip-address/prefix-length
```



CAUTION: Although the CLI permits you to configure two management Ethernet interfaces within the same subnet, only one interface is usable and supported.

NOTE: The management ports, `em0` or `re0:mgmt-0` (**MGMT** for RJ-45 connections) and `em1` (also labeled **MGMT** for fiber connections), are found on the front of the RCBs of the PTX10004 router.

Configure Optional Routes, Services, and Commit the Configuration

1. (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
```

2. Enable services such as SSH and Telnet.

NOTE: You will not be able to log in to the router as the `root` user through Telnet. Root login is allowed only through SSH.

```
[edit]
root@# set system services telnet
```

3. Commit the configuration to activate it on the router.

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

RELATED DOCUMENTATION

PTX10004 System Overview | 2

PTX10004 Installation Overview | 113

CHAPTER 4

Maintaining Components

Install and Remove PTX10004 Routing and Control Boards | 151

Install and Remove PTX10004 Cooling System Components | 158

Install and Remove PTX10004 Power System Components | 167

Install and Remove PTX10004 Switch Fabric Components | 187

Install and Remove PTX10004 Line Card Components | 199

PTX10004 Transceiver and Fiber Optic Cable Installation and Removal | 212

Remove the PTX10004 Router | 219

Install and Remove PTX10004 Routing and Control Boards

IN THIS SECTION

- How to Hold a Routing and Control Board | 151
- How to Store a Routing and Control Board | 152
- Install a PTX10004 Routing and Control Board | 152
- Remove a PTX10004 Routing and Control Board | 155

The PTX10004 modular chassis can house one or two Routing and Control Boards (RCBs), depending on the configuration. You can install RCBs in either of the two top slots on the front of the chassis. After the hot insertion, the RCB powers up and comes online. In a single RCB system, the RCB comes online as the primary and restarts the line cards and the switch fabric. In a dual RCB system, the RCB powers up and comes online in the backup mode. To install or remove an RCB, read the following sections.

How to Hold a Routing and Control Board

Pay proper attention to the way you are holding an RCB. An RCB is installed horizontally, and it is best to hold it by the sides of the unit when it isn't in the chassis.

To handle and store an RCB properly:

1. Orient the RCB so that the faceplate is toward you.
2. Grasp each side of the unit firmly as you slide the unit out of the chassis.
3. Take care not to strike the unit against any object as you carry it.

> ⚠ **CAUTION**: Never hold the RCB by the connector edge. The connectors are fragile and the RCB will not seat properly if the connector is damaged.

4. If you must rest an RCB on an edge, place a cushion between the edge and the surface.

CAUTION: Do not stack RCBs on top of one another or on top of any other component.

5. Place each RCB in an individual antistatic bag or separately on an antistatic mat that is placed on a flat, stable surface.

How to Store a Routing and Control Board

You must store an RCB either in the chassis or in a spare shipping container, horizontally and sheet-metal side down. Do not stack these units on top of one another or on top of any other component. Place each unit separately in an antistatic bag or on an antistatic mat placed on a flat, stable surface.

NOTE: Because these units are heavy, and because antistatic bags are fragile, inserting the line card into the bag is best done by two people.

To insert an RCB into an electrostatic bag:

1. Hold the unit horizontally with the faceplate toward you.
2. Have the second person slide the opening of the antistatic bag over the connector edge and then pull the bag to cover the unit.

If you must insert an RCB into a bag by yourself:

1. Lay the unit horizontally on an antistatic mat that is on a flat, stable surface with the sheet-metal side down.
2. Orient the unit with the faceplate toward you.
3. Carefully insert the connector edge into the opening of the bag and pull the bag toward you to cover the unit.

Install a PTX10004 Routing and Control Board

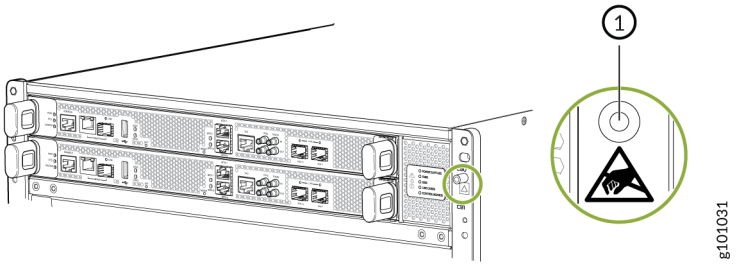
In redundant configurations, a PTX10004 RCB is a hot-removable and hot-insertable field-replaceable unit (FRU). In base configurations, you need to install a second RCB before you remove a failing RCB to prevent the router from shutting down.

Before you install an RCB, ensure that you have an electrostatic discharge (ESD) grounding strap.

To install an RCB:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to one of the ESD points on the chassis (see Figure 60 on page 153).

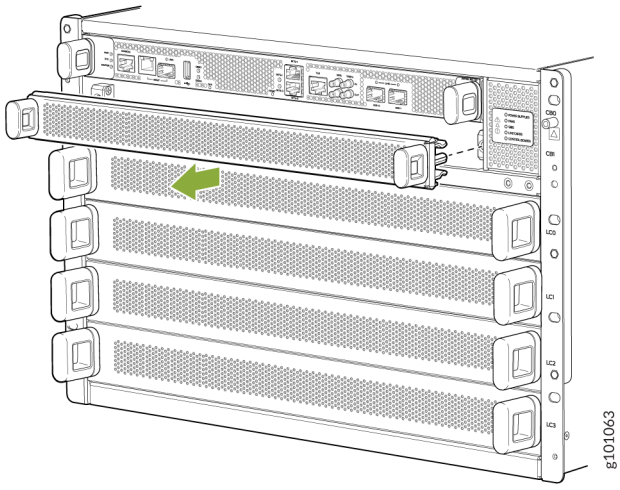
Figure 60: ESD Point on the Front of the PTX10004 Chassis



1– ESD point

2. Either remove the cover from the available RCB slot (see Figure 61 on page 153) or remove the failing RCB, (see "Remove a PTX10004 Routing and Control Board" on page 155).

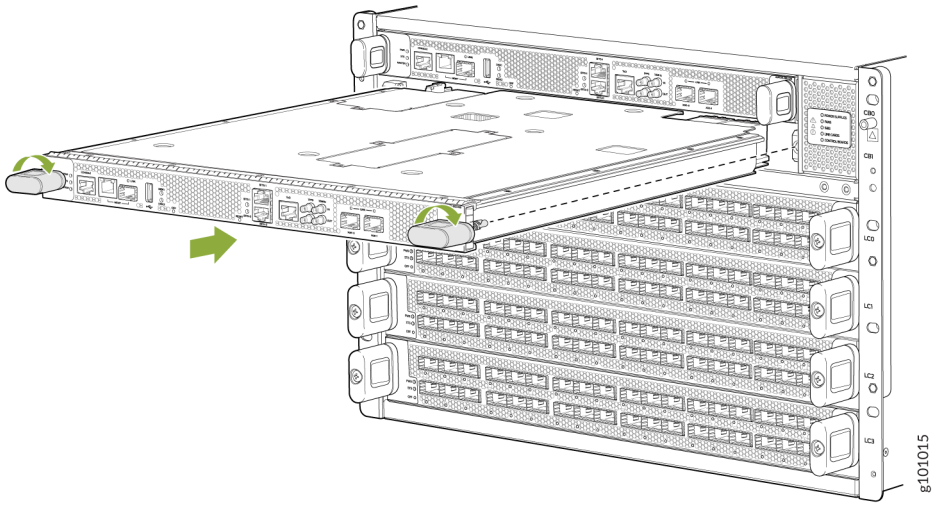
Figure 61: Remove an RCB Cover



3. Remove the new RCB from the antistatic bag and inspect it for any damage before installing it in the chassis.
4. Lift the RCB by its sides, being careful not to bump the connectors.
5. Carefully align the sides of the RCB with the guides inside the chassis.
6. Slide the RCB into the chassis, carefully ensuring that it is correctly aligned.

7. Grasp both handles on the RCB and rotate them simultaneously clockwise until the RCB is fully seated and the handles are vertical (see Figure 62 on page 154).

Figure 62: Install an RCB



The RCB begins the power-on sequence when fully seated.

8. To verify that the RCB is functioning normally, check the **PWR** LED on its faceplate and the **CONTROL BOARDS** LED on the status panel. Both LEDs should light steadily shortly after the RCB is installed. If the **PWR** LED is blinking yellow, there might be insufficient power available. See "PTX10004 Power Planning" on page 84 and "Power Requirements for PTX10004 Components" on page 84 to ensure that you have adequate power for the additional unit.

   Another method to verifyi that the RCB is online is to use the following CLI command:

```
user@host> show chassis environment cb
```

SEE ALSO

Power Requirements for PTX10004 Components | 84

PTX10004 Routing and Control Board LEDs | 53

Remove a PTX10004 Routing and Control Board

In redundant configurations, a PTX10004 RCB is a hot-removable and hot-insertable field-replaceable unit (FRU). In base configurations, you need to install a second RCB before removing a failing RCB to prevent the router from shutting down. We recommend that you take base systems offline before replacing the RCB.

Before you remove an RCB, ensure that you have an electrostatic discharge (ESD) grounding strap.



CAUTION: In base configurations, removal of the RCB causes the system to shut down. In redundant configurations, removal of the RCB causes the system to reboot and start the election process for a new primary.

To remove an RCB:

1. Place an antistatic bag or antistatic mat on a flat, stable surface.
2. Use the following CLI commands to take the RCB offline (re0 or re1).

```
user@host> request node power-off re0|re1
Power-off the node ? [yes,no?]
yes
user@host> request chassis cb slot slot-number offline
Offline initiated
```

You can use the `show chassis environment cb | match State` CLI command to verify that the RCB is offline.

```
user@host0> show chassis environment cb | match State
State                       Online Master
State                       Offline Standby
```

For example, your primary RCB is re0 and your backup RCB is re1 and you want to remove the backup RCB from the chassis. You would issue the above commands from the console of the primary RCB. On the console of the backup, you would see output similar to the following:

```
Shutdown at Thu Nov 19 09:40:59 2020
.

{backup}
user@host1>                                                              Stopping
User Manager for UID 0...
```

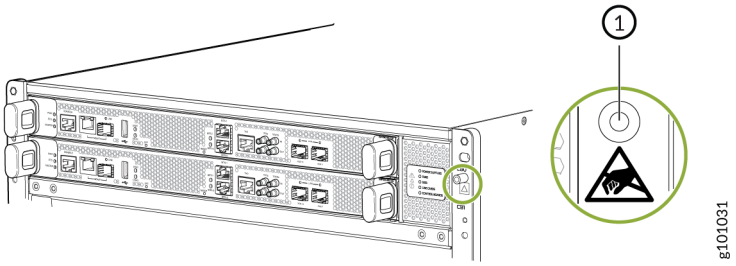
```
[  OK  ] Stopped Management Ethernet Interface Manager Service.
       [  OK  ] Stopped Serial Getty on ttyS0.
[  OK  ] Stopped User Manager for UID 0.
[  OK  ] Stopped DHCPv4 Server Daemon.
[  OK  ] Stopped Marvell Controller Service.
[  OK  ] Stopped Session c38 of user root.
[  OK  ] Stopped Session c23 of user root.
[  OK  ] Stopped Session c22 of user root.
[  OK  ] Stopped Vsftpd ftp daemon.
[  OK  ] Removed slice User Slice of root.
         Stopping Login Service...
[  OK  ] Removed slice system-serial\x2dgetty.slice.
[  OK  ] Removed slice system-getty.slice.
         Stopping Permit User Sessions...

.
.
.

.
.
.
         Unmounting /uswitch/tmp...
         Unmounting /uswitch/dev...
         Unmounting /etc...
         Unmounting /run/user/0...
         Unmounting /soft/uswitch...
         Unmounting /var/db...
         Unmounting /usr/conf...
         Unmounting /uswitch/proc...
         Unmounting /uswitch/soft...
         Unmounting /usr/evo/share...
         Unmounting /data/var/external...
[  OK  ] Unmounted /data/config.
[  OK  ] Unmounted /u.
[  OK  ] Unmounted /sys/kernel/debug/tracing.
[  OK  ] Unmounted /boot.
[  OK  ] Unmounted /config.
[  OK  ] Unmounted /var/pfe.
[  OK  ] Unmounted /d[34935.235545] reboot: Power down
ata/var/home/root/.ssh.
[  OK  ] Unmounted /var/etc.
```

3. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to one of the ESD points on the chassis (see Figure 63 on page 157).

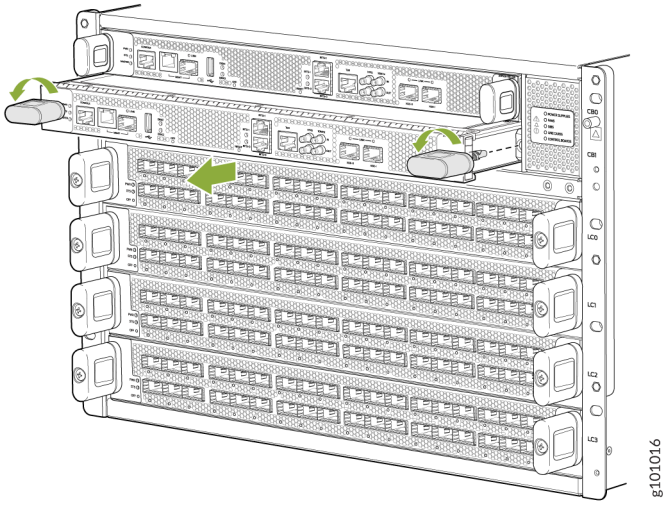
Figure 63: ESD Point on the Front of the PTX10004 Chassis



1– ESD point

4. Simultaneously rotate the RCB handles counterclockwise to unseat the RCB.
5. Grasp the handles and slide the RCB about halfway out of the chassis (see Figure 64 on page 157).

Figure 64: Remove an RCB



6. Grasp each side of the RCB and slide it completely out of the chassis.
7. Place the RCB on the antistatic mat.
8. If you are not replacing the RCB immediately, install a cover in the empty slot.

Install and Remove PTX10004 Cooling System Components

IN THIS SECTION

- Install a PTX10004 Fan Tray | 158
- Remove a PTX10004 Fan Tray | 160
- Install a PTX10004 Fan Tray Controller | 163
- Remove a PTX10004 Fan Tray Controller | 165

The PTX10004 router has two independent, field-replaceable fan trays. To install or remove the fan trays and fan tray controller, see the following sections.

Install a PTX10004 Fan Tray

Before you begin to install a fan tray:

- Ensure that you understand how to prevent ESD damage. See "Prevention of Electrostatic Discharge Damage" on page 283.
- Ensure that you have the following parts and tools available to install a fan tray in a PTX10004 router:
  - Electrostatic discharge (ESD) grounding strap
  - A Phillips (+) screwdriver, number 1 or 2 (optional), for the captive screws
  - A replacement fan tray

CAUTION: One fan tray can be removed and replaced while the router is operating. Replace the fan tray as soon as possible to prevent thermal alarms and to prevent the chassis from overheating.

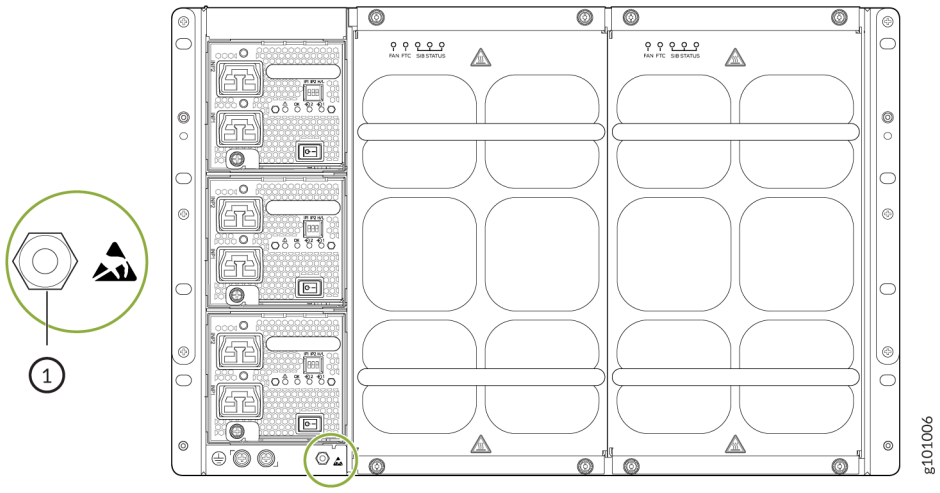
Each JNP10004-FAN2 fan tray is a hot-removable and hot-insertable field-replaceable unit (FRU); you can remove and replace the fan tray while the router is running without turning off power to the router or disrupting routing functions.

Each fan tray is installed vertically on the rear, or FRU side, of the chassis.

To install a PTX10004 fan tray:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to one of the ESD points on the chassis (see Figure 65 on page 159).

Figure 65: ESD Point on the Rear of the PTX10004

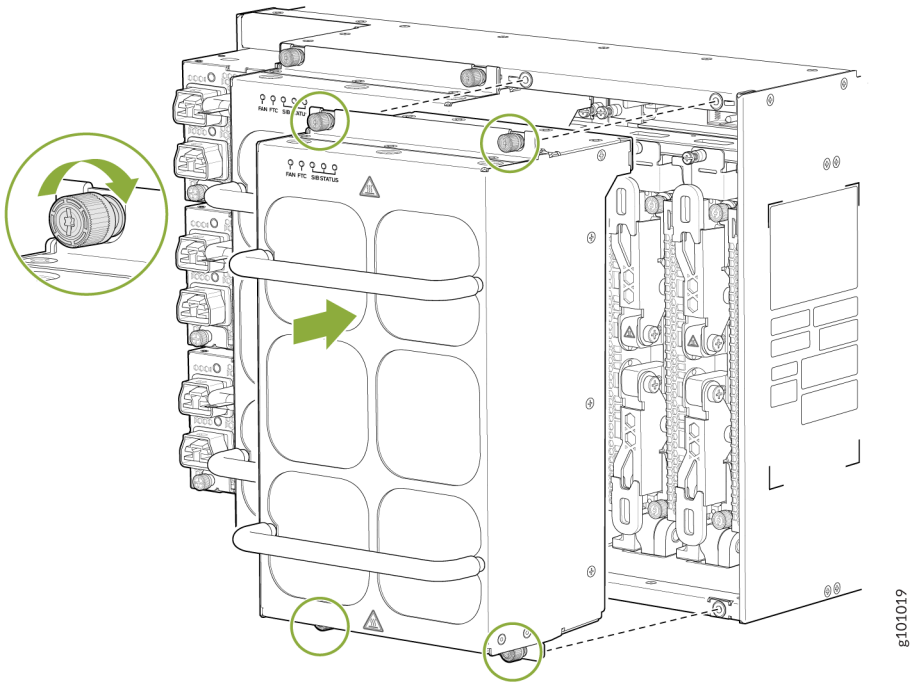


1– ESD point

2. Grasp the top and bottom fan tray handles and align the fan tray so that it makes contact with the side wall.
3. Push the fan tray into place until it is fully seated.

4. Tighten the captive screws with the Phillips screwdriver or your fingers until the screws are finger tight. See Figure 66 on page 160.

Figure 66: Install the JNP10004-FAN2 Fan Tray in a PTX10004



5. Set the fan speed to normal. From the primary RCB, issue these commands to reset the fan tray speed:

```
[edit]
root@# root@re0> request chassis fan tray 0 speed normal
root@# root@re0> request chassis fan tray 1 speed normal
```

Remove a PTX10004 Fan Tray

Before you remove a fan tray:

- Ensure that you understand how to prevent ESD damage. See "Prevention of Electrostatic Discharge Damage" on page 283.
- Ensure that you have the following parts and tools available to remove a fan tray from a PTX10004:

- Electrostatic discharge (ESD) grounding strap
- Replacement fan tray
- A Phillips (+) screwdriver, number 1 or 2 (optional), for the captive screws

- Run the fans at 100 percent of max rated speed for 10 minutes before removing fan tray. Enter these commands from the primary RCB:

```
[edit]
root@# root@re0> request chassis fan tray 0 speed 100
root@# root@re0> request chassis fan tray 1 speed 100
```

The PTX10004 chassis has two independent, field-replaceable fan trays (JNP10004-FAN2). Each fan tray is a hot-removable and hot-insertable FRU; you can remove and replace a single fan tray while the router is running without turning off power to the router or disrupting routing functions.

CAUTION: Do not remove the fan tray unless you have a replacement fan tray available.

If you remove a fan tray, you have a limited amount of time before a thermal alarm is raised. If you plan to replace one or more JNP10004-SF3 Switch Interface Boards (SIBS), make sure you calculate the round-trip of removing the fan tray, adding or replacing the SIBS, and installing the fan tray back into the chassis. To calculate the time allowed for replacing a fan tray, see Table 61 on page 161.

Table 61: Fan Removal Alarm Times

Equivalent Ambient (degC) at sea level	Time to Minor (Yellow) Alarm in Minutes			Time to Major (Red) Alarm in Minutes		
	25 % Traffic	50 % Traffic	80 % Traffic	25 % Traffic	50 % Traffic	80 % Traffic
25	>10 min.	4 min. 43 sec.	2 min. 50 sec.	>15 min	6 min. 23 sec.	3 min. 10 sec.
30	3 min. 11 sec.	2 min. 54 sec.	1 min. 4 sec.	3 min. 51 sec.	3 min. 14 sec.	2 min. 3 sec.

Table 61: Fan Removal Alarm Times *(Continued)*

Equivalent Ambient (degC) at sea level	Time to Minor (Yellow) Alarm in Minutes			Time to Major (Red) Alarm in Minutes		
40	1 min. 57 sec.	1 min. 17 sec.	58 sec.	2 min. 18 sec.	1 min. 37 sec.	1 min. 10 sec.

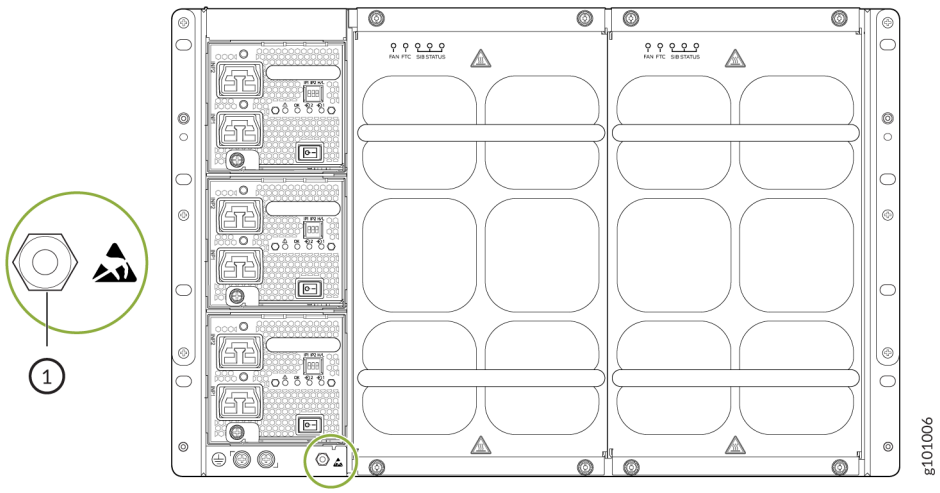
Each fan tray is installed vertically on the rear, or FRU side, of the chassis.

CAUTION: A single fan tray can be removed and replaced while the router is operating. However, if you remove both fan trays at the same time you'll trigger a thermal alarm and the system will shut down. See Table 61 on page 161.

To remove a PTX10004 fan tray:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to one of the ESD points on the chassis (see Figure 67 on page 162).

Figure 67: ESD Point on the Rear of the PTX10004

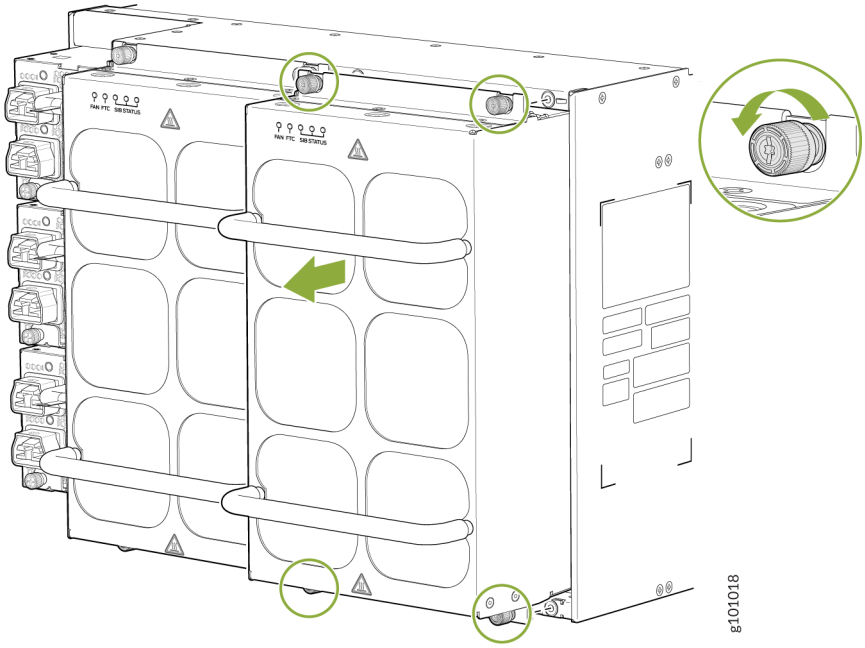


1– ESD point

2. Loosen the four captive screws either by unscrewing with your thumb and forefinger or with a Phillips screwdriver.

3. Grasp the top and bottom handles and pull the fan tray out about 3 in. (7.6 cm). See Figure 68 on page 163.

Figure 68: Remove a PTX10004 Fan Tray



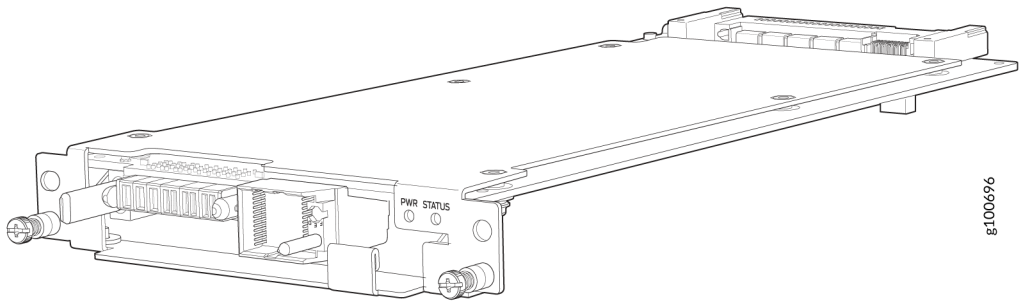
4. Tilt the top of the fan tray forward.
5. Using both hands, lift the fan tray out of the slot and rest it on a flat surface with the handles to the side.

