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PTX10002-36QDD Router Hardware Guide

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PTX10002-36QDD Router Hardware Guide

YEAR 2000 NOTICE

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

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About This Guide

Use this guide to install hardware and perform initial software configuration, routine maintenance, and troubleshooting for the PTX10002-36QDD Router. After you've completed the installation and basic configuration procedures documented in this guide, refer to the Junos OS Evolved documentation to further configure the PTX10002-36QDD.

CHAPTER 1

Fast Track: Initial Installation

Fast Track to Rack Installation and Power

SUMMARY

This procedure guides you through the simplest steps for the most common installation to mount your router in a rack and connect it to power.

IN THIS SECTION

Mount the PTX10002-36QDD on a Square Hole Four-Post Rack

IN THIS SECTION

You can mount the router on a four-post rack or cabinet by using the rack mount kit shipped with the router by default. We'll walk you through the steps to mount a router and connect it to power.

The router chassis weighs approximately 63.6 lb (28.85 kg) with three fan modules and two power supply units (PSUs) installed.

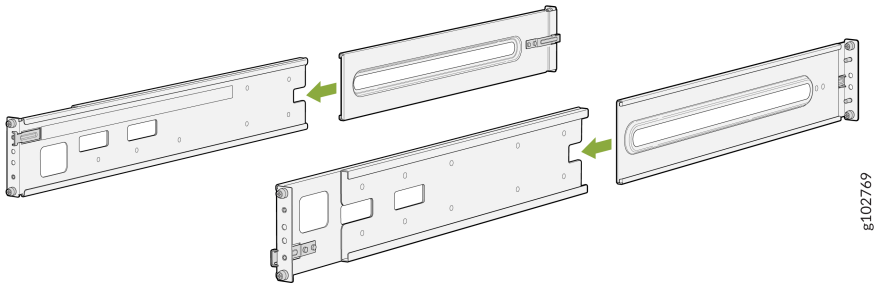
You must install the router in a restricted-access location and ensure that the chassis is always grounded properly.

Before you mount, review the following:

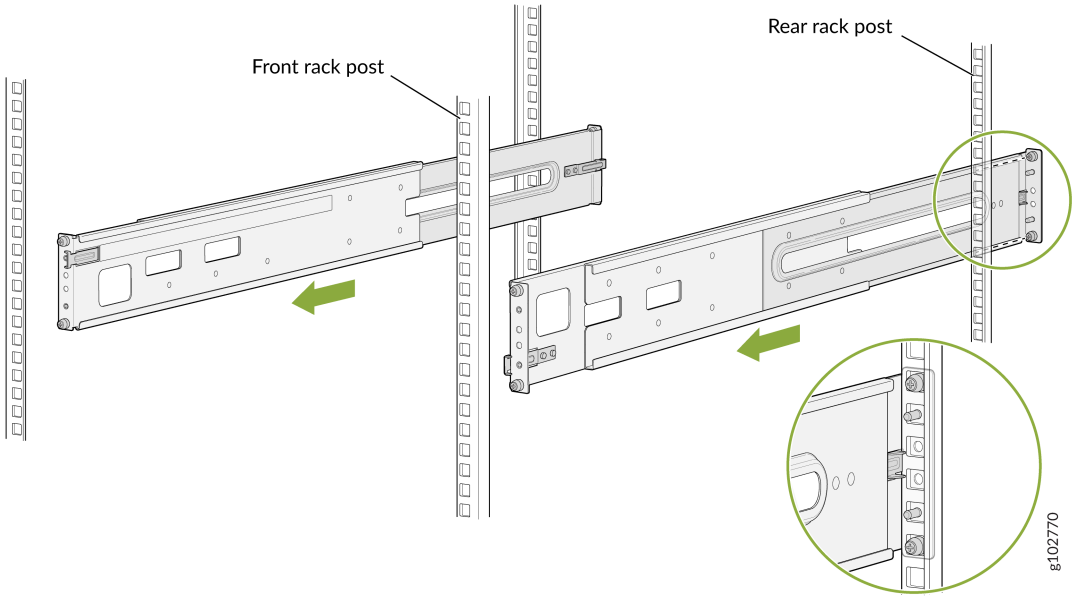
- "Site Preparation Checklist for PTX10002-36QDD Routers" on page 35
- *Safety Information* with particular attention to *Chassis and Component Lifting Guidelines*
- *Prevention of Electrostatic Discharge Damage*
- "Unpack the Router" on page 57

Mount the Router

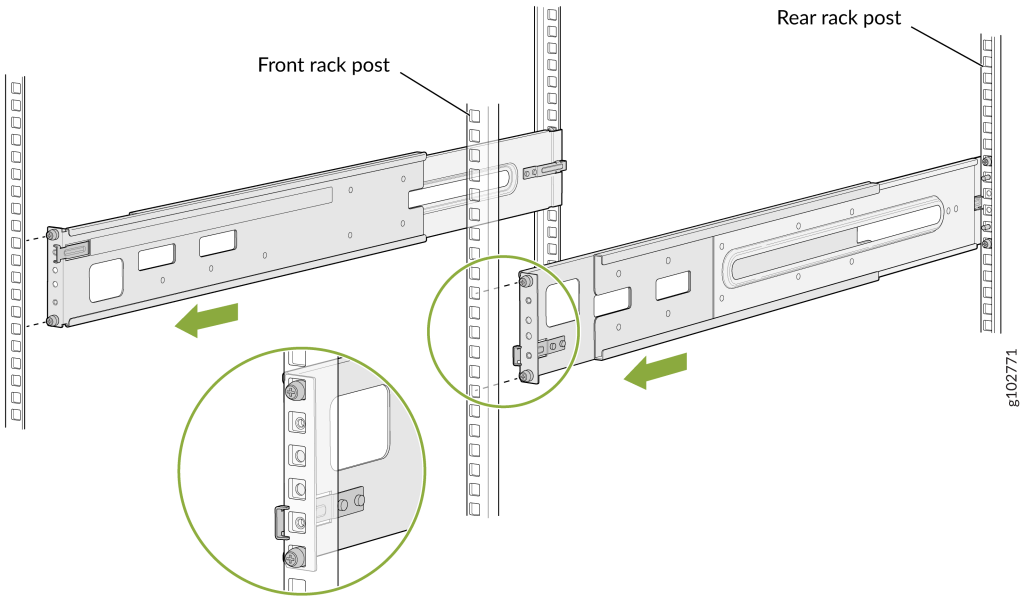
1. Place the router on a flat, stable surface.
2. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end to a site ESD point.
3. Assemble both the right and left mounting rails. Align the rear mounting rails with the guides on the front mounting rails and gently slide the rear mounting rails into the front mounting rails.



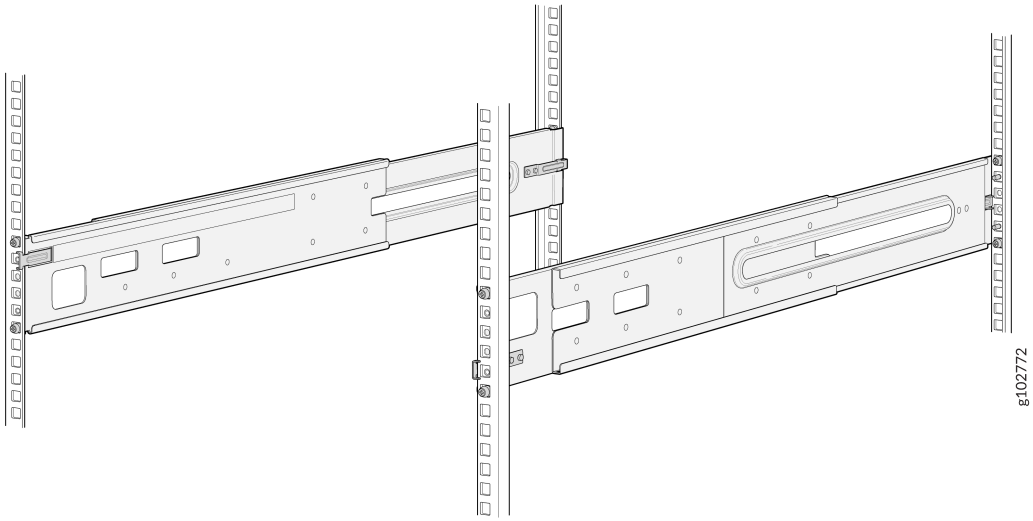
4. Attach the rear mounting rails to the rack posts—tighten the captive thumb screws by using a number 2 Phillips (+) screwdriver.



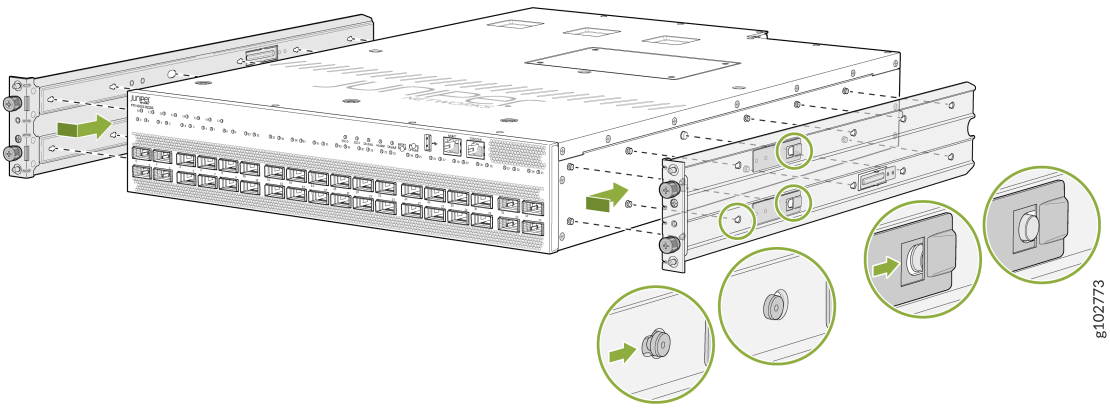
5. Attach the front mounting rails to the rack posts—tighten the captive thumb screws by using a number 2 Phillips (+) screwdriver.



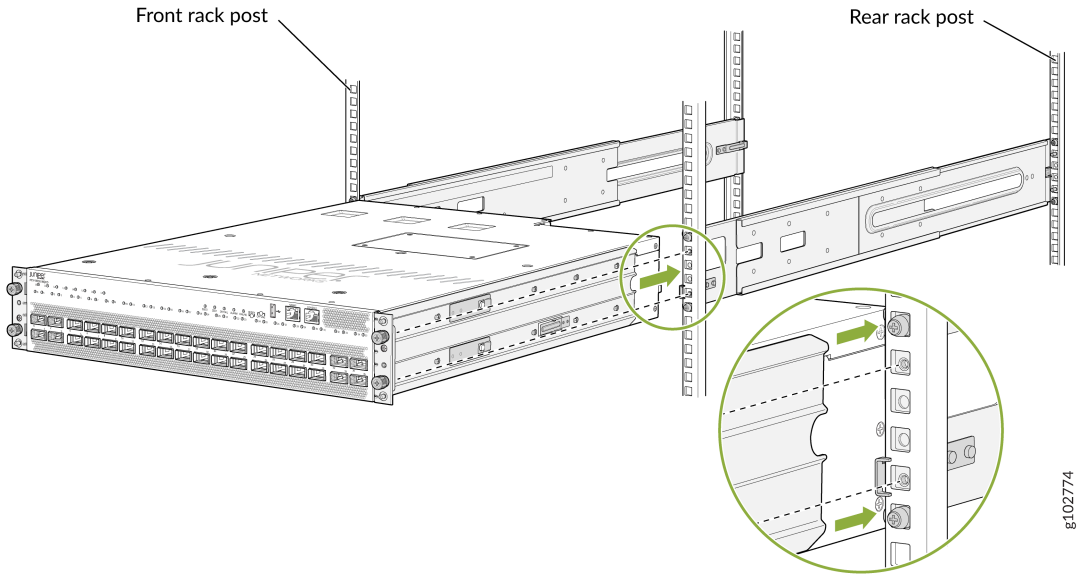
6. Ensure that the mounting rails are level by verifying that all screws on one side of the rack align with the screws on the other side.



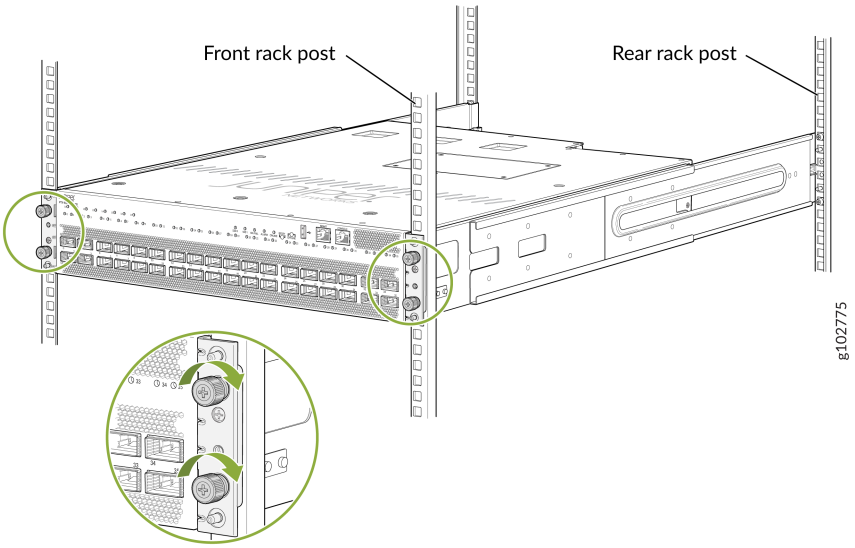
7. Attach the mounting brackets to the router chassis.



8. Align the mounting brackets with the guides on the mounting rails and gently slide the chassis on to the mounting rails until the chassis locks in place.



9. Secure the router to the rack—tighten the thumb screws by using the screwdriver.



10. Ensure that the router chassis is level by verifying that all the screws on one side of the rack align with the screws on the other side.

Connect to Power

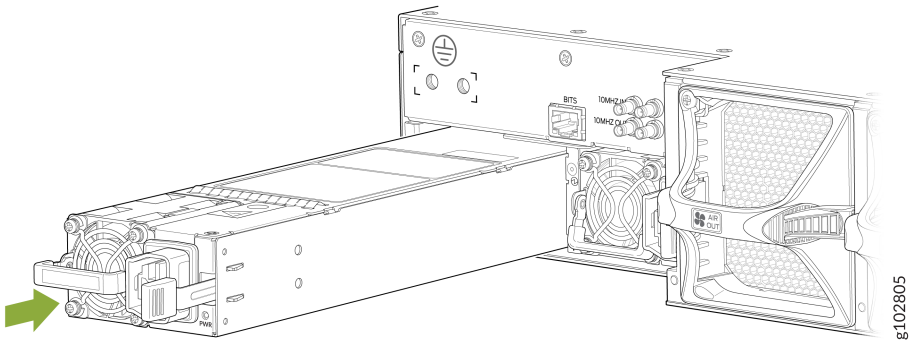
IN THIS SECTION

To connect the router to HVAC/HVDC power:

Install the Power Supply Units

We ship the router with the PSUs preinstalled in the rear panel. If the PSUs are not installed in the chassis, follow the steps in this procedure to install the PSUs. The PSUs are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the router or disrupting router functions.

1. If the PSU has protective plastic wrap, peel and remove the plastic wrap from all sides of the PSU.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
3. Taking care not to touch PSU components, pins, leads, or solder connections, remove the PSU from its bag.
4. Using both hands, place the PSU in the PSU slot on the rear panel and slide it in until it is fully seated and the locking lever slides into place.



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 existing components with the same type of component.

Ground the Router

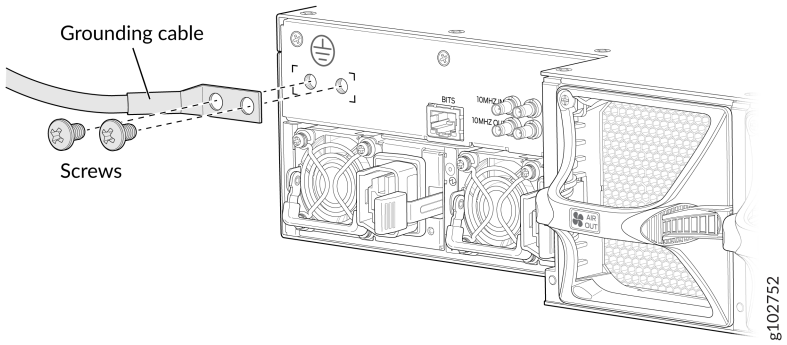
To meet safety and EMI requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power. You must use the protective earthing terminal on the router chassis to connect it to earth ground. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the router chassis to connect to the earth ground.

NOTE: An HVAC/HVDC-powered PTX10002-36QDD gains additional grounding when you plug the power supply unit (PSU) in the device into a grounded power outlet by using a power cord appropriate for your geographical location. See Table 15 on page 30.

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

To ground the router:

1. Ensure that a licensed electrician has attached the protective earthing terminal lug (provided in the accessory kit) to the grounding cable that you supply. A cable with an incorrectly attached lug can damage the router (for example, by causing a short circuit).
2. Connect the other end of the grounding cable to a proper site earth ground, such as the rack in which the router is mounted.
3. Place the grounding lug attached to the grounding cable over the protective earthing terminal on the chassis.



4. Secure the grounding lug to the protective earthing terminal by using the washers and screws.
5. Dress the grounding cable and ensure that it does not touch or block access to other device components and that it does not drape where people can trip over it.

Connect the Power Cable and Power On the Router

You must connect each PSU to a dedicated power source outlet.

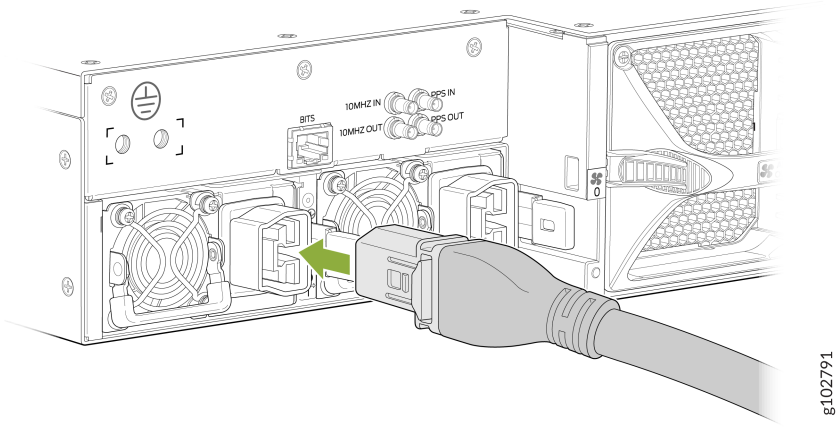
To connect the power cable and power on the router:

1. Ensure that the PSU is fully inserted in the chassis and the latches are secure.

2. Locate the power cord or cords that are appropriate for your geographical location.

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

3. Insert the coupler end of the power cord into the power cord inlet on the PSU faceplate.



4. If the power source outlet has a power switch, set it to the off (**O**) position.

   NOTE: The router powers on as soon as power is provided to the PSU. There is no power switch on the router.

5. Insert the power cord plug into a power source outlet.

6. If the power source outlet has a power switch, set it to the on (**|**) position.

7. Verify that the status LED on the PSU is lit green. If the status LED is lit amber, remove power from the PSU and replace the PSU (see "Remove a Power Supply Unit from the PTX10002-36QDD" on page 85). Do not remove the PSU until you have a replacement PSU ready.

Onboard, Configure, and Monitor the PTX10002-36QDD

After you have completed the initial steps to get your router up and running, you can configure the router by using the Junos OS Evolved CLI.

In addition to the CLI, you can use Juniper Paragon Automation to onboard, manage, and monitor your router. See the Juniper Paragon Automation Documentation page for more information.

To learn more about what you can do with the PTX10002-36QDD, see Table 1 on page 10.

Table 1: What's Next

If you want to	Then
Customize the basic configuration	See "Perform the Initial Software Configuration for the PTX10002-36QDD" on page 81
Explore the software features supported on PTX10002-36QDD	See Feature Explorer
Configure supported software features on PTX10002-36QDD	See PTX10002-36QDD Documentation

2

CHAPTER

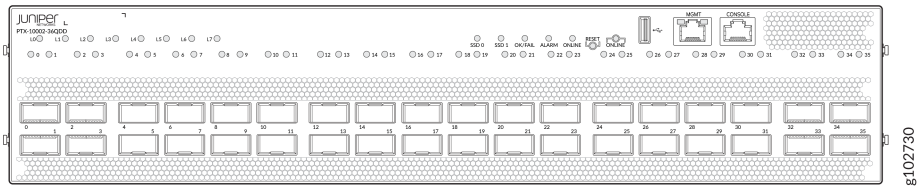
Overview

PTX10002-36QDD System Overview

IN THIS SECTION

PTX10002-36QDD Router Description

Juniper Networks® PTX10002-36QDD is a fixed-configuration router featuring 36 network ports that provide high-density and cost-efficient 800-Gigabit Ethernet (GbE) ports in a 2-U form factor. With a throughput of 28.8 Tbps, the PTX10002-36QDD is optimally designed for peering, core routing, and infrastructure edge routing roles in cloud provider, service provider, and content provider networks.



The PTX10002-36QDD port panel has 36 high-density ports and port LEDs.

The router operates in the normal power mode when 3000-W power supply units (PSUs) are installed in the router. The router operates in the power-optimized mode when 2200-W PSUs are installed in it. The ports support 800 Gbps speed in the normal power mode and provides a throughput of 28.8 Tbps. The ports support 400 Gbps speed in the power-optimized mode and provides a throughput of 14.4 Tbps.

The links on the ports come up at 400 Gbps speed by default, irrespective of the power mode. You can change the port speed to 800 Gbps by using the **set interfaces <interface-name> speed <speed>** command.

When the router is operating in the power-optimized mode, the ports support SFP+, QSFP+, QSFP28, QSFP56-DD, or high-power 400G-ZR transceivers. When the router is operating in the normal power mode, the ports support 800 Gbps transceivers additionally.