Install a PTX10004 Fan Tray Controller

For each of the two fan trays, there is a JNP10004-FTC2 fan tray controller. Each controller is a hot-removable and hot-insertable field-replaceable unit (FRU); you can remove and replace one fan tray

controller while the router is running without turning off power to the router or disrupting routing functions. See Figure 69 on page 164.

Figure 69: JNP10004-FTC2 Fan Tray Controller



CAUTION: Do not remove the fan tray controller unless you have a replacement controller available.

To install a fan tray controller, you must first remove the associated fan tray. With the fan tray removed, the fan tray controller is installed horizontally above the Switch Interface Boards (SIBs) at the top of the chassis.

Before you install a fan tray controller:

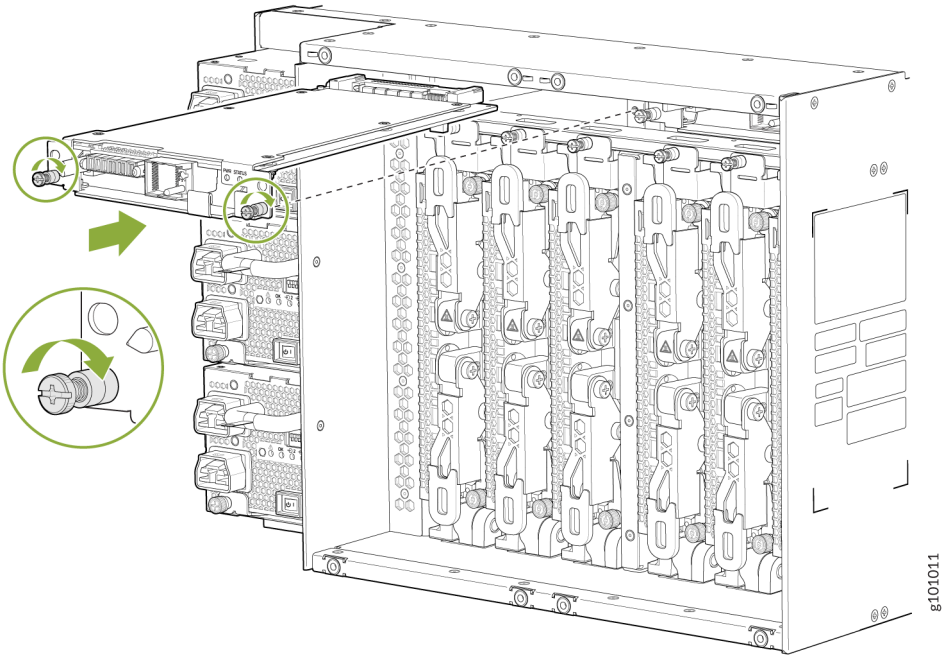
- Ensure that you have removed the associated fan tray and fan tray controller. See "Remove a PTX10004 Fan Tray" on page 160 and "Remove a PTX10004 Fan Tray Controller" on page 165.
- Ensure that you understand how to prevent ESD damage. See "Prevention of Electrostatic Discharge Damage" on page 283.
- Ensure that you have the following parts and tools available to install a fan tray controller into a PTX10004:
  - Electrostatic discharge (ESD) grounding strap
  - Replacement fan tray controller (JNP10004-FTC2)
  - A Phillips (+) screwdriver, number 1, for the captive screws (optional)

To install a fan tray controller:

1. Remove the replacement fan tray controller from the antistatic bag.

2. Carefully slide the fan tray controller into the fan tray controller slot until it is flush with the mounting holes. See Figure 70 on page 165.

Figure 70: Install the PTX10004 Fan Tray Controller



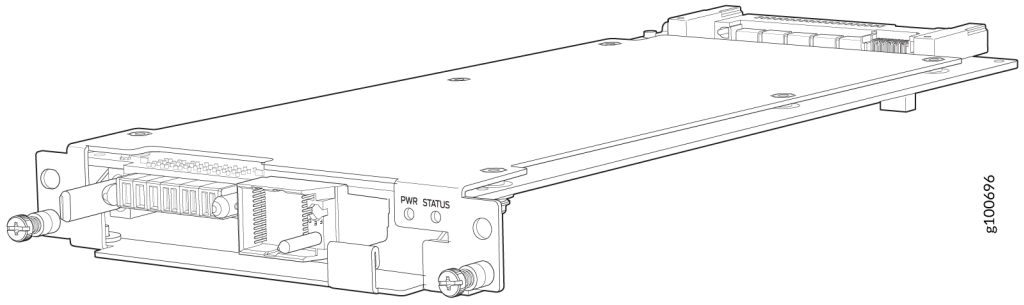
3. Tighten the captive screws for the fan tray controller by using your thumb and forefinger or using a Phillips screwdriver.
4. Reinstall the fan tray. See "Install a PTX10004 Fan Tray" on page 158.

Remove a PTX10004 Fan Tray Controller

For each of the two fan trays, there is a JNP10004-FTC2 fan tray controller. Each fan tray controller is a hot-removable and hot-insertable field-replaceable unit (FRU); you can remove and replace one fan tray

controller while the router is running without turning off power to the router or disrupting routing functions. See Figure 71 on page 166.

Figure 71: JNP10004-FTC2 Fan Tray Controller



CAUTION: Do not remove the fan tray controller unless you have a replacement controller available.

In order to access a fan tray controller, you must first remove the fan tray. With the fan tray removed, the fan tray controller is installed horizontally above the switch interface boards (SIBs) at the top of the chassis.

Before you remove a fan tray controller:

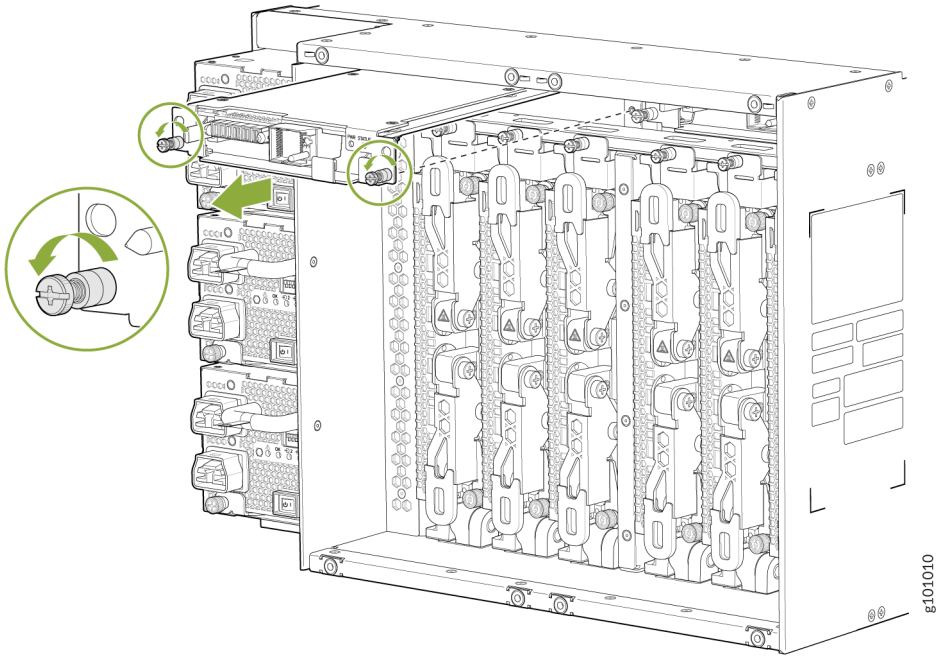
- Ensure you understand how to prevent ESD damage. See "Prevention of Electrostatic Discharge Damage" on page 283.
- Ensure that you have the following parts and tools available to remove a fan tray controller from a PTX10004:
  - Electrostatic discharge (ESD) grounding strap
  - An electrostatic bag or an antistatic mat
  - Replacement fan tray controller
  - A Phillips (+) screwdriver, number 1, for the captive screws (optional)

Both models of fan controller are removed using the same procedure.

1. Remove the fan tray. See "Remove a PTX10004 Fan Tray" on page 160.
2. Loosen the two captive screws on each side of the fan tray controller with your thumb and forefinger or with a Phillips screwdriver.

3. Grasp the fan tray controller and pull it straight out of the slot. See Figure 72 on page 167.

Figure 72: Remove the JNP10004-FTC2 Fan Tray Controller



4. Place the fan tray controller in an antistatic bag or on an antistatic mat.

RELATED DOCUMENTATION

PTX10004 Cooling System and Airflow | 27

PTX10004 Field-Replaceable Units | 21

Install and Remove PTX10004 Power System Components

IN THIS SECTION

Install a JNP10K-PWR-AC2 Power Supply | 168

- Remove a JNP10K-PWR-AC2 Power Supply | **172**
- Install a JNP10K-PWR-DC2 Power Supply | **175**
- Remove a JNP10K-PWR-DC2 Power Supply | **184**

The PTX10004 routers support AC, DC, high-voltage alternating current (HVAC), and high-voltage direct current (HVDC) power supplies. To install and remove the power supplies in a PTX10004, read the following sections. All power supply models are hot-insertable and hot-removeable field-replaceable units (FRUs). You can install up to three power supplies in the rear of the chassis in the slots provided along the left side.

CAUTION: Use the same type of power supply in all slots. Do not mix power supply models in the same chassis.

NOTE: See the heat symbol



. Wear heat-resistant hand gloves while accessing the fan tray and power supply.

Install a JNP10K-PWR-AC2 Power Supply

CAUTION: Use the same type of power supply in all slots. Do not mix power supply models in a production chassis. The only time you are allowed to have two models concurrently running in a system is when you are in the process of swapping out all JNP10K-PWR-AC power supplies with all JNP10K-PWR-AC2 power supplies.

WARNING: Protect yourself from severe burns by wearing heat-protective gloves when removing a running JNP10K-PWR-AC2 power supply from the chassis. The power

supply can reach temperatures between 158°F to 176°F (70°C to 80°C) under running conditions.

Before you install a JNP10K-PWR-AC2 power supply in the chassis:

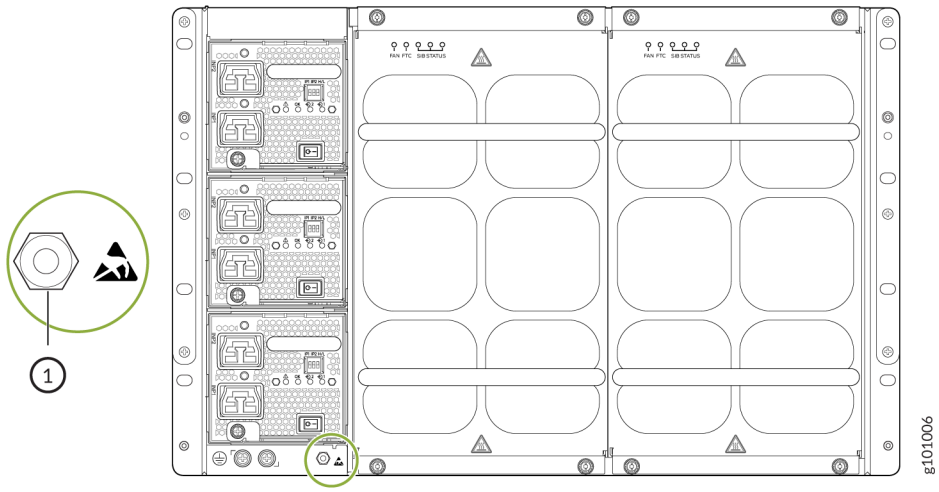
- Ensure that you have followed all safety warnings and cautions.
- Ensure that you understand how to prevent ESD damage. See "Prevention of Electrostatic Discharge Damage" on page 283.
- If the AC or DC power source outlets have a power switch, set them to the off (**O**) position. Ensure that you have the following parts and tools available to install the JNP10K-PWR-AC2 power supply:
  - Electrostatic discharge (ESD) grounding strap
  - Phillips (+) screwdriver, number 1
  - Power cables appropriate for your geographical location (for low-voltage installations) or input amperage (for high-voltage installations). See "PTX10004 Power Cable Specifications" on page 92. HVAC and HVDC connectors and lugs must be installed by a qualified electrician before installation.

To install a JNP10K-PWR-AC2 power supply in a PTX10004:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to an ESD point on the chassis. There is an ESD point located next to the

protective earthing terminal and below **PSU2** on the rear of the PTX10004 (see Figure 73 on page 170).

Figure 73: ESD Point on the Rear of the PTX10004



1– ESD point

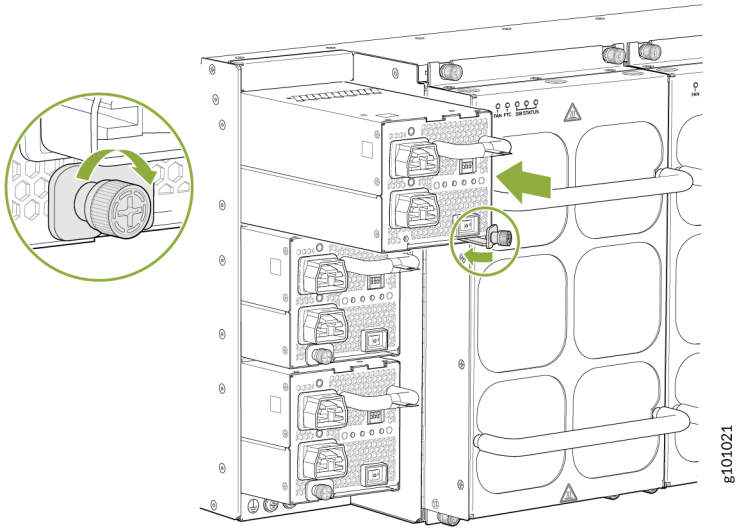
2. Taking care not to touch power supply connections, remove the power supply from its bag.
3. Peel back and remove the protective plastic wrap that covers all four sides of the power supply.
4. Ensure that the power switch is set to the standby (**O**) position. This switch turns off the output voltage; it doesn't interrupt input power.
5. Unscrew the captive screw in the counterclockwise direction by using the Phillips (+) screwdriver, number 1.
6. Rotate the captive screw away from the faceplate of the power supply to release the latch.

> **NOTE**: You can install the power supplies in any slot labeled **PSU 0** through **PSU 5** (top to bottom) on a PTX10004.

7. Using both hands, place the power supply in the power supply slot on the rear of the system. Slide the power supply straight into the chassis until the power supply is fully seated in the slot. Ensure

that the power supply faceplate is flush with any adjacent power supply faceplates or power supply covers (see Figure 74 on page 171).

Figure 74: Install a JNP10K-PWR-AC2



8. Push the captive screw into the power supply faceplate. Ensure that the screw is seated inside the corresponding hole on the faceplate.
9. Tighten the captive screw by turning it clockwise by using the Phillips (+) screwdriver, number 1. When the screw is completely tight, the latch locks into the router chassis.
10. Attach each power cable to a dedicated power source (A and B). The JNP10K-PWR-AC2 only requires that each power supply be connected to a separate source.
11. For each power cable, insert the end of the cable with the Anderson connector into the JNP10K-PWR-AC2 power supply. The connector snaps and locks the cable into position.

> **WARNING**: Ensure that the power cords do not block access to router components or drape where people can trip on them.

12. If the AC or DC power source outlets have a power switch, set them to the on (|) position.
13. Set the three DIP switches to set the inputs and whether the power supply is running at 3000 W, 5000 W, or 5500 W. See Table 62 on page 172.

    Set both switch **1** and switch **2** to the **on** position when using both power source inputs; power is shared. When not using source redundancy, set the unused source to the off (**O**) position. The LED turns red and indicates an error if a source input is not in use and the DIP switch is on (|).

Table 62: Set the JNP10K-PWR-AC2 DIP Switches

Switch	State	Description
1	On	INP0 is present.
	Off	INP0 is not present.
2	On	INP1 is present.
	Off	INP1 is not present.
3	On	Enabled for 30-A feed; 5000 W for single feed, 5500 W for dual feeds.
	Off	Enabled for 20-A feed; power supply capacity is 3000 W.

14. If the AC power source outlet has a power switch, turn it off before plugging in the AC power cord to the power outlet.
15. Verify that the **INP1** and **INP2** LEDs on the power supply faceplate are lit and are on steadily.
16. Press the power switch to the on (|) position.

Remove a JNP10K-PWR-AC2 Power Supply

Before you remove a JNP10K-PWR-AC2 power supply from the chassis:

- Ensure that you understand how to prevent ESD damage. See "Prevention of Electrostatic Discharge Damage" on page 283.
- Ensure that you have the following parts and tools available:
  - Heat-protective gloves able to withstand temperatures of 158°F (70°C)
  - Electrostatic discharge (ESD) grounding strap
  - Phillips (+) screwdriver, number 1
  - Replacement power supply or a cover for the power supply slot

WARNING: Protect yourself from severe burns by wearing heat-protective gloves when removing a working JNP10K-PWR-AC2 power supply from the chassis. These power supplies can reach temperatures between 158°F and 176°F (70°C to 80°C) under running conditions.

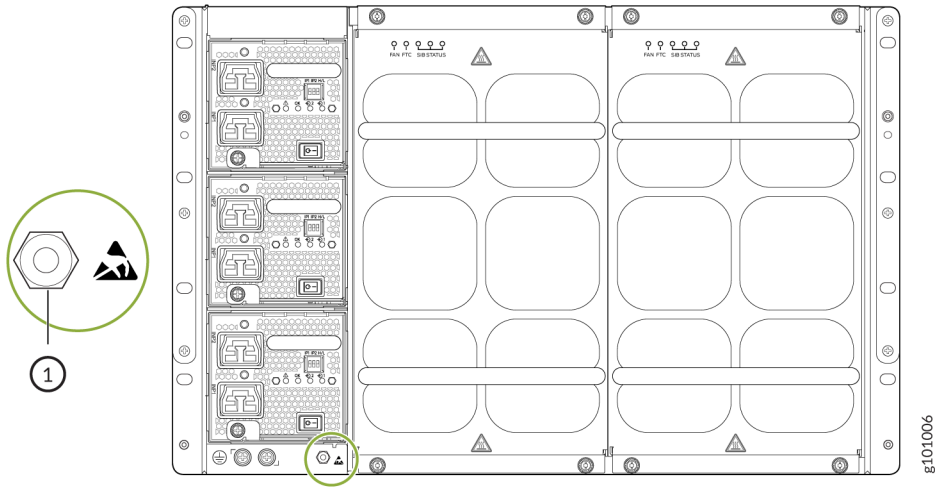
CAUTION: Before you remove a power supply, ensure that you have power supplies sufficient to power the router left in the chassis. See "Power Requirements for PTX10004 Components" on page 84.

CAUTION: Do not leave the power supply slot empty for a long time while the router is operational. Either replace the power supply promptly or install a cover over the empty slot.

To remove a JNP10K-PWR-AC2 power supply from a PTX10004 router:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to an ESD point on the chassis. There is an ESD point located next to the protective earthing terminal and below **PSU 2** on the rear of the PTX10004 (see Figure 75 on page 173).

Figure 75: ESD Point on the Rear of the PTX10004

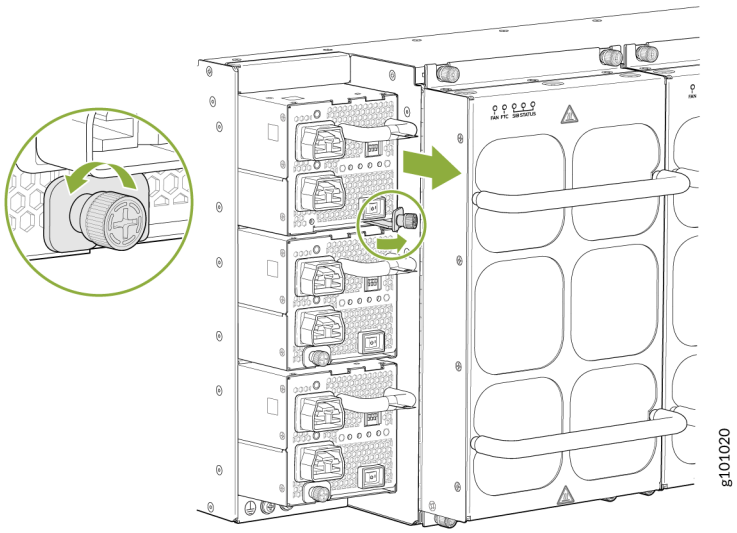


1– ESD point

2. Flip the power (|) switch next to the appliance inlet on the power supply to the standby position (O).
3. If the AC or DC power source outlets have a power switch, set them to the off (O) position.
4. Disconnect the Anderson connectors from each input on the JNP10K-PWR-AC2 power supply faceplate.
5. Unscrew the captive screw counterclockwise by using the Phillips (+) screwdriver, number 1. See Figure 76 on page 174.

> **NOTE**: Ensure that the ejector is fully open to avoid scratching the chassis.

Figure 76: Remove a JNP10K-PWR-AC2 Power Supply from a PTX10004



6. Rotate the captive screw away from the faceplate of the power supply to release the latch.
7. Wear heat protective gloves before you remove the power supply from the chassis.



8. Taking care not to touch the power supply output connections, pins, leads, or solder connections, place one gloved-hand under the power supply to support it. Grasp the power supply handle with your other hand and pull the power supply completely out of the chassis.

CAUTION: Do not bump the output connections. If the connection hits a solid object, it could damage the power supply.

9. Place the JNP10K-PWR-AC2 power supply on an antistatic surface to completely cool before placing the power supply in an antistatic bag for storage.
10. Install the replacement JNP10K-PWR-AC2 power supply.

CAUTION: Use the same type of power supply in all slots. Do not mix power supply models in a production chassis.

Install a JNP10K-PWR-DC2 Power Supply

Before you install a JNP10K-PWR-DC2 power supply in the chassis:

- Ensure that you follow all safety warnings and cautions.

WARNING: Before performing DC power procedures, ensure that power is removed from the DC circuit. To ensure that all power is off, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the off (**O**) position, and tape the switch handle of the circuit breaker in the off position.

WARNING: Protect yourself from severe burns by wearing heat-protective gloves when removing a working JNP10K-PWR-DC2 power supply from the chassis. JNP10K-PWR-DC2 power supplies can reach temperatures between 158°F and 176°F (70°C to 80°C) under running conditions.

CAUTION: Before you connect power to the router, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the router (for example, by causing a short circuit).

CAUTION: Use the same type of power supply in all slots. Do not mix power supply models in a production chassis.

CAUTION: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the PTX10004 routers to earth ground before you connect them to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the router chassis to connect to earth ground. For instructions on connecting a PTX10004 router to ground using a separate grounding conductor, see "Connect the PTX10004 Router to Earth Ground" on page 134.

NOTE: The battery returns of the JNP10K-PWR-DC2 power supply must be connected as an isolated DC return (DC-I).

- Ensure that you understand how to prevent ESD damage. See "Prevention of Electrostatic Discharge Damage" on page 283.
- Ensure that you have the following parts and tools available to install a DC power supply:
  - Electrostatic discharge (ESD) grounding strap
  - Use high-current cable assembly, CBL-PWR2-BARE (not provided) with the cable lugs (provided) attached.

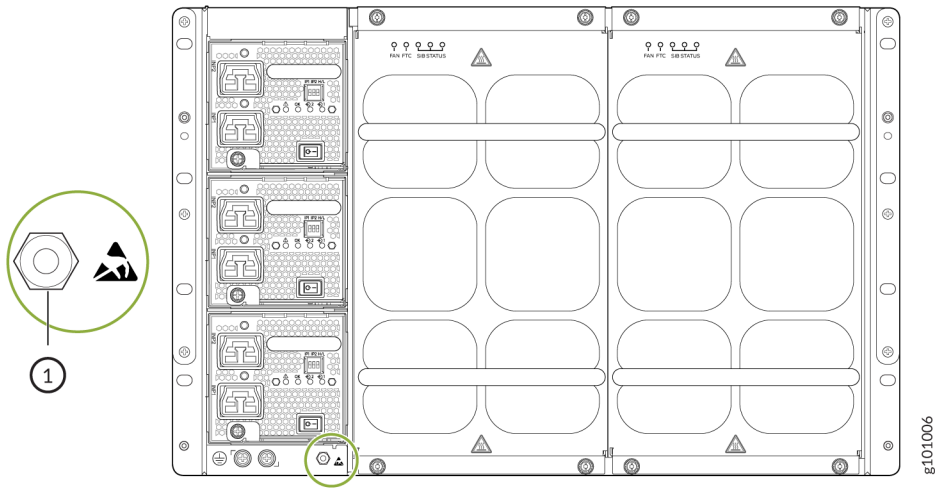
    The provided terminal lugs for the JNP10K-PWR-DC2 are Panduit LCD4-14A-L, or equivalent, and sized for 4 AWG (21.1 mm^2) power source cables. The 4 AWG (21.1 mm^2) stranded wire should be rated 75° C or per local electrical code. We recommend that you install heat-shrink tubing insulation around the crimped section of the power cables and lugs.
  - 13/32 in. (10 mm) nut driver or socket wrench
  - Phillips (+) screwdrivers, numbers 1 and 2
  - Multimeter

To install a JNP10K-PWR-DC2 power supply in a PTX10004:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to an ESD point on the chassis. There is an ESD point located next to the

protective earthing terminal and below **PSU 5** on the rear of the PTX10004 (see Figure 77 on page 177).

Figure 77: ESD Point on the Rear of the PTX10004

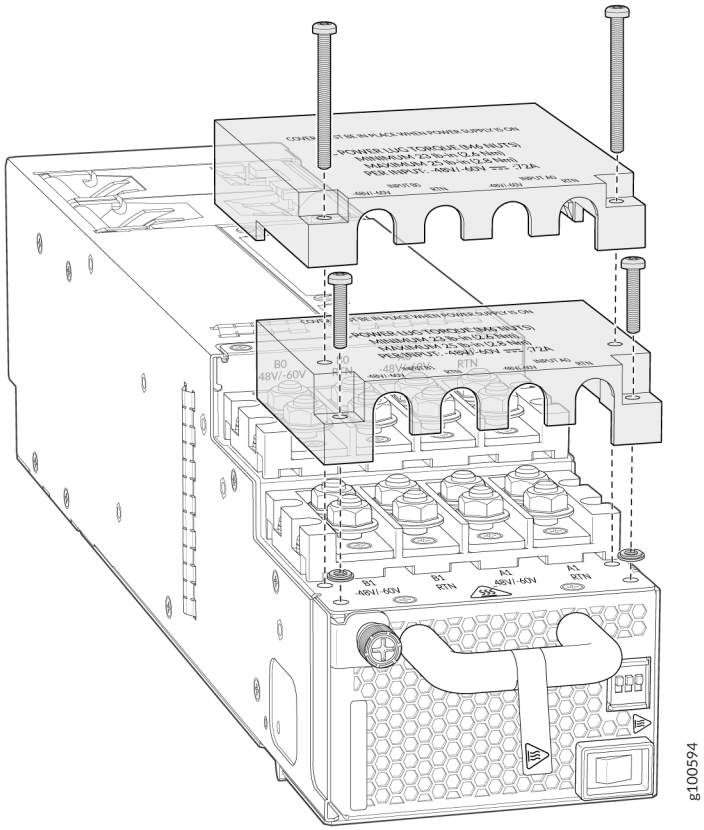


1– ESD point

2. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.
3. Peel back and remove the protective plastic wrap that covers all four sides of the power supply.
4. Ensure that the power switch is set to the standby (**O**) position. This switch turns off the output voltage; it doesn't interrupt DC.

5. Remove the plastic cable cover from the power input terminals by using the Phillips (+) screwdriver, number 2, to loosen the screws (see Figure 78 on page 178).

Figure 78: Remove the Plastic Cable Cover on a JNP10K-PWR-DC2 Power Supply



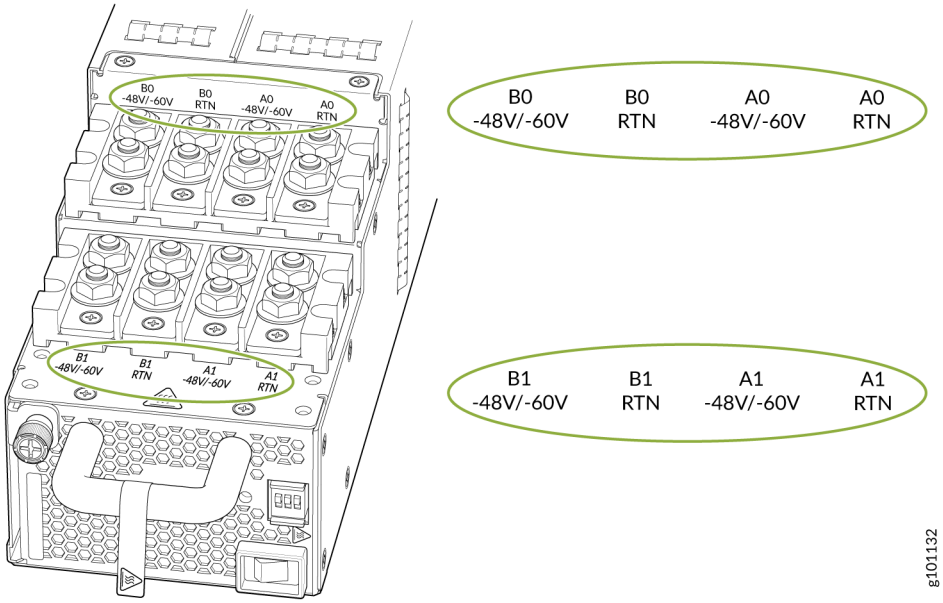
6. Remove the nuts from each DC power input terminal, using the 13/32 in. (10 mm) nut driver or socket wrench to loosen the nuts.
7. Ensure that the power source circuit breaker is open so that the voltage across the DC power source cable leads is 0 V. Also ensure that the cable leads don't become active while you connect DC power.
8. Verify that the DC power cables are correctly labeled before making connections to the power supply. In a typical power distribution scheme where the return is connected to chassis ground at the battery plant, you can use a multimeter to verify the resistance of the **–48V** and **RTN** DC cables to chassis ground:
   - The cable with very high resistance (indicating an open circuit) to chassis ground is negative (–) and will be installed on the **–48V** (input) DC power input terminal.
   - The cable with very low resistance (indicating a closed circuit) to chassis ground is positive (+) and will be installed on the **RTN** (return) DC power input terminal.

The JNP10K-PWR-DC2 power supply is the equivalent of two power supplies in a single housing. Each JNP10K-PWR-DC2 has four independent sets of DC power input terminals:

- **INPUT A0: : RTN –48V/–60V**
- **INPUT B0: : RTN –48V/–60V**
- **INPUT A1: : RTN –48V/–60V**
- **INPUT B1: : RTN –48V/–60V**

We recommend source redundancy (source A and source B) to all inputs to ensure reliability of the system. If you not have two power sources available, then having two feeds from the same source provides power distribution reliability because there are two independent power distribution from the source to the system. See Figure 79 on page 179.

Figure 79: JNP10K-PWR-DC2 Input Terminal Marking



CAUTION: You must ensure that power connections maintain the proper polarity. The power source cables might be labeled **(+)** and **(–)** to indicate their polarity. There is no standard color coding for DC power cables.

9. Install heat-shrink tubing insulation around the power cables.

   To install heat-shrink tubing:

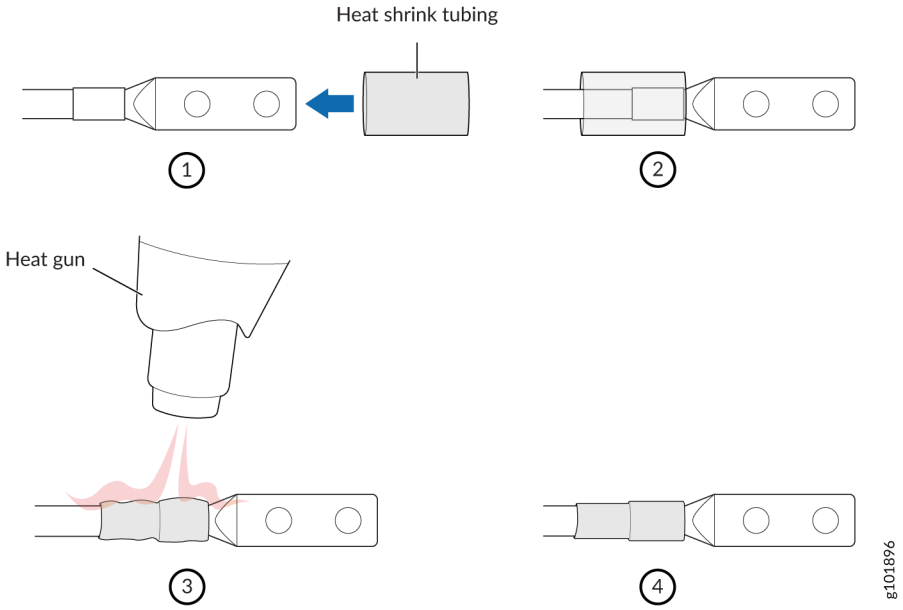
a. Slide the tubing over the portion of the cable where it is attached to the lug barrel. Ensure that tubing covers the end of the wire and the barrel of the lug attached to it.

b. Shrink the tubing with a heat gun. Ensure that you heat all sides of the tubing evenly so that it shrinks around the cable tightly.

Figure 80 on page 180 shows the steps to install heat-shrink tubing.

NOTE: Do not overheat the tubing.

Figure 80: How to Install Heat-Shrink Tubing

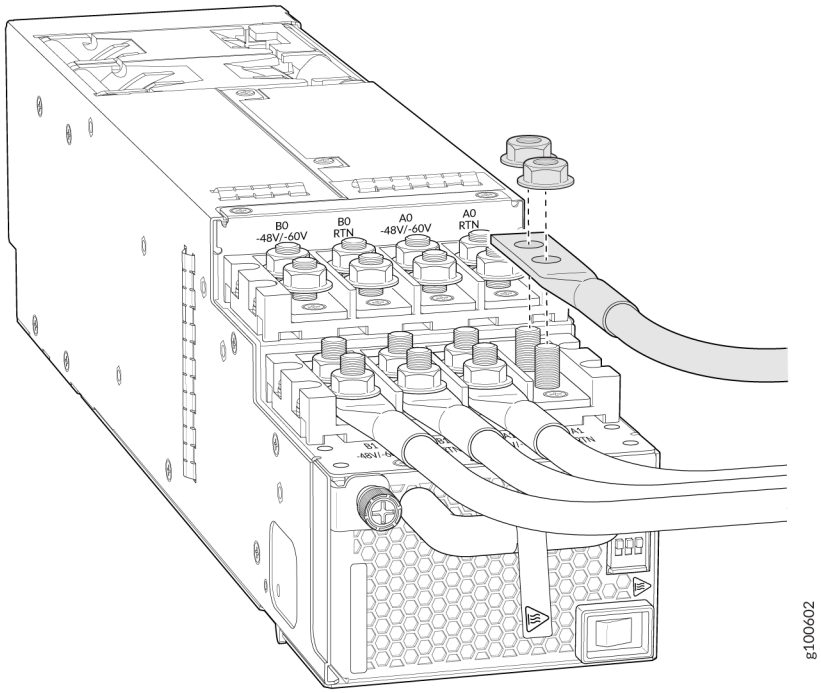


10. Install each power cable lug on the DC power input terminal, securing it with the nut (see Figure 81 on page 181). Apply between 24 lb-in. (2.7 Nm) and 25 lb-in. (2.8 Nm) of torque to each nut. (Use the 13/32 in. [10 mm] nut driver or socket wrench.)

a. Secure each positive **(+)** DC source power cable lug to the **RTN** (return) DC power input terminal.

b. Secure each negative **(–)** DC source power cable lug to the **–48V** (input) DC power input terminal.

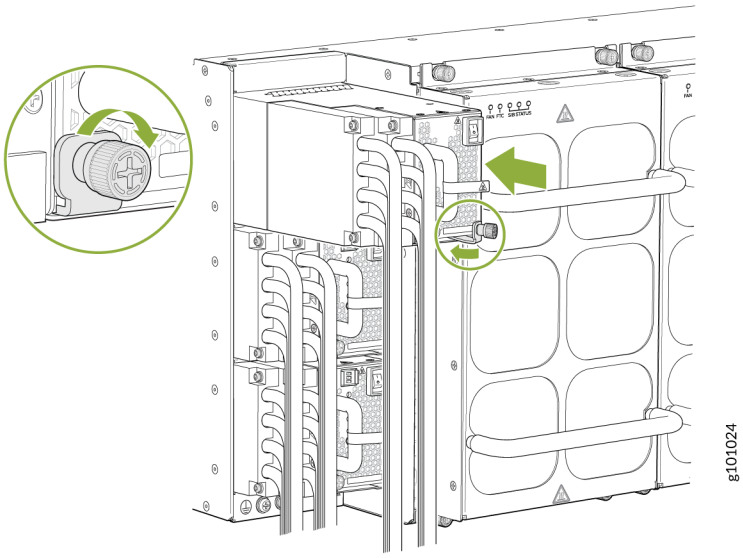
Figure 81: Connect the DC Power Source Cables to a JNP10K-PWR-DC2 Power Supply



11. Install the plastic cable cover over each set of power cables by using the Phillips (+) screwdriver, number 2, to tighten the screw.
12. Unscrew the captive screw in the counterclockwise direction by using the Phillips (+) screwdriver, number 1.
13. Rotate the captive screw away from the faceplate of the power supply to release the latch.
14. Using both hands, place the power supply in the power supply slot on the rear of the router. Slide the power supply straight into the chassis until the power supply is fully seated in the slot. (See Figure 82 on page 182).
15. Push the captive screw into the power supply faceplate. Ensure that the screw is seated inside the corresponding hole on the faceplate.

16. Tighten the captive screw by turning it clockwise by using the Phillips (+) screwdriver, number 1. When the screw is completely tight, the latch locks into the router chassis.

Figure 82: Install a JNP10K-PWR-DC2 in a PTX10004



17. Route INP1 cables to a power source and INP2 to another power source. The JNP10K-PWR-DC2 shares power, so if power dips on one input, the power supply is able to load-balance internally.

> **WARNING**: Ensure that the power cords do not block access to router components or drape where people can trip on them.

18. Set the three DIP switches to indicate the number of input sources and to indicate high or low power. See Table 63 on page 182 and Figure 83 on page 183.

    Set both enable switches to the **on** position when using both source inputs. When not using source redundancy, set the unused source to the off position. The LED turns red and indicates an error if a source input is not in use and the enable switch is **on**.

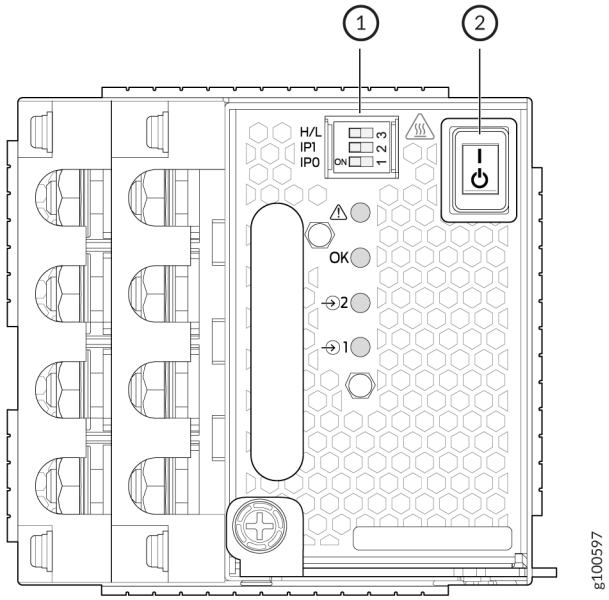
Table 63: Set the JNP10K-PWR-DC2 DIP Switches

Switch	State	Description
1	On	IP0 is present.
	Off	IP0 is not present.

Table 63: Set the JNP10K-PWR-DC2 DIP Switches *(Continued)*

Switch	State	Description
2	On	IP1 is present.
	Off	IP1 is not present.
3	On	Enabled for 80-A feed; 2750 W for a single feed, 5500 W for dual feeds.
	Off	Enabled for 60-A feed; 2200 W for a single feed, 4400 W for dual feeds.

Figure 83: Set the Enable Switches for the Power Source



1– DIP switches

2– Power switch, on (|), and standby (**O**)

19. Verify that the input 1 and 2 LEDs on the power supply faceplate are lit and are on steadily.
20. Press the power switch to the on (|) position.

Remove a JNP10K-PWR-DC2 Power Supply

Before you remove a DC power supply from the router:

- Ensure that you understand how to prevent ESD damage. See "Prevention of Electrostatic Discharge Damage" on page 283.
- Ensure that you have the following parts and tools available to remove a JNP10K-PWR-DC2 power supply:
  - Heat-protective gloves able to withstand temperatures between 158°F to 176°F (70°C to 80°C)
  - Electrostatic discharge (ESD) grounding strap
  - Phillips (+) screwdriver, numbers 1 and 2
  - 13/32 in. (10 mm) nut driver or socket wrench
  - Replacement power supply or a cover for the power supply slot

CAUTION: A working JNP10K-PWR-DC2 power supply can reach temperatures of up to 158°F and 176°F (70°C to 80°C) under running conditions. In order to avoid injury, do not touch a running power supply with your bare hands.



CAUTION: Before you remove a power supply, ensure that you have power supplies sufficient to power the router left in the chassis. See "PTX10004 Power Planning" on page 84 and "Power Requirements for PTX10004 Components" on page 84.

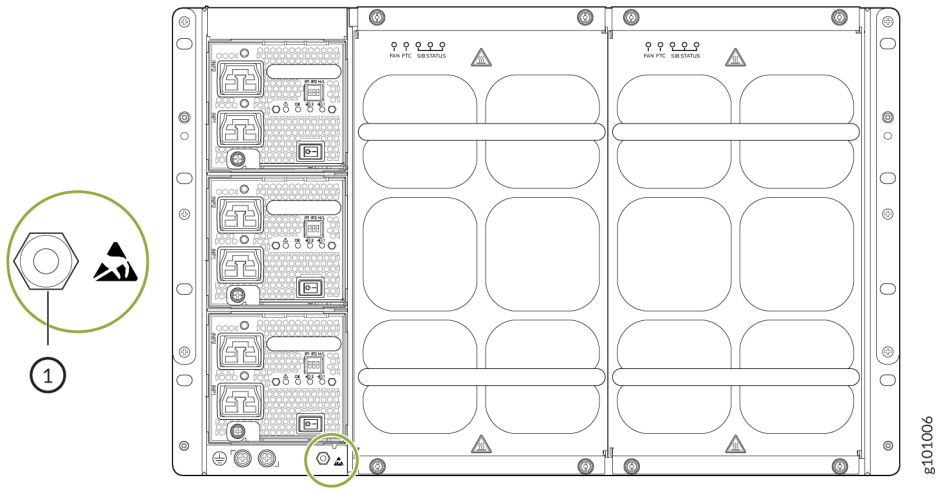
CAUTION: Do not leave the power supply slot empty for a long time while the router is operational. Either replace the power supply promptly or install a cover over the empty slot.

To remove a JNP10K-PWR-DC2 power supply from a PTX10004 router:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to an ESD point on the chassis. There is an ESD point located next to the

protective earthing terminal and below **PSU 5** on the rear of the PTX10004 (see Figure 84 on page 185).

Figure 84: ESD Point on the Rear of the PTX10004

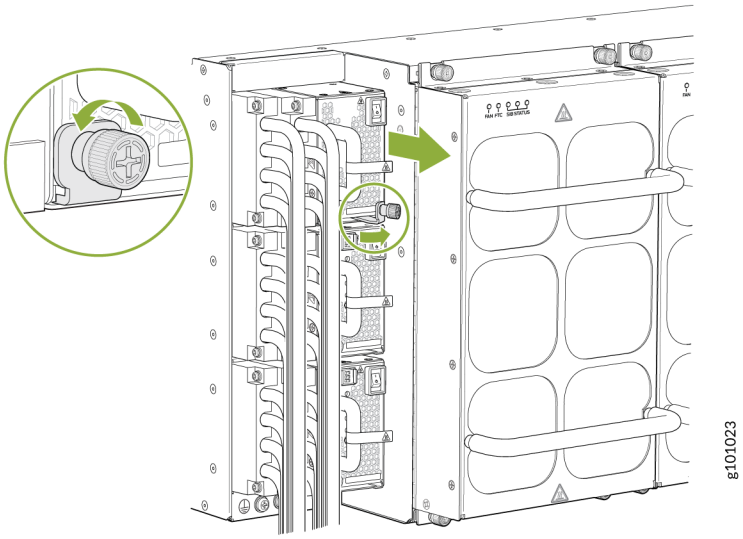


1– ESD point

2. Make sure that the voltage across the DC power source cable leads is 0 V and that there is no chance that the cables might become active during the removal process.
3. Ensure that the black power supply output switch, to the right of the captive screw, is set to the standby position.
4. Unscrew the captive screw counterclockwise by using the Phillips (+) screwdriver, number 1.

5. Unscrew the captive screw counterclockwise using the Phillips (+) screwdriver, number 1. (See Figure 85 on page 186)

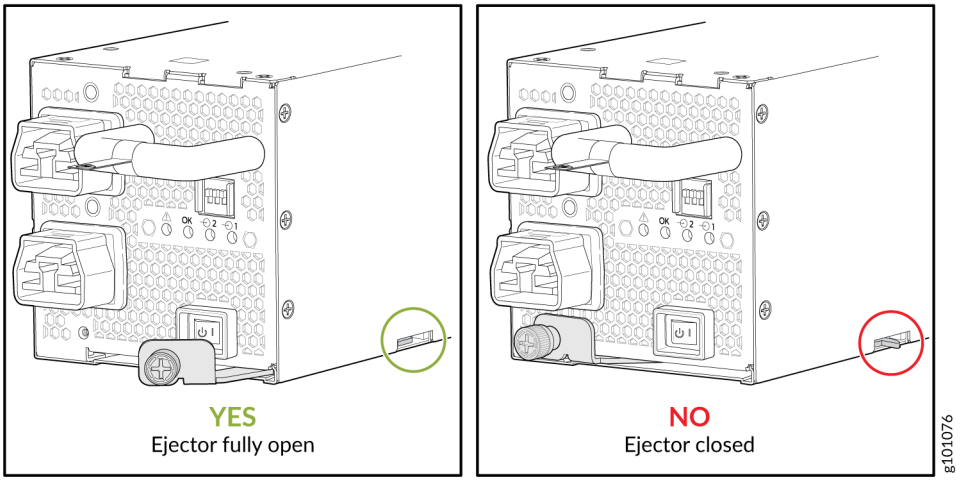
Figure 85: Remove a JNP10K-PWR-DC2 Power Supply on a PTX10004



6. Rotate the captive screw away from the faceplate of the power supply to release the latch.

NOTE: Ensure that the ejector is fully open to avoid seeing the chassis. See Figure 86 on page 186.

Figure 86: Open Power Supply Ejector



7. Wear the heat-resistant gloves to protect your hands from the hot power supply.
8. Taking care not to touch power supply components, pins, leads, or solder connections, place one gloved hand under the power supply to support it. Grasp the power supply handle with your other hand and pull the power supply completely out of the chassis.
9. If you are not replacing the power supply, install the cover over the slot. To install the cover, insert your thumb and forefinger into the finger holes of the cover, squeeze to retract the spring latches, and place the cover in the slot. Do not run the chassis without a power supply or cover in place.
10. Unscrew the screw on the plastic cable cover that shields the input terminal studs counterclockwise by using the Phillips (+) screwdriver, number 2.
11. Unscrew the nuts counterclockwise, using the 13/32 in. (10 mm) nut driver or socket wrench, from the input terminal studs.
12. Remove the cable lugs from the input terminal studs.

RELATED DOCUMENTATION

- JNP10K-PWR-AC2 Power Supply | 42
- JNP10K-PWR-DC2 Power Supply | 44
- Connect AC Power to a PTX10004 | 136
- Connect DC Power to a PTX10004 | 137
- Calculate Power Requirements for a PTX10004 Router | 85
- PTX10004 Field-Replaceable Units | 21

Install and Remove PTX10004 Switch Fabric Components

IN THIS SECTION

- How to Handle and Store PTX10004 SIBs | 188
- Install a PTX10004 Switch Interface Board | 190
- Remove a PTX10004 Switch Interface Board | 195

Each PTX10004 router contains a minimum of three and a maximum of six Switch Interface Boards (SIBs) that are installed vertically, mid-chassis, between the line cards and the Routing and Control Boards (RCBs) in the front and the fan trays in the rear. To install or remove the switch interface boards in a the router, read the following sections.

How to Handle and Store PTX10004 SIBs

IN THIS SECTION

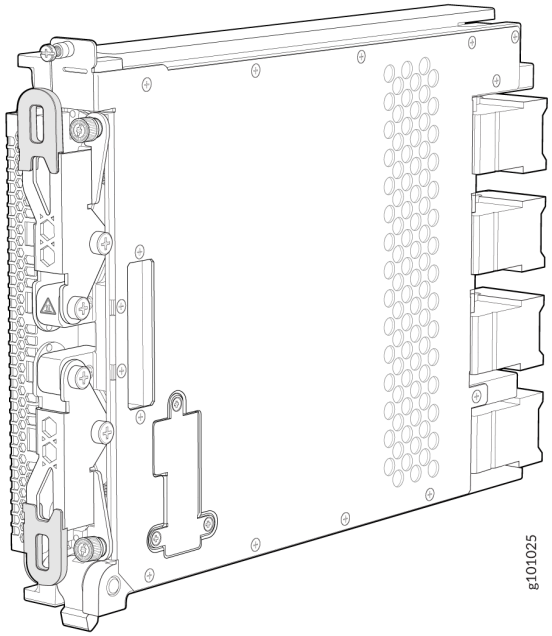
- How to Hold a SIB | **189**
- How to Store a Switch Interface Board | **190**

The PTX10004 SIBs have fragile components. To avoid damage to the SIBs, be sure you follow safe handling practices.

How to Hold a SIB

SIBs are installed vertically and should be held vertically until they are clear of the router before rotating them 90 degrees and placing them on an antistatic mat or placing them in an antistatic bag for storage. See Figure 87 on page 189.