The management panel in the router is on the far right side of the front panel, above the port LEDs.

The rear panel houses the PSUs, fan modules, BITS port, the 10-MHz ports, pulse per second (PPS) ports, and a protective earthing terminal.

The router supports the following PSUs:

- 2200-W HVAC/HVDC
- 2200-W DC
- 3000-W HVAC/HVDC
- 3000-W DC

The cooling system in the router consists of three fan modules for the chassis and a single built-in fan in each PSU. The router supports front-to-back airflow.

Benefits

- **High availability hardware**—The PTX10002-36QDD is engineered with hardware redundancy for cooling and power supply. With the router's high availability, service providers can maintain an always-on infrastructure base that helps meet stringent service-level agreements (SLAs) across the core.
- **Space and power efficiency**—The router's ultra-compact 2-U form factor makes it space saving and critical in space-constrained and power-restricted internet exchange locations, remote central offices, and embedded peering points throughout the network. In 36x800 Gbps mode, with no optical transceivers installed, the router delivers a power efficiency of less than 0.055 watts/Gbps.
- **Support for QSFP-DD800 transceivers**—The PTX10002-36QDD supports universal multi-rate QSFP-DD800 optical transceivers, multiplying aggregate switch bandwidth while maintaining the port density. QSFP-DD800 transceivers support continuing growth in network bandwidth demand and data-center traffic.
- **Support for channelization**—You can channelize the ports on the PTX10002-36QDD and increase the number of interfaces.
- **Junos OS® Evolved**—The PTX10002-36QDD operates on Junos OS Evolved, Juniper Networks next-generation Junos OS. Junos OS Evolved has the same CLI user interface, the same code base for applications and features, and the same management and automation tools as Junos OS. However, the Junos OS Evolved infrastructure is entirely modernized, delivering the high availability, portability, faster innovation, and simplified upgrades you need.

- **Interoperability**—The PTX10002-36QDD provides seamless interoperability with existing Juniper routing deployments.

System Software

The PTX10002-36QDD runs Junos OS Evolved, which provides Layer 2 and Layer 3 switching, routing, and security services. Junos OS Evolved runs natively on Linux, giving the OS direct access to all the Linux utilities and operations. Junos OS Evolved has a modular design, which allows for upgrades to be performed on a component-by-component basis without a system reboot. Only the components that are changed are restarted. Junos OS Evolved is easily portable and works on any platform, with minimal requirements. Junos OS Evolved and Junos OS have the same CLI, the same code base for applications and features, and the same management and automation tools. However, the Junos OS Evolved infrastructure is entirely modernized, giving you the high availability, portability, faster innovation, and simplified upgrades you need.

You can manage and monitor PTX10002-36QDD router by using the CLI. In addition to the CLI, you can manage and monitor PTX10002-36QDD router by using Juniper Paragon Automation.

For information about which features are supported on PTX Series devices, see Feature Explorer.

Channelization

You can channelize the ports to operate in the following speeds:

- 2x400 Gbps
- 8x100 Gbps
- 4x100 Gbps
- 3x100 Gbps
- 2x100 Gbps
- 2x50 Gbps
- 4x25 Gbps
- 4x10 Gbps

Physical Specifications of PTX10002-36QDD Chassis

Table 2 on page 15 lists the physical specifications for the PTX10002-36QDD chassis.

Table 2: Physical Specifications of PTX10002-36QDD Chassis

Description	Value
Height	8.89 cm
Width	44 cm
Depth	61 cm
Weight	• With three fan modules and two PSUs installed—63.6 lb (28.85 kg) • Without fan modules or PSUs installed—53.1 lb (24.1 kg)

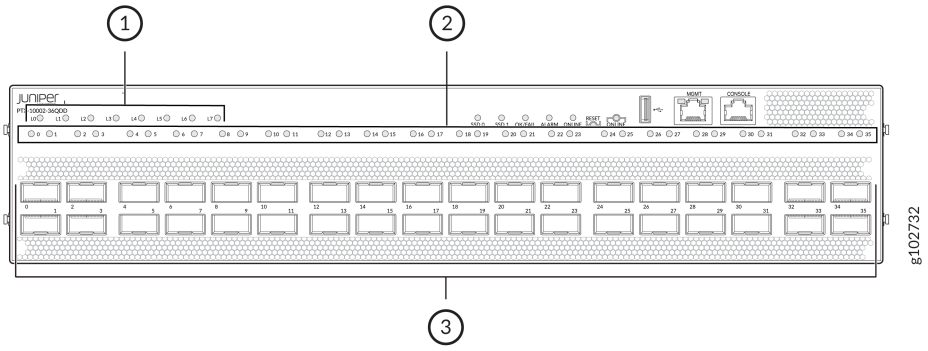
Field-Replaceable Units

Field-replaceable units (FRUs) are components that you can replace at your site. The FRUs in the router are hot-removable and hot-insertable: You can remove and replace them without powering off the router or disrupting the router functions. The following are the FRUs in the PTX10002-36QDD:

- Fan modules
- PSUs
- Transceivers

PTX10002-36QDD Port Panel

The port panel in a PTX10002-36QDD router has 36 high-density ports. The panel also has LEDs that indicate the speed and status of the ports.



1– Lane LEDs	3– Network ports
2– Port LEDs	

The router operates in the normal power mode when 3000-W power supply units (PSUs) are installed in the router. The router operates in the power-optimized mode when 2200-W PSUs are installed in it. The ports support 800 Gbps speed in the normal power mode and provides a throughput of 28.8 Tbps. The ports support 400 Gbps speed in the power-optimized mode and provides a throughput of 14.4 Tbps. You can see the power mode by using the *show chassis power* command.

The links on the ports come up at 400 Gbps speed by default, irrespective of the power mode. You can change the port speed to 800 Gbps by using the *speed* command.

When the router is operating in the power-optimized mode, the ports support SFP+ by using QSA adapter, QSFP+, QSFP28, QSFP56-DD, or high-power 400G-ZR transceivers. When the router is operating in the normal power mode, the ports support 800 Gbps transceivers additionally.

The ports support breakout cables and active optical cables.

You can channelize the ports by using the *number-of-sub-ports (interface)* command to operate in the following speeds:

- 2x400 Gbps
- 8x100 Gbps
- 4x100 Gbps
- 3x100 Gbps
- 2x100 Gbps

- 2x50 Gbps
- 4x25 Gbps
- 4x10 Gbps

You can channelize the ports to operate in 2x400 Gbps or 8x100 Gbps speed when the router is operating in the normal power mode.

Table 3 on page 17 describes the port LEDs. The lane LEDs work in conjunction with the port LEDs. Table 4 on page 18 describes the lane LEDs. Table 5 on page 18 describes the lane LEDs that indicate the lane status in the different channelization modes.

When a lane is down, the lane LED for that lane and the LED on the port that has that lane blink in red color. If there are more than one port that have lanes that are down, the port LEDs on those ports blink in red color for 30 seconds, one after the other.

Table 3: Port LEDs

State	Color	Pattern	Description
On	Green	On steadily	A link is established and all the channels are up.
On	Green	Blinking	The lane LED is indicating the fault in a port that is not receiving any signal.
On	Green	Blipping	The beacon function is enabled on the port.
On	Red	On steadily	The transceiver installed in the port has a failure.
On	Red	Blinking	The lane LED is indicating the fault in a lane on the port.

Table 3: Port LEDs *(Continued)*

State	Color	Pattern	Description
On	Amber	On steadily	The port has a fault (other than failure of the transceiver installed in it and the port not receiving any signal) and is not functioning normally.
On	Amber	Blinking	The lane LED is indicating the fault in a lane on the port.
Off	—	—	The port is not receiving any signal.

Table 4: Lane LEDs

State	Color	Pattern	Description
On	Green	On steadily	The lane is up.
On	Amber	On steadily	The lane is disabled.
Off	—	—	The lane is not receiving any signal.

Table 5: Lane LEDs that Indicate the Lane Status in the Different Channelization Modes

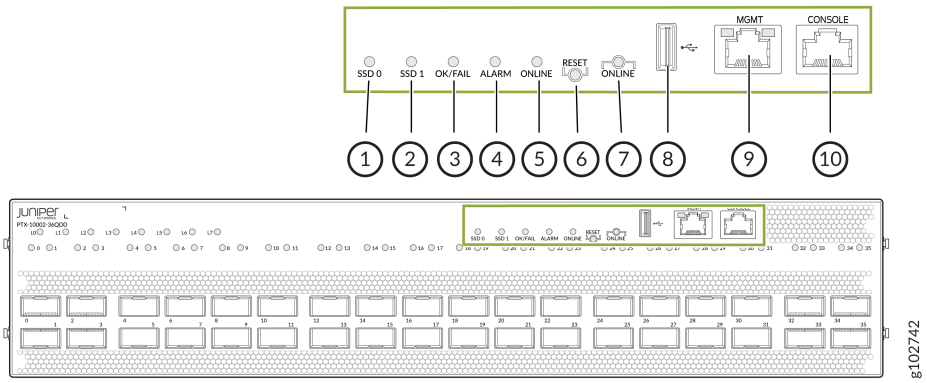
Channelization Mode	LEDs that Indicate the Lane Status
2x400 Gbps	L0 and L1
8x100 Gbps	L0 through L7

Table 5: Lane LEDs that Indicate the Lane Status in the Different Channelization Modes *(Continued)*

Channelization Mode	LEDs that Indicate the Lane Status
4x100 Gbps	L0 through L3
3x100 Gbps	L0 through L2
2x100 Gbps	L0 and L1
2x50 Gbps	L0 and L1
4x25 Gbps	L0 through L3
4x10 Gbps	L0 through L3

PTX10002-36QDD Management Panel

The management panel in the router is on the far right side of the front panel, above the port LEDs.



1– SSD 0 LED	6– Reset button
2– SSD 1 LED	7– Online button
3– OK/FAIL LED	8– Management port with a Type A USB connector

4– Alarm LED	9– Management port with an RJ-45 connector
5– Online LED	10– Console port with an RJ-45 connector

If you press the Reset button once, the router resets. If you press the Reset button for more than 10 seconds, the router enters the BIOS restore mode.

If you press the Online button for more than four seconds, all the power rails except the BIAS 3V3, which powers RE FPGA, power off. If you press it once more, the power-on sequence starts.

Table 6 on page 20 describes the OK/FAIL LED.

Table 6: OK/FAIL LED

State	Color	Pattern	Description
On	Green	On steadily	The router does not have any fault and is functioning normally.
On	Red	Blinking	The router has a fault and is not functioning normally.

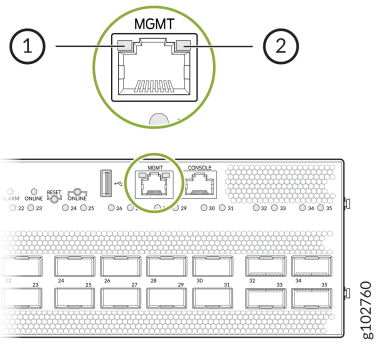
Table 7 on page 20 describes the Alarm LED.

Table 7: Alarm LED

State	Color	Pattern	Description
On	Red	On steadily	There is a major alarm.
On	Yellow	On steadily	There is a minor alarm.
On	Yellow	Blinking	There is a major alarm and a minor alarm.
Off	–	–	There is no alarm.

Figure 1 on page 21 shows the LEDs on the management port. Table 8 on page 21 describes the LEDs on the management port with an RJ-45 connector.

Figure 1: LEDs on the Management Port



1– Link activity LED	2– Speed status LED

Table 8: LEDs on the Management Port

LED	State	Color	Pattern	Description
Link activity LED	On	Green	Blinking	The port and the link are active, and there is link activity.
Speed status LED	On	Green	On steadily	The link speed is 1000 Mbps.
Speed status LED	On	Yellow	On steadily	The link speed is 100 Mbps.
Speed status LED	Off	–	–	The link speed is 10 Mbps or the link is not active.

Table 9 on page 22 describes the SSD LEDs.

Table 9: SSD LEDs

State	Color	Pattern	Description
On	Green	Blinking	The corresponding SSD storage device is being accessed.
Off	—	—	The corresponding SSD is not being accessed.

Table 10 on page 22 describes the Online LED.

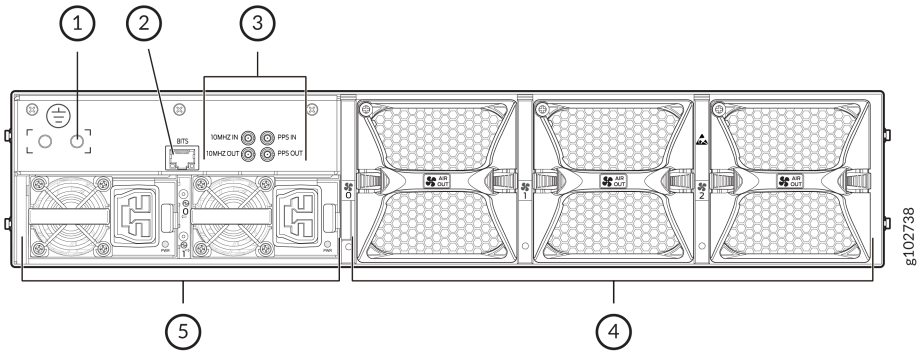
Table 10: Online LED

State	Color	Pattern	Description
On	Green	On steadily	The software in the router is booted.
On	Green	Blinking	The software in the router is booting up.
On	Green	Blipping	The router is powering up.
Off	—	—	The router is offline.

PTX10002-36QDD Rear Panel

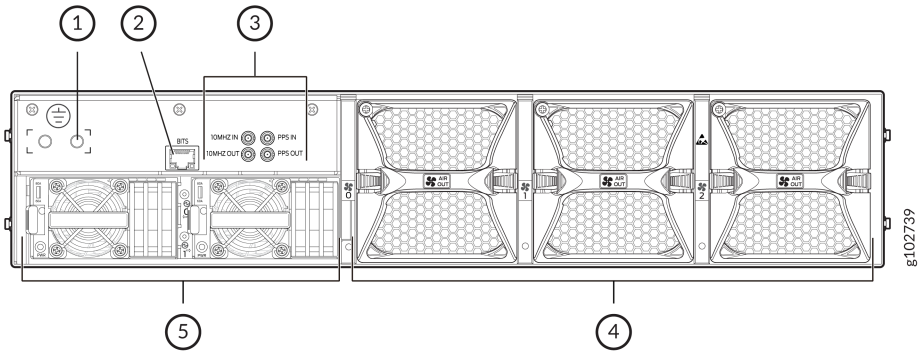
The rear panel houses the power supply units (PSUs), fan modules, a BITS port, 10-MHz ports, pulse per second (PPS) ports, and a protective earthing terminal.

Figure 2: Rear Panel with 2200-W or 3000-W HVAC/HVDC PSUs



1– Protective earthing terminal	4– Fan modules
2– BITS port	5– Power supply units
3– 10-MHz and PPS ports	

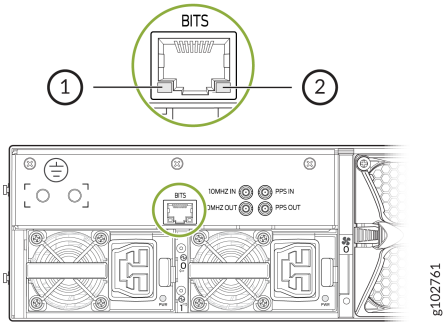
Figure 3: Rear Panel with 2200-W or 3000-W DC PSUs



1– Protective earthing terminal	4– Fan modules
2– BITS port	5– Power supply units
3– 10-MHz and PPS ports	

The 10-MHz and PPS input clock connectors are used to connect to an external clock source, such as a GNSS receiver with precise timing outputs. The 10-MHz and PPS outputs provide debug information for the Synchronous Ethernet and IEEE 1588 timing circuitry.

The LEDs on the BITS port are used to convey the status of the T1/E1 BITS timing interface. Table 11 on page 24 describes BITS LEDs.



1– Error LED	2– Link LED

Table 11: BITS LEDs

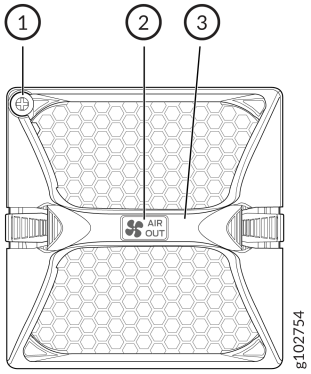
LED	State	Color	Pattern	Description
Link LED	On	Green	On steadily	The link is active.
Link LED	Off	—	—	The link is not active.
Error LED	On	Amber	Blinking	There is an error.

Cooling System and Airflow in a PTX10002-36QDD

The cooling system in the router consists of three dual-rotor fan modules for the chassis and a single built-in fan in each power supply unit. The router supports front-to-back airflow. We ship the router with 2+1 redundant fan modules preinstalled in the rear panel.

The fan modules are hot-insertable and hot-removable FRUs: You can remove and replace them without powering off the router or disrupting router functions. The fan modules are installed in the fan module slots on the rear panel of the router. The fan module slots are numbered 0 through 2 from left to right. Each fan module slot has a fan icon and a fan module status LED next to it.

Each fan module weighs approximately 1.5 lb (0.68 kg).



1– Captive screw	3– Handle
2– Airflow direction label	

NOTE:

- You must install all the fan modules, and they must be operational for optimal functioning of the router.
- Under normal operating conditions, the fan modules operate at a moderate speed. Temperature sensors in the chassis monitor the temperature within the chassis.

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

Figure 4: Airflow Through the Router

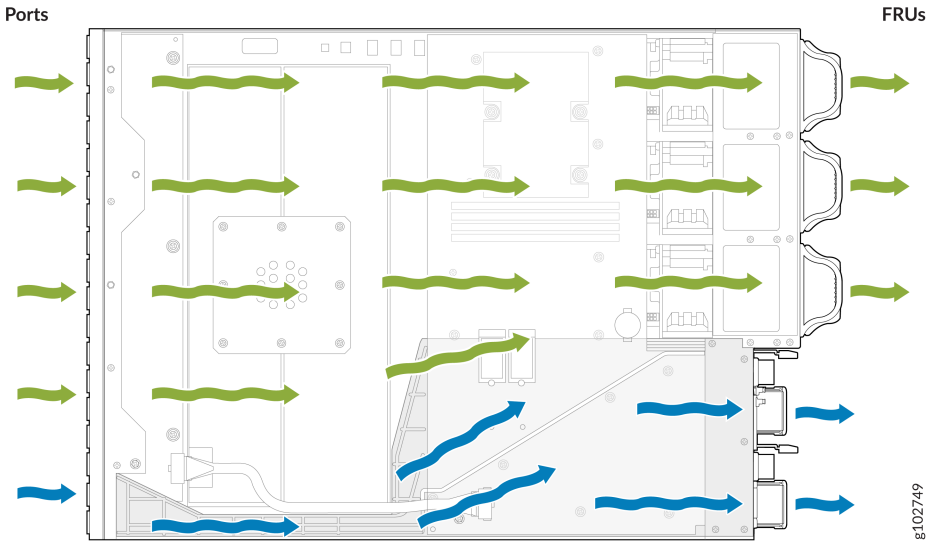


Figure 5: Fan Module Status LED

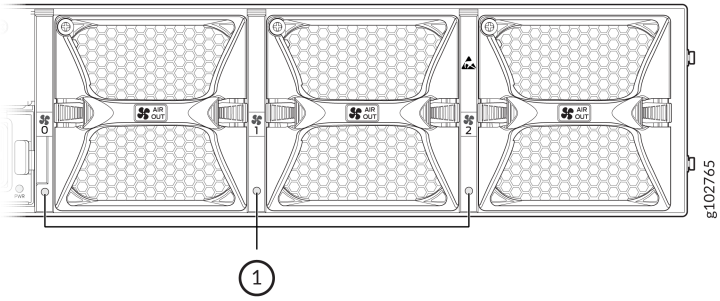


Table 12: Description of the Fan Module Status LED

State	Color	Pattern	Description
On	Green	On steadily	The fan module is working normally.

Table 12: Description of the Fan Module Status LED *(Continued)*

State	Color	Pattern	Description
On	Green	Blinking	The initiation of the fan module software is in progress.
On	Red	On steadily	The fan module is faulty.
On	Amber	On steadily	One of the fans in the fan module is faulty.
Off	–	–	There is no power supply to the fan module.

PTX10002-36QDD Power System

IN THIS SECTION

The router supports the following power supplies (PSUs):

- 2200-W HVAC/HVDC
- 2200-W DC
- 3000-W HVAC/HVDC
- 3000-W DC

The router supports 1+1 redundant, preinstalled PSUs. The PSUs are installed on the rear panel of the chassis in power supply slots labeled **0** and **1**. The PSUs directly plug into the power distribution board

and are located symmetrically on the left side of the rear panel of the chassis for better thermal management. The power distribution board distributes different output voltages produced by the PSUs to the router components, depending on their voltage requirements. Each PSU has a handle, an ejection lever, and a status LED. A minimum of one PSU is required for non-redundant operation. Both the PSUs must be present in the chassis for the normal operation of the router. If one PSU in a redundant configuration fails, the second PSU assumes the entire electrical load without interruption. The PSUs are hot-insertable and hot-removable, field-replaceable units (FRUs): You can remove and replace them without powering off the router or disrupting the router functions.

Each PSU is cooled by its own internal cooling system.

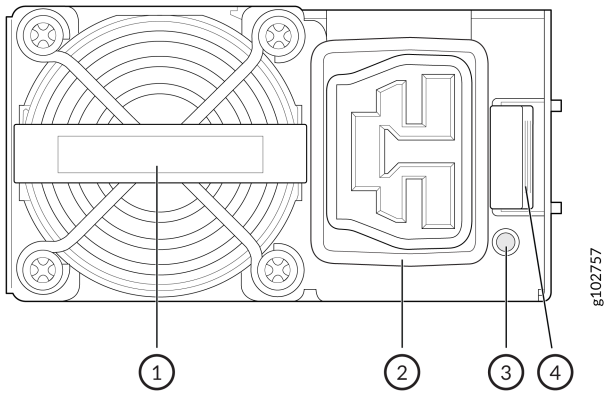
CAUTION: You must not mix:

- HVAC/HVDC and DC PSUs in the same chassis.
- 2200-W and 3000-W PSUs in the same chassis

PTX10002-36QDD HVAC/HVDC Power Supply Units

The router supports 2200-W HVAC/HVDC and 3000-W HVAC/HVDC PSUs. The PSUs automatically detect whether there is HVAC or HVDC input voltage and manage the power accordingly.