Figure 87: JNP10004-SF3 Switch Interface Board



The proper method of holding a SIB is to:

1. Hold the SIB by the ejectors while you keep the SIB vertical, and slide the SIB about three-quarters of the way out of the chassis.
2. Place one hand underneath the SIB to support it, and slide it completely out of the chassis.

CAUTION: Never hold the SIB by the connector edge. The connectors are fragile and the SIB won't align and seat properly if the connector is damaged.

CAUTION: Don't stack SIBs on top of one another or on top of any other component.

How to Store a Switch Interface Board

You must store SIBs either in the chassis or in a spare shipping container, horizontally and sheet-metal side down. Do not stack these units on top of one another or on top of any other component. Place each unit separately in an antistatic bag or on an antistatic mat placed on a flat, stable surface.

> **NOTE**: Because these units are heavy and because antistatic bags are fragile, inserting the line card into the bag is best done by two people.

To insert a SIB into an antistatic bag:

1. Hold the unit horizontally with the faceplate toward you.
2. Slide the opening of the bag over the connector edge.

If you must insert the SIB into a bag by yourself:

1. Lay the unit horizontally on an antistatic mat that is on a flat, stable surface with the sheet-metal side down.
2. Orient the unit with the faceplate toward you.
3. Carefully insert the connector edge into the opening of the bag and pull the bag toward you to cover the unit.

Install a PTX10004 Switch Interface Board

A PTX10004 router has up to six SIBs that are located in the middle of the chassis behind the fan trays. **SIB 0** through **SIB 2** are located behind the left fan tray, and **SIB 3** through **SIB 5** are located behind the right fan tray. You must remove the appropriate fan tray to install a SIB. See "Remove a PTX10004 Fan Tray" on page 160.

Ensure that you have the following equipment with you before you install a SIB:

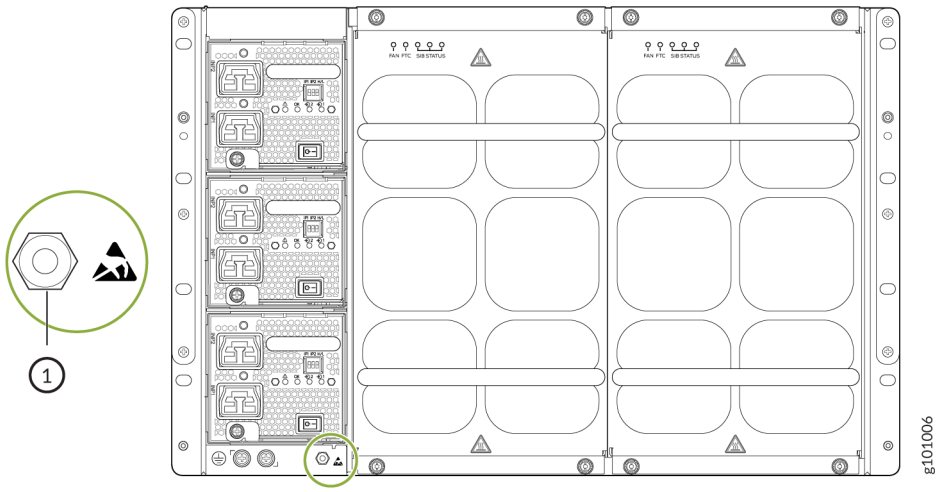
- Antistatic bag or antistatic mat
- Electrostatic discharge (ESD) grounding strap
- Phillips (+) number 2 screwdriver (optional)

To install a SIB:

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

2. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to an ESD point on the chassis. There is an ESD point located next to the protective earthing terminal and below the bottom power supply on the rear of the PTX10004 (see Figure 88 on page 191).

Figure 88: ESD Point on the Rear of the PTX10004



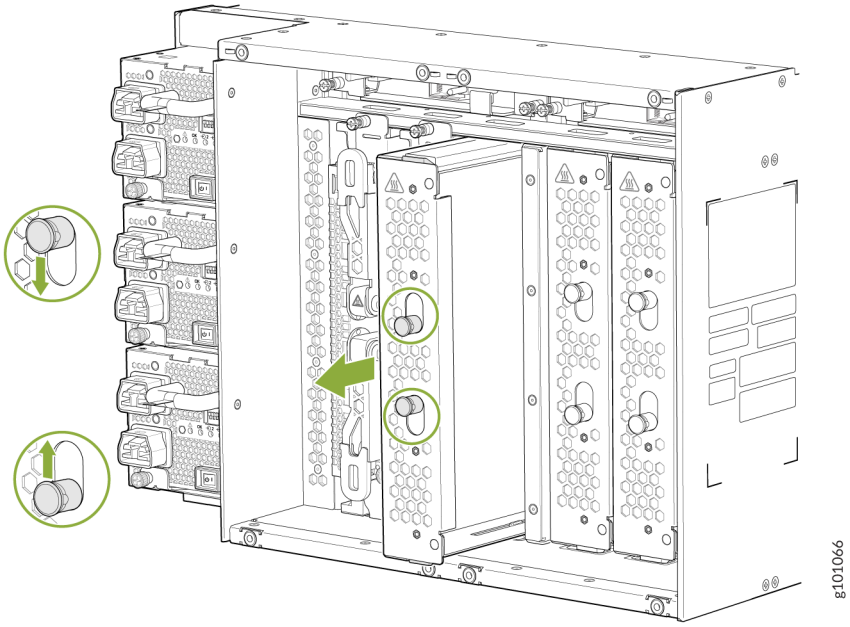
1– ESD point

3. Remove the appropriate fan tray (see "Remove a PTX10004 Fan Tray" on page 160).

CAUTION: Do not remove both fan trays at the same time. If you remove both fan trays, the system triggers a thermal alarm and shuts down the chassis.

4. Either remove the failing SIB (see "Remove a PTX10004 Switch Interface Board" on page 195) or remove the cover by grasping each side of the plate and pulling straight out (see Figure 89 on page 192).

Figure 89: Remove a SIB Cover on a PTX10004

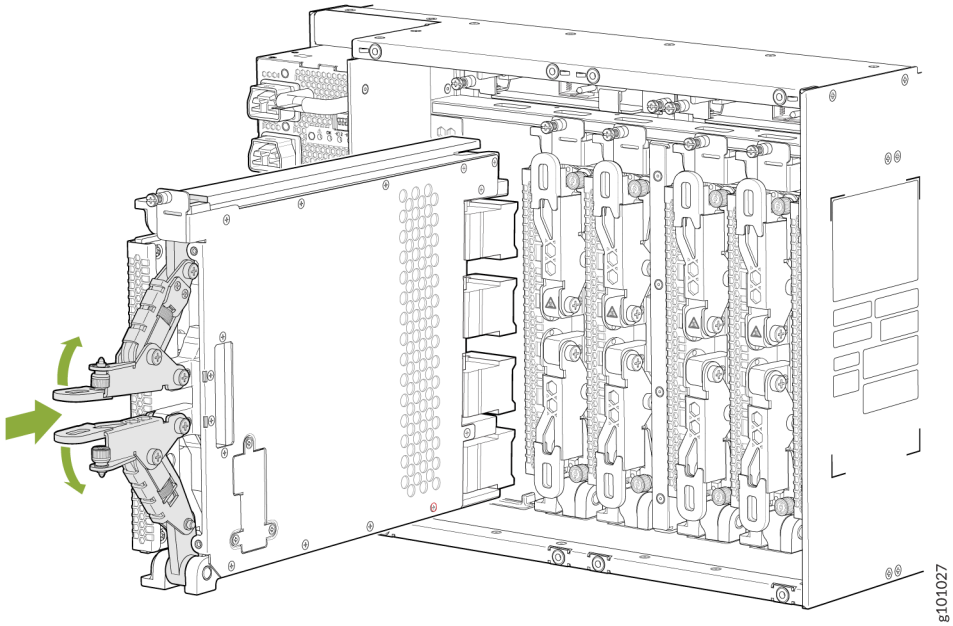


5. Lift the SIB by the handle with one hand and support the lower edge with the other hand.
6. Hold the SIB vertically and slide the SIB into the open slot until the ejector handles engage and start to close.

   If you are installing multiple SIBs, such as during a hardware upgrade, install the SIBs from the lowest slot number **0** to the highest **5**. Don't skip slots.

7. Grasp the two ejector handles and fold them inward until they latch to seat the SIB (see Figure 90 on page 193).

Figure 90: Install a PTX10004 Switch Interface Board



8. Tighten the captive screws using your thumb and forefinger or using a Phillips screwdriver until the captive screws are hand-tight.
9. Bring the SIB online using the `request chassis sib slot` *`slot number`* `online` command.

   You can check the status of the SIB using the `show chassis fabric sibs` and the `show chassis fabric plane-location` commands. For example:

```
root> show chassis fabric sibs
SIB #0  Online
    Asic #0 Fcore #0 (plane 0) Active
        FPC #3
            PFE #0  : Links ok
            PFE #1  : Links ok
            PFE #2  : Links ok
            PFE #3  : Links ok
            PFE #4  : Links ok
            PFE #5  : Links ok
            PFE #6  : Links ok
            PFE #7  : Links ok
            PFE #8  : Links ok
```

```
    Asic #0 Fcore #0 (plane 1) Active
        FPC #3
            PFE #0  : Links ok
            PFE #1  : Links ok
            PFE #2  : Links ok
            PFE #3  : Links ok
            PFE #4  : Links ok
            PFE #5  : Links ok
            PFE #6  : Links ok
            PFE #7  : Links ok
            PFE #8  : Links ok
    Asic #0 Fcore #0 (plane 2) Active
        FPC #3
            PFE #0  : Links ok
            PFE #1  : Links ok
            PFE #2  : Links ok
            PFE #3  : Links ok
            PFE #4  : Links ok
            PFE #5  : Links ok
            PFE #6  : Links ok
            PFE #7  : Links ok
            PFE #8  : Links ok
    Asic #0 Fcore #0 (plane 3) Active
        FPC #3
            PFE #0  : Links ok
            PFE #1  : Links ok
            PFE #2  : Links ok
            PFE #3  : Links ok
            PFE #4  : Links ok
            PFE #5  : Links ok
            PFE #6  : Links ok
            PFE #7  : Links ok
            PFE #8  : Links ok
Asic #1 Fcore #0 (plane 4) Active
        FPC #3
            PFE #0  : Links ok
            PFE #1  : Links ok
            PFE #2  : Links ok
            PFE #3  : Links ok
            PFE #4  : Links ok
            PFE #5  : Links ok
            PFE #6  : Links ok
            PFE #7  : Links ok
```

```
            PFE #8  : Links ok
    Asic #1 Fcore #0 (plane 5) Active
        FPC #3
            PFE #0  : Links ok
            PFE #1  : Links ok
            PFE #2  : Links ok
            PFE #3  : Links ok
            PFE #4  : Links ok
            PFE #5  : Links ok
            PFE #6  : Links ok
            PFE #7  : Links ok
            PFE #8  : Links ok
```

NOTE: If you completely powered off the SIB using the `set chassis sib power-off slot` *slot* command, you must delete the configuration to bring the SIB online. To delete the configuration and bring a replacement SIB online, use the `delete chassis sib power-off slot` *slot number* command.

Remove a PTX10004 Switch Interface Board

A PTX10004 router has up to six Switch Interface Boards (SIBs) that are located in the middle of the chassis behind the fan trays. **SIB 0** through **SIB 2** are located behind the left fan tray and **SIB 3** through **SIB 5** are located behind the right fan tray. You must remove the appropriate fan tray to access the failing SIB. See "Remove a PTX10004 Fan Tray" on page 160.

Ensure you have the following equipment on hand before replacing a SIB:

- Antistatic bag or antistatic mat
- Electrostatic discharge (ESD) grounding strap
- Phillips (+) number 2 screwdriver (optional)

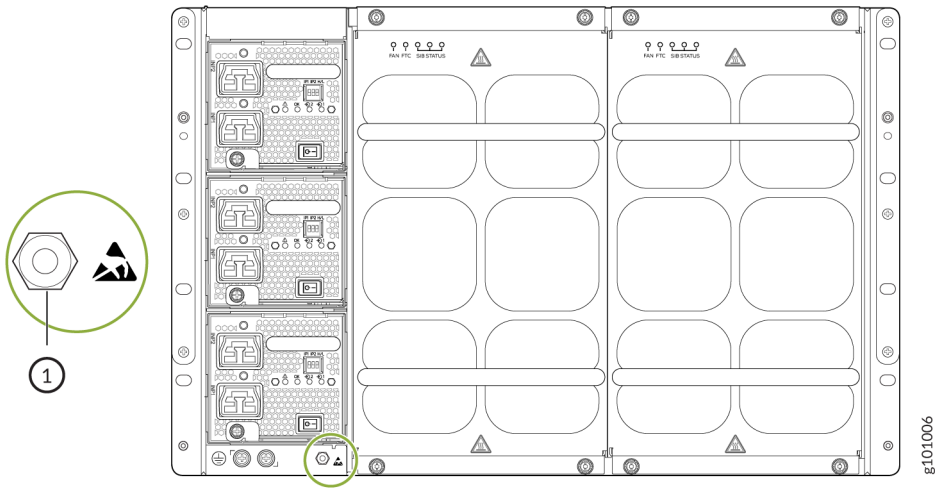
To remove a SIB:

1. Take the SIB offline using the `request chassis sib slot` *slot number* `offline` command.

NOTE: If you suspect the SIB is faulty and want to ensure that packets do not flow through the SIB, power off the SIB instead of taking the SIB offline. To power down the SIB, use the `set chassis sib power-off slot` *`slot number`* command. Before you bring a new SIB in that slot online, you must delete the old configuration using the `delete chassis sib power-off slot` *`slot number`* command.

2. Place an antistatic bag or an antistatic mat on a flat, stable surface.
3. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to an ESD points on the chassis. There is an ESD point located next to the protective earthing terminal and below the bottom power supply on the rear of the PTX10004, (see Figure 91 on page 196).

Figure 91: ESD Point on the Rear of the PTX10004



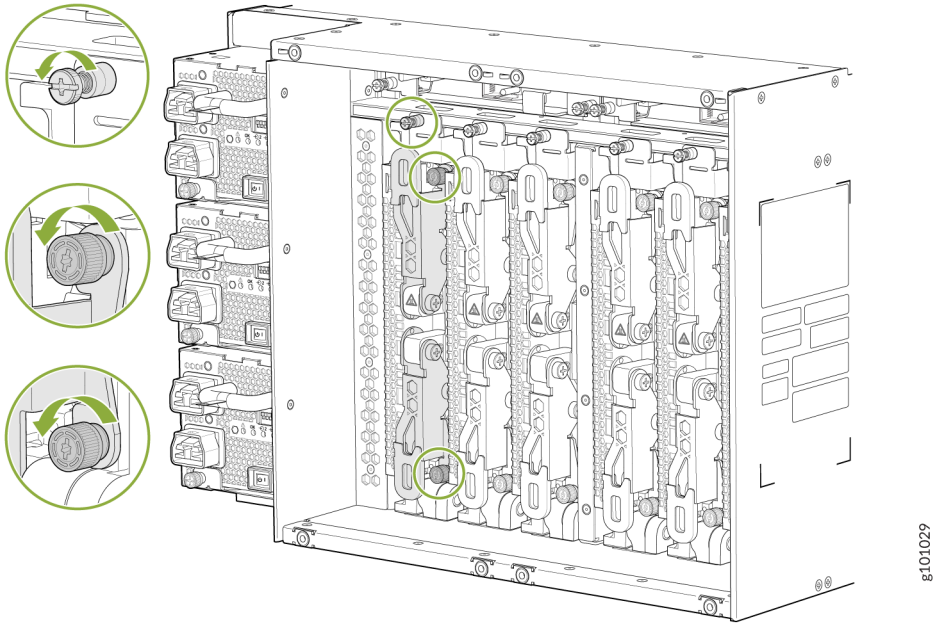
1– ESD point

4. Remove the appropriate fan tray (see "Remove a PTX10004 Fan Tray" on page 160).

CAUTION: Do not remove both fan trays at the same time. If you remove both fan trays, the system triggers a thermal alarm and shuts down the chassis.

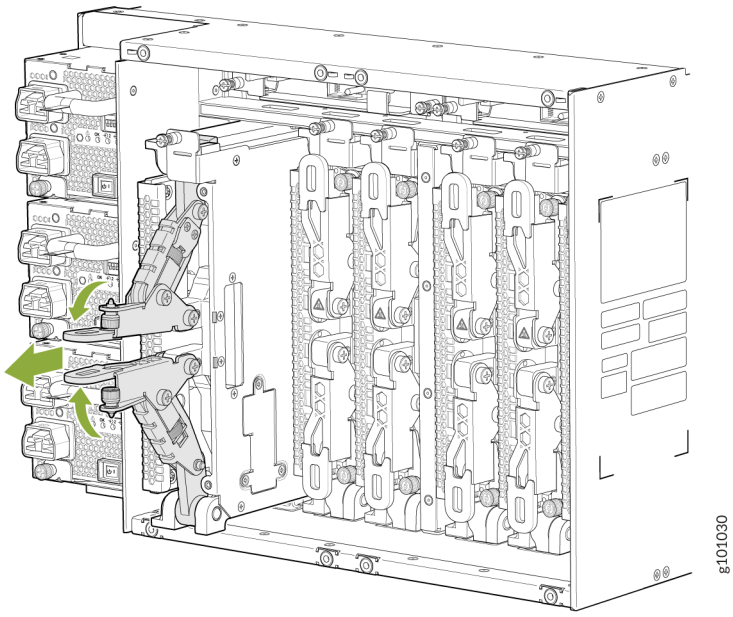
5. Loosen the captive screws at the top and bottom of the SIB using your thumb and forefinger or a Phillips screwdriver. See Figure 92 on page 197.

Figure 92: Loosen the Captive Screws on the SIB



6. Grasp both ejector handles and bring them together. The SIB slides about a quarter of the way out of the slot. See Figure 93 on page 198.

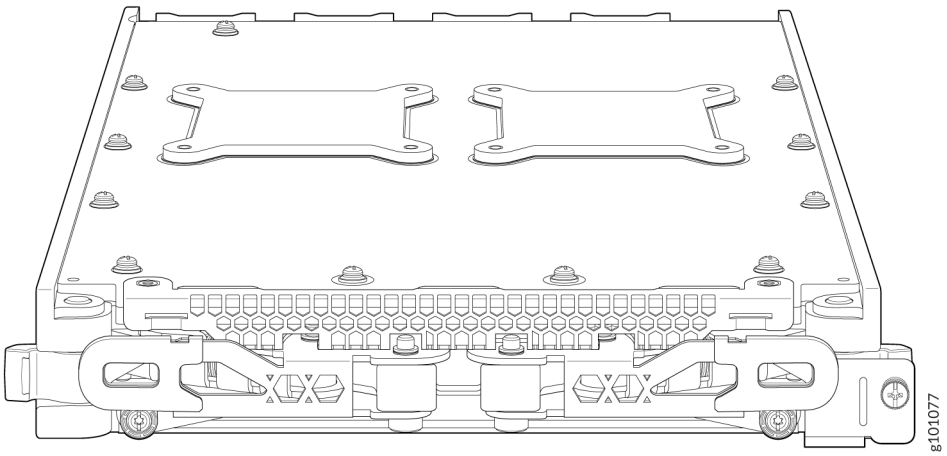
Figure 93: Join the Ejector Handles



7. Grasp the ejector handle with one hand and place your other hand under the SIB for support as you slide the SIB out of the slot.
8. Support the SIB as you rotate the SIB 90 degrees and place it on the antistatic mat with the printed circuit board (PCB) facing upward. Be careful not to bump or handle the SIB by the connectors. If you don't have an antistatic mat, have another person help you slide the antistatic bag over the SIB before you place it on a stable surface. See Figure 94 on page 199.

CAUTION: Do not stack hardware components on top of one another after you remove them. Place each component on an antistatic mat resting on a stable, flat surface.

Figure 94: Extracted SIB



RELATED DOCUMENTATION

PTX10004 Switch Interface Board Description | **57**

Install and Remove PTX10004 Line Card Components

IN THIS SECTION

- How to Handle and Store PTX10004 Line Cards | **200**
- How to Hold PTX10004 Line Cards | **200**
- How to Store a Line Card | **201**

- Take a PTX10004 Line Card Online or Offline | **202**
- Install a PTX10004 Line Card | **202**
- Remove a PTX10004 Line Card | **205**
- Install the PTX10004 Cable Management System | **208**

Line cards on the PTX10004 are field-replaceable units (FRUs) that can be installed in any of the line-card slots on the front of the chassis. The line cards are hot-insertable and hot-removable: you can remove and replace them without powering off the router or disrupting router functions.

How to Handle and Store PTX10004 Line Cards

The PTX10004 line cards have fragile components. To avoid damaging the line cards, be sure you follow safe handling practices.

How to Hold PTX10004 Line Cards

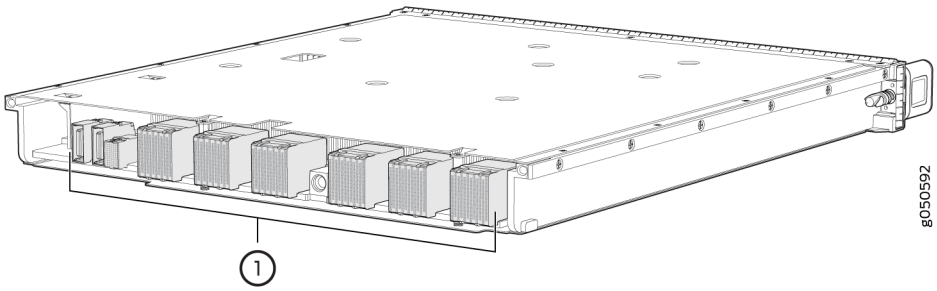
Pay proper attention to the way you hold the line cards. Line cards are installed horizontally, and it is best to hold them by the sides of the units when they are not in the chassis.

When you walk with a line card in hand:

1. Orient the line card so that the faceplate is toward you.
2. Grasp each side of the unit firmly as you slide the unit out of the chassis.
3. Take care not to strike the unit against any object as you carry it.

CAUTION: Never hold the line card by the connector edge. The connectors are fragile and the line card won't seat properly if the connector is damaged. See Figure 95 on page 201.

Figure 95: Connector Edge of a Line Card



1– Connectors

4. If you must rest a line card on an edge, place a cushion between the edge and the surface.

CAUTION: Do not stack line cards on top of one another or on top of any other component.

5. Place each line card separately in an electrostatic bag or on an antistatic mat placed on a flat, stable surface.

How to Store a Line Card

You must store line cards either in the chassis or in a spare shipping container, horizontally and sheet-metal side down. Don't stack these units on top of one another or on top of any other component. Place each unit separately in an antistatic bag or on an antistatic mat placed on a flat, stable surface.

NOTE: Because these units are heavy and because antistatic bags are fragile, inserting the line card into the bag is best done by two people.

To insert a line card into an antistatic bag:

1. Hold the unit horizontally with the faceplate toward you.
2. Slide the opening of the bag over the connector edge.

If you must insert the line card into a bag by yourself:

1. Lay the unit horizontally on an antistatic mat that is on a flat, stable surface with the sheet-metal side down.
2. Orient the unit with the faceplate toward you.
3. Carefully insert the connector edge into the opening of the bag and pull the bag toward you to cover the unit.

Take a PTX10004 Line Card Online or Offline

The offline/online (**OFF**) button is recessed below the faceplate directly below the status (**STS**) LED. You can take any of the PTX10004 line cards online or offline using either of these two methods:

- Press the **OFF** button with a non-conductive pin tool, such as a toothpick, until the **STS** LED turns off after about 5 seconds.
- Issue the CLI command:

```
user@host> request chassis pic fpc-slot fpc-slot pic-slot pic-slot offline
```

Install a PTX10004 Line Card

Before you install a line card in the router chassis:

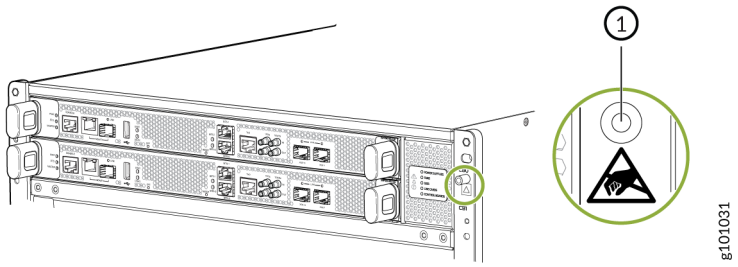
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 283.
- Ensure that you know how to handle and store the line card. See "How to Handle and Store PTX10004 Line Cards" on page 200.
- Inspect the connector edge of the line card for physical damage. Installing a damaged line card might damage the router.

- Ensure that the router has sufficient power to power the line card while maintaining its *n*+1 power redundancy. To determine whether the router has enough power available for the line card, use the `show chassis power-budget-statistics` command.
- Ensure that you have the following parts and tools available to install a line card in the router:
  - ESD grounding strap
  - Phillips (+) screwdriver, number 2

To install a line card in the router chassis:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to one of the ESD points on the chassis. An ESD point is located above the status LED panel on the front of the router chassis. See Figure 96 on page 203.