Each HVAC/HVDC PSU weighs approximately 3 lb (1.36 kg) and consists of a handle, an ejector lever, an appliance inlet, a built-in fan, and an LED to monitor the status of the PSU. Each inlet requires a dedicated power feed and a dedicated customer-site circuit breaker.



1– Handle	3– LED
2– Inlet plug	4– Ejector lever

Table 13: LED on the HVAC/HVDC PSU

State	Color	Pattern	Description
On	Green	On steadily	The PSU is receiving power.
On	Green	Blinking	There is input power; however, the PSU is off.
On	Amber	On steadily	The PSU is not functioning normally and has a fault.
On	Amber	Blinking	The system software has shut down the PSU.
Off	–	–	The PSU is in off state.

The router operates within the HVAC/HVDC input voltage range listed in Table 14 on page 29.

Table 14: PTX10002-36QDD HVAC/HVDC Power Specifications

Parameter	Minimum	Rated	Maximum
Input voltage—HVAC	180 VAC	200–277 VAC	305 VAC
Frequency for input—HVAC	47 Hz	50-60 Hz	63 Hz
Input voltage—HVDC	190 VDC	240–380 VDC	400 VDC

Table 15 on page 30 lists the specifications of the HVAC power cord provided for each country or region.

Table 15: PTX10002-36QDD HVAC Power Cord Specifications

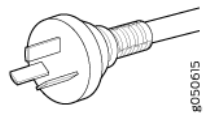
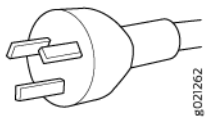
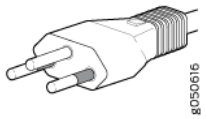
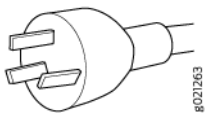
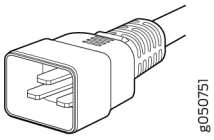
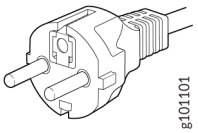
Locale	Cord Set Rating	Plug Standards	Spare Juniper Model Number	Graphic
Argentina	16 A, 277 VAC	IRAM 2073 Type RA/3	CBL-JNP-SG4-AR	
Australia and New Zealand	16 A, 277 VAC	AS/NZS 4417	CBL-JNP-SG4-AU	
Brazil	16 A, 277 VAC	NBR 14136 Type BR/3	CBL-JNP-SG4-BR	
China	16 A, 277 VAC	GB2099	CBL-JNP-SG4-CH	
China, Europe, and Japan	16 A, 277 VAC	C20 to Anderson 3-5958p4	CBL-JNP-SG4-C20-CH	
Europe (except Italy, Switzerland, and United Kingdom)	16 A, 277 VAC	CEE 7/7 STRAIGHT	CBL-JNP-SG4-EU	
Great Britain	16 A, 277 VAC,	BS1363	CBL-JNP-SG4-UK	

Table 15: PTX10002-36QDD HVAC Power Cord Specifications *(Continued)*

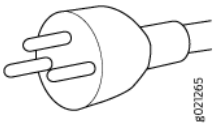
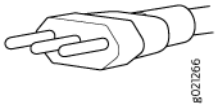
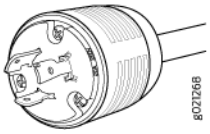
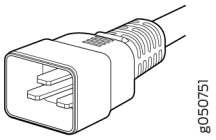
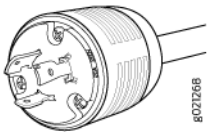
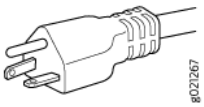
Locale	Cord Set Rating	Plug Standards	Spare Juniper Model Number	Graphic
India	16 A, 277 VAC	SANS 164/1	CBL-JNP-SG4-SA	
Israel	16 A, RA, 277 VAC	SI 32/1971 Type IL/3G	CBL-JNP-SG4-IL	
Italy	16 A, 277 VAC	CEI 23-16	CBL-JNP-SG4-IT	
Japan	16 A, 277 VAC	Nema L-20	CBL-JNP-SG4-JPL	
North America	20 A, 277 VAC	C20 to Anderson 3-5958p4	CBL-JNP-SG4-C20	
North America	20 A, 277 VAC	Locking NEMA L6-20P	CBL-JNP-SG4-US-L	
North America	20 A, 277 VAC	NEMA 6-20P	CBL-JNP-SG4-US	

Table 15: PTX10002-36QDD HVAC Power Cord Specifications *(Continued)*

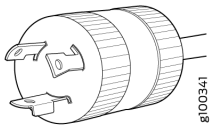
Locale	Cord Set Rating	Plug Standards	Spare Juniper Model Number	Graphic
North America	20 A, 277 V	NEMA I7-20P	CBL-JNP-SG4-HVAC	
South Africa	16 A, 277 VAC	SANS 164/1	CBL-JNP-SG4-SA	
Switzerland	16 A, 277 VAC	CEI 23-50	CBL-JNP-SG4-SZ	

Table 16 on page 32 lists the specifications of the HVDC power cord.

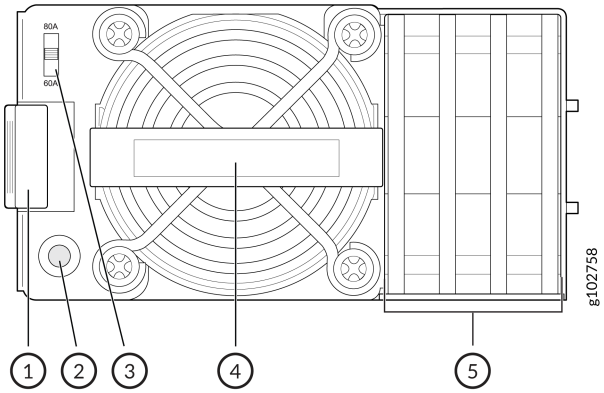
Table 16: PTX10002-36QDD HVDC Power Cord Specifications

Cord Set Rating	Spare Juniper Model Number
16 A, 400 HVDC	CBL-PWR2-BARE

PTX10002-36QDD DC Power Supply Units

The router supports 2200-W DC and 3000-W DC PSUs. Each PSU has a single DC input and provides 12 VDC output with a standby voltage of 12 VDC.

Each DC PSU weighs approximately 3 lb (1.36 kg) and consists of a handle, an ejector lever, a terminal block that provides a single DC input (–48/–60 VDC and return), a built-in fan, and an LED to monitor the status of the PSU. The DC PSU requires a dedicated customer-site circuit breaker. We recommend that you use a dedicated customer-site circuit breaker rated for 80 A (125 VDC), or as required by the local code.



1– Ejector lever	4– Handle
2– LED	5– Terminal block
3– DC input current selector (DIP) switch	

The DIP switch is used to select the DC input current. The switch is active only in the 3000-W DC PSU.

Table 17: LED on the DC PSU

State	Color	Pattern	Description
On	Green	On steadily	The PSU is receiving power.
On	Green	Blinking	There is input power; however, the PSU is off.
On	Amber	On steadily	The PSU is not functioning normally and has a fault.
On	Amber	Blinking	The system software has shut down the PSU.
Off	—	—	The PSU is in off state.

CHAPTER 3

Site Planning, Preparation, and Specifications

Site Guidelines and Requirements for PTX10002-36QDD Routers

IN THIS SECTION

Site Preparation Checklist for PTX10002-36QDD Routers

The checklist in Table 18 on page 35 summarizes the tasks you need to perform when preparing a site for PTX10002-36QDD router installation.

Table 18: Site Preparation Checklist

Item or Task	For More Information	Performed by	Date
Environment			
Verify that environmental factors such as temperature and humidity do not exceed router tolerances.	"Environmental Requirements and Specifications for PTX10002-36QDD Routers" on page 37		
Power			

Table 18: Site Preparation Checklist *(Continued)*

Item or Task	For More Information	Performed by	Date
Measure the distance between the external power sources and the router installation site.	"Clearance Requirements for Airflow and Hardware Maintenance for PTX10002-36QDD Routers" on page 41		
Locate sites to connect system grounding.			
Calculate the power consumption and requirements.	"PTX10002-36QDD Power System" on page 27		
Hardware Configuration			
Choose the number and types of routers you want to install.	"PTX10002-36QDD System Overview" on page 12		
Rack or Cabinet			
Verify that the rack or cabinet meets the minimum requirements for installing the router.	• "Rack Requirements" on page 40 • "Cabinet Requirements" on page 40		
Plan rack or cabinet location, including required space clearances.			
Secure the rack or cabinet to the floor and building structure.			
Cables			

Table 18: Site Preparation Checklist *(Continued)*

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

Environmental Requirements and Specifications for PTX10002-36QDD Routers

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

Follow these environmental guidelines:

- Keep the site as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the 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.

Table 19 on page 37 provides the required environmental conditions for normal router operation.

Table 19: PTX10002-36QDD Environmental Tolerances

Altitude	Relative Humidity	Temperature	Seismic

No performance degradation up to 6,562 ft (2000 m).	Normal operation ensured in the relative humidity range of 5% through 90%, noncondensing.	• Normal operation ensured in the temperature range of 32° F through 104° F (0° C through 40° C). • Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C).	Designed to comply with Zone 4 earthquake requirements per DC NEBS GR-3160.

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

General Site Guidelines

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

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

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

Site Electrical Wiring Guidelines

Table 20 on page 39 describes the factors you must consider while planning the electrical wiring at your site.

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

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

Table 20: Site Electrical Wiring Guidelines

Site Wiring Factor	Guidelines
Signaling limitations	If your site experiences any of the following problems, consult experts in electrical surge suppression and shielding: • Radio frequency interference (RFI) because of improperly installed wires • Damage from lightning strikes occuring when wires exceed recommended distances or pass between buildings • Electromagnetic pulses (EMPs) caused by lightning damaging unshielded conductors and electronic devices
Radio frequency interference	To reduce or eliminate RFI from your site wiring, do the following: • Use a twisted-pair cable with a good distribution of grounding conductors. • To exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal, when applicable.
Electromagnetic compatibility	If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, seek expert advice. Strong sources of electromagnetic interference (EMI) can cause: • Destruction of the signal drivers and receivers in the device. • Electrical hazards as a result of power surges conducted over the lines into the equipment.

Rack Requirements

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

Rack Requirement	Guidelines
Rack type	A U is the standard rack unit defined by the Electronic Components Industry Association (ECIA) (http://www.ecianow.org). You can mount the device on a rack that provides bracket holes or hole patterns spaced at 1U (1.75 in. or 4.45 cm) increments and meets the size and strength requirements to support the weight.
Mounting bracket hole spacing	The holes in the mounting brackets are spaced at 1U (1.75 in. or 4.45 cm) so that the device can be mounted in any rack that provides holes spaced at that distance.
Rack size and strength	Ensure that the: • Rack complies with the size and strength standards of a 19-in. rack as defined by the ECIA (http://www.ecianow.org). • Rack rails are spaced widely enough to accommodate the external dimensions of the device chassis. Also ensure that the outer edges of the front mounting brackets extend the width of the chassis to 19 in. (48.2 cm). • Rack is strong enough to support the weight of the device. • Spacing of rails and adjacent racks provides for proper clearance around the device and rack.
Rack connection to building structure	• Secure the rack to the building structure. • If your geographical area is earthquake-prone, secure the rack to the floor. • Secure the rack to the ceiling brackets as well as wall or floor brackets for maximum stability.

Cabinet Requirements

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

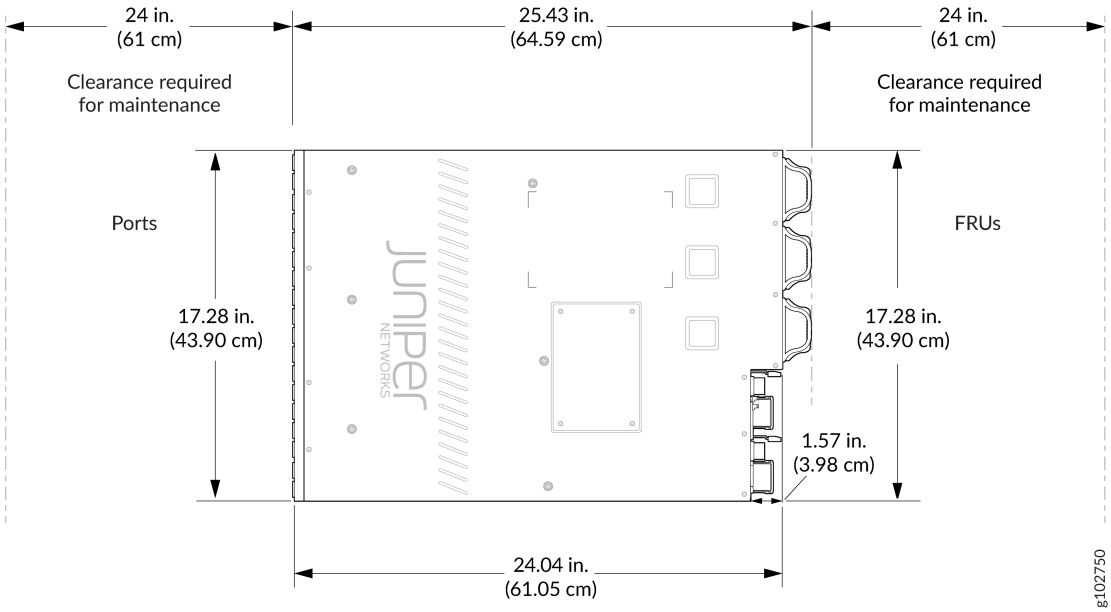
Cabinet Requirement	Guidelines
Cabinet size	• The minimum cabinet size is 36 in. (91.4 cm) deep. Large cabinets improve airflow and reduce chances of overheating.
Cabinet clearance	• The outer edges of the front mounting brackets extend the width of the chassis to 19 in. (48.2 cm). • The minimum total clearance inside the cabinet is 30.7 in. (78 cm) between the inside of the front door and the inside of the rear door.
Cabinet airflow requirements	When you mount the device in a cabinet, ensure that ventilation through the cabinet is sufficient to prevent overheating, as follows: • Ensure that there is adequate cool air supply to dissipate the thermal output of the device or devices. • Ensure that the hot air exhaust of the chassis exits the cabinet without recirculating into the device. An open cabinet (without a top or doors) that employs hot air exhaust extraction from the top ensures the best airflow through the chassis. If the cabinet contains a top or doors, perforations in these elements assist with removing the hot air exhaust. • Install the device in the cabinet in a way that maximizes the open space on the side of the chassis that has the hot air exhaust. • Route and secure all cables to minimize the blockage of airflow to and from the chassis. • Ensure that the spacing of rails and adjacent cabinets is such that proper clearance exists around the device and cabinet. • A cabinet larger than the minimum required provides better airflow and reduces the chance of overheating.

Clearance Requirements for Airflow and Hardware Maintenance for PTX10002-36QDD Routers

When planning the site for installing a PTX10002-36QDD router, follow these clearance requirements (see Figure 6 on page 42):

- For the cooling system to function properly, ensure that the airflow around the chassis is unrestricted.
- If you are mounting the router on a rack or cabinet along with other equipment, ensure that the hot air exhaust from other equipment does not blow into the cold air intake vents of the chassis.
- DC NEBS GR-3160 recommends that you allow at least 30 in. (76.2 cm) in front of the rack or cabinet and 24 in. (61 cm) behind the rack or cabinet.
- Leave at least 24 in. (61 cm) clearance in front of and behind the router for service personnel to remove and install hardware components.

Figure 6: Clearance Requirements for Airflow and Hardware Maintenance for PTX10002-36QDD Router



PTX10002-36QDD Network Cable and Transceiver Planning

IN THIS SECTION

Pluggable Transceivers and Cables Supported on PTX10002-36QDD Routers

You can find the list of transceivers and cables supported on PTX10002-36QDD routers and information about those transceivers and cables at the Hardware Compatibility Tool page for PTX10002-36QDD.

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

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.

Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion

IN THIS SECTION

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

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

Single-mode fiber is so small in diameter that rays of light can 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 with multimode fiber, single-mode fiber has a higher bandwidth and can carry signals for longer distances.

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

Attenuation and Dispersion in Fiber-Optic Cable

Correct functioning of an optical data link depends on modulated light reaching the receiver with enough power to be demodulated correctly. *Attenuation* is the reduction in power of the light signal as it is transmitted. Attenuation is caused by passive media components such as cables, cable splices, and connectors. Although attenuation is significantly lower for optical fiber than for other media, it still occurs in both multimode and single-mode transmission. An efficient optical data link must have enough light available to overcome attenuation.

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

- Chromatic dispersion—Spreading of the signal over time, resulting from the different speeds of light rays.
- Modal dispersion—Spreading of the signal over time, resulting from 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 rather than modal dispersion limits 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 less than the limits specified for the type of link in Telcordia Technologies document GR-253-CORE (Section 4.3) and International Telecommunications Union (ITU) document G.957.

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

Calculating Power Budget and Power Margin for Fiber-Optic Cables

IN THIS SECTION

Use the information in this topic and the specifications for your optical interface to calculate the power budget and power margin for fiber-optic cables.

TIP: You can use the Hardware Compatibility Tool to find information about the pluggable transceivers supported on your Juniper Networks device.

To calculate the power budget and power margin, perform the following tasks:

Calculate Power Budget for Fiber-Optic Cables

To ensure that fiber-optic connections have sufficient power for correct operation, you need to calculate the link's power budget (P_B), which is the maximum amount of power it can transmit. When you calculate the power budget, you use a worst-case analysis to provide a margin of error, even though all the parts of an actual system do not operate at the worst-case levels. To calculate the worst-case estimate of P_B, you assume minimum transmitter power (P_T) and minimum receiver sensitivity (P_R):

$P_B = P_T - P_R$

The following hypothetical power budget equation uses values measured in decibels (dB) and decibels referred to one milliwatt (dBm):

$P_B = P_T - P_R$

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

$P_B = 13 \text{ dB}$

How to Calculate Power Margin for Fiber-Optic Cables

After calculating a link's P_B, you can calculate the power margin (P_M), which represents the amount of power available after subtracting attenuation or link loss (LL) from the P_B) A worst-case estimate of P_M assumes maximum LL:

$P_M = P_B - LL$

P_M greater than zero indicates that the power budget is sufficient to operate the receiver.

Factors that can cause link loss include higher-order mode losses, modal and chromatic dispersion, connectors, splices, and fiber attenuation. Table 21 on page 46 lists an estimated amount of loss for the factors used in the following sample calculations. For information about the actual amount of signal loss caused by equipment and other factors, refer to vendor documentation.

Table 21: Estimated Values for Factors Causing Link Loss

Link-Loss Factor	Estimated Link-Loss Value
Higher-order mode losses	Single mode—None Multimode—0.5 dB

Table 21: Estimated Values for Factors Causing Link Loss *(Continued)*

Link-Loss Factor	Estimated Link-Loss Value
Modal and chromatic dispersion	Single mode—None Multimode—None, if product of bandwidth and distance is less than 500 MHz-km
Faulty connector	0.5 dB
Splice	0.5 dB
Fiber attenuation	Single mode—0.5 dB/km Multimode—1 dB/km

The following sample calculation for a 2-km-long multimode link with a P_B of 13 dB uses the estimated values from Table 21 on page 46. This example calculates LL as the sum of fiber attenuation (2 km @ 1 dB/km, or 2 dB) and loss for five connectors (0.5 dB per connector, or 2.5 dB) and two splices (0.5 dB per splice, or 1 dB) as well as higher-order mode losses (0.5 dB). The P_M is calculated as follows:

$P_M = P_B - LL$

$P_M = 13\ dB - 2\ km\ (1\ dB/km) - 5\ (0.5\ dB) - 2\ (0.5\ dB) - 0.5\ dB$

$P_M = 13\ dB - 2\ dB - 2.5\ dB - 1\ dB - 0.5\ dB$

$P_M = 7\ dB$

The following sample calculation for an 8-km-long single-mode link with a P_B of 13 dB uses the estimated values from Table 21 on page 46. This example calculates LL as the sum of fiber attenuation (8 km @ 0.5 dB/km, or 4 dB) and loss for seven connectors (0.5 dB per connector, or 3.5 dB). The pP_M is calculated as follows:

$P_M = P_B - LL$

$P_M = 13\ dB - 8\ km\ (0.5\ dB/km) - 7(0.5\ dB)$

$P_M = 13\ dB - 4\ dB - 3.5\ dB$

$P_M = 5.5\ dB$

In both the examples, the calculated P_M is greater than zero, indicating that the link has sufficient power for transmission and does not exceed the maximum receiver input power.

PTX10002-36QDD Management Cable Specifications and Pinouts

IN THIS SECTION

PTX10002-36QDD Cable Specifications for Console and Management Connections

Table 22 on page 48 provides the specifications of the cables that connect the router to a management device.

Table 22: Specifications of the Cables for Console and Management Connections

Port on the Router	Cable Specification	Maximum Length	Device Receptacle
Console (**CON**) port	RS-232 (EIA-232) serial cable	2.13 meters	RJ-45
Management (**MGMT**) port	Category 5 cable or equivalent suitable for 1000 BASE-T operation	100 meters	RJ-45

NOTE: We no longer include the RJ-45 console cable with the DB-9 adapter as part of the device package. If the console cable and adapter are not included in your device package, or if you need a different type of adapter, you can order the following separately:

- RJ-45 to DB-9 adapter (JNP-CBL-RJ45-DB9)
- RJ-45 to USB-A adapter (JNP-CBL-RJ45-USBA)
- RJ-45 to USB-C adapter (JNP-CBL-RJ45-USBC)

If you want to use RJ-45 to USB-A or RJ-45 to USB-C adapter you must have X64 (64-Bit) Virtual COM port (VCP) driver installed on your PC. See, https://ftdichip.com/drivers/vcp-drivers/ to download the driver.

PTX10002-36QDD Management Port Connector Pinouts

You must use an RJ-45 connector to connect the 10/100/1000BASE-T management port (labeled **MGMT**) to a management device for out-of-band management.

Table 23 on page 49 provides the pinout information of the RJ-45 management port connector.

Table 23: Pinouts of the RJ-45 Management Port Connector on the PTX10002-36QDD

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

Table 23: Pinouts of the RJ-45 Management Port Connector on the PTX10002-36QDD *(Continued)*

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

PTX10002-36QDD Console Port Connector Pinouts

The console port (labeled **CON**) is an RS-232 serial interface. You must use an RJ-45 connector to connect to a console management device. The default baud rate for the console port is 9600 baud.

Table 24 on page 50 provides the pinout information for the RJ-45 console port connector.

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

Table 24: Pinouts of the Console Port Connector on the PTX10002-36QDD

Pin	Signal	Description
1	RTS Output	Request to send
2	DTR Output	Data terminal ready
3	TxD Output	Transmit data
4	Signal Ground	Signal ground
5	Signal Ground	Signal ground

Table 24: Pinouts of the Console Port Connector on the PTX10002-36QDD *(Continued)*

Pin	Signal	Description
6	RxD Input	Receive data
7	DCD Input	Data carrier detect
8	CTS Input	Clear to send

PTX10002-36QDD BITS Port Connector Pinouts

Table 25 on page 51 provides the pinout information for the BITS port connector.

Table 25: Pinouts of the BITS Port Connector on the PTX10002-36QDD

Pin	Signal	Description
1	RX ring	Rx_N connection
2	RX tip	Rx_P connection
3	No connection	—
4	Tx ring	Tx_N connection
5	Tx tip	Tx_P connection
6	No connection	—
7	No connection	—
8	No connection	—

PTX10002-36QDD QSFP28 Port Connector Pinouts

Table 26 on page 52 provides the pinout information for the QSFP28 port connector.

Table 26: Pinouts of the QSFP28 Port Connector on the PTX10002-36QDD

Pin	Signal
1	GND
2	TX2n
3	TX2p
4	GND
5	TX4n
6	TX4p
7	GND
8	ModSelL
9	LPMode_Reset
10	VccRx
11	SCL
12	SDA
13	GND
14	RX3p

Table 26: Pinouts of the QSFP28 Port Connector on the PTX10002-36QDD *(Continued)*

Pin	Signal
15	RX3n
16	GND
17	RX1p
18	RX1n
19	GND
20	GND
21	RX2n
22	RX2p
23	GND
24	RX4n
25	RX4p
26	GND
27	ModPrsL
28	IntL
29	VccTx

Table 26: Pinouts of the QSFP28 Port Connector on the PTX10002-36QDD *(Continued)*

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

PTX10002-36QDD USB Port Specifications

The following Juniper Networks USB flash drives have been tested and are officially supported for the USB port in the PTX Series router:

- 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 PTX Series router has not been tested by Juniper Networks. The use of any unsupported USB memory

product could expose your device to unpredictable behavior. The 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 a PTX Series router. Failure to do so could expose your device to unpredictable behavior.

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

CHAPTER 4

Initial Installation and Configuration

Unpack and Mount the PTX10002-36QDD

IN THIS SECTION

Unpack the Router

The PTX10002-36QDD router chassis is a rigid sheet-metal structure that houses the hardware components. We ship the router in a cardboard carton, secured with foam packing material. The carton has an accessory compartment.

CAUTION: The routers are maximally protected inside the shipping carton. Do not unpack the routers until you are ready to mount the router.

To unpack the router:

1. Move the shipping carton to a staging area as close to the installation site as possible, but where you have enough room to remove the system components.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Pull out the packing material holding the router in place.
5. Verify the parts received against the inventory on the label attached to the carton (see Table 27 on page 58). If any part on the packing list is missing, contact your customer service representative or contact Juniper customer care from within the U.S. or Canada by telephone at 1-888-314-5822. For international-dial or direct-dial options in countries without toll-free numbers, see https://www.juniper.net/support/requesting-support.html.
6. Save the shipping carton and packing materials in case you need to move or ship the router later.

Table 27: Inventory of Components

Component	Quantity
Router	1
Power supplies	2 preinstalled
Fan modules	3 preinstalled
(If you purchased a model with an HVAC/HVDC power supply) Power cord appropriate for your geographical location	1
Four-post mounting kit	1
Documentation Roadmap	1
Juniper Networks Product Warranty	1
End-User License Agreement	1

Update Base Installation Data

CAUTION: 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 SLA for products that do not have accurate installation base data.

Update your installation base at https://supportportal.juniper.net/s/CreateCase .

Mount the PTX10002-36QDD on a Square Hole Four-Post Rack

You can mount the router on:

- Four posts of a 19-in. four-post rack or cabinet by using the four-post mounting kit (part number: JNP10002-4P-TL-RMK)—provided
- Two posts of a 19-in. two-post rack or cabinet by using the two-post mounting kit (part number: JNP10002-2P-TL-RMK)—separately orderable

The remainder of this topic uses *rack* to mean rack or cabinet.

Before you mount the router on a square hole four-post rack:

- Verify that the site meets the requirements described in "Site Preparation Checklist for PTX10002-36QDD Routers" on page 35.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the rack to the building structure.
- Read *Safety Information*, with particular attention to *Chassis and Component Lifting Guidelines*.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Unpack the router from the shipping carton (see "Unpack the Router" on page 57).

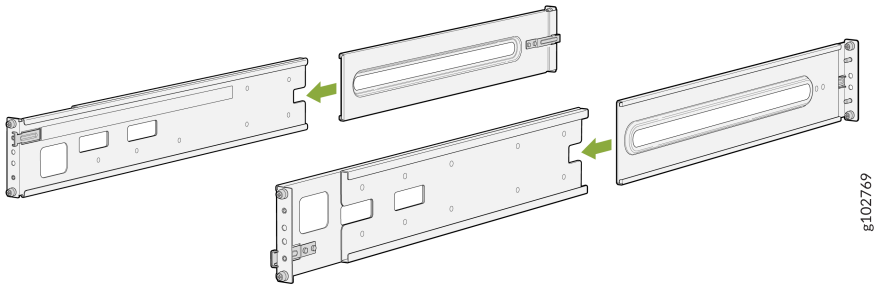
Ensure that you have the following parts and tools available:

- A number 2 Phillips (+) screwdriver—not provided
- An ESD grounding strap—not provided
- The four-post mounting kit provided with the router that includes the following:
  - Front mounting rails—2
  - Rear mounting rails—2
  - Mounting brackets—2

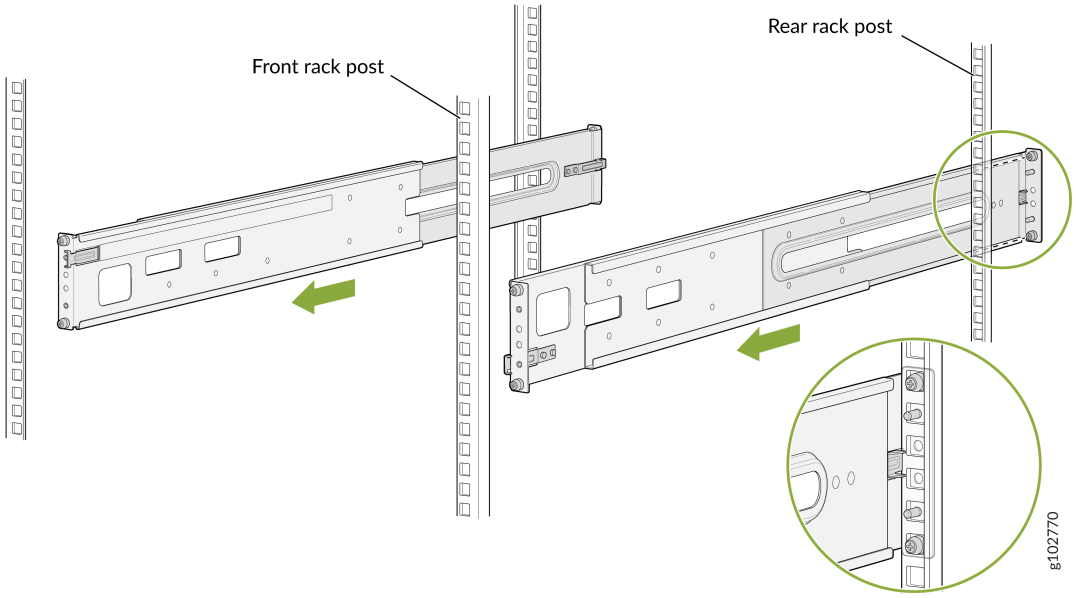
Have one person to support the weight of the router while another person secures the router to the rack posts.

To mount the router on a square hole four-post rack:

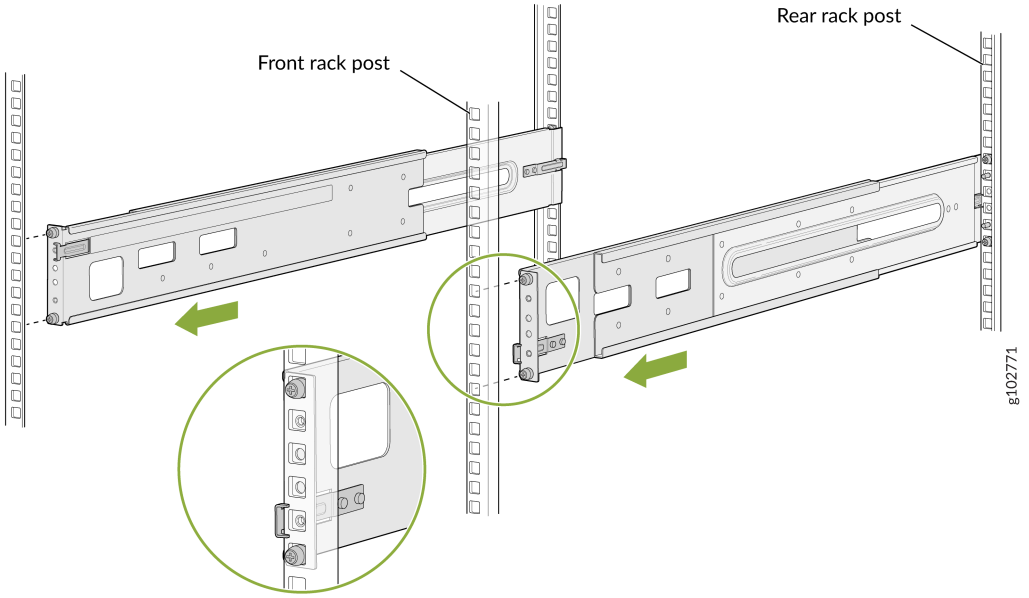
1. Place the router on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
3. Assemble both the right and left mounting rails. Align the rear mounting rails with the guides on the front mounting rails and gently slide the rear mounting rails into the front mounting rails.



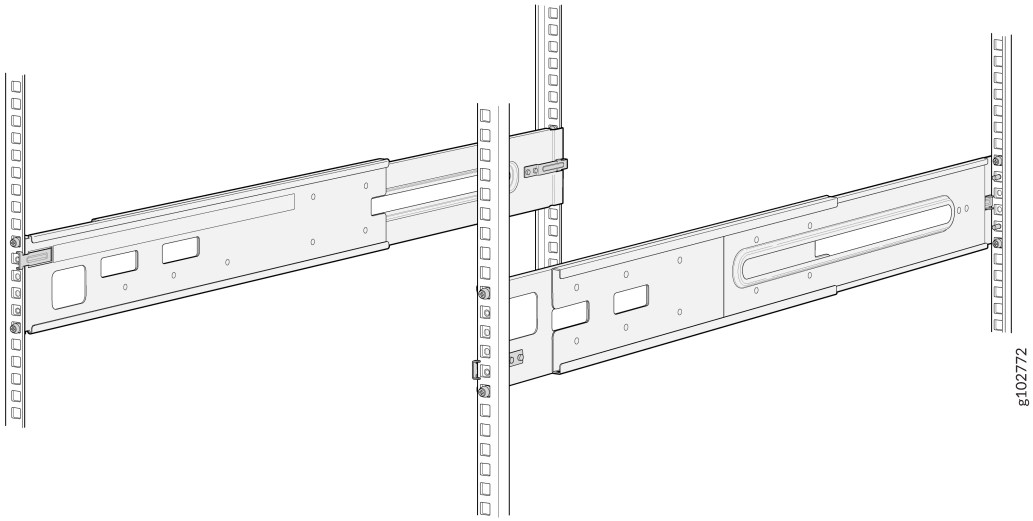
4. Attach the rear mounting rails to the rack posts—tighten the thumb screws by using the screwdriver.



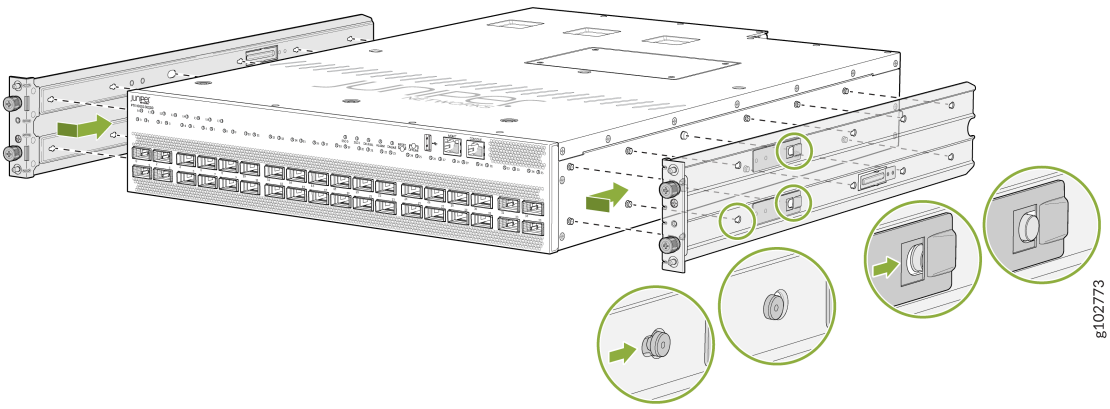
5. Attach the front mounting rails to the rack posts—tighten the captive thumb screws by using the screwdriver.



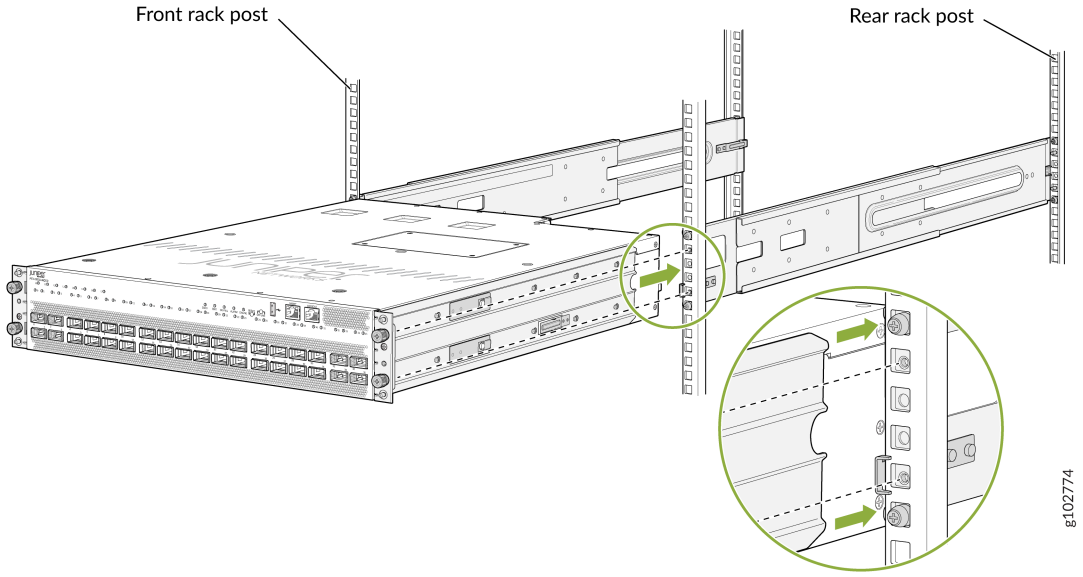
6. Ensure that the mounting rails are level by verifying that all screws on one side of the rack align with the screws on the other side.



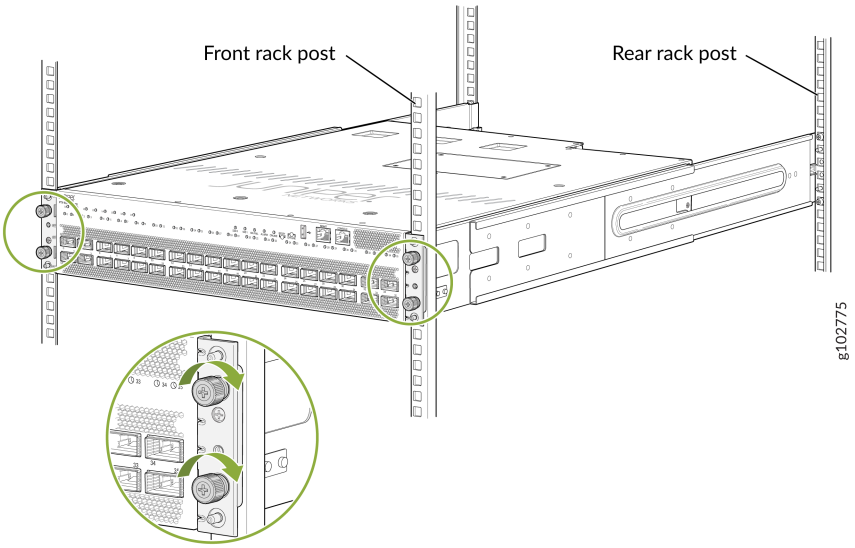
7. Attach the mounting brackets to the router chassis.



8. Align the mounting brackets with the guides on the mounting rails and gently slide the chassis on to the mounting rails until the chassis locks in place.



9. Secure the router to the rack—tighten the thumb screws by using the screwdriver.



10. Ensure that the router chassis is level by verifying that all the screws on one side of the rack align with the screws on the other side.

Mount the PTX10002-36QDD on a Threaded Hole Four-Post Rack

You can mount the router on:

- Four posts of a 19-in. four-post rack or cabinet by using the four-post mounting kit (part number: JNP10002-4P-TL-RMK)—provided
- Two posts of a 19-in. two-post rack or cabinet by using the two-post mounting kit (part number: JNP10002-2P-TL-RMK)—separately orderable

The remainder of this topic uses *rack* to mean rack or cabinet.

Before you mount the router on a threaded hole four-post rack:

- Verify that the site meets the requirements described in "Site Preparation Checklist for PTX10002-36QDD Routers" on page 35.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the rack to the building structure.
- Read *Safety Information*, with particular attention to *Chassis and Component Lifting Guidelines*.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).

- Unpack the router from the shipping carton (see "Unpack the Router" on page 57).

Ensure that you have the following parts and tools available:

- A number 2 Phillips (+) screwdriver—not provided
- An ESD grounding strap—not provided
- An antistatic bag—not provided
- The four-post mounting kit provided with the router that includes the following:
  - Front mounting rails—2
  - Rear mounting rails—2
  - Mounting brackets—2

Have one person to support the weight of the router while another person secures the router to the rack posts.

To mount the router on a threaded hole four-post rack:

1. Place the router on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
3. Remove the guide blocks from the mounting rails by using the screwdriver. Keep them in an antistatic bag. See Figure 7 on page 64 and Figure 8 on page 65.