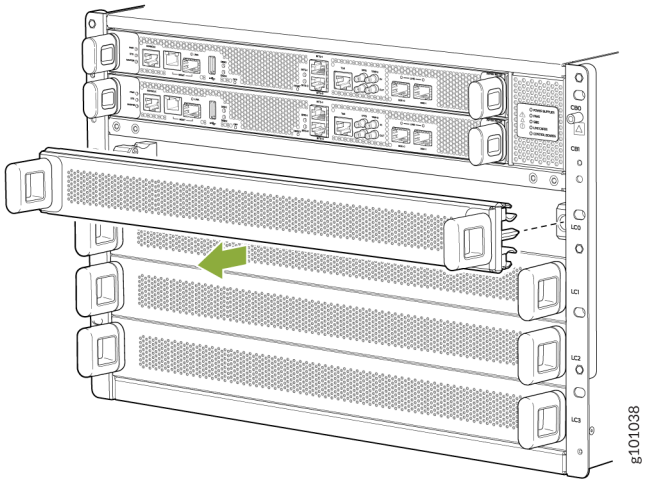
Figure 96: ESD Point on the Front of the PTX10004



1– ESD point

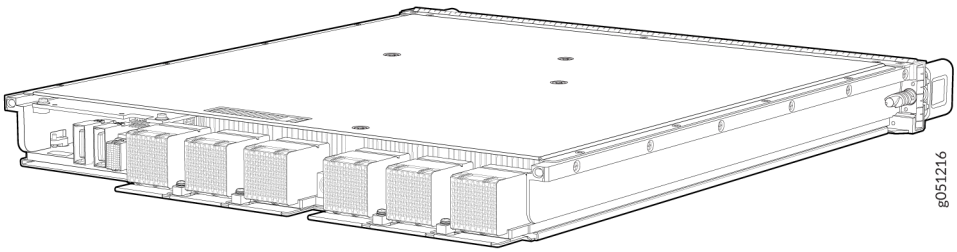
2. Remove the line card cover by grasping the handles and pulling straight out to expose the slot for the line card. See Figure 97 on page 204.

Figure 97: Remove the Cover for a Line Card



CAUTION: Do not lift the line card by holding the edge connectors or the handles on the faceplate. Neither the handles nor the edge connectors can support the weight of the line card. Lifting the line card by the handles or edge connectors might bend them, which would prevent the line cards from being properly seated in the chassis. See Figure 98 on page 204.

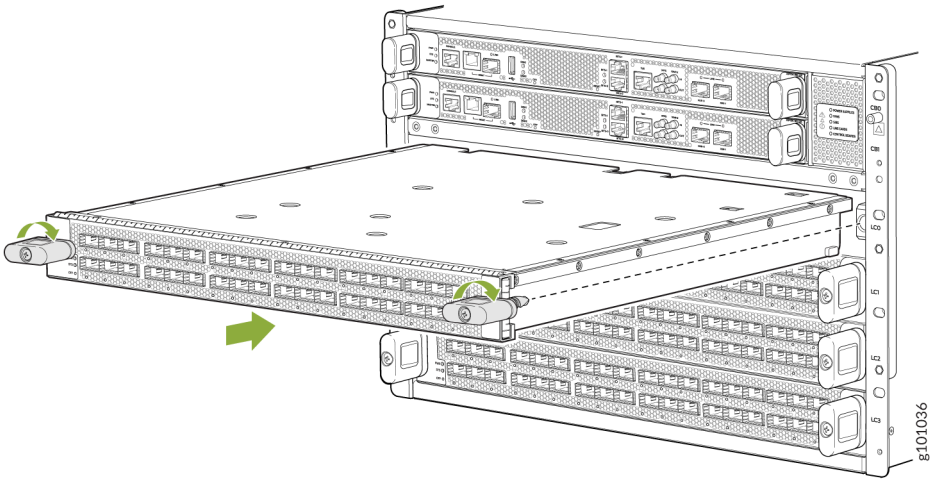
Figure 98: Line-Card Connectors



3. Remove the line card from the antistatic bag and inspect it for any damage before you install it into the chassis.
4. Grasp and lift the line card by the sides.

5. Slide the line card all the way into the slot until the handle holes align. See Figure 99 on page 205.

Figure 99: Insert the Line Card into the Slot and Rotate the Handles



6. Rotate the handles simultaneously into the chassis until the card is fully seated and the handles are vertical.
7. If the system is not powered, the line card automatically comes online when power is applied to the system. If you are adding the line card to a running system, issue the following command to bring the line card online:

```
user@host> request chassis pic fpc-slot fpc-slot pic-slot pic-slot online
```

You can install the optional cable management kit after the card is installed.

Remove a PTX10004 Line Card

If you have the optional line-card cable management system, it's not necessary to remove the cable management system before removing the line card.

Before you remove a line card from the router chassis:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 283.

- If there are any optical cables (including transceivers installed in the line card), remove them before you remove the line card. See "How to Disconnect a Fiber-Optic Cable from a Transceiver on a PTX10004 Router" on page 217.
- Ensure that you know how to handle and store the line card. See "How to Handle and Store PTX10004 Line Cards" on page 200.
- Ensure that you have the following parts and tools available to remove a line card from a PTX10004 chassis:
  - ESD grounding strap
  - An antistatic bag or an antistatic mat

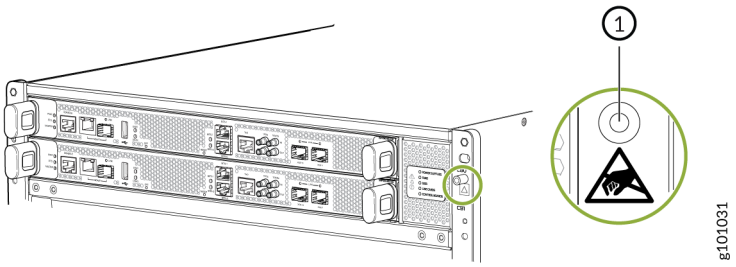
    NOTE: Placing a line card in an electrostatic bag might require a second person to assist with sliding the line card into the bag.

  - Replacement line card or a cover for the empty slot

To remove a line card from a PTX10004 router chassis:

1. Place the antistatic bag or antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to one of the ESD points on the chassis. An ESD point is located above the status LED panel on the front of the router chassis. See Figure 100 on page 206.

Figure 100: ESD Point on the Front of the PTX10004



1– ESD point

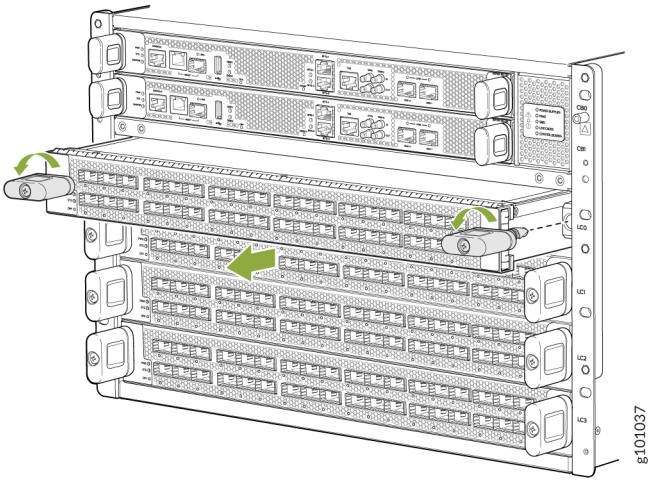
3. Label the cables connected to each port on the line card so that you can reconnect the cables to the correct ports.

4. Issue the following CLI command to take the line card offline:

```
user@router> request chassis fpc slot slot-number offline
```

5. Unscrew the line card from the chassis by continually turning the handles to the left until the line card is fully unseated. See Figure 101 on page 207.

Figure 101: Remove a PTX10004 Line Card



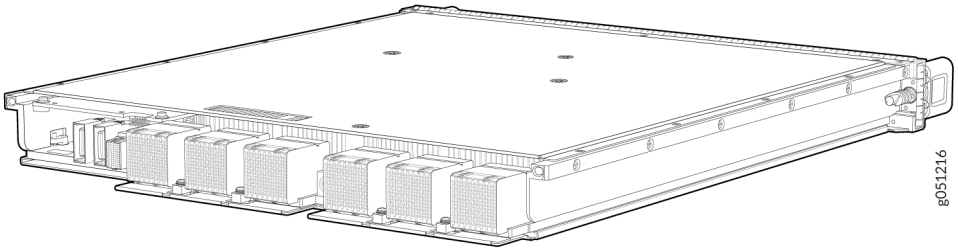
6. Using the handles, slide the line card halfway out of the chassis.

CAUTION: Do not stack line cards on top of one another or on top of any other component. Place each line card separately in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

CAUTION: Each PTX10004 line card weighs 29.2 lb (13.24 kg). Be prepared to support the full weight as you slide the line card out of the chassis.

7. Grasp both sides of the line card at midpoint and remove the line card from the chassis. Either have someone assist you in putting the line card into the antistatic bag or rest the card on the antistatic mat. Take care not to bump or store the line cards on the connectors. See Figure 102 on page 208.

Figure 102: Line Card Connectors



8. If you are not installing a line card in the emptied line-card slot within a short time, install a cover over the slot. Do this to protect the interior of the chassis from dust or other foreign substances and to ensure that the airflow inside the chassis is not disrupted.

Install the PTX10004 Cable Management System

The PTX10004 cable management system is an optional, orderable kit (JLC-CBL-MGMT-KIT) that organizes and protects optical cabling attached to the line cards. After a line card is installed, you can still remove the line card without needing to remove the cable management system.

Ensure that you have the following parts and tools available to install the PTX10004 cable management system on a line card:

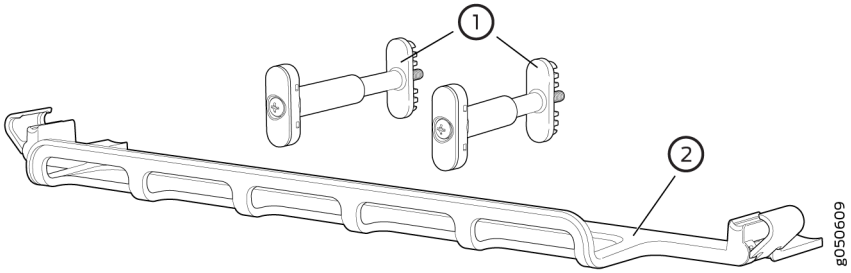
- Phillips (+) screwdriver, number 2

To install the cable management system (see Figure 103 on page 209):

1. Open the shipping carton for cable management system and check that you have:
   - Two handle extensions

- One cable tray

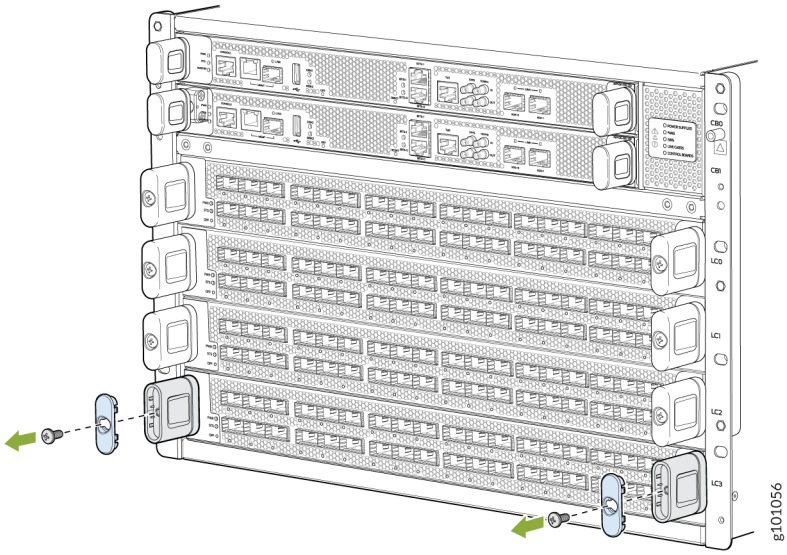
Figure 103: Cable Management System Components



1– Handle extensions	2– Cable tray

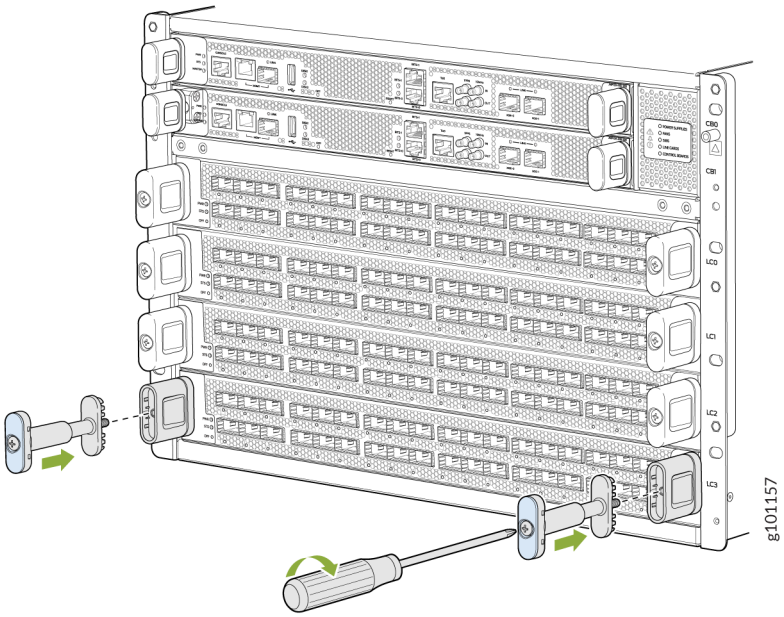
2. Use the Phillips screwdriver to loosen and remove the screws on the two line-card handles (see Figure 104 on page 209).

Figure 104: Remove the Handle Screws



3. Replace the blue cap on the line-card handle with the two handle extensions (see Figure 105 on page 210).

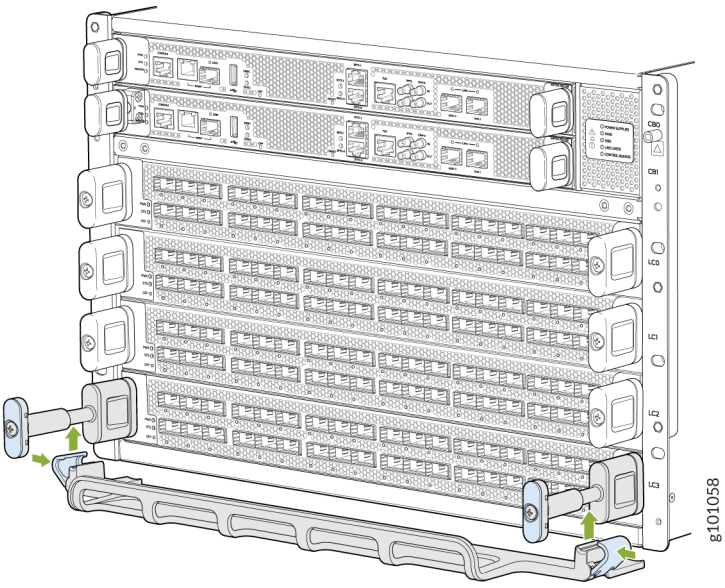
Figure 105: Attach the Handle Extensions



4. Tighten the screws into the handle extensions.
5. Snap open the blue clips on the ends of the cable tray with your hands.
6. Place the cable tray across the front of the line card so that the two ends of the cable tray are under the handle extensions.

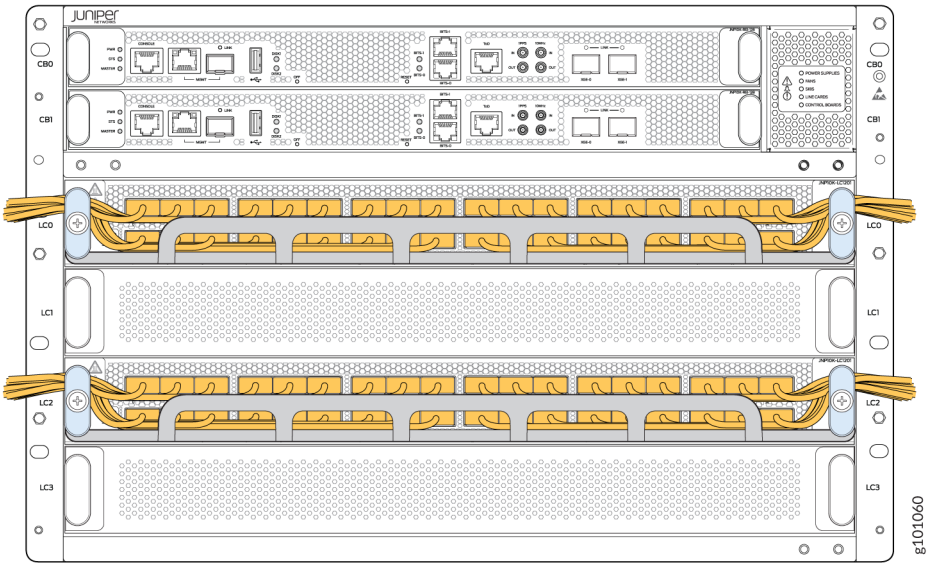
7. Snap to close the blue clips of the cable tray around the handle extensions (see Figure 106 on page 211).

Figure 106: Add the Cable Tray



8. Drape and tie the optical cables to the side (see Figure 107 on page 212). Another option is to drape some of the cables under the handle extension and some cables over the handle extension.

Figure 107: Completed Cable Management System



RELATED DOCUMENTATION

PTX10004 Cable Management System | **72**

PTX10004 Transceiver and Fiber Optic Cable Installation and Removal

IN THIS SECTION

- PTX10004 Transceiver Installation | **213**
- PTX10004 Transceiver Removal | **215**
- How to Connect a Fiber-Optic Cable from a Transceiver on a PTX10004 Router | **216**

How to Disconnect a Fiber-Optic Cable from a Transceiver on a PTX10004 Router | 217
Fiber-Optic Cable Maintenance for a PTX10004 Router | 218

The transceivers for the PTX10004 router 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.

To understand how to install or remove a transceiver of a PTX10004 router, read the following sections.

PTX10004 Transceiver Installation

Before you begin to install a transceiver in a PTX10004 line card or Routing and Control Board (RCB), ensure that you have taken the necessary precautions for safe handling of lasers (see "Laser and LED Safety Guidelines and Warnings" on page 271).

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

To install a transceiver in the PTX10004 line card or the RCB:



CAUTION: To avoid electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

1. Remove the transceiver from its bag.
2. Check to see whether the transceiver is covered by a rubber safety cap. If it is not, cover the transceiver with a rubber safety cap.



LASER 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.

3. 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.
4. Using both hands, carefully place the transceiver in the empty port. The connectors must face the device chassis.

CAUTION: Before you slide the transceiver into the port, ensure that the transceiver is aligned correctly. Misalignment might cause the pins to bend, making the transceiver unusable. On PTX10004 line cards, the ports are designed belly-to-belly, which requires you to turn the transceiver over on the bottom port row. See Figure 108 on page 214 and Figure 109 on page 214 for the correct orientation for your device.

5. Slide the transceiver in gently until it is fully seated.
6. Remove the rubber safety cap when you are ready to connect the cable to the transceiver.

LASER 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.

Figure 108: Install an SFP Transceiver

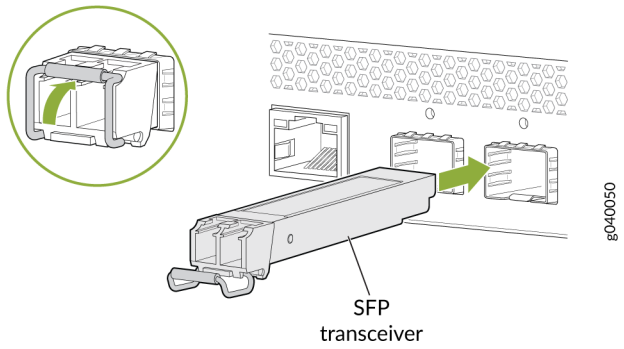
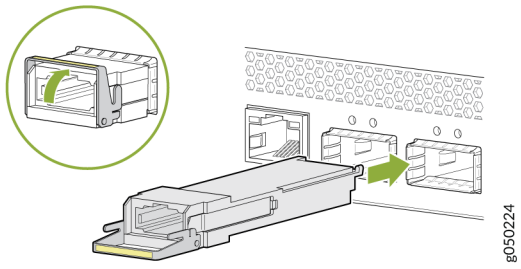


Figure 109: Install a QSFP+, QSFP28, or QSFP56-DD Transceiver



PTX10004 Transceiver Removal

Before you begin to remove a transceiver from the PTX10004 line card or RCB, ensure that you have taken the necessary precautions for safe handling of lasers (see "Laser and LED Safety Guidelines and Warnings" on page 271).

Ensure that you have the following parts and tools available:

- Antistatic bag or an antistatic mat
- Rubber safety caps to cover the transceiver and fiber-optic cable connector
- Dust cover to cover the port

To remove a transceiver from the PTX10004 line card or RCB:

1. Place the antistatic bag or antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the switch.
3. Label the cable connected to the transceiver so that you can reconnect it correctly.



LASER 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.



LASER 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. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.

4. Remove the cable connected to the transceiver (see "How to Disconnect a Fiber-Optic Cable from a Transceiver on a PTX10004 Router" on page 217). Cover the transceiver and the end of each fiber-optic cable connector with a rubber safety cap immediately after you disconnect the fiber-optic cables.
5. Using your fingers, pull the ejector lever away from the transceiver to unlock the transceiver.

CAUTION: Before removing the transceiver, make sure you open the ejector lever completely until you hear it click. This prevents damage to the transceiver.

6. 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 electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

7. 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.

How to Connect a Fiber-Optic Cable from a Transceiver on a PTX10004 Router

Before you connect a fiber-optic cable to an optical transceiver installed in the PTX10004 router, ensure that you have taken the necessary precautions for safe handling of lasers (see "Laser and LED Safety Guidelines and Warnings" on page 271).

To connect a fiber-optic cable to an optical transceiver installed in the PTX10004 router:

LASER 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.

LASER WARNING: Do not stare into the laser beam or view it directly with optical instruments even if the interface has been disabled.

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. If the optical transceiver is covered by a rubber safety cap, remove the cap. Save the cap.
3. Insert the cable connector into the optical transceiver.
4. Secure the cables so that they are not supporting 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. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.

CAUTION: 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.

How to Disconnect a Fiber-Optic Cable from a Transceiver on a PTX10004 Router

Before you disconnect a fiber-optic cable from an optical transceiver installed in the PTX10004 router, ensure that you have taken the necessary precautions for safe handling of lasers (see "Laser and LED Safety Guidelines and Warnings" on page 271).

Ensure that you have the following parts and tools available:

- Rubber safety cap to cover the transceiver
- Rubber safety cap to cover the fiber-optic cable connector

To disconnect a fiber-optic cable from an optical transceiver installed in the PTX10004 router:

1. (Recommended) Disable the port in which the transceiver is installed by including the `disable` statement at the `[edit interfaces]` hierarchy level for the specific interface.

   LASER 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.

   LASER WARNING: Do not stare into the laser beam or view it directly with optical instruments even if the interface has been disabled.

2. Carefully unplug the fiber-optic cable connector from the transceiver.
3. Cover the transceiver with a rubber safety cap.



LASER 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.

Fiber-Optic Cable Maintenance for a PTX10004 Router

To maintain fiber-optic cables in the PTX10004 router:

- 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 the fiber-optic cable to avoid 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 is not supporting its own weight as it hangs to the floor. Never let a fiber-optic cable hang free from the connector.
- Do not bend fiber-optic cables beyond their minimum bend radius. Bending the cables beyond their minimum bend radius 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 directions in the cleaning kit you use.

  After you clean 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 Cletop-S® Fiber Cleaner. Follow the directions in the cleaning kit you use.

RELATED DOCUMENTATION

PTX10004 Transceiver and Cable Specifications | 101

Remove the PTX10004 Router

IN THIS SECTION

- Power Off a PTX10004 | 219
- Remove a PTX10004 from a Four-Post Rack Using a Mechanical Lift | 226
- Manually Remove a PTX10004 from a Four-Post Rack | 228

To power off and remove a PTX10004 router, read the following sections.

Power Off a PTX10004

Before you power off a PTX10004 router.

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 283.
- Ensure that you don't need to forward traffic through the router.
- Ensure that you have the following parts and tools available to power off the router:
  - An ESD grounding strap
  - An external management device such as a PC
  - An RJ-45 to DB-9 rollover cable to connect the external management device to the console port on one of the Routing and Control Boards (RCBs)

To power off a PTX10004 router:

1. Connect to the router using one of the following methods:
   - Connect a management device to the console (**CON**) port on an RCB by following the instructions in "Connect a PTX10004 Router to a Management Console" on page 140.
   - Connect a management device to one of the two management (**MGMT**) ports on the RCB by following the instructions in "Connect a PTX10004 Router to a Network for Out-of-Band Management" on page 139.

2. Shut down Junos OS from the external management device by using the `request node power-off` *node* operational mode CLI command followed by the `request chassis cb slot` *0|1*. These commands shut down a single RCB gracefully and preserves system state information. When this command is issued on a redundant system, it shuts down the partner RCB. A message appears on the other RCB console, confirming that the operating system has halted. For example, if you want to shut down the backup RCB, issue the command on the primary RCB. You view the output on the backup RCB.