Figure 7: Remove the Guide Blocks from the Front Mounting Rails

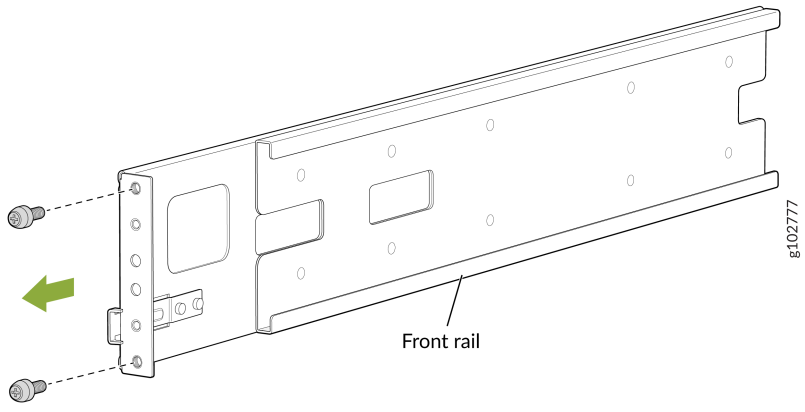
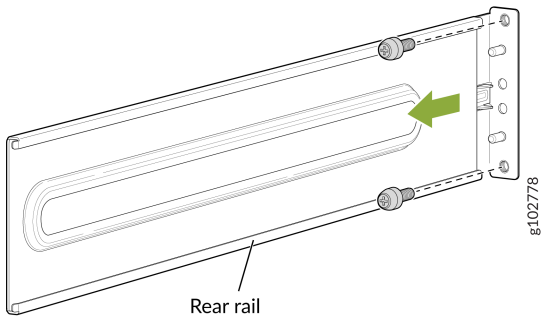
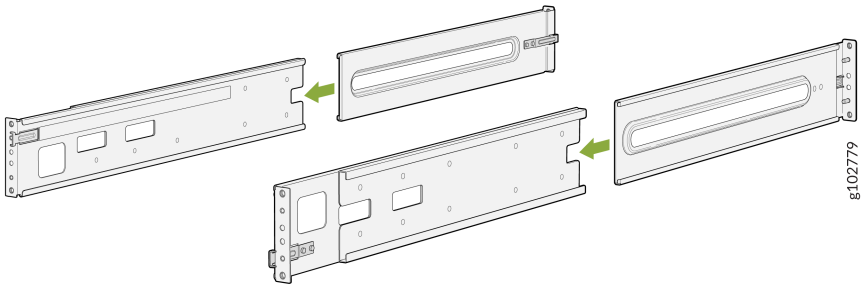


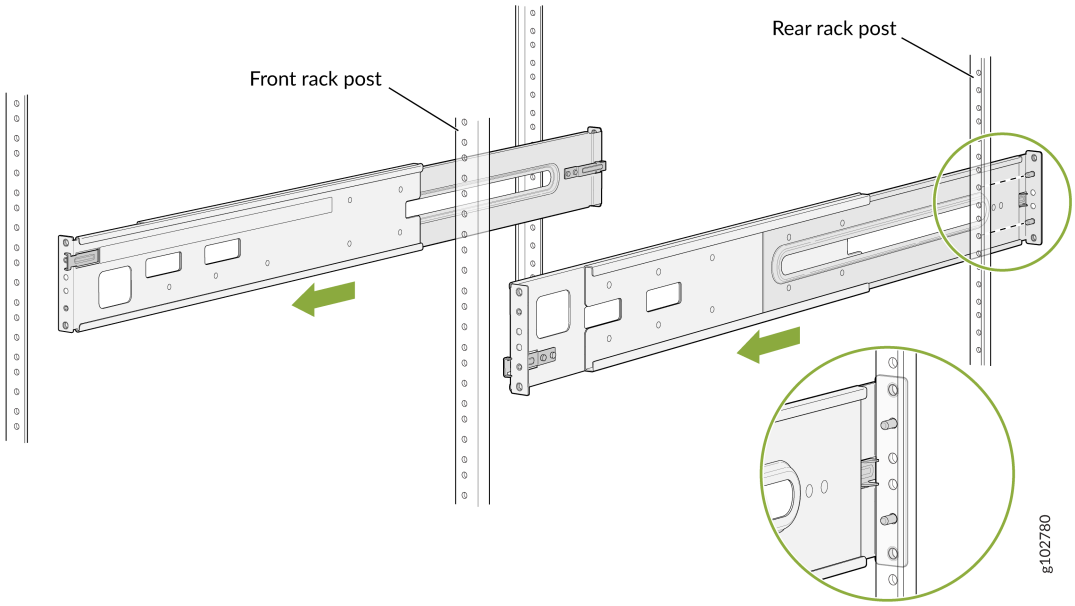
Figure 8: Remove the Guide Blocks from the Rear Mounting Rails



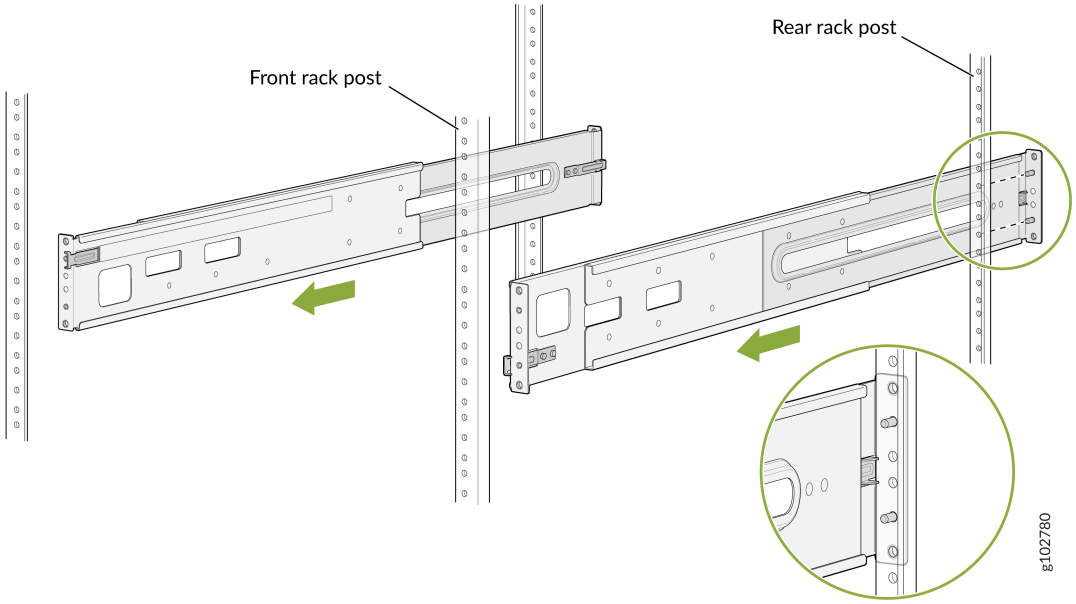
4. Assemble both the right and left mounting rails. Align the rear mounting rails with the guides on the front mounting rails and gently slide the rear mounting rails into the front mounting rails.



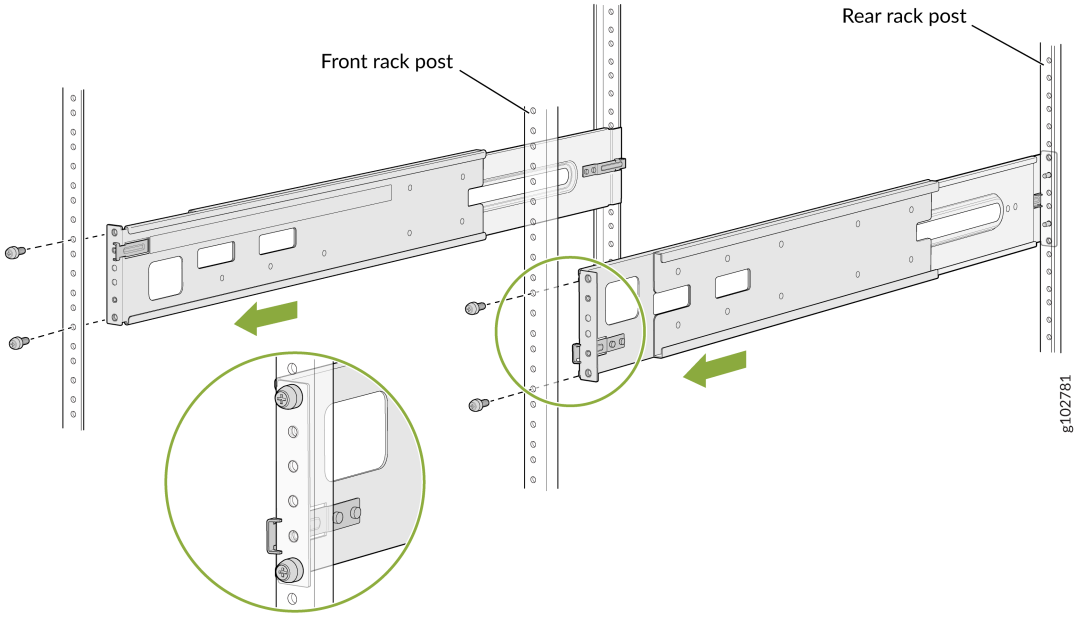
5. Insert the studs on the rear mounting rails in the holes on the rack posts.



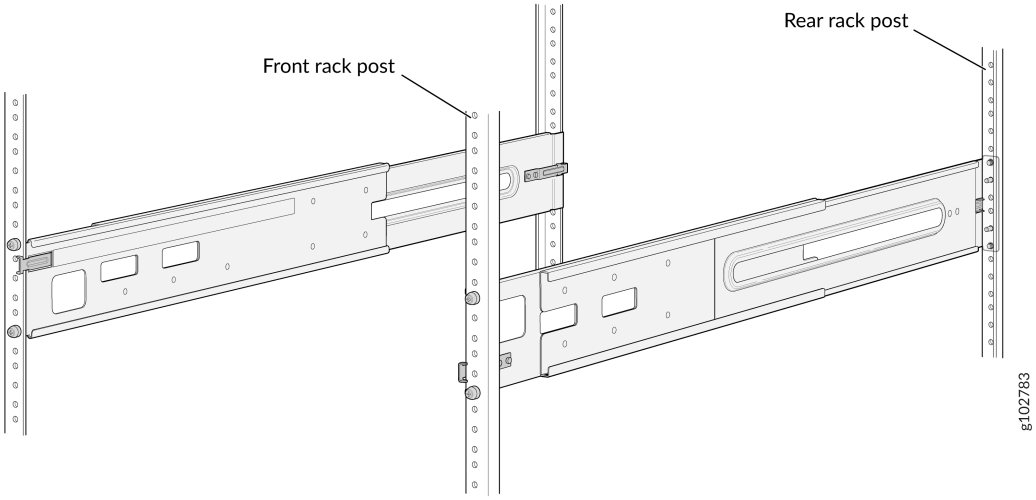
6. Attach the rear mounting rails to the rack posts—tighten the captive thumb screws by using the screwdriver.



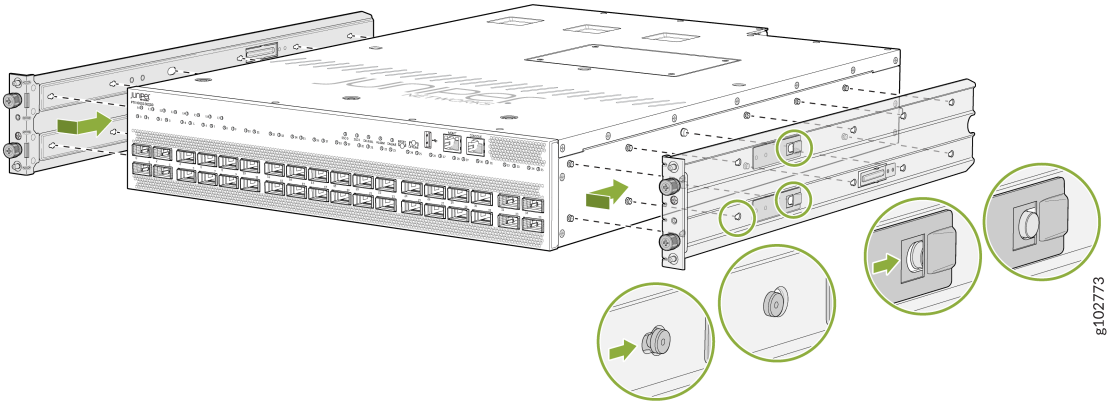
7. Attach the front mounting rails to the rack posts—tighten the thumb screws by using the screwdriver.



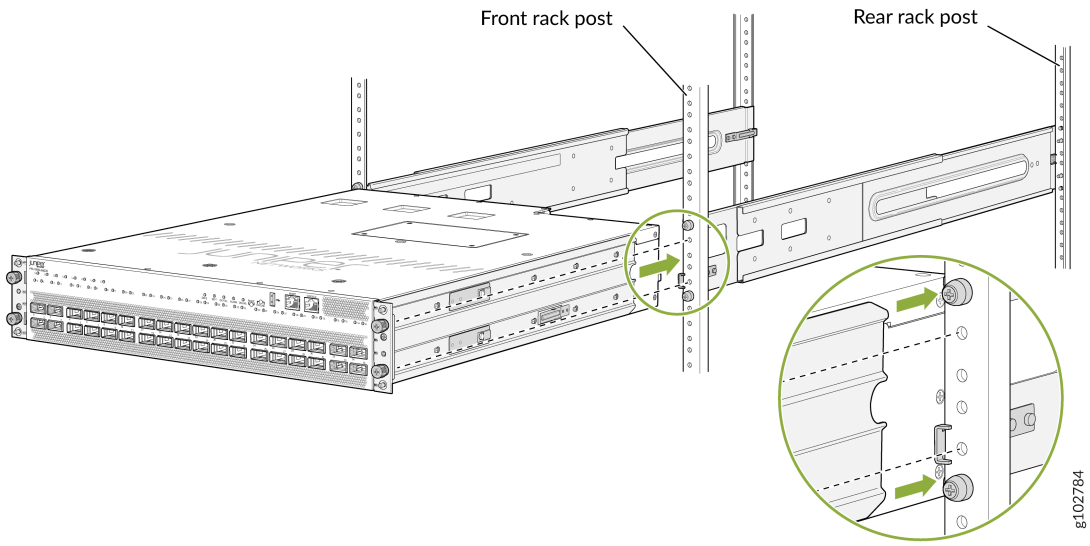
8. Ensure that the mounting rails are level by verifying that all screws on one side of the rack align with the screws on the other side.



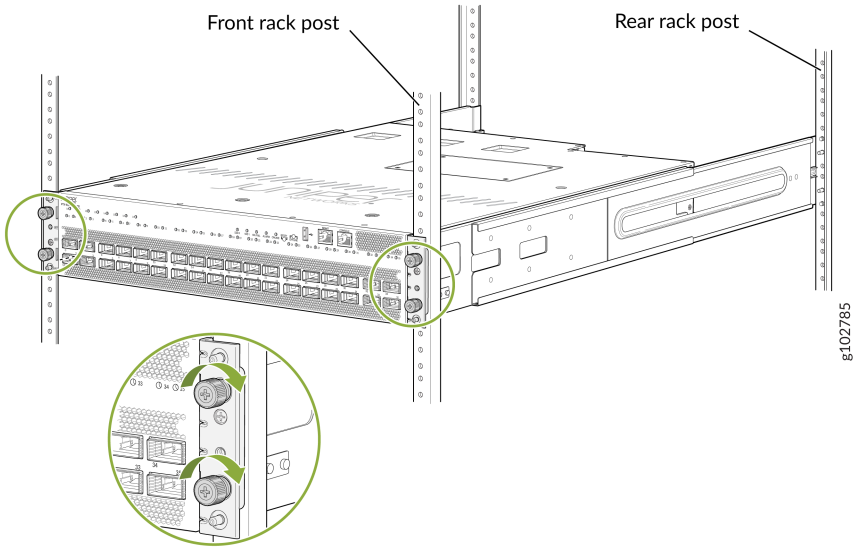
9. Attach the mounting brackets to the router chassis.



10. Align the mounting brackets with the guides on the mounting rails and gently slide the chassis on to the mounting rails until the chassis locks in place.



11. Secure the router to the rack—tighten the thumb screws by using the screwdriver.



12. Ensure that the router chassis is level by verifying that all the screws on one side of the rack align with the screws on the other side.

Mount the PTX10002-36QDD on Two Posts of a Rack or Cabinet

You can mount the router on:

- Two posts of a 19-in. two-post rack or cabinet by using the two-post mounting kit (part number: JNP10002-2P-TL-RMK)—separately orderable
- Four posts of a 19-in. four-post rack or cabinet by using the four-post mounting kit (part number: JNP10002-4P-TL-RMK)—provided

The remainder of this topic uses *rack* to mean rack or cabinet.

Before you mount the router on a two-post rack:

- Verify that the site meets the requirements described in "Site Preparation Checklist for PTX10002-36QDD Routers" on page 35.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure the rack to the building structure.
- Read *Safety Information*, with particular attention to *Chassis and Component Lifting Guidelines*.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Unpack the router from the shipping carton (see "Unpack the Router" on page 57).

Ensure that you have the following parts and tools available:

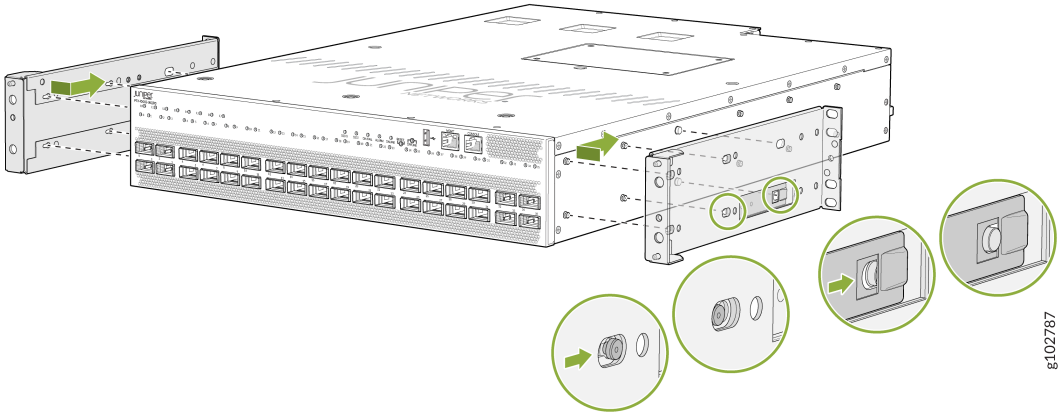
- A number 2 Phillips (+) screwdriver—not provided
- An ESD grounding strap—not provided
- 8 screws to secure the router to the posts of the pack—not provided
- The two-post mounting kit that includes the following:
  - C-shaped two-post mounting brackets—2
  - L-shaped two-post mounting brackets—2
  - Screws to attach the two-post mounting brackets to the chassis—24

Have one person to support the weight of the router while another person secures the router to the rack posts.

To mount the router on a two-post rack:

1. Place the router on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
3. Attach the two-post mounting brackets to the side panels of the router chassis by using the screws to attach the brackets.

a. Align the front end of one of the C-shaped mounting brackets flush with the front panel of the router chassis.



b. Insert the screws into the aligned holes on the chassis. Tighten the screws by using a screwdriver.

c. Align the front end of one of the L-shaped mounting brackets behind the C-shaped mounting brackets.

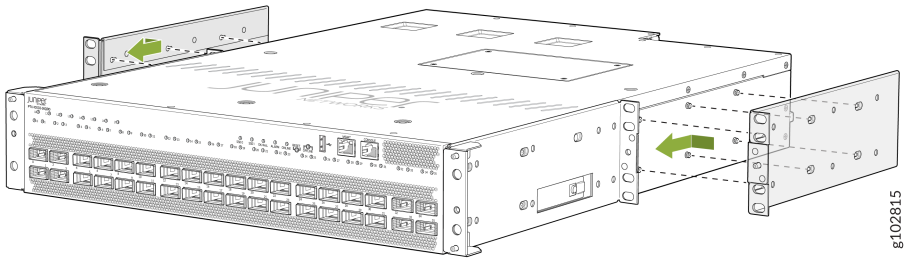
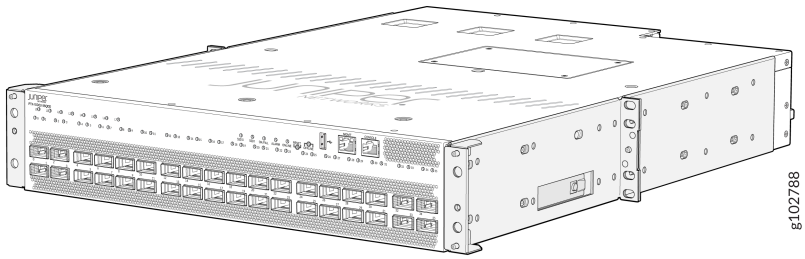
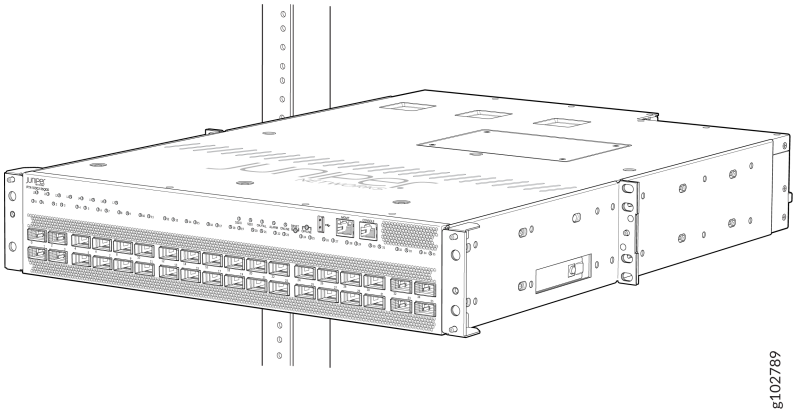


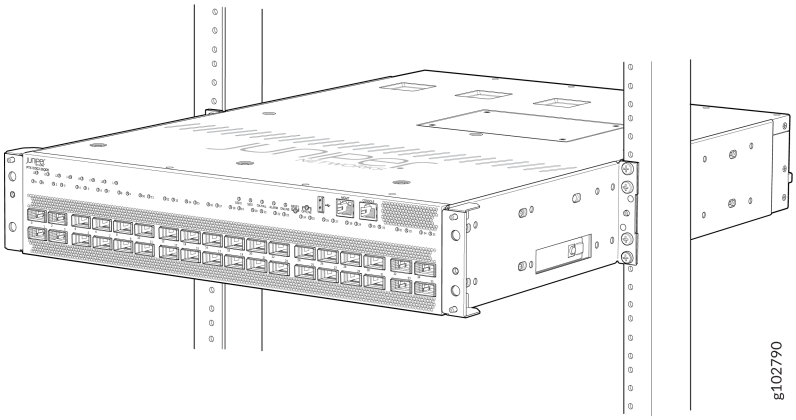
Figure 9: Router with the Brackets Attached



4. Have one person grasp both sides of the router, lift the router, and position it in the rack, aligning the holes of the C-shaped and L-shaped mounting brackets with the threaded holes in the posts of the rack. Align the bottom hole in both the mounting brackets with a hole in each rack post, making sure that the chassis is level.



5. Secure the router to the posts of the rack. Have a second person attach the mounting brackets to the rack by using the screws appropriate for your rack. Tighten the screws by using a screwdriver.



6. Ensure that the router chassis is level by verifying that all screws on one side of the rack align with the screws on the other side.

   JNP10002-4P-TL-RMK

Connect the PTX10002-36QDD to Power

IN THIS SECTION

Connect the PTX10002-36QDD to Ground

To meet safety and EMI requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power. You must use the protective earthing terminal on the router chassis to connect it to earth ground. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the router chassis to connect to the earth ground.

NOTE: An HVAC/HVDC-powered PTX10002-36QDD gains additional grounding when you plug the power supply unit (PSU) in the device into a grounded power outlet by using a power cord appropriate for your geographical location. See Table 15 on page 30.

CAUTION: Before you connect the chassis to earth ground, ensure that a licensed electrician has attached the protective earthing terminal lug (provided in the accessory kit) to the grounding cable that you supply. A cable with an incorrectly attached lug can damage the router (for example, by causing a short circuit).