   You see the following output (or something similar) after entering the command:

```
Shutdown at Thu Nov 19 09:40:59 2020
.

{backup}
root@BackupRE
Stopping User Manager for UID 0...
[  OK  ] Stopped Management Ethernet Interface Manager Service.
       [  OK  ] Stopped Serial Getty on ttyS0.
[  OK  ] Stopped User Manager for UID 0.
[  OK  ] Stopped DHCPv4 Server Daemon.
[  OK  ] Stopped Marvell Controller Service.
[  OK  ] Stopped Session c38 of user root.
[  OK  ] Stopped Session c23 of user root.
[  OK  ] Stopped Session c22 of user root.
[  OK  ] Stopped Vsftpd ftp daemon.
[  OK  ] Removed slice User Slice of root.
         Stopping Login Service...
[  OK  ] Removed slice system-serial\x2dgetty.slice.
[  OK  ] Removed slice system-getty.slice.
         Stopping Permit User Sessions...
         Stopping Helper service to orchestrate actions prior to shut down...
[  OK  ] Stopped Login Service.
[  OK  ] Stopped Imgd on all nodes.
[  OK  ] Stopped Permit User Sessions.
[  OK  ] Stopped Arp filtering arptables.
[  OK  ] Stopped Helper service to orchestrate actions prior to shut down.
         Stopping "Fabric Management Hub on RE"...
         Stopping "Evo memory management service "...
         Stopping "Simple Network Management Protocol Daemon on RE"...
         Stopping "Monitors smartd activity and alerts smartd-agent"...
         Stopping "rpc daemon for service discovery API's"...
         Stopping "Evo Dns Relay"...
         Stopping "Objping server"...
```

```
          Stopping "Mastership Zookeeper interaction deamon"...
          Stopping "Charonctl agent on RE"...
          Stopping NA-MQTTD daemon on RE...
          Stopping "Firewall Daemon on RE"...
          Stopping "Netlink service daemon"...
          Stopping "PCI Agent"...
          Stopping "Distributor daemon"...
          Stopping "diskmgmt on RE"...
          Stopping "Destination Usage Class Index Manager service"...
          Stopping "Platform Monitoring and Reporting Agent"...
          Stopping "Composite Nexthop Index Manager service"...
          Stopping "JUNOS SNTP(Simple Network...tocol) Daemon client version"...
          Stopping "AggEther Daemon"...
          Stopping "PPMD Daemon on RE"...
          Stopping "Jstatsd Daemon on RE to fetch local statistics"...
          Stopping "System Command Registration Daemon"...
          Stopping "dhcp-managerd on RE"...
          Stopping "Fault Proxy Agent"...
          Stopping "Alarm Management Daemon on RE"...
          Stopping "Objmon on RE"...
          Stopping "The network agent daemon (for gRPC)"...
          Stopping "BFDD Daemon on RE"...
          Stopping "CFM daemon on RE"...
          Stopping "ICMP daemon on RE"...
          Stopping "JUNOS SNTP(Simple Network...tocol) Daemon server version"...
          Stopping "EVO firewall Proxy Daemon for JunOS Applications on RE"...
          Stopping "EVENTD daemon in relay mode"...
          Stopping Management daemon (mgd) on PFE...
[  OK  ] Stopped fuse-fixup.service.
[  OK  ] Stopped "Charonctl agent on RE".
[  OK  ] Stopped "Jstatsd Daemon on RE to fetch local statistics".
[  OK  ] Stopped NA-MQTTD daemon on RE.
[  OK  ] Stopped "Mastership Zookeeper interaction deamon".
[  OK  ] Stopped "Objmon on RE".
[  OK  ] Stopped "Platform Monitoring and Reporting Agent".
[  OK  ] Stopped "Objping server".
[  OK  ] Stopped "EVENTD daemon in relay mode".
[  OK  ] Stopped "PCI Agent".
[  OK  ] Stopped "rpc daemon for service discovery API's".
[  OK  ] Stopped Management daemon (mgd) on PFE.
[  OK  ] Stopped "System Command Registration Daemon".
[  OK  ] Stopped MGD for PFE initialization of schema and database.
[  OK  ] Stopped "ICMP daemon on RE".
```

```
[  OK  ] Stopped Ethernet Bridge Filtering Tables.
[  OK  ] Stopped "Simple Network Management Protocol Daemon on RE".
[  OK  ] Stopped "Netlink service daemon".
[  OK  ] Stopped "Destination Usage Class Index Manager service".
[  OK  ] Stopped "Fabric Management Hub on RE".
[  OK  ] Stopped "Fault Proxy Agent".
[  OK  ] Stopped "Firewall Daemon on RE".
[  OK  ] Stopped "Composite Nexthop Index Manager service".
[  OK  ] Stopped "JUNOS SNTP(Simple Network ...rotocol) Daemon server version".
[  OK  ] Stopped "diskmgmt on RE".
[  OK  ] Stopped "Evo Dns Relay".
[  OK  ] Stopped "Evo memory management service ".
[  OK  ] Stopped "Monitors smartd activity and alerts smartd-agent".
         Stopping Self Monitoring and Reporting Technology (SMART) Daemon...
[  OK  ] Stopped Self Monitoring and Reporting Technology (SMART) Daemon.
[  OK  ] Stopped "dhcp-managerd on RE".
[  OK  ] Stopped "AggEther Daemon".
[  OK  ] Stopped "Alarm Management Daemon on RE".
[  OK  ] Stopped "EVO firewall Proxy Daemon for JunOS Applications on RE".
[  OK  ] Stopped "JUNOS SNTP(Simple Network ...rotocol) Daemon client version".
[  OK  ] Stopped "BFDD Daemon on RE".
[  OK  ] Stopped "CFM daemon on RE".
[  OK  ] Stopped "PPMD Daemon on RE".
         Stopping MGD sync-other-re on RE...
         Stopping "Command Daemon"...
[  OK  ] Stopped MGD sync-other-re on RE.
         Stopping Xinetd Server to Launch System Services...
         Stopping Constraint check daemon (mustd) on RE...
[  OK  ] Stopped Xinetd Server to Launch System Services.
         Stopping "FIB Service Daemon Proxy"...
[  OK  ] Stopped "Command Daemon".
[  OK  ] Stopped "FIB Service Daemon Proxy".
[  OK  ] Stopped Constraint check daemon (mustd) on RE.
[  OK  ] Stopped "The network agent daemon (for gRPC)".
         Stopping Management daemon (mgd) on RE...
[  OK  ] Stopped "Distributor daemon".
[  OK  ] Stopped Management daemon (mgd) on RE.
         Stopping Evo Sysman Launch Service...
         Stopping Helper service to hand over mastership when OFP stops...
[  OK  ] Stopped Helper service to hand over mastership when OFP stops.
         Stopping OFP on RE...
[  OK  ] Stopped Evo Sysman Launch Service.
         Stopping Evo SysEpochMan Service...
```

```
         Stopping "core-mgr on RE"...
         Stopping "Trace Writer"...
         Stopping "Trace Relay"...
[  OK  ] Stopped OFP on RE.
[  OK  ] Stopped Evo SysEpochMan Service.
[  OK  ] Stopped "core-mgr on RE".
[  OK  ] Stopped "Trace Writer".
         Stopping EVO coredump utility...
         Stopping Zookeeper Server...
[  OK  ] Stopped "Trace Relay".
[  OK  ] Stopped EVO coredump utility.
[  OK  ] Stopped Zookeeper Server.
[  OK  ] Stopped target Network.
         Stopping vrf0 Network-device Configuration...
         Stopping vib Network-device Configuration...
         Stopping jtdv51 Network-device Configuration...
         Stopping vrf51 Network-device Configuration...
        Stopping vfb Network-device Configuration...
         Stopping eth2 Network-device Configuration...
         Stopping jtdv50 Network-device Configuration...
         Stopping eth3 Network-device Configuration...
         Stopping tap0 Network-device Configuration...
         Stopping mgmt_junos Network-device Configuration...
         Stopping sit0 Network-device Configuration...
         Stopping eth1 Network-device Configuration...
         Stopping vmb0 Network-device Configuration...
         Stopping iri Network-device Configuration...
         Stopping vrf50 Network-device Configuration...
         Stopping jtdrop Network-device Configuration...
         Stopping eth0 Network-device Configuration...
         Stopping tunl0 Network-device Configuration...
         Stopping jtd0 Network-device Configuration...
         Stopping ingvrf Network-device Configuration...
         Stopping jtdv0 Network-device Configuration...
[  OK  ] Stopped target Remote File Systems.
[  OK  ] Stopped Setup VRF on RE.
         Stopping Helper service to execute ...re network layer is shut down...
[  OK  ] Stopped vrf0 Network-device Configuration.
[  OK  ] Stopped vib Network-device Configuration.
[  OK  ] Stopped jtdv51 Network-device Configuration.
[  OK  ] Stopped vrf51 Network-device Configuration.
[  OK  ] Stopped vfb Network-device Configuration.
[  OK  ] Stopped jtdv50 Network-device Configuration.
```

```
[  OK  ] Stopped eth3 Network-device Configuration.
[  OK  ] Stopped tap0 Network-device Configuration.
[  OK  ] Stopped mgmt_junos Network-device Configuration.
[  OK  ] Stopped sit0 Network-device Configuration.
[  OK  ] Stopped vmb0 Network-device Configuration.
[  OK  ] Stopped iri Network-device Configuration.
[  OK  ] Stopped vrf50 Network-device Configuration.
[  OK  ] Stopped jtdrop Network-device Configuration.
[  OK  ] Stopped tunl0 Network-device Configuration.
[  OK  ] Stopped jtd0 Network-device Configuration.
[  OK  ] Stopped ingvrf Network-device Configuration.
[  OK  ] Stopped jtdv0 Network-device Configuration.
[  OK  ] Stopped eth0 Network-device Configuration.
[  OK  ] Stopped eth2 Network-device Configuration.
[  OK  ] Stopped Helper service to execute a...fore network layer is shut down.
         Stopping System Internal Communication Infrastructre...
[  OK  ] Stopped System Internal Communication Infrastructre.
         Stopping D-Bus System Message Bus...
         Stopping Junos RE mastership daemon...
[  OK  ] Stopped D-Bus System Message Bus.
[  OK  ] Stopped Junos RE mastership daemon.
[  OK  ] Stopped MGD initialization of schema and database.
[  OK  ] Stopped eth1 Network-device Configuration.
[  OK  ] Removed slice system-network.slice.
[  OK  ] Stopped target Basic System.
[  OK  ] Stopped target Sockets.
[  OK  ] Closed RPCbind Server Activation Socket.
[  OK  ] Closed D-Bus System Message Bus Socket.
[  OK  ] Closed Finger Socket for Per-Connection Servers.
[  OK  ] Stopped target Paths.
[  OK  ] Stopped Forward Password Requests to Wall Directory Watch.
[  OK  ] Stopped Dispatch Password Requests to Console Directory Watch.
[  OK  ] Stopped Monitor /var/run/chassis/mastership for changes.
[  OK  ] Stopped target Slices.
[  OK  ] Removed slice User and Session Slice.
[  OK  ] Stopped target [34933.218166] systemd-shutdown[10895]: Failed to remount '/var' read-
only: Device or resource busy
System Initialization.
[  OK  ] Stopped Apply Kernel[34933.372848] systemd-shutdown[1]: Failed to wait for process:
Protocol error
Variables.
[  OK  ] Stopped Load Kernel Modules.
[  OK  ] Stopped Setup Virtual Console.
```

```
         Stopping Update UTMP about System Boot/Shutdown...
[  OK  ] Stopped Update is Completed.
[  OK  ] Stopped Rebuild Hardware Database.
[  OK  ] Stopped Rebuild Dynamic Linker Cache.
[  OK  ] Stopped Rebuild Journal Catalog.
[  OK  ] Stopped Update UTMP about System Boot/Shutdown.
[  OK  ] Stopped Create Volatile Files and Directories.
[  OK  ] Stopped target Local File Systems.
         Unmounting /data/config...
         Unmounting /u...
         Unmounting /sys/kernel/debug/tracing...
         Unmounting /boot...
         Unmounting Temporary Directory...
         Unmounting /config...
         Unmounting /var/pfe...
         Unmounting /data/var/home/root/.ssh...
         Unmounting /var/etc...
         Unmounting /uswitch/data/var/external...
         Unmounting /uswitch/tmp...
         Unmounting /uswitch/dev...
         Unmounting /etc...
         Unmounting /run/user/0...
         Unmounting /soft/uswitch...
         Unmounting /var/db...
         Unmounting /usr/conf...
         Unmounting /uswitch/proc...
         Unmounting /uswitch/soft...
         Unmounting /usr/evo/share...
         Unmounting /data/var/external...
[  OK  ] Unmounted /data/config.
[  OK  ] Unmounted /u.
[  OK  ] Unmounted /sys/kernel/debug/tracing.
[  OK  ] Unmounted /boot.
[  OK  ] Unmounted /config.
[  OK  ] Unmounted /var/pfe.
[  OK  ] Unmounted /d[34935.235545] reboot: Power down
ata/var/home/root/.ssh.
[  OK  ] Unmounted /var/etc.
```

> **CAUTION**: The final output of any version of the `request node shutdown power-off` command is the "`System Haulted`" message. Wait at least 60 seconds after first seeing this message before following the instructions in Step 4 and Step 5 to power off the router.

3. Wrap and fasten one end of the ESD grounding strap around your bare wrist and connect the other end of the strap to one of the ESD points on the chassis. One ESD point is located above the status LED panel on the front of the router chassis, and the other ESD point is located in the rear below the power supplies.
4. Disconnect power to the router by performing one of the following tasks:
   - AC power supply—Set the enable router switch to the off (**O**) position and gently pull out the coupler for the power cord from the faceplate.
   - DC power supply—Switch the circuit breaker on the panel board that services the DC circuit to the off position.
5. Remove the power source cable from the power supply faceplate:
   - AC power supply—Remove the power cord from the power supply faceplate by detaching the power cord retainer and gently pulling out the power cord plug that is connected to the power supply faceplate.
   - DC power supply—Loosen the thumbscrews by securing the DC power connector on the power source cables. Remove the power source cables from the power supply.
6. Remove any remaining cables and optics before you remove the chassis from the rack.

SEE ALSO

Remove a JNP10K-PWR-AC2 Power Supply | **172**

Remove a JNP10K-PWR-DC2 Power Supply | **184**

Remove a PTX10004 from a Four-Post Rack Using a Mechanical Lift

Before you remove the router using a lift:

- Ensure that the rack is stable and secured to the building.
- Ensure that there is enough space to place the removed router in its new location and along the path to the new location. See "PTX10004 Clearance Requirements for Airflow and Hardware Maintenance" on page 83.

- Review "General Safety Guidelines and Warnings" on page 258.
- Review the chassis lifting guidelines described in "Chassis and Component Lifting Guidelines" on page 264.
- Ensure that the router is safely powered off (see "Power Off a PTX10004" on page 219).
- Ensure that you have the following parts and tools to remove the router:
  - A mechanical lift rated for 250 lbs (113.4 kg)
  - A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mount screws



CAUTION: When removing more than one router chassis from a rack, remove the routers in order from top to bottom.

The chassis weighs approximately 123 lb (56 kg) with only the fan tray controllers installed. Because of the router's size and weight, we strongly recommend that you use a mechanical lift to remove the PTX10004. Lifting the chassis and removing it from a rack or cabinet requires at least three people.

Make sure the chassis is empty (contains only the fan tray controllers) before you lift it.

NOTE: For instructions on removing a router without using a mechanical lift, see "Manually Remove a PTX10004 from a Four-Post Rack" on page 228.

To remove the router using a mechanical lift:

1. Remove all optics, line cards, RCBs, power supplies, fan trays, and SIBs before you attempt to move the router chassis. See the following topics:
   - "Remove a PTX10004 Line Card" on page 205
   - "Remove a PTX10004 Routing and Control Board" on page 155
   - "Remove a JNP10K-PWR-AC2 Power Supply" on page 172
   - "Remove a JNP10K-PWR-DC2 Power Supply" on page 184
   - "Remove a PTX10004 Fan Tray" on page 160
   - "Remove a PTX10004 Switch Interface Board" on page 195

   Ensure that all of the removed components are stored in antistatic bags.
2. Use the appropriate Phillips (+) screwdriver to remove the screws that attach the chassis to the rack.

3. Move the lift to the rack and position it so that its platform is centered about 0.5 in. (1.27 cm) below the bottom of the router chassis and as close to it as possible.
4. Carefully slide the router from the mounting tray attached to the rack onto the lift.
5. Move the lift away from the rack and lower the platform on the lift (see Figure 110 on page 228).
6. Use the lift to transport the router to its new location.

   After moving the router to its new location, install the components in the chassis or store the components in antistatic bags.

Figure 110: Move the PTX10004 Using a Mechanical Lift



SEE ALSO

Power Off a PTX10004 | 219

Manually Remove a PTX10004 from a Four-Post Rack

Before you manually remove the router from a rack:

- Ensure that the rack is stable and secured to the building.

- Ensure that there is enough space to place the removed router in its new location and along the path to the new location. "PTX10004 Clearance Requirements for Airflow and Hardware Maintenance" on page 83.
- Review "General Safety Guidelines and Warnings" on page 258.
- Review the chassis lifting guidelines described in "Chassis and Component Lifting Guidelines" on page 264.
- Ensure that the router is safely powered off (see "Power Off a PTX10004" on page 219).
- Ensure that you have a Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mount screws.

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



CAUTION: The chassis weighs approximately 123 lb (56 kg) with only the fan tray controllers installed. Because of the router's size and weight, we strongly recommend that you use a mechanical lift to remove the PTX10004. Lifting the chassis and removing it from a rack or cabinet requires at least three people.

Make sure the chassis is empty (contains only the fan tray controllers) before you lift it.



CAUTION: When removing more than one router chassis from a rack, remove the routers in order from top to bottom.

To manually remove a PTX10004 from a rack:

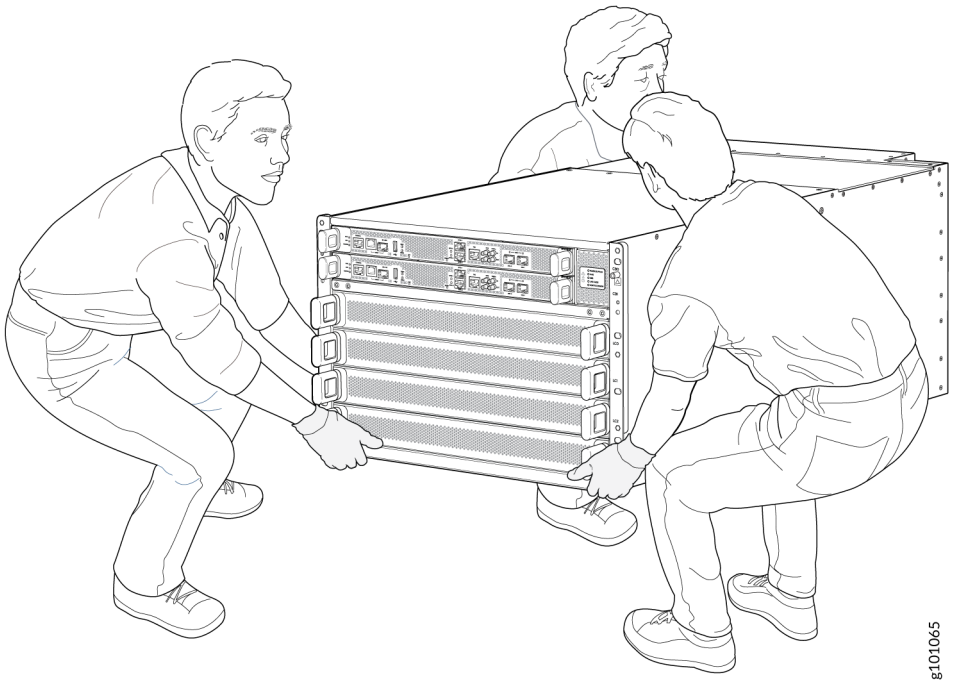
1. Remove all optics, line cards, RCBs, power supplies, fan trays, and SIBs before you attempt to move the router chassis. See the following topics:
   - "Remove a PTX10004 Line Card" on page 205
   - "Remove a PTX10004 Routing and Control Board" on page 155
   - "Remove a JNP10K-PWR-AC2 Power Supply" on page 172
   - "Remove a JNP10K-PWR-DC2 Power Supply" on page 184
   - "Remove a PTX10004 Fan Tray" on page 160
   - "Remove a PTX10004 Switch Interface Board" on page 195

   Ensure that all of the removed components are stored in antistatic bags.
2. Use the appropriate Phillips (+) screwdriver to remove the screws that attach the chassis to the rack.

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

3. Position one person on each side and another in the rear of the chassis. There are two handles on the side, but these handles are only meant to help guide the empty chassis out of the base and rear brackets.
4. On each side, hold the bottom of the chassis and carefully lift it up from the mounting tray attached to the rack.
5. Carefully lift the chassis out of rack. If you have a pallet jack, move the router onto the pallet jack. See Figure 111 on page 230.

Figure 111: Lift the PTX10004 Without Using a Mechanical Lift



6. Carefully move the chassis to its new location.

   After moving the router to its new location, install the components in the chassis or store the components in antistatic bags.

RELATED DOCUMENTATION

Connect the PTX10004 Router to Earth Ground | **134**

Connect AC Power to a PTX10004 | **136**

Connect DC Power to a PTX10004 | **137**

CHAPTER 5

Troubleshooting Hardware

How to Troubleshoot PTX10004 Error Conditions | 233

How to Troubleshoot PTX10004 Error Conditions

IN THIS SECTION

- Here's Where to Start | 233
- PTX10004 Alarm Messages Overview | 234
- PTX10004 Chassis Alarm Messages | 235

Read the following sections to learn how you can diagnose problems on the PTX10004 using alarm messages and component indicators.

Here's Where to Start

You have troubleshooting resources available through Junos OS alarm messages and LED indicators. You can use these links to discover what these alarms and indicators mean when an error occurs.

To troubleshoot a PTX10004 modular chassis, you use the Junos OS CLI, alarms, and LEDs on the network ports, management panel of the Routing Control Board (RCB), and components.

- LEDs—When the Routing Engine detects an alarm condition, it lights the red or yellow alarm LED on the management panel as appropriate. In addition, you can use component LEDs and network port LEDs to troubleshoot the PTX10004. For more information, see the following topics:
  - "PTX10004 Status Panel" on page 23
  - "PTX10004 Routing and Control Board LEDs" on page 53
  - PTX10K-LC1201-36CD Line Card
  - PTX10K-LC1202-36MR Line Card
  - "PTX10004 Fan Tray LEDs and Fan Tray Controller LEDs" on page 34
  - "JNP10K-PWR-AC2 Power Supply LEDs" on page 46 and "JNP10K-PWR-DC2 Power Supply LEDs" on page 48
- CLI—The CLI is the primary tool used to flow and troubleshoot hardware, Junos OS, routing protocols, and network connectivity. CLI commands display information from routing tables,

information specific to routing protocols, and information about network connectivity derived from the ping and traceroute utilities. For information about using the CLI to troubleshoot Junos OS, see the appropriate Junos OS configuration guide.

- JTAC—If you need assistance during troubleshooting, you can contact the Juniper Networks Technical Assistance Center (JTAC) by using the Web or by telephone. If you encounter software problems, or problems with hardware components not discussed here, contact JTAC.
- Knowledge Base articles—Knowledge Base.

PTX10004 Alarm Messages Overview

When a PTX10004 Routing Engine detects an alarm condition, it lights the red or yellow alarm LED on the RCB management panel as appropriate. To view a more detailed description of the alarm cause, issue the `show system alarms` CLI command, which indicates major and minor alarms on the system.

In this example, a fan tray error occurred in slot **4**.

```
user@host> show system alarms
6 alarms currently active
Alarm time               Class  Description
2020-07-21 09:33:09 PDT  Minor  PSM 0 PSM MCU AC minimum supported firmware version mismatch
2020-07-21 09:33:09 PDT  Minor  PSM 1 PSM MCU AC minimum supported firmware version mismatch
2020-07-21 09:33:09 PDT  Minor  PSM 2 PSM MCU AC minimum supported firmware version mismatch
2020-07-21 09:33:08 PDT  Major  PSM 0 Input2 Failed
2020-07-21 09:33:09 PDT  Major  PSM 1 Input2 Failed
2020-07-21 09:33:09 PDT  Major  PSM 2 Input2 Failed
```

You can also use the variations of the `show system errors` command to find key information about the error.

- `show system errors active`—Displays current active errors in the system
- `show system errors active fpc`—Displays active errors for line cards
- `show system errors count`—Displays system-wide errors and current count
- `show system errors fru detail`—Displays detailed FRU-specific error
- `show system errors fru detail fpc`—Displays information about detected errors based on the FRU

This example shows not only the current errors but also those that are cleared.

```
user@host> show system errors count
Level   Occurred   Cleared     Action-Taken
-----------------------------------------
Minor         35        32               39
Major          3         0                6
Fatal          0         0                0
```

PTX10004 Chassis Alarm Messages

Chassis alarms indicate a failure of the device or one of its components. Chassis alarms are preset and cannot be modified.

Chassis alarms on PTX1004 modular chassis have two severity levels:

- Major (red)—Indicates a critical situation on the device that has resulted from one of the conditions described in Table 64 on page 235. A red alarm condition requires immediate action.
- Minor (yellow or amber)—Indicates a noncritical condition on the device that, if left unchecked, might cause an interruption in service or degradation in performance. A yellow alarm condition requires monitoring or maintenance.

Table 64 on page 235 describes the chassis alarm messages on a PTX10004 router.

Table 64: Chassis Component Alarm Conditions on the PTX10004

Chassis Component	Alarm Condition	Alarm Severity	Remedy
Routing Control Board	An RCB has failed.	Major (red)	Replace the failed RCB.
	An RCB has been removed.	Minor (yellow)	Install an RCB in the empty slot.
Line cards	A line card is offline.	Minor (yellow)	Check the line card. Remove and reinstall the line card. If this fails, replace the failed card.

Table 64: Chassis Component Alarm Conditions on the PTX10004 *(Continued)*

Chassis Component	Alarm Condition	Alarm Severity	Remedy
	A line card has failed.	Major (red)	Replace the failed line card.
	A line card has been removed.	Major (red)	Install a line card in the empty slot.
Fan trays	A fan tray has been removed from the chassis.	Major (red)	Install the missing fan tray.
	One fan in the chassis is not spinning or is spinning below required speed.	Major (red)	Replace the fan tray.
	A fan is not receiving power from the fan tray controller.	Major (red)	Check and replace the failed fan tray controller if required.
Fan Tray Controller	A fan tray controller has failed.	Minor (yellow)	Check and replace the failed fan tray controller if required.
	One of the fan tray controllers in the chassis is not receiving enough power.	Major (red)	Check the power supply.
Switch Interface Boards (SIBs)	One of the SIBs has failed.	Minor (yellow)	Check the below: • The SIB is not receiving power. • The fan tray controller is having a power problem.