NOTE: Mount the router before attaching the grounding lug to the PTX10002-36QDD. See "Unpack and Mount the PTX10002-36QDD" on page 57.

NOTE: You must install the router in a restricted-access location and ensure that the chassis is always properly grounded. The router has a two-hole protective grounding terminal on the rear panel. Under all circumstances, use this grounding connection to

ground the chassis. For HVAC/HVDC-powered systems, you must also use the grounding wire in the power cord along with the two-hole protective grounding lug connection. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.

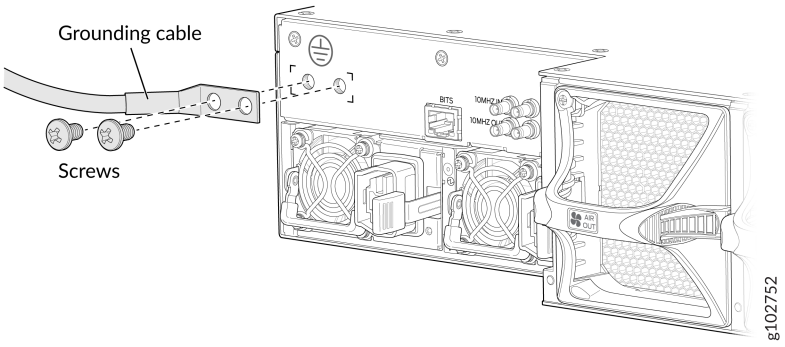
Before you connect the router to ground, ensure that you have the following parts and tools available:

- Grounding lug for your grounding cable—The grounding lug required is a Panduit LCDX4-14AH-L or equivalent—provided.
- Grounding cable—The grounding cable must be 4 AWG (25 mm^2), minimum 75° C wire, or as permitted by the local code—not provided.
- Two M6 screws and washers—not provided.
- A screwdriver appropriate for the screws—not provided.

To connect the router to ground:

1. Connect one end of the grounding cable to a proper site earth ground, such as the rack in which the router is mounted.
2. Place the grounding lug attached to the grounding cable over the protective earthing terminal on the chassis.

Figure 10: Connect a Grounding Cable to the Router



3. Secure the grounding lug to the protective earthing terminal by using the washers and screws.
4. Dress the grounding cable and ensure that it does not touch or block access to other device components and that it does not drape where people could trip over it.

Connect HVAC/HVDC Power to the PTX10002-36QDD

Before you begin connecting HVAC/HVDC power:

- Read *AC Power Electrical Safety Guidelines* and *General Safety Guidelines and Warnings*.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have connected the router chassis to earth ground (see "Connect the PTX10002-36QDD to Ground" on page 72).

> **NOTE**: An HVAC/HVDC-powered router gains additional grounding when you plug the PSU in the device into a grounded power outlet by using a power cord appropriate for your geographical location. See Table 15 on page 30.

- Install the PSU in the chassis by following the instructions in "Install a Power Supply Unit in a PTX10002-36QDD" on page 88.
- Ensure that you have the following parts and tools available:
  - An ESD grounding strap—not provided
  - A power cord appropriate for your geographical location (see Table 15 on page 30)—provided.

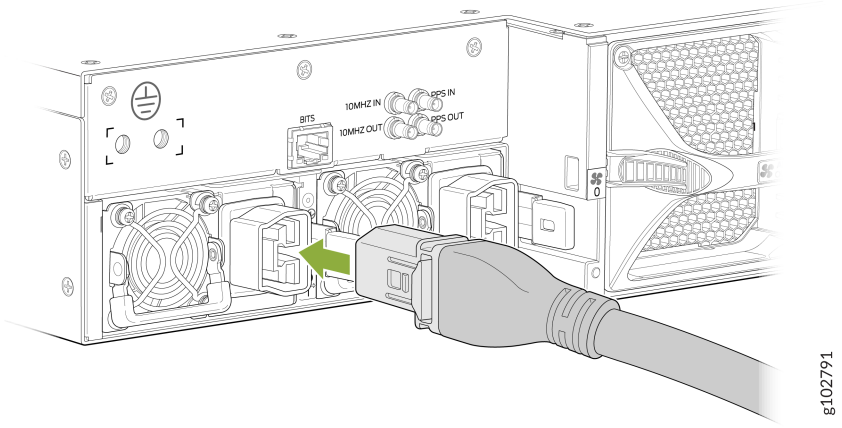
> **NOTE**: You must connect each PSU to a dedicated power source outlet.

To connect HVAC/HVDC power:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Ensure that the PSU is fully inserted in the chassis and the latches are secure.
3. Locate the power cord or cords that are appropriate for your geographical location.

> **WARNING**: Ensure that the power cord does not block access to router components or drape where people could trip over it.

4. Insert the coupler end of the power cord into the power cord inlet on the PSU faceplate.



5. If the power source outlet has a power switch, set it to the off (**O**) position.

> **NOTE**: The router powers on as soon as power is provided to the PSU. There is no power switch on the router.

6. Insert the power cord plug into a power source outlet.
7. If the power source outlet has a power switch, set it to the on (**|**) position.
8. Verify that the status LED on the PSU is lit green.

   If the status LED is lit amber, remove power from the PSU, and replace the PSU (see "Remove a Power Supply Unit from the PTX10002-36QDD" on page 85). Do not remove the PSU until you have a replacement PSU ready.

Connect DC Power to the PTX10002-36QDD

Before you begin connecting DC power:

- Read *DC Power Electrical Safety Guidelines* and *DC Power Electrical Safety Warnings*.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have connected the router chassis to earth ground (see "Connect the PTX10002-36QDD to Ground" on page 72).

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

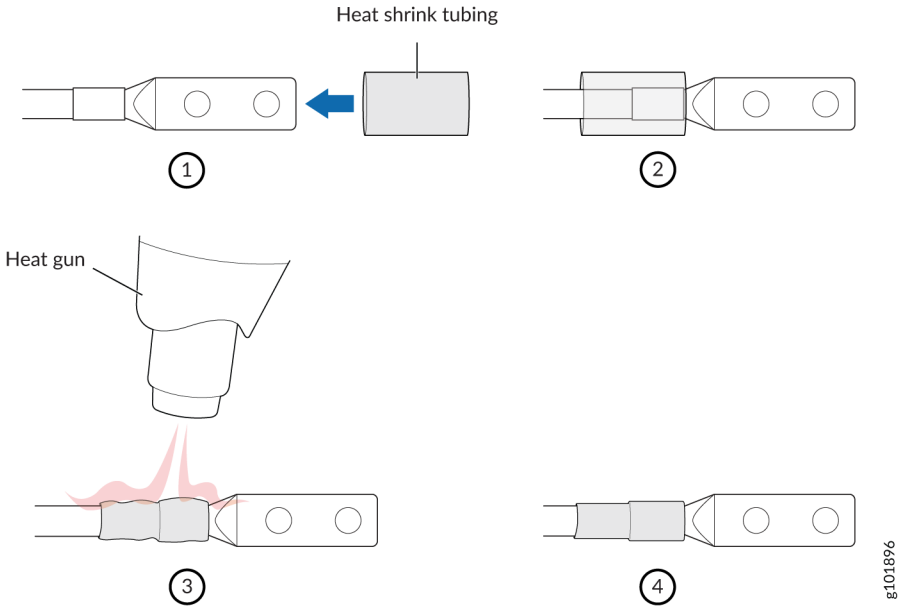
- Install the PSU in the chassis by following the instructions in "Install a Power Supply Unit in a PTX10002-36QDD" on page 88.
- Ensure that you have the following parts and tools available:
  - An ESD grounding strap—not provided
  - Power cables—The power cables must be 4 AWG (25 mm^2), minimum 75° C wire, or as permitted by the local code—not provided.
  - Power cable lugs for your power cables—The power cable lugs required is a Panduit LCD4-14AH-L or equivalent—provided.
  - A number 1 Phillips (+) screwdriver—not provided
  - Four hex nuts to secure the power cables to the terminal studs and a wrench to tighten the hex nuts—provided
  - Heat-shrink tubing and a heat gun to shrink the tubing—not provided

NOTE: You must connect each PSU to a dedicated power source outlet.

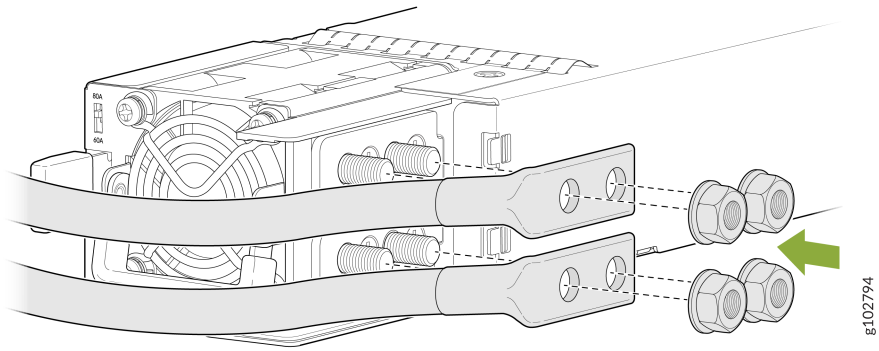
To connect DC power:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Ensure that the PSU is fully inserted in the chassis and the latches are secure.
3. Use the Phillips screwdriver to loosen the screw that secures the cable manager bracket to the PSU terminal block cover.
4. Remove the cable manager bracket to expose the terminal studs. Keep the bracket aside.
5. Install heat-shrink tubing insulation around the power cables.
   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.

NOTE: Do not overheat the tubing.



6. Connect the DC power cable lugs to the terminal studs on the DC PSU and secure the power cables by using hex nuts.



WARNING: Ensure that the power cables do not block access to device components or drape where people could trip over them.

CAUTION: You must use an appropriate wrench to tighten the hex nuts. Do not overtighten the hex nuts. Applying excessive torque damages the terminal block.

7. Use a wrench to tighten the hex nuts by applying torque up to 6 lb-in. (0.68 Nm).
8. Close the input circuit breaker.

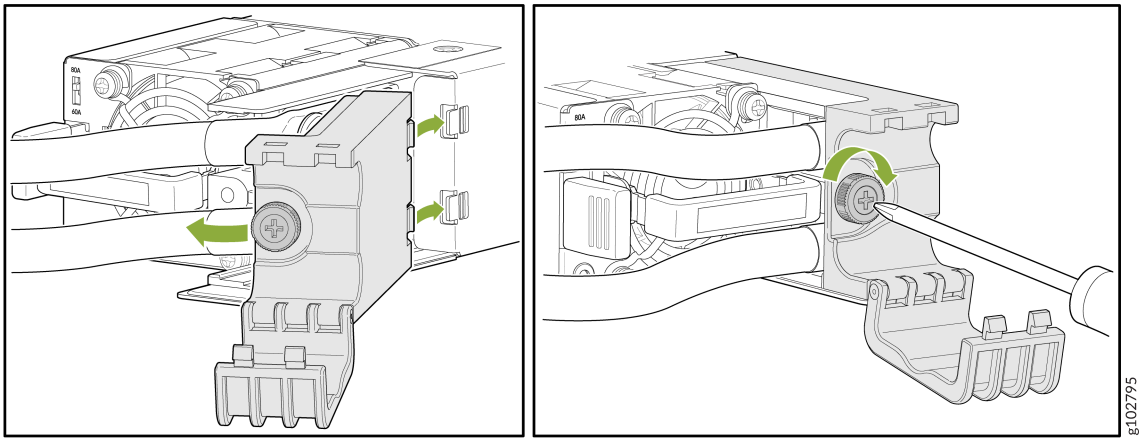
NOTE: We recommend that you equip the facility DC source with a circuit breaker as required by the local code.

NOTE: The router powers on as soon as power is provided to the PSU. There is no power switch on the router.

9. Verify that the status LED on the PSU is lit green.

   If the status LED is lit amber, remove power from the PSU, and replace the PSU (see "Remove a Power Supply Unit from the PTX10002-36QDD" on page 85). Do not remove the PSU until you have a replacement PSU ready.

10. Align the slots on the cable manager bracket with the slots on the PSU and push it in place. Gently move the bracket to the left to cover the power cables. Secure the bracket to the PSU by tightening the captive screw on the bracket by using the screwdriver.



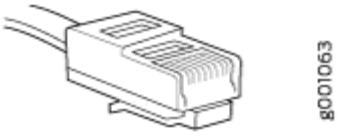
Connect the PTX10002-36QDD to External Devices

IN THIS SECTION

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

Ensure that you have an Ethernet cable that has an RJ-45 connector at either end.

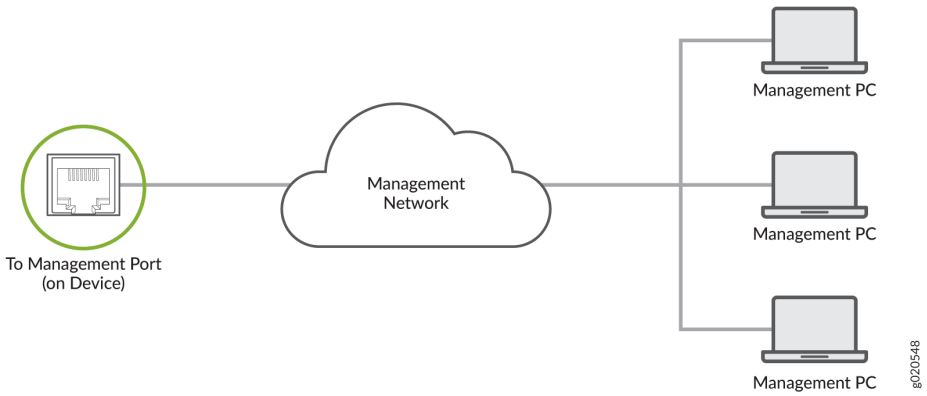
Figure 11: RJ-45 Connector on an Ethernet Cable



You can monitor and manage a network device, such as a router or a switch, by using a dedicated management channel. Each device has a management port to which you can connect an Ethernet cable with an RJ-45 connector. Use the management port to connect the device to the management device.

To connect a device to a network for out-of-band management:

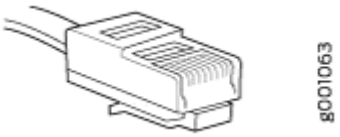
1. Connect one end of the Ethernet cable to the management port on the device.
2. Connect the other end of the Ethernet cable to the management device.



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

Ensure that you have an Ethernet cable that has an RJ-45 connector at either end and an RJ-45-to-DB-9 serial port adapter.

Figure 12: RJ-45 Connector on an Ethernet Cable



NOTE: We no longer include the RJ-45 console cable with the DB-9 adapter as part of the device package. If the console cable and adapter are not included in your device package, or if you need a different type of adapter, you can order the following separately:

- RJ-45 to DB-9 adapter (JNP-CBL-RJ45-DB9)
- RJ-45 to USB-A adapter (JNP-CBL-RJ45-USBA)
- RJ-45 to USB-C adapter (JNP-CBL-RJ45-USBC)

If you want to use RJ-45 to USB-A or RJ-45 to USB-C adapter, you must have X64 (64-Bit) Virtual COM port (VCP) driver installed on your PC. See https://ftdichip.com/drivers/vcp-drivers/ to download the driver.

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

You can configure and manage your network devices using a dedicated management channel. Each device has a console port that you can connect to using an Ethernet cable with an RJ-45 connector. Use the console port to connect the device to the console server or management console. The console port accepts a cable that has an RJ-45 connector.

To connect the device to a management console:

1. Connect one end of the Ethernet cable to the console port (labeled **CON**, **CONSOLE**, or **CON1**) on the device.
2. Connect the other end of the Ethernet cable to the console server (see Figure 13 on page 81) or management console (see Figure 14 on page 81).

Figure 13: Connect a Device to a Management Console Through a Console Server

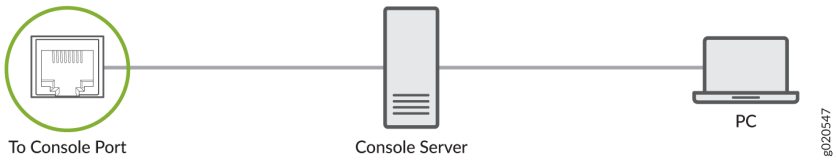


Figure 14: Connect a Device Directly to a Management Console

Perform the Initial Software Configuration for the PTX10002-36QDD

Before you begin connecting and configuring a PTX10002-36QDD, set the following parameter values on the management console or console server:

- Baud rate—9600
- Flow control—None
- Data—8
- Parity—None
- Stop bits—1
- DCD state—Disregard

You can provision the router through the console port using the CLI or through zero-touch provisioning (ZTP). To provision the router using ZTP, you'll need 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.

To connect and configure the router using the CLI:

1. Connect the console port to a laptop or PC by using the supplied RJ-45 cable and RJ-45 to DB-9 adapter. The console port (labeled **CON**) is located on the management panel of the router (see "Connect a Device to a Management Console Using an RJ-45 Connector" on page 79 for more information).

   > **NOTE**: We no longer include the RJ-45 console cable with the DB-9 adapter as part of the device package. If the console cable and adapter are not included in your device package, or if you need a different type of adapter, you can order the following separately:
   >
   > - RJ-45 to DB-9 adapter (JNP-CBL-RJ45-DB9)
   > - RJ-45 to USB-A adapter (JNP-CBL-RJ45-USBA)
   > - RJ-45 to USB-C adapter (JNP-CBL-RJ45-USBC)
   >
   > If you want to use RJ-45 to USB-A or RJ-45 to USB-C adapter, you must have X64 (64-Bit) Virtual COM port (VCP) driver installed on your PC. See https://ftdichip.com/drivers/vcp-drivers/ to download the driver.

2. Log in as **root**. There is no password. If the software boots before you connect to the console port, you might need to press the Enter key for the prompt to appear.

```
login: root
```

3. Start the CLI.

```
root@% cli
```

4. Enter configuration mode.

```
root> configure
```

5. 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
```

6. (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
```

7. Configure the default gateway.

```
[edit]
root@# set routing-options static route default next-hop address
```

8. Configure the IP address and prefix length for the management interface.

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

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

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

10. Enable the Telnet service.

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

NOTE: When Telnet is enabled, you cannot log in to the router through Telnet by using root credentials. Root login is allowed only for SSH access.

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

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

5

CHAPTER

Remove, Install, and Maintain Components

Maintain the PTX10002-36QDD Power Supply Units

IN THIS SECTION

Remove a Power Supply Unit from the PTX10002-36QDD

We ship the router with 1+1 redundant power supply units PSUs preinstalled in the rear panel. The PSUs are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the router or disrupting router functions.

Before you remove a PSU, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).

Ensure that you have the following parts and tools available:

- An ESD grounding strap—not provided
- An antistatic bag or an antistatic mat—not provided
- A number 1 Phillips (+) screwdriver—not provided
- If you are removing a DC PSU, a wrench to loosen the hex nuts that secure the power cable lugs to the PSU—not provided

CAUTION: Replace the PSU within 30 seconds of removal to prevent chassis overheating. Before removing the PSU, ensure you have a replacement PSU available. Both the PSUs must be present in the chassis for the normal operation of the router.

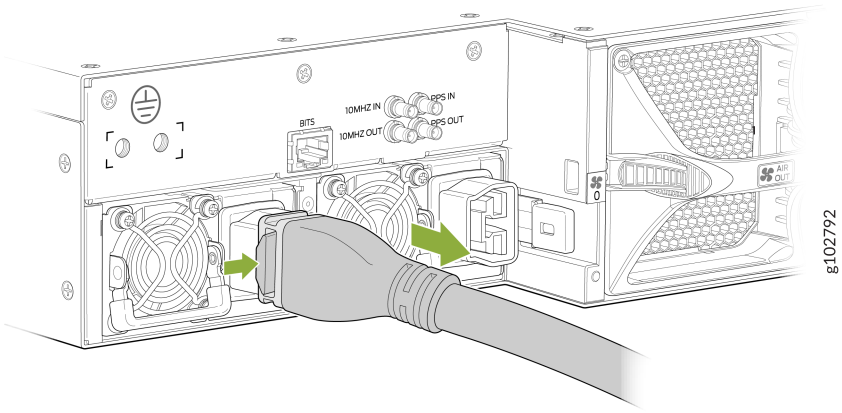
To remove a PSU:

1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.

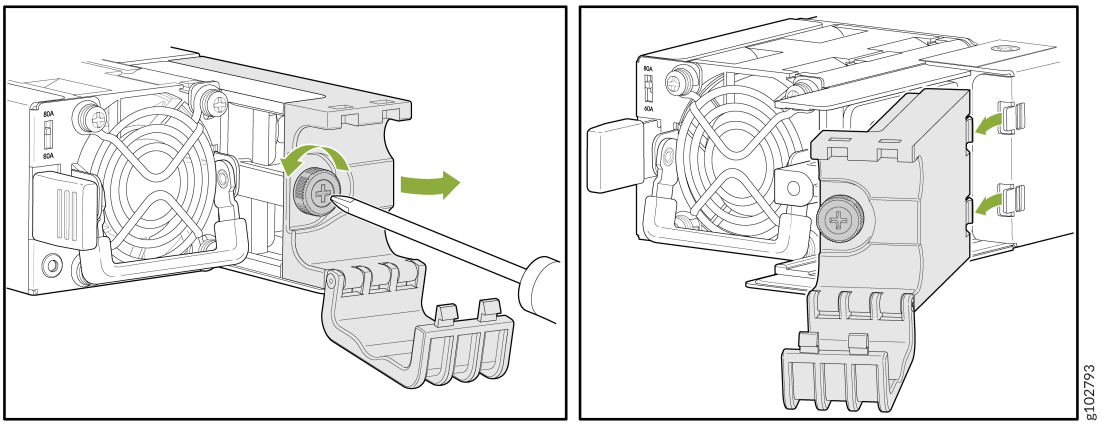
3. Disconnect power to the PSU:
   - HVAC/HVDC PSU—If the power source outlet has a power switch, set it to the off (**O**) position.
   - DC PSU—Switch the circuit breaker on the panel board that services the DC circuit to the off position.

> **NOTE**: If you need to remove all the PSUs installed in the router, you must power off the router before removing the PSUs. See "Power Off the PTX10002-36QDD Router" on page 116.