Table 64: Chassis Component Alarm Conditions on the PTX10004 *(Continued)*

Chassis Component	Alarm Condition	Alarm Severity	Remedy
Ethernet	The Ethernet management interface on the RCB is down.	Minor (yellow)	• Check the interface cable connection. • Reboot the system. • If the alarm recurs, open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States).
Hot swapping	Too many hot-swap interrupts are occurring.	Major (red)	Replace the failed components.
Power supplies	A power supply has been removed from the chassis.	Minor (yellow)	Install a power supply in the empty slot.
	A power supply has a high temperature.	Major (red)	Replace the failed power supply.
	A power supply input has failed.	Major (red)	Check power supply input connection and the power cord.
	A power supply output has failed.	Major (red)	Check power supply output connection.
	A power supply has failed.	Major (red)	Replace the failed power supply.
	AC and DC power supplies are installed.	Major (red)	Do not mix AC and DC power supplies.
	Inadequate number of power supplies.	Major (red)	Install an additional power supply.

Table 64: Chassis Component Alarm Conditions on the PTX10004 *(Continued)*

Chassis Component	Alarm Condition	Alarm Severity	Remedy
Temperature	The chassis temperature has exceeded 104° F (40° C), the fans have been turned on to full speed, and one or more fans have failed.	Minor (yellow)	• Check room temperature. • Check airflow. • Replace the fan tray.
	The chassis temperature has exceeded 149° F (65° C), and the fans have been turned on to full speed.	Minor (yellow)	• Check room temperature. • Check airflow. • Check the fans.
	The chassis temperature has exceeded 149° F (65° C), and a fan has failed. If this condition persists for more than 90 seconds, the router will shut down.	Major (red)	• Check room temperature. • Check airflow. • Check the fan.
	Chassis temperature has exceeded 167° F (75° C). If this condition persists for more than 90 seconds, the router will shut down.	Major (red)	• Check room temperature. • Check airflow. • Check fan.
	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, US & Canada) or 1-408-745-9500 (from outside the United States).

RELATED DOCUMENTATION

Contact Customer Support to Obtain a Return Materials Authorization for a PTX10004 Router or Component | **250**

CHAPTER 6

Contacting Customer Support and Returning the Chassis or Components

Contact Customer Support | 240

Return Procedures for the PTX10004 Chassis or Components | 241

Contact Customer Support

You can contact Juniper Networks Technical Assistance Center (JTAC) 24 hours a day, 7 days a week in one of the following ways:

- On the Web, using the Service Request Manager link at:

  https://support.juniper.net/support/

- By telephone:
  - From the US and Canada: 1-888-314-JTAC
  - From all other locations: 1-408-745-9500

> **NOTE**: If contacting JTAC by telephone, enter your 12-digit service request number followed by the pound (#) key if this is an existing case, or press the star (*) key to be routed to the next available support engineer.

When requesting support from JTAC by telephone, be prepared to provide the following information:

- Your existing service request number, if you have one
- 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
- Your name, organization name, telephone number, fax number, and shipping address

The support representative validates your request and issues an RMA number for return of the component.

Return Procedures for the PTX10004 Chassis or Components

IN THIS SECTION

- Return Procedure Overview | 241
- Locate the Serial Number on a PTX10004 Router or Component | 242
- Contact Customer Support to Obtain a Return Materials Authorization for a PTX10004 Router or Component | 250
- How to Pack a PTX10004 Router or Component for Shipping | 251

Return Procedure Overview

If you need to return a PTX10004 router or a PTX10004 component to Juniper Networks for repair or replacement, follow these steps:

1. Determine the serial number of the component. For instructions, see "Locate the Serial Number on a PTX10004 Router or Component" on page 242.
2. Obtain a Return Materials Authorization (RMA) number from the Juniper Technical Assistance Center (JTAC), as described in "Contact Customer Support to Obtain a Return Materials Authorization for a PTX10004 Router or Component" on page 250.

   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 router or component for shipping, as described in "How to Pack PTX10004 Components for Shipping" on page 255.

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 a PTX10004 Router or Component

IN THIS SECTION

- List the PTX10004 Chassis and Component Details Using the CLI | 242
- Locate the Chassis Serial Number ID Label on a PTX10004 | 244
- Locate the Serial Number ID Label on a PTX10004 Power Supply | 244
- Locate the Serial Number ID Labels on PTX10004 Fan Trays and Fan Tray Controllers | 246
- Locate the Serial Number ID Labels on PTX10004 Routing and Control Boards | 248
- Locate the Serial Number ID Labels on a PTX10004 Line Card | 249
- Locate the Serial Number ID Labels on a PTX10004 Switch Interface Board | 250

If you want to return a router or component to Juniper Networks for repair or replacement, you must locate the serial number of the router or component. You must provide the serial number to the Juniper Networks Technical Assistance Center (JTAC) when you contact them to obtain an RMA. See "Contact Customer Support to Obtain a Return Materials Authorization for a PTX10004 Router or Component" on page 250.

If the router is operational and you can access the CLI, you can list serial numbers for the router and for some components with a CLI command. If you don't have access to the CLI or if the serial number for the component doesn't appear in the command output, you can locate the serial number ID label on the router or component.

NOTE: If you want to find the serial number ID label on a component, you need to remove the component from the router chassis, for which you must have the required parts and tools available.

List the PTX10004 Chassis and Component Details Using the CLI

To list the PTX10004 chassis and the components and their serial numbers, use the `show chassis hardware` CLI operational mode command. See the following example and the related output.

```
user@device> show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                EL409             JNP10004 [PTX10004]
```

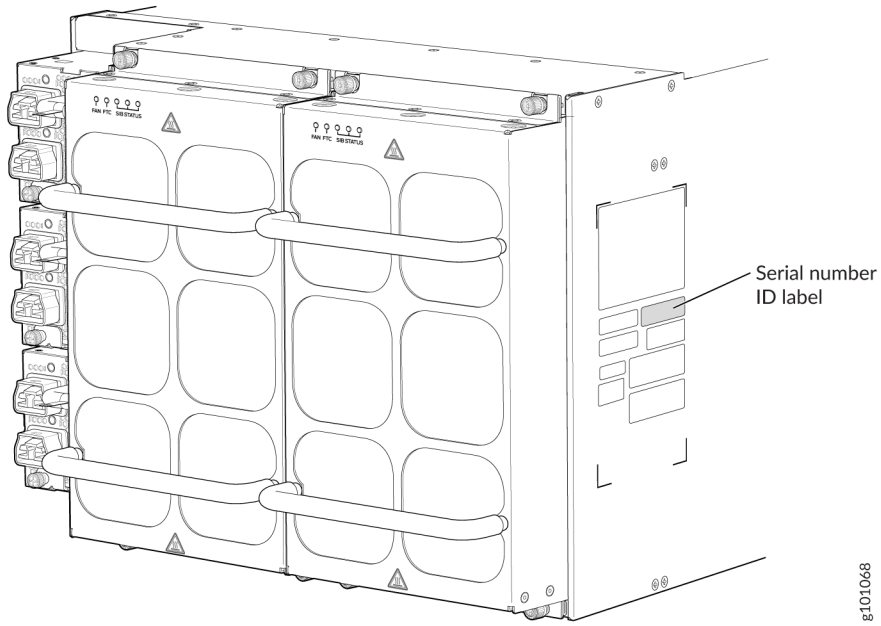
```
Midplane 0       REV 09   750-099025   BCBH2295          Midplane 4
FPM 0            REV 02   711-086964   BCBF8510          Front Panel Display
PSM 0            Rev 03   740-069994   1F219340457       JNP10K 5500W AC/HVDC
Po                                              wer Supply Unit
PSM 1            Rev 03   740-069994   1F219340458       JNP10K 5500W AC/HVDC
Po                                              wer Supply Unit
Routing Engine 0          BUILTIN      BUILTIN           JNP10K-RE1-E
CB 0             REV 19   750-079562   BCBJ6711          Control Board
CB 1             REV 19   750-079562   BCBJ6721          Control Board
FPC 3            REV 31   750-093524   BCBD9284          JNP10K-LC1201
  CPU            REV 07   711-072984   BCBD3758          JNP10K-LC1201 PMB Board
  PIC 0                   BUILTIN      BUILTIN           JNP10K-36QDD-LC-PIC
    Xcvr 0       REV 01   740-061405   1ECQ1445065       QSFP-100GBASE-SR4-T2
    Xcvr 1       REV 01   740-067443   QI2902BC          QSFP+-40G-SR4
    Xcvr 2       REV 01   720-087757   1J1C46A438069     QSFP56-DD-400G-CR8-
CU-2                                                        1M
    Xcvr 3       REV 01   720-088939   1P1C48A45118R     QSFP56-DD-400G-CR8-
CU-2                                                       .5M
    Xcvr 4       REV 01   740-058734   1ECQ144608L       QSFP-100GBASE-SR4
    Xcvr 5       REV 01   740-061405   1ECQ15140J6       QSFP-100GBASE-SR4-T2
    Xcvr 6       REV 01   740-061408   1F2CQ5A4440KC     QSFP-100G-CWDM4
    Xcvr 7       REV 01   740-061408   1F2CQ5A4440WZ     QSFP-100G-CWDM4
    Xcvr 8       REV 01   720-087757   1J1C46A438066     QSFP56-DD-400G-CR8-CU-2M
    Xcvr 9       REV 01   720-087757   1J1C46A438092     QSFP56-DD-400G-CR8-CU-2M
    Xcvr 10      REV 01   740-067442   1ACP133009J       QSFP+-40G-SR4
    Xcvr 11      REV 01   740-061001   1RC4251600U       QSFP28-100G-CU3M
    Xcvr 12      REV 01   720-087757   1J1C46A438062     QSFP56-DD-400G-CR8-CU-2M
    Xcvr 13      REV 01   720-087757   1J1C46A438076     QSFP56-DD-400G-CR8-CU-2M
    Xcvr 14      REV 01   720-087757   1J1C46A438098     QSFP56-DD-400G-CR8-CU-2M
    Xcvr 15      REV 01   720-087757   1J1C46A438086     QSFP56-DD-400G-CR8-CU-2M
    Xcvr 16      REV 01   740-067443   QJ510316          QSFP+-40G-SR4
    Xcvr 17      REV 01   740-085354   1W1CZDA443003     QSFP56-DD-4X100G-FR
    Xcvr 18      REV 01   720-087757   1J1C46A438047     QSFP56-DD-400G-CR8-CU-2M
    Xcvr 19      REV 01   740-032986   QD371878          QSFP+-40G-SR4
    Xcvr 20      REV 01   720-087757   1J1C46A438084     QSFP56-DD-400G-CR8-CU-2M
    Xcvr 21      REV 01   720-087757   1J1C46A438091     QSFP56-DD-400G-CR8-CU-2M
    Xcvr 22      REV 01   740-058734   1ECQ144608J       QSFP-100GBASE-SR4
    Xcvr 24      REV 01   740-061001   1RC42516034       QSFP28-100G-CU3M
    Xcvr 26      REV 01   720-087757   1J1C46A438097     QSFP56-DD-400G-CR8-CU-2M
    Xcvr 27      REV 01   720-087757   1J1C46A438080     QSFP56-DD-400G-CR8-CU-2M
    Xcvr 28      REV 01   740-067442   1ACP135301R       QSFP+-40G-SR4
    Xcvr 29      REV 01   740-067443   QJ1400W2          QSFP+-40G-SR4
    Xcvr 30      REV 01   720-087757   1J1C46A438083     QSFP56-DD-400G-CR8-CU-2M
```

```
    Xcvr 31      REV 01   740-061001   1RC4251602J       QSFP28-100G-CU3M
    Xcvr 34      REV 01   720-088939   1J1C48A450057     QSFP56-DD-400G-CR8-CU-2.5M
    Xcvr 35      REV 01   720-088939   1J1C48A450004     QSFP56-DD-400G-CR8-CU-2.5M
  MEZZ 0         REV 09   711-084968   BCBD9368          JNP10K-LC1201 MEZZ Board
SIB 0            REV 06   750-094060   BCBH4883          SIB-JNP10004
FTC 0            REV 16   750-086270   BCBD9805          Fan Controller 4
FTC 1            REV 16   750-086270   BCBD9770          Fan Controller 4
Fan Tray 0       REV 04   760-099039   BCBH2782          Fan tray 4
Fan Tray 1       REV 04   760-099039   BCBJ3212          Fan tray 4
```

Locate the Chassis Serial Number ID Label on a PTX10004

The serial number ID label is located on a label on the left side as you face the front of the chassis. See Figure 112 on page 244 for the location on a PTX10004.

Figure 112: PTX10004 Serial Number Label

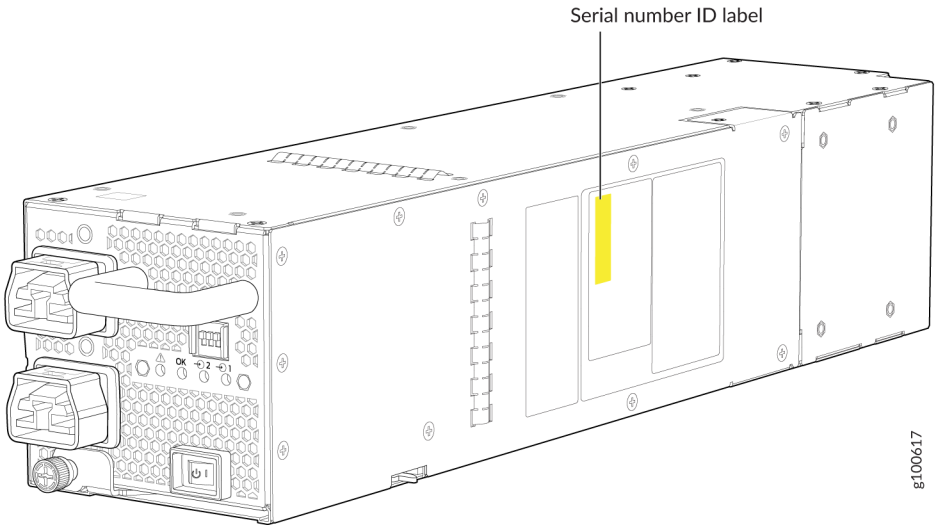


Locate the Serial Number ID Label on a PTX10004 Power Supply

The power supplies installed in a PTX10004 are field-replaceable units (FRUs). For each FRU, you must remove the FRU from the router chassis to see the FRU serial number ID label.

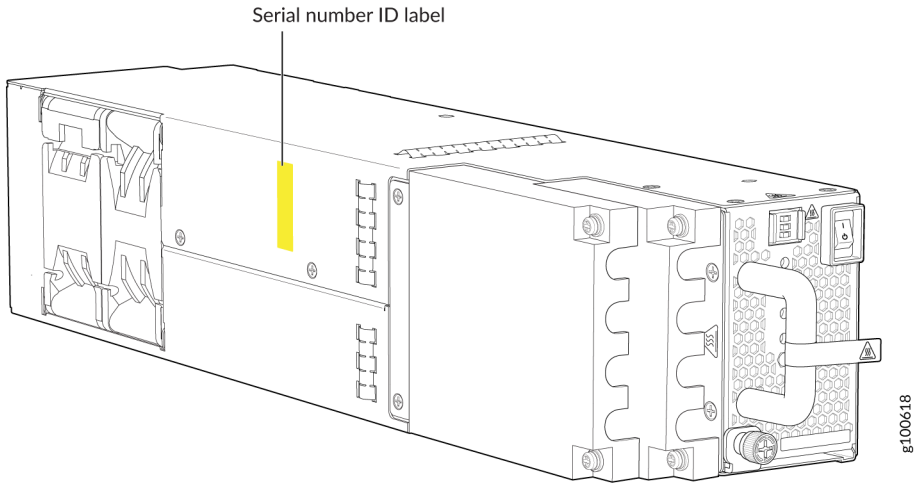
- JNP10K-PWR-AC2 power supply—The serial ID label is on the right side of the power supply. See Figure 113 on page 245.

Figure 113: JNP10K-PWR-AC2 Power Supply Serial Number Location



- JNP10K-PWR-DC2 power supply—The serial number ID label is on the left side of the power supply. See Figure 114 on page 245.

Figure 114: JNP10K-PWR-DC2 Power Supply Serial Number Location

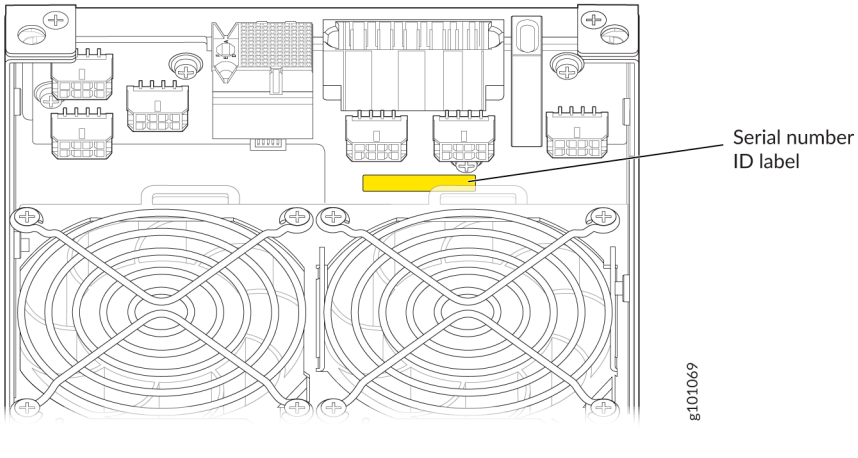


Locate the Serial Number ID Labels on PTX10004 Fan Trays and Fan Tray Controllers

The two fan trays and their associated fan tray controllers installed in a PTX10004 are field-replaceable units (FRUs). For each FRU, you must remove the FRU from the router chassis to see the FRU serial number ID label.

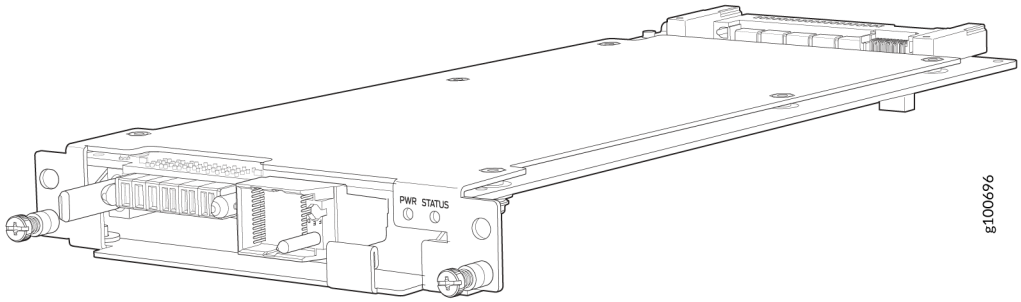
- Fan tray–The serial number ID label for the fan tray (JNP10004-FAN2) is located on the inside of the fan tray at the base of the fan tray Control Board. See Figure 115 on page 246.

Figure 115: PTX10004 Fan Tray Serial Number Location



- Fan tray controller–The serial number ID label for the fan tray controller (JNP10004-FTC2) is located on the top of the fan tray controller. See Figure 116 on page 247.

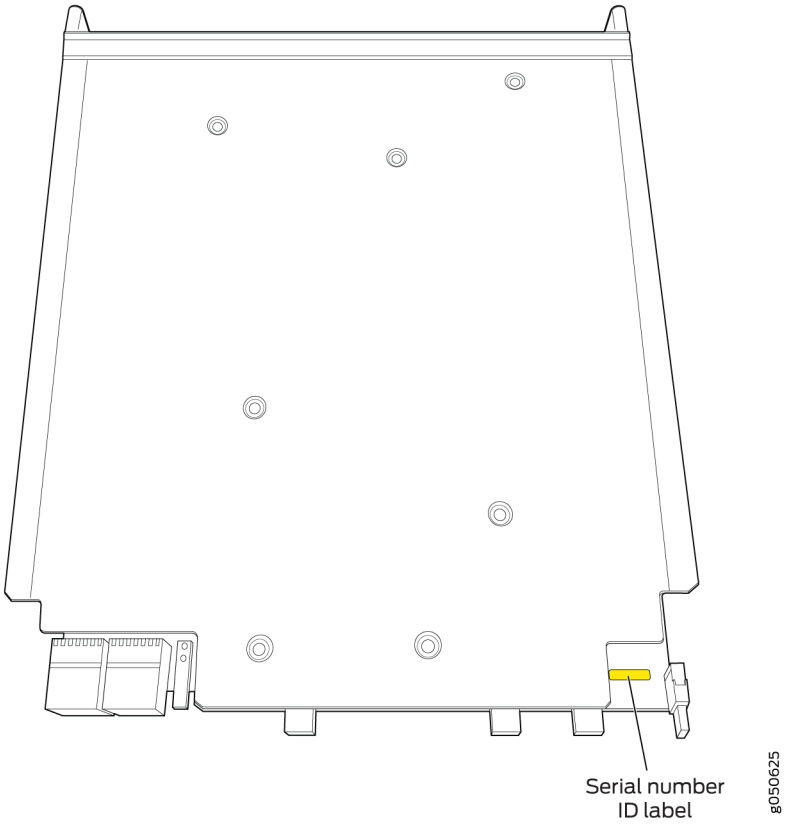
Figure 116: PTX10004 Fan Tray Controller Serial Number Location



Locate the Serial Number ID Labels on PTX10004 Routing and Control Boards

The serial number ID label for a Routing and Control Board (RCB) is located on the connector end of the unit. See Figure 117 on page 248.

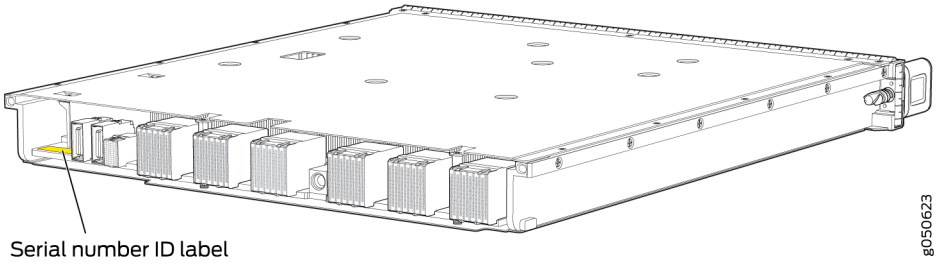
Figure 117: PTX10004 Routing and Control Board Serial Number Location



Locate the Serial Number ID Labels on a PTX10004 Line Card

The serial number ID label for a line card is located on the connector end of the card (see Figure 118 on page 249).

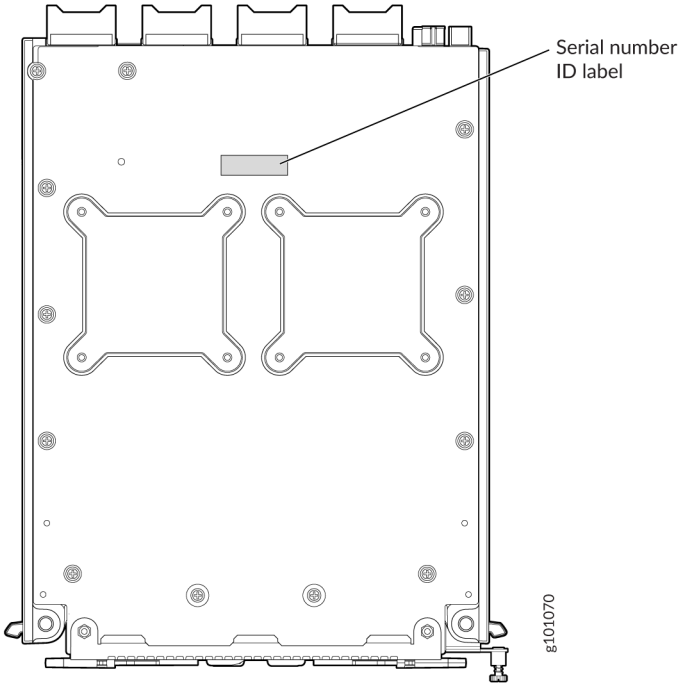
Figure 118: 4 Line Card Serial Number Location



Locate the Serial Number ID Labels on a PTX10004 Switch Interface Board

The serial number ID label for a Switch Interface Board (SIB) is located on the side of the board. See Figure 119 on page 250.

Figure 119: PTX10004 SIB Serial Number Location



Contact Customer Support to Obtain a Return Materials Authorization for a PTX10004 Router or Component

If you want to return a PTX10004 router or component to Juniper Networks for repair or replacement, you must first obtain a Return Materials Authorization (RMA) from the Juniper Networks Technical Assistance Center (JTAC).

After locating the serial number of the device or component you want to return, open a service request with Juniper Networks Technical Assistance Center (JTAC) on the Web or by telephone.

For instructions on locating the serial number of the device or component you want to return, see the following device instructions:

- "Locate the Serial Number on a PTX10004 Router or Component" on page 242

Before you request an RMA 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 the USA, Canada, and Mexico

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

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.

SEE ALSO

PTX10004 System Overview | 2

How to Pack a PTX10004 Router or Component for Shipping

IN THIS SECTION

How to Pack a PTX10004 Chassis for Shipping | 252

- How to Pack PTX10004 Components for Shipping | 255

Follow this procedure if you want to return a PTX10004 chassis or router component to Juniper Networks for repair or replacement.