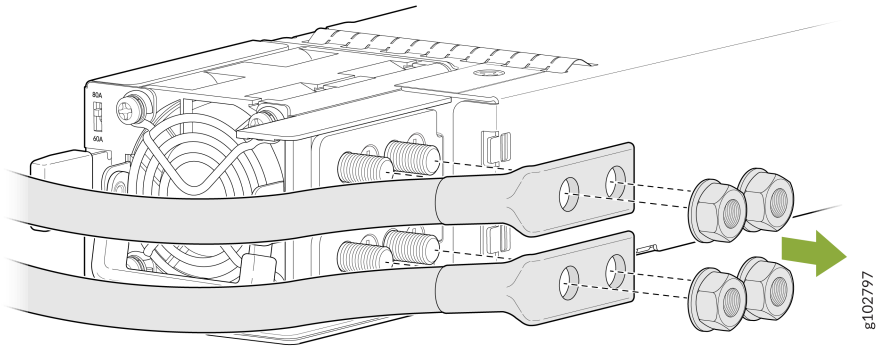
4. Remove the power source cable from the PSU faceplate:
   - HVAC/HVDC PSU—Gently pull out the socket end of the power plug connected to the PSU faceplate.



   - DC PSU
     - Use a number 1 Phillips (+) screwdriver to loosen the screws that secure the cable manager bracket to the PSU. Gently move the bracket to the right and pull it out.

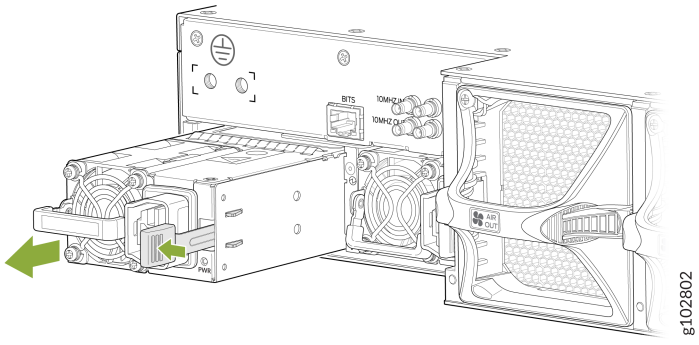


- Use a wrench to loosen the hex nuts that secure the power cable lugs to the PSU and remove the cables.

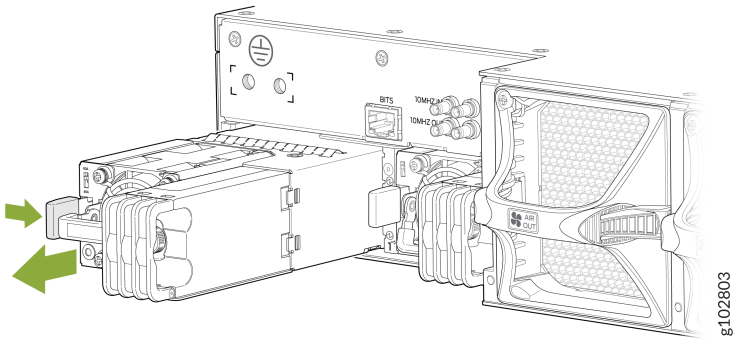


5. Pull the PSU out of the chassis:

   - HVAC/HVDC PSU—Push the locking lever toward the handle. Grasp the PSU handle and pull firmly to slide the PSU halfway out of the chassis.



- DC PSU—Push the locking lever toward the handle. Grasp the PSU handle and pull firmly to slide the PSU halfway out of the chassis.



6. Place one hand under the PSU to support it and slide it completely out of the chassis. Take care not to touch PSU components, pins, leads, or solder connections.
7. Place the PSU in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

Install a Power Supply Unit in a PTX10002-36QDD

We ship the router with 1+1 redundant PSUs preinstalled in the rear panel. The PSUs are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the router or disrupting router functions.

- Before you install a PSU in the router, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have an ESD grounding strap.
- If the PSU has protective plastic wrap, peel and remove the plastic wrap from all sides of the PSU.

CAUTION: You must not mix:

- HVAC/HVDC and DC PSUs in the same chassis.
- 2200-W and 3000-W PSUs in the same chassis.

WARNING: You must install the router in a restricted-access location and ensure that the chassis is always properly grounded.

To install a PSU:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Taking care not to touch PSU components, pins, leads, or solder connections, remove the PSU from its bag.
3. If the PSU has protective plastic wrap, peel and remove the plastic wrap from all sides of the PSU.
4. Using both hands, place the PSU in PSU slot on the rear panel and slide it in until it is fully seated and the locking lever slides into place.

Figure 15: Install an HVAC/HVDC PSU

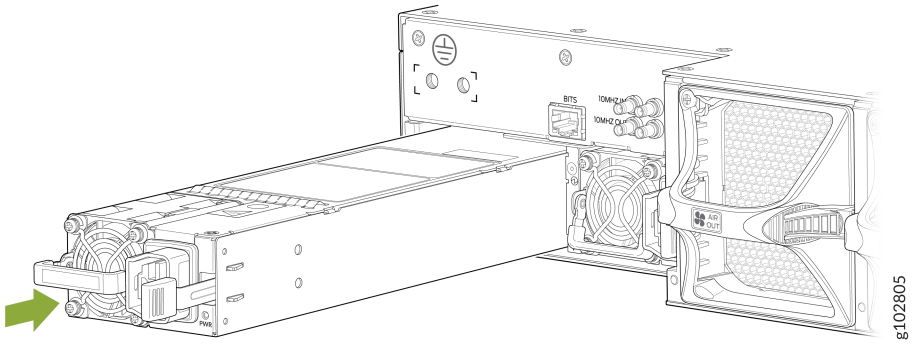
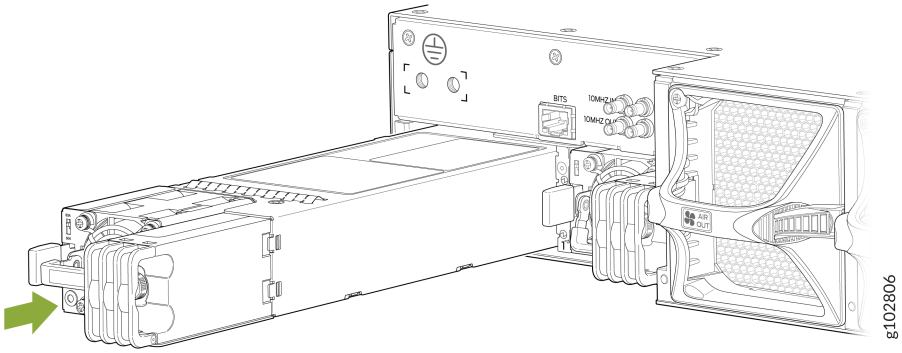


Figure 16: Install a DC PSU



NOTE: You must connect each PSU to a dedicated power source outlet.

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 existing components with the same type of component.

Maintain the PTX10002-36QDD Cooling System

IN THIS SECTION

Remove a Fan Module from the PTX10002-36QDD

We ship the router with 2+1 redundant fan modules preinstalled in the rear panel. The fan modules are hot-removable and hot-insertable field-replaceable units (FRUs): You can remove and replace them without powering off the router or disrupting router functions.

Before you remove a fan module, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).

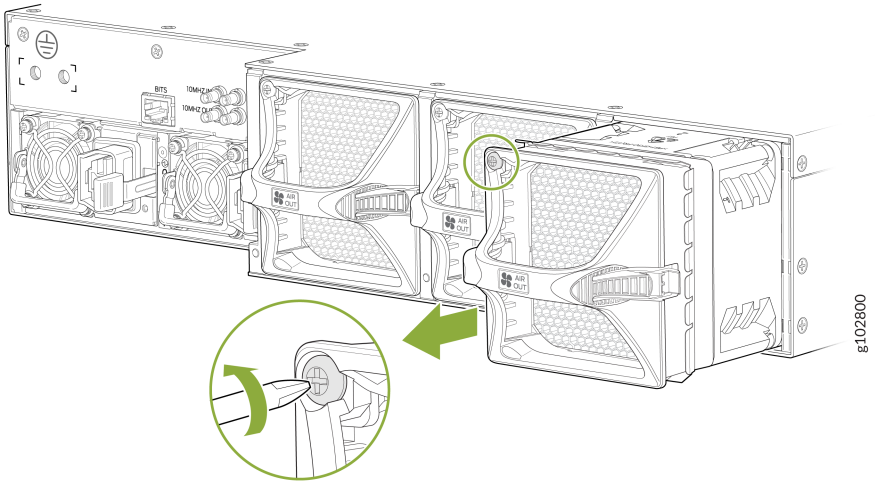
Ensure that you have the following parts and tools available:

- An ESD grounding strap—not provided
- An antistatic bag or an antistatic mat—not provided
- A number 1 Phillips (+) screwdriver—not provided
- A replacement fan module

CAUTION: Replace the fan module within 120 seconds of removal to prevent components in the chassis from overheating and shutting down. If you replace a fan module when the ambient temperature is below 96.8° F (36° C) and the power drawn by each transceiver installed in the router is below 25 W, none of the transceivers would shut down due to overheating. Before removing the fan module, ensure you have a replacement fan module available.

To remove a fan module:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Place the antistatic bag or the antistatic mat on a flat, stable surface.
3. Using the Phillips screwdriver, loosen the locking screw (3 or 4 turns to the left).



4. Grasp the handle on the fan module and squeeze the outside of the handle to release the module.

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

5. Pull firmly to slide the fan module halfway out of the chassis.
6. When the fan stops spinning, slide the fan module completely out of the chassis.
7. Place the fan module in the antistatic bag or on the antistatic mat.

NOTE: When a fan module is removed, the CLI message `Fan/Blower is Absent` is logged in the system log, and the system raises a major alarm.

Install a Fan Module in the PTX10002-36QDD

We ship the router with 2+1 redundant fan modules preinstalled in the rear panel. The fan modules are hot-removable and hot-insertable field-replaceable units (FRUs) installed in the rear panel: You can remove and replace them without powering off the router or disrupting router functions.

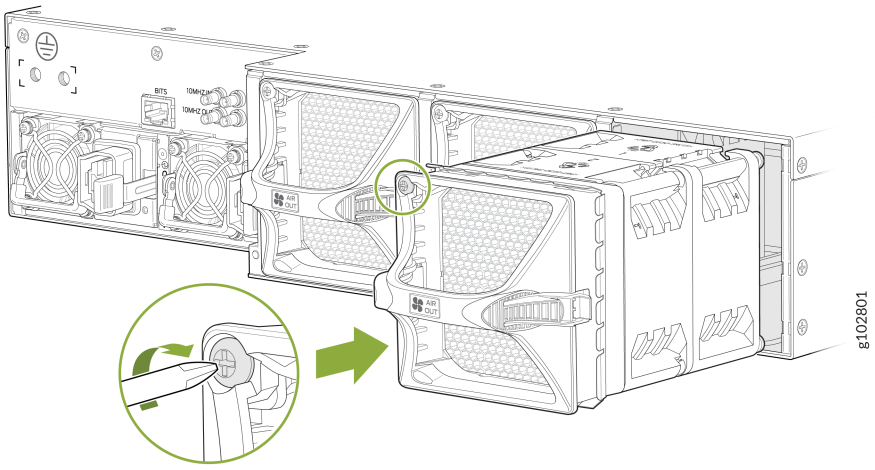
Before you install a fan module, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).

Ensure that you have the following parts and tools available:

- An ESD grounding strap—not provided
- A number 1 Phillips (+) screwdriver—not provided

To install a fan module:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Taking care not to touch the connectors, remove the fan module from its bag.
3. Align the module with the open fan module slot on the rear panel of the router and slide it in until it is fully seated.



4. Using the Phillips screwdriver, tighten the locking screw (3 or 4 turns to the right).

Maintain the PTX10002-36QDD Solid-State Drive

IN THIS SECTION

Remove a Solid-State Drive from the PTX10002-36QDD

We ship the PTX10002-36QDD with two solid-state drives (SSDs) preinstalled.

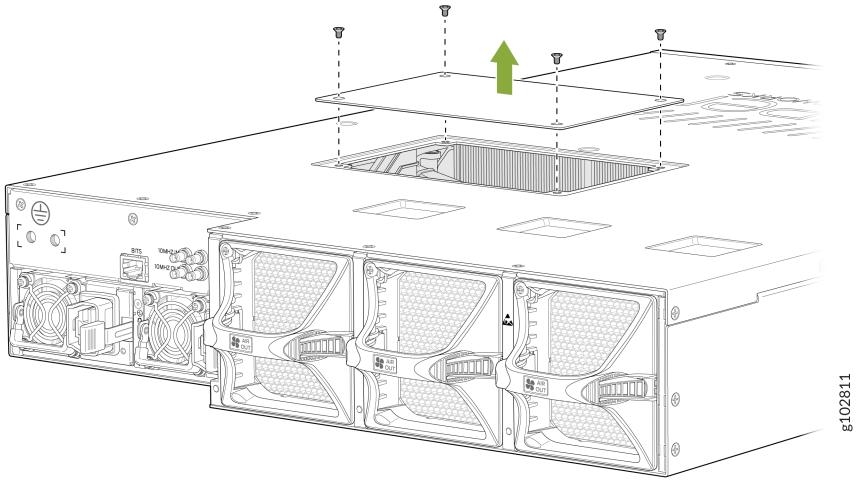
Before you remove an SSD from a PTX10002-36QDD, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).

Ensure that you have the following parts and tools available:

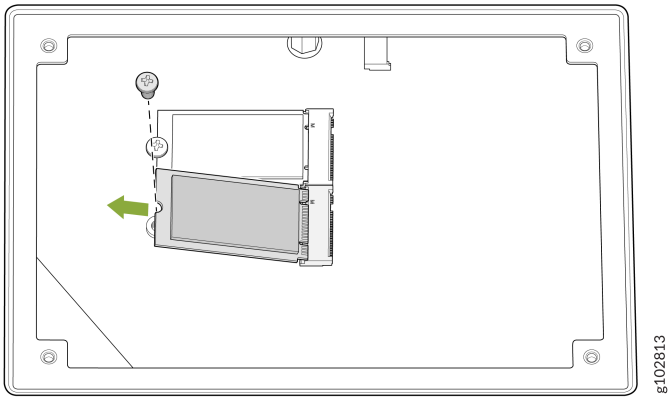
- An ESD grounding strap—not provided
- An antistatic bag or an antistatic mat—not provided
- A number 1 Phillips (+) screwdriver—not provided

To remove an SSD:

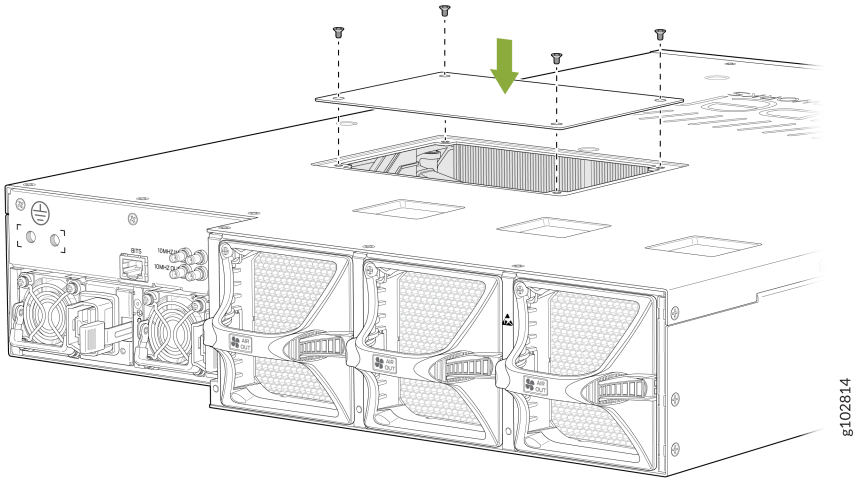
1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Place the antistatic bag or the antistatic mat on a flat, stable surface.
3. Power off the router (see "Power Off the PTX10002-36QDD Router" on page 116).
4. Using the Phillips screwdriver, loosen the screws (3 or 4 turns to the left) that secure the SSD slot cover on the top panel of the chassis.



5. Using the Phillips screwdriver, loosen the screw (3 or 4 turns to the left) that secures the SSD.



6. Gently pull the SSD out of the chassis.
7. Place the SSD in the antistatic bag or on the antistatic mat.
8. If you do not plan to replace the SSD, replace the SSD slot cover.



9. Tighten the screws (3 or 4 turns to the right) to secure the SSD slot cover to the chassis by using the screwdriver.

Install a Solid-State Drive in the PTX10002-36QDD

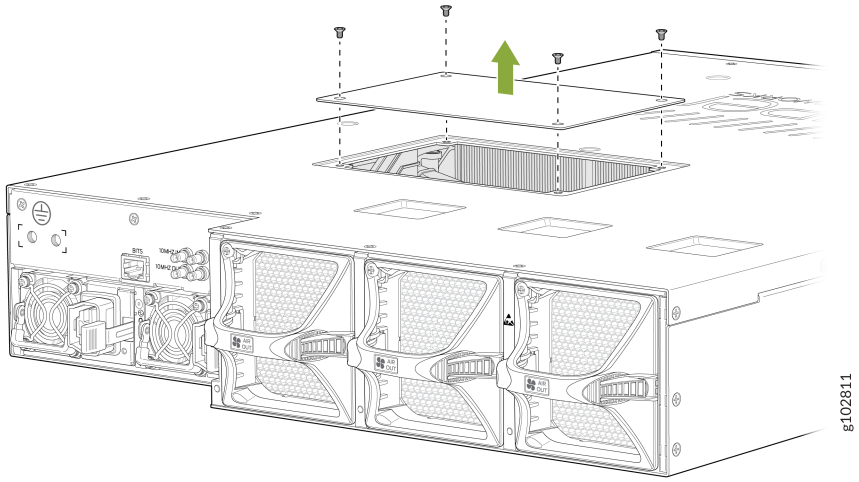
Before you install an SSD, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).

Ensure that you have the following parts and tools available:

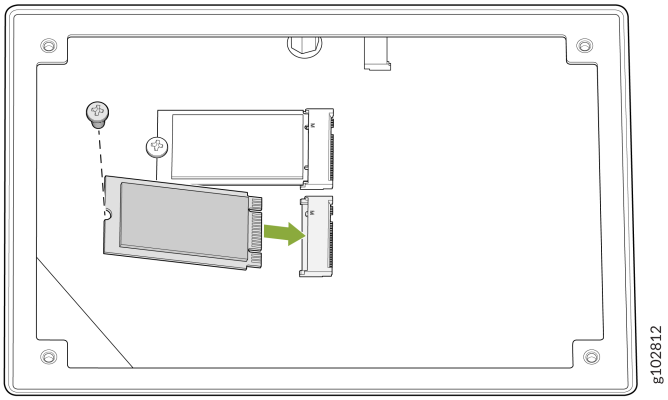
- An ESD grounding strap—not provided
- A number 1 Phillips (+) screwdriver—not provided

To install an SSD:

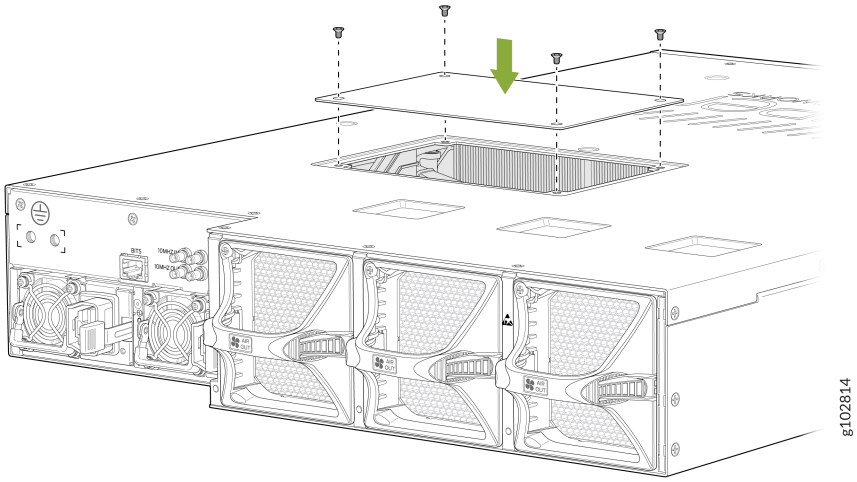
1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Using the Phillips screwdriver, loosen the screws (3 or 4 turns to the left) that secure the SSD slot cover on the top panel of the chassis.



3. Taking care not to touch the connectors, remove the SSD from its bag.
4. Align the SSD with the open slot in the PTX10002-36QDD and slide it in until it is fully seated.



5. Using the Phillips screwdriver, tighten the screw (3 or 4 turns to the right) to secure the SSD to the chassis.
6. Replace the SSD cover slot cover.



7. Tighten the screws (3 or 4 turns to the right) to secure the SSD slot cover to the chassis by using the screwdriver.

Maintain the PTX10002-36QDD Transceivers and Fiber-Optic Cables

IN THIS SECTION

Remove a Transceiver

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

Ensure that you have the following parts and tools available:

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

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

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

Figure 17 on page 99 shows how to remove a quad small form-factor pluggable plus (QSFP+) transceiver. The procedure is the same for all types of transceivers except the QSFP28 and C form-factor pluggable (CFP) transceivers.

To remove a transceiver from a device:

1. Place the antistatic bag or antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the rack.
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 protects your eyes from accidental exposure to laser light.

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

4. Remove the cable connected to the transceiver (see Disconnect a Fiber-Optic Cable). Cover the transceiver and the end of each fiber-optic cable connector with a rubber safety cap immediately after disconnecting the fiber-optic cables.

5. If there is a cable management system, arrange the cable in the cable management system to prevent it from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the cable management system. Placing fasteners on the loop helps to maintain its shape.
6. To remove an SFP56-DD, SFP, SFP+, XFP, a QSFP+, or QSFP56-DD transceiver:
   a. Using your fingers, pull open the ejector lever on the transceiver to unlock the transceiver.