Before you pack a PTX10004 router or router component:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 283.
- Pack your chassis or component using one of these materials:
  - Use the packing material from the replacement chassis or component
  - Retrieve the original shipping carton and packing materials

Contact your JTAC representative if you do not have these materials, to learn about approved packing materials. See "Contact Customer Support to Obtain a Return Materials Authorization for a PTX10004 Router or Component" on page 250.

Ensure that you have the following parts and tools available:

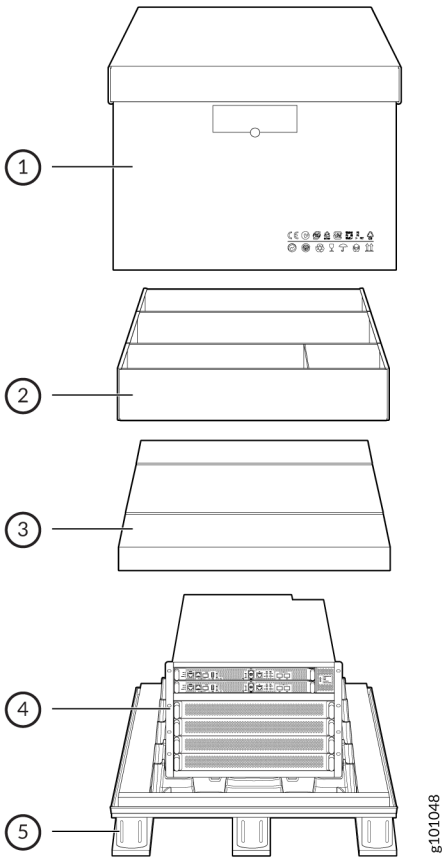
- ESD grounding strap.
- Electrostatic bag, one for each component.
- If you want to returnthe chassis:
  - A 13/32-in. or 10-mm open-end or socket wrench to install the bracket bolts on the chassis and shipping pallet
  - An appropriate screwdriver for the mounting screws used on your rack

How to Pack a PTX10004 Chassis for Shipping

The PTX10004 is shipped in a cardboard box that has a two-layer wooden pallet base with foam cushioning between the layers. The router chassis is bolted to the pallet base with four pallet fasteners,

two on each side of the chassis. See Figure 120 on page 253 for the stacking configuration of the PTX10004.

Figure 120: Stacking Configuration for Packing the PTX10004 Chassis



To pack a PTX10004 for shipping:

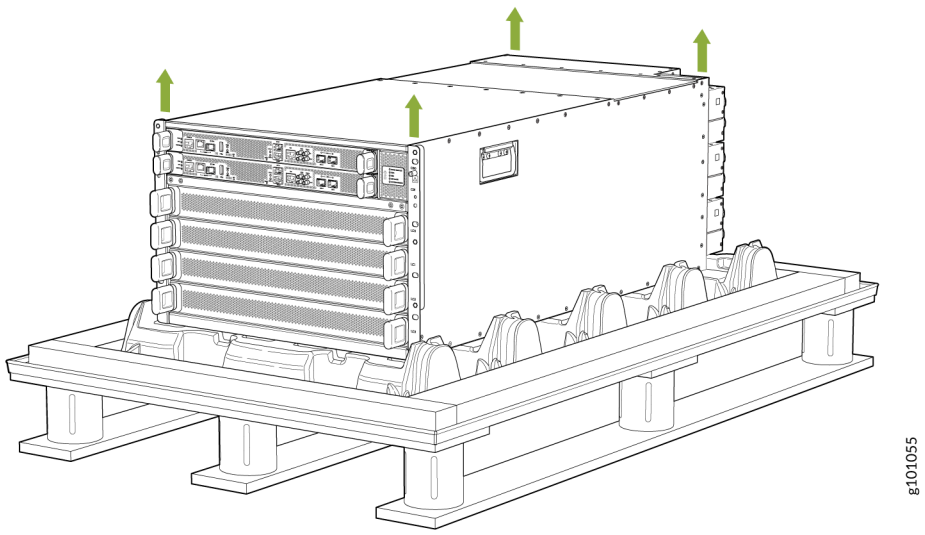
1. Power down the chassis and remove the power cables. See "Power Off a PTX10004" on page 219.
2. Remove the cables that connect the PTX10004 to all external devices.
3. Remove all line cards and pack them in their original shipping containers. See "Remove a PTX10004 Line Card" on page 205 and "How to Store a Line Card" on page 201.
4. Install covers over blank slots.

   Leave components that came installed in the chassis, such as the RCBs or power supplies.
5. Move the wooden pallet and packing material to a staging area as close to the router as possible. Make sure that there is enough space to move the chassis from the rack to the wooden pallet.
6. Position a mechanical lift under the device. If a mechanical lift is not available, have three people support the weight of the router while another person uses the screwdriver to remove the front

mounting screws that attach the chassis mounting brackets to the rack. For PTX10004 removal, see "Remove a PTX10004 from a Four-Post Rack Using a Mechanical Lift" on page 226 or "Manually Remove a PTX10004 from a Four-Post Rack" on page 228.

7. Remove the router from the rack (see "Chassis and Component Lifting Guidelines" on page 264) and place the router on the shipping pallet. Position the router on the pallet so that the front of the router is facing the silkscreened “front” mark on the pallet. The pallet also has crop marks to guide you in positioning the chassis.
8. Use the 13/32-in. or 10-mm open-end or socket wrench to install the four sets of brackets and bolts that secure the chassis to the wooden pallet.
9. Slide the plastic cover over the router chassis. The plastic cover is part of the router’s original packing materials.
10. Place the packing foam on top of and around the router.
11. Place the power cords in the box.
12. Remove the rack mount kit from the rack and place the kit and the connecting screws in the accessory box.
13. If you want to return accessories or FRUs with the router, pack them as instructed in "How to Pack PTX10004 Components for Shipping" on page 255.
14. Verify that all accessories are present. See "Compare the PTX10004 Order to the Packing List" on page 118.
15. Slide the cardboard box over the chassis, making sure that the arrows on the box point up and the pallet fasteners to secure the cardboard box to the wooden pallet are near the bottom.
16. Attach the cardboard box to the wooden pallet by screwing two screws into each of the four pallet fasteners. See Figure 121 on page 254.

Figure 121: Attach the PTX10004 to the Pallet



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

How to Pack PTX10004 Components for Shipping

Before you begin to pack a router component, ensure that you have the following parts and tools available:

- Antistatic bag, one for each component
- Electrostatic discharge (ESD) grounding strap

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

To pack and ship PTX10004 components:

1. Place individual FRUs in antistatic bags.
2. Use the original packing materials if they are available. If the original packing materials are not available, ensure that 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.
3. Ensure that the components are adequately protected with packing materials and packed so that the pieces are prevented from moving around inside the carton.
4. Close the top of the cardboard shipping box and seal it with packing tape.
5. Write the RMA number on the exterior of the box to ensure proper tracking.

RELATED DOCUMENTATION

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CHAPTER 7

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General Safety Guidelines and Warnings

The following guidelines help ensure your safety and protect the device from damage. The list of guidelines might not address all potentially hazardous situations in your working environment, so be alert and exercise good judgment at all times.

- Perform only the procedures explicitly described in the hardware documentation for this device. Make sure that only authorized service personnel perform other system services.
- Keep the area around the device clear and free from dust before, during, and after installation.
- Keep tools away from areas where people could trip over them while walking.
- Do not wear loose clothing or jewelry, such as rings, bracelets, or chains, which could become caught in the device.
- Wear safety glasses if you are working under any conditions that could be hazardous to your eyes.
- Do not perform any actions that create a potential hazard to people or make the equipment unsafe.
- Never attempt to lift an object that is too heavy for one person to handle.
- Never install or manipulate wiring during electrical storms.
- Never install electrical jacks in wet locations unless the jacks are specifically designed for wet environments.
- Operate the device only when it is properly grounded.
- Follow the instructions in this guide to properly ground the device to earth.
- Replace fuses only with fuses of the same type and rating.
- Do not open or remove chassis covers or sheet-metal parts unless instructions are provided in the hardware documentation for this device. Such an action could cause severe electrical shock.
- Do not push or force any objects through any opening in the chassis frame. Such an action could result in electrical shock or fire.
- Avoid spilling liquid onto the chassis or onto any device component. Such an action could cause electrical shock or damage the device.
- Avoid touching uninsulated electrical wires or terminals that have not been disconnected from their power source. Such an action could cause electrical shock.

- Some parts of the chassis, including AC and DC power supply surfaces, power supply unit handles, SFB card handles, and fan tray handles might become hot. The following label provides the warning for 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.

LASER 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 familiarize yourself 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 THIS SECTION

- Fire Suppression | 262
- Fire Suppression Equipment | 262

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 your legs bear most of the weight 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.
  - From 39.7 lb (18 kg) to 70.5 lb (32 kg): Two or more people.
  - From 70.5 lb (32 kg) to 121.2 lb (55 kg): Three or more people.
  - Above 121.2 lb (55 kg): Use material handling systems (such as levers, slings, lifts, and so on). When this is not practical, engage specially trained persons or systems (such as 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:

- Install the device in a rack that is secured to the building structure.
- Mount the device 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.

Laser and LED Safety Guidelines and Warnings

IN THIS SECTION

- General Laser Safety Guidelines | **272**
- Class 1 Laser Product Warning | **272**
- Class 1 LED Product Warning | **273**
- Laser Beam Warning | **273**

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 IEC/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.



LASER 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



LASER 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



LASER 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



LASER WARNING: Do not stare into the laser beam or view it directly with optical instruments.
Waarschuwing Niet in de straal staren of hem rechtstreeks bekijken met optische instrumenten.

Varoitus Älä katso säteeseen äläkä tarkastele sitä suoraan optisen laitteen avulla.

Avertissement Ne pas fixer le faisceau des yeux, ni l'observer directement à l'aide d'instruments optiques.

Warnung Nicht direkt in den Strahl blicken und ihn nicht direkt mit optischen Geräten prüfen.

Avvertenza Non fissare il raggio con gli occhi né usare strumenti ottici per osservarlo direttamente.

Advarsel Stirr eller se ikke direkte p strlen med optiske instrumenter.

Aviso Não olhe fixamente para o raio, nem olhe para ele directamente com instrumentos ópticos.

¡Atención! No mirar fijamente el haz ni observarlo directamente con instrumentos ópticos.

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

Radiation from Open Port Apertures Warning



LASER WARNING: Because invisible radiation might be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures.

Waarschuwing Aangezien onzichtbare straling vanuit de opening van de poort kan komen als er geen fiberkabel aangesloten is, dient blootstelling aan straling en het kijken in open openingen vermeden te worden.

Varoitus Koska portin aukosta voi emittoitua näkymätöntä säteilyä, kun kuitukaapelia ei ole kytkettynä, vältä säteilylle altistumista äläkä katso avoimiin aukkoihin.

Avertissement Des radiations invisibles à l'il nu pouvant traverser l'ouverture du port lorsqu'aucun câble en fibre optique n'y est connecté, il est recommandé de ne pas regarder fixement l'intérieur de ces ouvertures.

Warnung Aus der Port-Öffnung können unsichtbare Strahlen emittieren, wenn kein Glasfaserkabel angeschlossen ist. Vermeiden Sie es, sich den Strahlungen auszusetzen, und starren Sie nicht in die Öffnungen!

Avvertenza Quando i cavi in fibra non sono inseriti, radiazioni invisibili possono essere emesse attraverso l'apertura della porta. Evitate di esporvi alle radiazioni e non guardate direttamente nelle aperture.

Advarsel Unngå utsettelse for stråling, og stirr ikke inn i åpninger som er åpne, fordi usynlig stråling kan emiteres fra portens åpning når det ikke er tilkoblet en fiberkabel.

Aviso Dada a possibilidade de emissão de radiação invisível através do orifício da via de acesso, quando esta não tiver nenhum cabo de fibra conectado, deverá evitar an

EXposição à radiação e não deverá olhar fixamente para orifícios que se encontrarem a descoberto.

¡Atención! Debido a que la apertura del puerto puede emitir radiación invisible cuando no existe un cable de fibra conectado, evite mirar directamente a las aperturas para no exponerse a la radiación.

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

Maintenance and Operational Safety Guidelines and Warnings

IN THIS SECTION

- Battery Handling Warning | **275**
- Jewelry Removal Warning | **277**
- Lightning Activity Warning | **278**
- Operating Temperature Warning | **279**
- Product Disposal Warning | **280**

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 (Network Equipment-Building System) 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 you clean grounding surface and give them a bright finish before making grounding connections.
- 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, and 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 122 on page 284) 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).

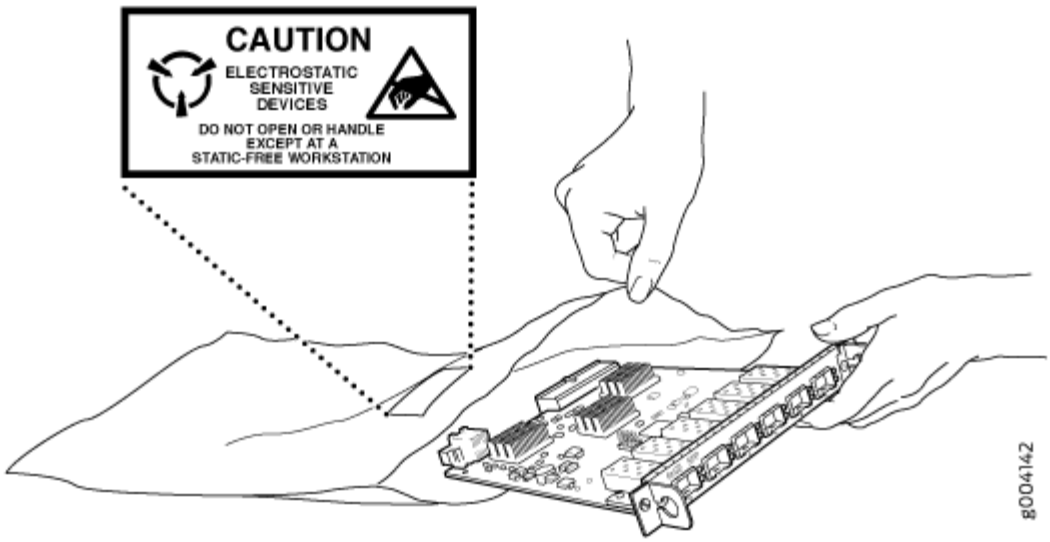
- When handling any component that is subject to ESD damage and that is removed from the device, make sure the equipment end of your ESD wrist strap is attached to the ESD point on the chassis.

  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 122 on page 284). If you are returning a component, place it in an antistatic bag before packing it.

Figure 122: Placing a Component into an Antistatic Bag



CAUTION: ANSI/TIA/EIA-568 cables such as Category 5e and Category 6 can get electrostatically charged. To dissipate this charge, always ground the cables to a suitable and safe earth ground before connecting them to the system.

Attention Les câbles ANSI/TIA/EIA-568, par exemple Cat 5e et Cat 6, peuvent emmagasiner des charges électrostatiques. Pour évacuer ces charges, reliez toujours les câbles à une prise de terre adaptée avant de les raccorder au système.

AC Power Electrical Safety Guidelines

The following electrical safety guidelines apply to AC-powered devices:

- Note the following warnings printed on the device:

  "**CAUTION:** THIS UNIT HAS MORE THAN ONE POWER SUPPLY CORD. DISCONNECT ALL POWER SUPPLY CORDS BEFORE SERVICING TO AVOID ELECTRIC SHOCK."

"**ATTENTION:** CET APPAREIL COMPORTE PLUS D'UN CORDON D'ALIMENTATION. AFIN DE PRÉVENIR LES CHOCS ÉLECTRIQUES, DÉBRANCHER TOUT CORDON D'ALIMENTATION AVANT DE FAIRE LE DÉPANNAGE."

- AC-powered devices are shipped with a three-wire electrical cord with a grounding-type plug that fits only a grounding-type power outlet. Do not circumvent this safety feature. Equipment grounding must comply with local and national electrical codes.
- You must provide an external certified circuit breaker (2-pole circuit breaker or 4-pole circuit breaker based on your device) rated minimum 20 A in the building installation.
- The power cord serves as the main disconnecting device for the AC-powered device. The socket outlet must be near the AC-powered device and be easily accessible.
- For devices that have more than one power supply connection, you must ensure that all power connections are fully disconnected so that power to the device is completely removed to prevent electric shock. To disconnect power, unplug all power cords (one for each power supply).

Power Cable Warning (Japanese)

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

注意

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

AC Power Disconnection Warning

WARNING: Before working on the device or near power supplies, unplug all the power cords from an AC-powered device.

Waarschuwing Voordat u aan een frame of in de nabijheid van voedingen werkt, dient u bij wisselstroom toestellen de stekker van het netsnoer uit het stopcontact te halen.

Varoitus Kytke irti vaihtovirtalaitteiden virtajohto, ennen kuin teet mitään asennuspohjalle tai työskentelet virtalähteiden läheisyydessä.

Avertissement Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif.

Warnung Bevor Sie an einem Chassis oder in der Nähe von Netzgeräten arbeiten, ziehen Sie bei Wechselstromeinheiten das Netzkabel ab bzw.

Avvertenza Prima di lavorare su un telaio o intorno ad alimentatori, scollegare il cavo di alimentazione sulle unità CA.

Advarsel Før det utføres arbeid på kabinettet eller det arbeides i nærheten av strømforsyningsenheter, skal strømledningen trekkes ut på vekselstrømsenheter.

Aviso Antes de trabalhar num chassis, ou antes de trabalhar perto de unidades de fornecimento de energia, desligue o cabo de alimentação nas unidades de corrente alternada.

¡Atención! Antes de manipular el chasis de un equipo o trabajar cerca de una fuente de alimentación, desenchufar el cable de alimentación en los equipos de corriente alterna (CA).

Varning! Innan du arbetar med ett chassi eller nära strömförsörjningsenheter skall du för växelströmsenheter dra ur nätsladden.

DC Power Electrical Safety Guidelines

- A DC-powered device is equipped with a DC terminal block that is rated for the power requirements of a maximally configured device.
- For permanently connected equipment, a readily accessible disconnect device shall be incorporated external to the equipment.
- For pluggable equipment, the socket-outlet shall be installed near the equipment and shall be easily accessible.
- Be sure to connect the ground wire or conduit to a solid central office earth ground.
- A closed loop ring is recommended for terminating the ground conductor at the ground stud.
- Run two wires from the circuit breaker box to a source of 48 VDC.
- A DC-powered device that is equipped with a DC terminal block is intended only for installation in a restricted-access location. In the United States, a restricted-access area is one in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code ANSI/NFPA 70.

NOTE: Primary overcurrent protection is provided by the building circuit breaker. This breaker must protect against excess currents, short circuits, and earth grounding faults in accordance with NEC ANSI/NFPA 70.

- Ensure that the polarity of the DC input wiring is correct. Under certain conditions, connections with reversed polarity might trip the primary circuit breaker or damage the equipment.
- The marked input voltage of –48 VDC for a DC-powered device is the nominal voltage associated with the battery circuit, and any higher voltages are only to be associated with float voltages for the charging function.
- Because the device is a positive ground system, you must connect the positive lead to the terminal labeled **RTN**, the negative lead to the terminal labeled –48 VDC, and the earth ground to the device grounding points.

DC Power Copper Conductors Warning



WARNING: Use copper conductors only.
Waarschuwing Gebruik alleen koperen geleiders.

Varoitus Käytä vain kuparijohtimia.

Attention Utilisez uniquement des conducteurs en cuivre.

Warnung Verwenden Sie ausschließlich Kupferleiter.

Avvertenza Usate unicamente dei conduttori di rame.

Advarsel Bruk bare kobberledninger.

Aviso Utilize apenas fios condutores de cobre.

¡Atención! Emplee sólo conductores de cobre.

Varning! Använd endast ledare av koppar.

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.

PTX10004 Agency Approvals and Compliance Statements

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Agency Approvals for the PTX10004 Router

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The PTX Series routers are tested against these standards:

- Safety
  - UL 62368-1 Standard for audio/video, information and communication technology equipment - Part 1: Safety requirements
  - CAN/CSA-C22.2 No. 60950-1 Information Technology Equipment - Safety
  - IEC 62368-1 Information Technology Equipment - Safety
  - IEC 60950-1 Information Technology Equipment - Safety CB Scheme report
  - IEC 60825-1 Laser safety
  -
- EMC
  - FCC 47 CFR, Part 15 Class A (2012) USA radiated emissions – Class A
  - IC ICES-003 Issue 6, Jan 2016 Canada radiated emissions – Class A
  - EN 300 386 V1.6.1 Telecom network equipment - EMC requirements Class A
  - EN 300 386 V2.1.1 Telecom network equipment - EMC requirements Class A
  - EN 55032:2012 + EN55032:2012/AC:2013 Electromagnetic compatibility of multimedia equipment - Emission requirements Class A
  - CISPR 32:2012 Electromagnetic compatibility of multimedia equipment - Emission Requirements Class A
  - EN 55024:2010/AC:2011 European radiated emissions Class A
  - CISPR 24 Information technology equipment - Immunity testing
  - EN 55035:2017 – Electromagnetic compatibility of multimedia equipment – Immunity requirements

  - CISPR 35:2016 – Electromagnetic compatibility of multimedia equipment – Immunity requirements
  - IEC/EN 61000 Series – Electromagnetic compatibility
  - AS/NZS CISPR 32:2015 Electromagnetic compatibility of multimedia equipment - Emission requirements Class A
  - VCCI-CISPR 32:2016 Japanese radiated and conducted emissions Class A
  - BSMI CNS 13438 – Taiwan radiated emissions Class A
  - KN32 and KN35 – Korea radiated emission (at 10 Meter) Class A
  - KN 61000 Series – Korea electromagnetic compatibility
  - TEC/SD/DD/EMC-221/05/Oct-16 – Electromagnetic compatibility
  - VCCI-V-3/2013.04 and V-4/2012.04 – Japanese radiated emissions Class A
  - TCVN 7189 – Vietnam Electromagnetic compatibility for Multimedia
  - TCVN 7317:2003 – Vietnam Electromagnetic compatibility for Multimedia
- Network Equipment Building System (NEBS)
  - EN 300 019-2-1 – Environmental engineering
  - EN 300 019-2-2 – Equipment engineering
  - EN 300 019-2-3 – Environmental engineering
  - EN 300 753 – Equipment engineering
  - GR-63-CORE – Requirements, physical protection
  - GR-1089-CORE, Issue 7 – Acoustic noise

Compliance Statement for Argentina

EQUIPO DE USO IDÓNEO.

Compliance Statements for EMC Requirements for the PTX10004 Router

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This topic describes the EMC requirements for the PTX10004 routers for:

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 may be extended by means of a certified connector assembly. The customer should be aware that compliance with the above conditions may 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, may give the telecommunications company cause to request the user to disconnect the equipment.

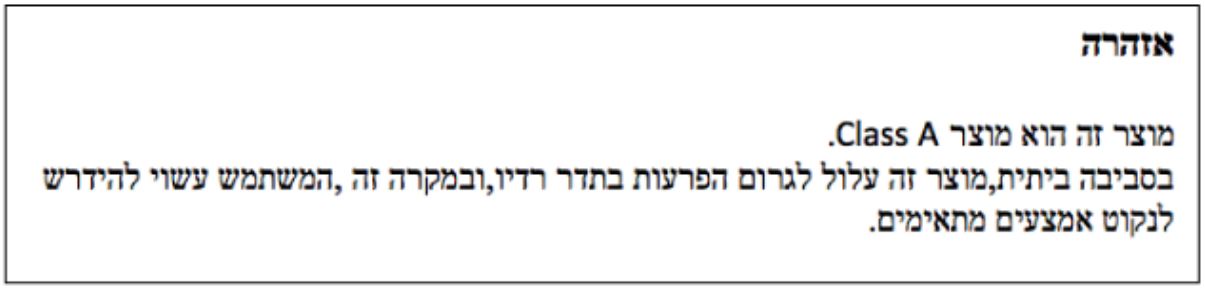
CAUTION: Users should not attempt to make electrical ground connections by themselves, but should contact the appropriate inspection authority or an electrician, as appropriate.

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 may be particularly important in rural areas.

European Community

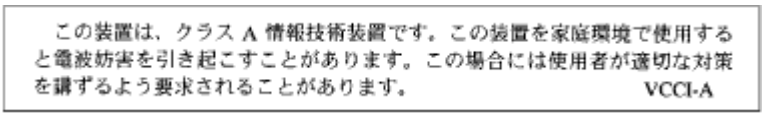
This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Israel



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

Japan



The preceding translates as follows:

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required 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 PTX10004 devices have 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, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Nonregulatory Environmental Standards

These PTX10004 is designed to be Network Equipment Building System (NEBS) compliant:

For specific line card compliance, see Table 65 on page 300.

Those device product SKUs are designed to meet the following NEBS compliance standards:

- SR-3580 NEBS Criteria Levels (Level 3 Compliance)
- GR-1089-CORE, Issue 7: EMC and Electrical Safety—Generic Criteria for Network Telecommunications Equipment
  - The equipment is suitable for installation in locations where the National Electrical Code (NEC) applies.
  - The battery return connection is to be treated as an Isolated DC return (DC-I), as defined in GR-1089-CORE.

- GR-63-CORE: NEBS, Physical Protection
  - The equipment is suitable for installation as part of the Common Bonding Network (CBN).
  - The equipment is suitable for installation in a central office (CO).

Table 65: Line Card Compliance

Line Card Model	Description	Compliance
PTX10K-LC1201-36CD	14.4 Tbps—36-port 400GbE, 200GbE, 100GbE, 50GbE, 25GbE, or 10GbE .	NEBS compliant
PTX10K-LC1202-36MR	4.8 Tbps–32 port 100GbE and 4 port 400GbE ports.	Not yet tested.