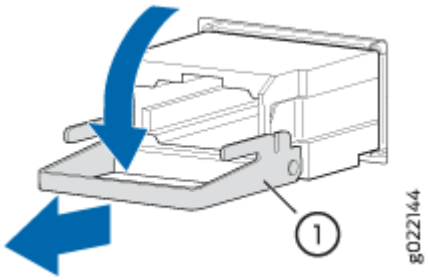
      Note that QSFP-DD and SFP-DD transceivers don't have ejector levers, instead they have a pull tab which can be used to unlock and remove the transceiver.

      CAUTION: Before removing the transceiver, make sure that you open the ejector lever completely until you hear it click. This precaution prevents damage to the transceiver.

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

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

Figure 17: Remove a QSFP+ Transceiver



1– Ejector lever

To remove a CFP transceiver:

a. Using your fingers, loosen the screws on the transceiver.

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

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

7. Using your fingers, grasp the body of the transceiver and pull it straight out of the port.
8. Place the transceiver in the antistatic bag or on the antistatic mat placed on a flat, stable surface.
9. Place the dust cover over the empty port, or install the replacement transceiver.

Install a Transceiver

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

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

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

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

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

CAUTION: 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.

Figure 18 on page 103 shows how to install a QSFP+ transceiver. The procedure is the same for all types of transceivers except the QSFP28 and CFP transceivers.

To install a transceiver:

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

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point or to the ESD point on the device.
2. Remove the transceiver from its bag.
3. Check to see whether the transceiver is covered with a rubber safety cap. If it is not, cover the transceiver with a rubber safety cap.

   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 protects your eyes from accidental exposure to laser light.

4. If the port in which you want to install the transceiver is covered with a dust cover, remove the dust cover and save it in case you need to cover the port later. If you are hot-swapping a transceiver, wait for at least 10 seconds after removing the transceiver from the port before installing a new transceiver.
5. Using both hands, carefully place the transceiver in the empty port. The connectors must face the chassis.

   CAUTION: Before you slide the transceiver into the port, ensure that the transceiver is aligned correctly. Misalignment might cause the pins to bend, making the transceiver unusable.

6. Slide the transceiver in gently until it is fully seated. If you are installing a CFP transceiver, use your fingers to tighten the captive screws on the transceiver.
7. Remove the rubber safety cap from the transceiver and the end of the cable, and insert the cable into 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 cable connected to a transceiver emit laser light that can damage your eyes.

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

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

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

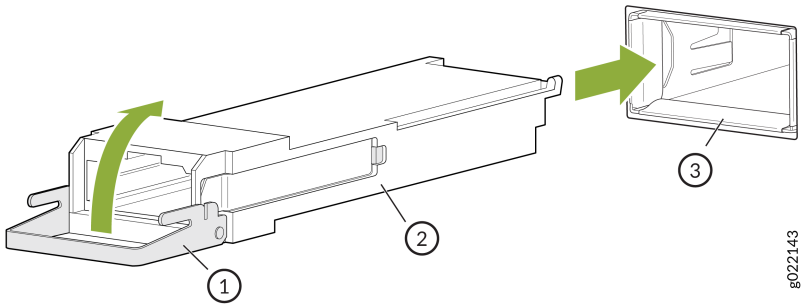
CAUTION: Avoid bending the fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

NOTE: When you install SFP-DD transceivers, push it hard until you hear a click sound. Use a long nose plier to pull the SFP-DD transceiver connected on the top and bottom rows of the chassis where the pull tabs face each other.

NOTE: Make sure to use a dust cap to cover ports that are unused.

NOTE: While using Finisar AOC SFP+ optical module with the QFX5130-48C switch, you may need to pull the module upwards to pull out the module smoothly from the cage.

Figure 18: Install a Transceiver



1– Ejector lever	3– Port
2– Transceiver	

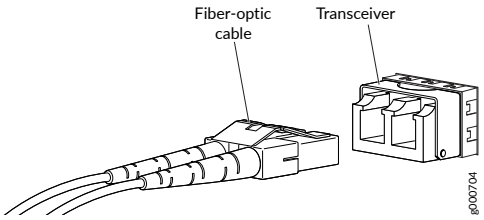
Connect a Fiber-Optic Cable

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

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

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.

1. If the fiber-optic cable connector is covered with a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the optical transceiver. Save the cap.
3. Insert the cable connector into the optical transceiver.



4. Secure the cables so that they do not support their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.

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

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

Disconnect a Fiber-Optic Cable

Before you disconnect a fiber-optic cable from an optical transceiver, ensure that you have taken the necessary precautions for safe handling of lasers. See *Laser and LED Safety Guidelines and Warnings*.

Ensure that you have the following parts and tools available:

- A rubber safety cap to cover the transceiver
- A rubber safety cap to cover the fiber-optic cable connector

Juniper Networks devices have optical transceivers to which you can connect fiber-optic cables.

To disconnect a fiber-optic cable from an optical transceiver installed in the device:

1. Disable the port in which the transceiver is installed by issuing the following command:

```
[edit interfaces]
user@device# set interface-name disable
```

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.

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 protects your eyes from accidental exposure to laser light.

4. Cover the fiber-optic cable connector with the rubber safety cap.

How to Handle Fiber-Optic Cables

Fiber-optic cables connect to optical transceivers that are installed in Juniper Networks devices.

Follow these guidelines when handling fiber-optic cables:

- When you unplug a fiber-optic cable from a transceiver, place rubber safety caps over the transceiver and on the end of the cable.
- Anchor fiber-optic cables to prevent stress on the connectors. When attaching a fiber-optic cable to a transceiver, be sure to secure the fiber-optic cable so that it does not support its own weight as it hangs to the floor. Never let a fiber-optic cable hang free from the connector.
- Avoid bending the fiber-optic cables beyond their minimum bend radius. Bending fiber-optic cables into arcs smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.
- Frequent plugging and unplugging of fiber-optic cables in and out of optical instruments can damage the instruments, which are expensive to repair. To prevent damage from overuse, attach a short fiber extension to the optical equipment. The short fiber extension absorbs wear and tear due to frequent plugging and unplugging. Replacing the short fiber extension is easier and cost efficient compared with replacing the instruments.
- Keep fiber-optic cable connections clean. Microdeposits of oil and dust in the canal of the transceiver or cable connector can cause loss of light, reduction in signal power, and possibly intermittent problems with the optical connection.
  - To clean the transceiver canal, use an appropriate fiber-cleaning device such as RIFOCS Fiber Optic Adaptor Cleaning Wands (part number 946). Follow the instructions in the cleaning kit you use.
  - After cleaning the transceiver, make sure that the connector tip of the fiber-optic cable is clean. Use only an approved alcohol-free fiber-optic cable cleaning kit such as the Opptex Cletop-S®Fiber Cleaner. Follow the instructions in the cleaning kit you use.

Maintain Active Optical Cables

IN THIS SECTION

An active optical cable (AOC) is an optical fiber cable that has a transceiver preattached to each end.

Disconnect an Active Optical Cable

Before you disconnect an active optical cable (AOC) from a device, ensure that you have taken the necessary precautions for safe handling of laser (see Laser and LED Safety Guidelines and Warnings).

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat to store the cable, if you are disconnecting the cable from all the ports it is connected to
- Rubber safety caps to cover the ports on the device, or a replacement cable
- Rubber safety caps to cover the transceivers at the ends of the cable
- An electrostatic discharge (ESD) grounding strap—not provided

To disconnect an active optical cable:

1. Disable the port to which the cable is connected by issuing the following command:

```
[edit interfaces]
user@device# set interface-name disable
```

2. Place the antistatic bag or antistatic mat on a flat, stable surface if you are disconnecting the cable from both the ports it is connected to.
3. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
4. Label the cable so that you can reconnect it correctly.

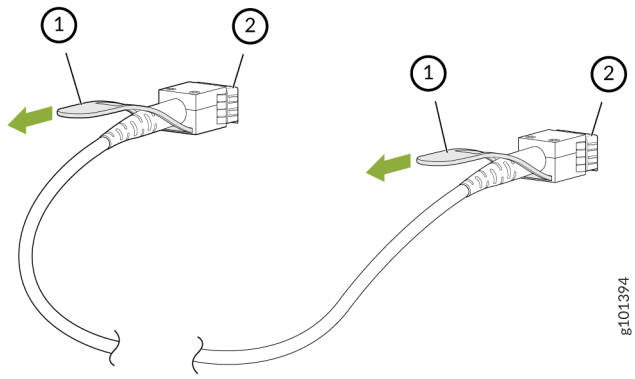
CAUTION: Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

Do not bend the cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let the cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

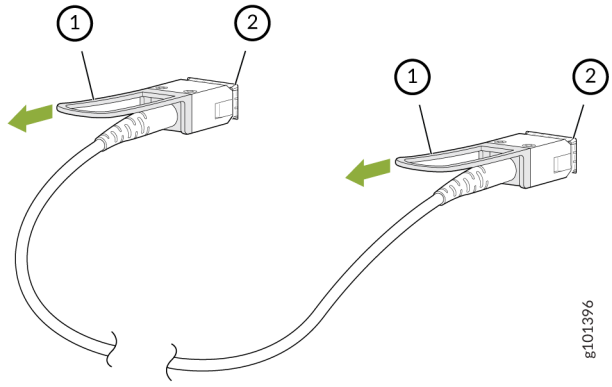
5. By using your fingers, pull the tab on the transceiver attached to the cable to disengage it.

Figure 19: Disconnect an SFP28 or SFP+ Active Optical Cable



1– Tab to pull the transceiver	2– Port on the device

Figure 20: Disconnect a QSFP28 or QSFP+ Active Optical Cable



1– Tab to pull the transceiver	2– Port on the device

6. Grasp the transceiver and gently slide it approximately 0.5 in. (1.3 cm) straight out of the port.

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

7. By using your fingers, grasp the body of the transceiver and pull it straight out of the port.
8. Cover the transceiver with a rubber safety cap.
9. If you are disconnecting the cable from both the ports it is connected to, place the cable in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

The procedure to disconnect other types of AOCs, other than direct attach AOCs, is the same as the procedure described in this topic.

Connect an Active Optical Cable

Before you connect an AOC to a device, ensure that you have taken the necessary precautions for safe handling of lasers (see Laser and LED Safety Guidelines and Warnings).

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

Ensure that you have an ESD grounding strap (not provided).

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

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

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

To connect an active optical cable:

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

2. Remove the cable from its bag.

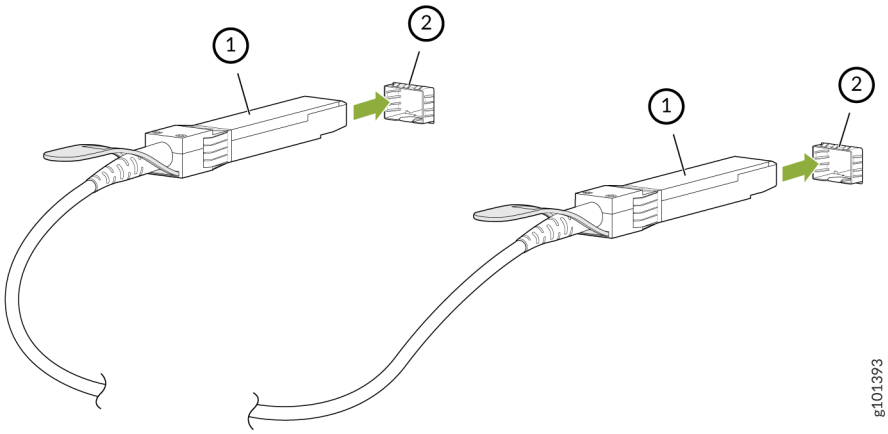
> **CAUTION**: Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

3. If the transceiver attached to the cable is covered with a rubber safety cap, remove the cap. Save the cap.
4. If the port on the device is covered with a rubber safety cap, remove the cap. Save the cap. If you are hot-swapping a cable, wait for at least 10 seconds after removing the cable from the port before installing a new cable.

> **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 cable unusable.
>
> Do not bend the cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.
>
> Do not let the cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

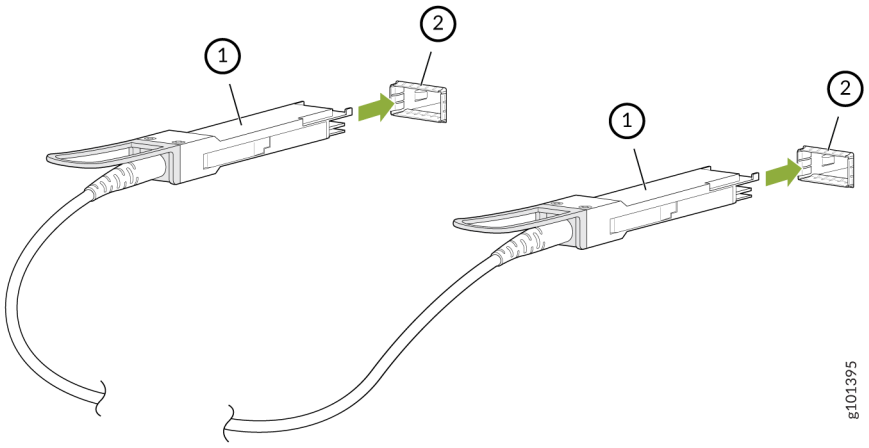
5. By using both hands, carefully insert the transceiver in the empty port. The connectors must face the chassis. Slide the transceiver in gently until it is fully seated.

Figure 21: Connect an SFP28 or SFP+ Active Optical Cable



1– Transceiver	2– Port on the device

Figure 22: Connect a QSFP28 or QSFP+ Active Optical Cable



1– Transceiver	2– Port on the device

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

The procedure to connect other types of AOCs, other than direct attach AOCs, is the same as the procedure described in this topic.

Maintain Direct Attach Cables

IN THIS SECTION

A direct attach cable has a transceiver preattached to each end.

Disconnect a Direct Attach Cable

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat to store the cable, if you are disconnecting the cable from both the ports it is connected to
- Rubber safety caps to cover the ports on the device, or a replacement cable
- Rubber safety caps to cover the transceivers at the ends of the cable
- An electrostatic discharge (ESD) grounding strap—not provided

To disconnect a direct attach cable:

1. Disable the port to which the cable is connected by issuing the following command:

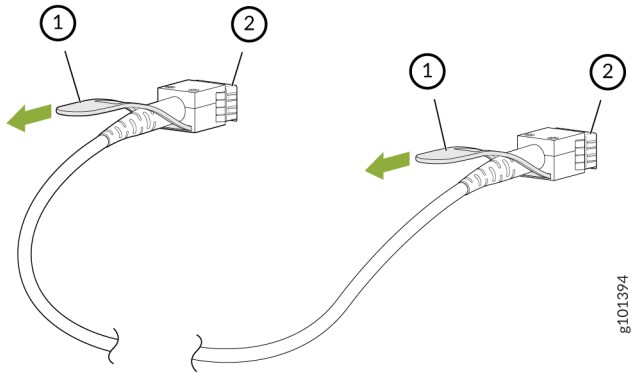
```
[edit interfaces]
user@device# set interface-name disable
```

2. Place the antistatic bag or antistatic mat on a flat, stable surface if you are disconnecting the cable from both the ports it is connected to.
3. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
4. Label the cable so that you can reconnect it correctly.

> ⚠ **CAUTION**: Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.
>
> Do not bend the cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.
>
> Do not let the cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

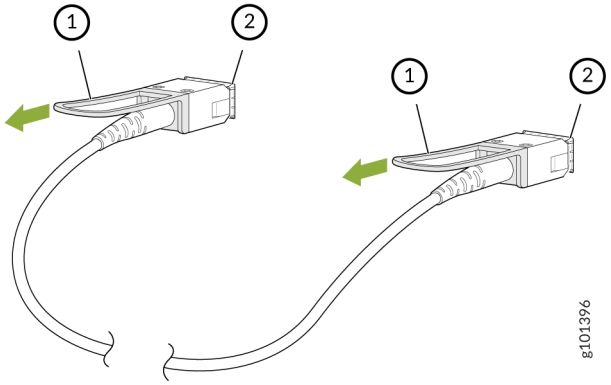
5. By using your fingers, pull the tab on the transceiver attached to the cable to disengage it.

Figure 23: Disconnect an SFP28 or SFP+ Direct Attach Cable



1– Tab to pull the transceiver	2– Port on the device

Figure 24: Disconnect a SFP28, SFP+, or QSFP-DD Direct Attach Cable



1– Tab to pull the transceiver	2– Port on the device

6. Grasp the transceiver and gently slide it approximately 0.5 in. (1.3 cm) straight out of the port.

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

7. By using your fingers, grasp the body of the transceiver and pull it straight out of the port.
8. Cover the transceiver with a rubber safety cap.
9. If you are disconnecting the cable from both the ports it is connected to, place the cable in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

The procedure to disconnect other types of direct attach cables, other than direct attach breakout cables, is the same as the procedure described in this topic.

Connect a Direct Attach Cable

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

Ensure that you have an ESD grounding strap (not provided).

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

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

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

To connect a direct attach cable:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
2. Remove the cable from its bag.

   CAUTION: Do not leave the transceivers at the ends of the cable uncovered except when connecting or disconnecting the cable. The rubber safety cap keeps the transceivers clean and protected.

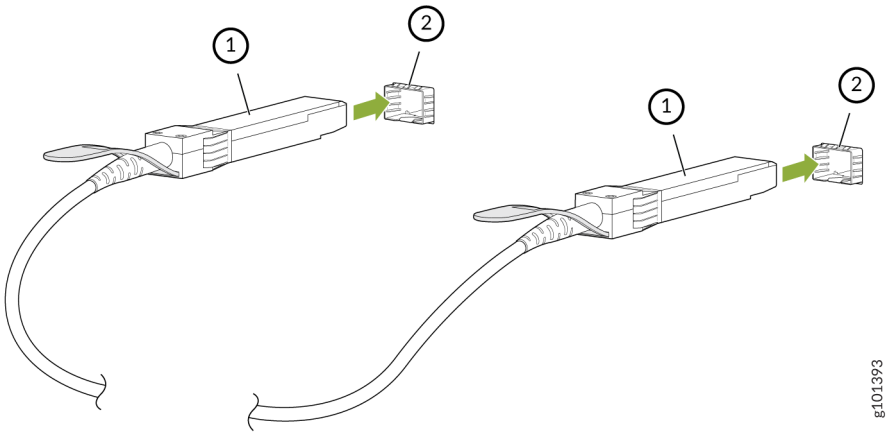
3. If the transceiver attached to the cable is covered with a rubber safety cap, remove the cap. Save the cap.

4. If the port on the device is covered with a rubber safety cap, remove the cap. Save the cap. If you are hot-swapping a cable, wait for at least 10 seconds after removing the cable from the port before installing a new cable.

> **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 cable unusable.
>
> Do not bend the cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.
>
> Do not let the cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

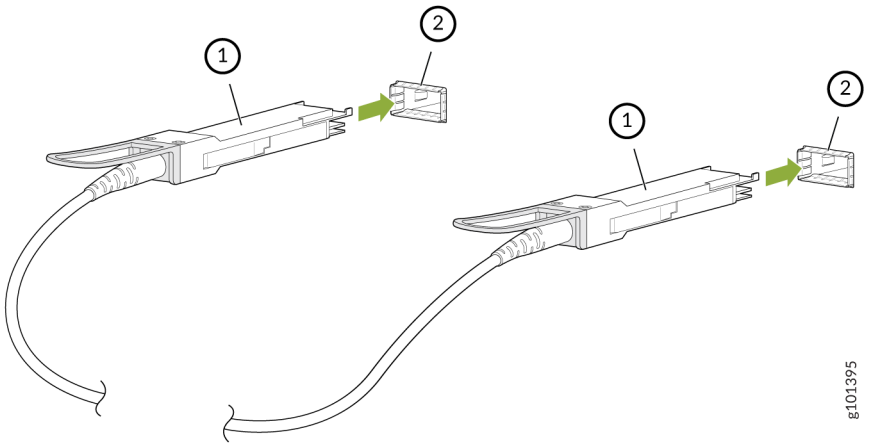
5. By using both hands, carefully insert the transceiver in the empty port. The connectors must face the chassis. Slide the transceiver in gently until it is fully seated.

Figure 25: Connect an SFP28 or SFP+ Direct Attach Cable



1– Transceiver	2– Port on the device

Figure 26: Connect a SFP28, SFP+, or QSFP-DD Direct Attach Cable



1– Transceiver	2– Port on the device

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

The procedure to connect other types of direct attach cables, other than direct attach breakout cables, is the same as the procedure described in this topic.

Power Off and Remove the PTX10002-36QDD Router

IN THIS SECTION

Power Off the PTX10002-36QDD Router

Before you power off the router:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See *Prevention of Electrostatic Discharge Damage*.
- Ensure that you do not need to route traffic through the router.
- Ensure that you have the following parts and tools available:
  - An ESD grounding strap—not provided
  - An external management device such as a PC—not provided
  - An RJ-45 to DB-9 rollover cable to connect the external management device to the console port —not provided

To power off the router:

1. Connect to the router by using one of the following methods:
   - Connect a management device to the console (**CON**) port on the router by following the instructions in "Connect a Device to a Management Console Using an RJ-45 Connector" on page 79.
   - Connect a management device to the management (**MGMT**) port by following the instructions in "Connect a Device to a Network for Out-of-Band Management" on page 79.
2. Shut down the router by issuing the `request node power-off (Junos OS Evolved)` command from the external management device.

   CAUTION: The LEDs on the power supply units (PSUs) remain lit and a fan module continues to run until the traffic and the operating system have stopped. Wait for at least 60 seconds after first seeing this message before following the instructions in Step 4.
3. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
4. Disconnect power and remove the power source cables from the PSU faceplate. See "Remove a Power Supply Unit from the PTX10002-36QDD" on page 85.

Remove a PTX10002-36QDD Router from a Rack

Before removing the router from a rack:

Ensure that you have the following parts and tools available:

- A screwdriver appropriate to remove your rack-mounting screws—not provided.
- Antistatic bags to store the router—not provided.

> **NOTE**: When you remove multiple devices from a rack, remove the device at the top of the rack first and proceed to remove the rest of the devices from top to bottom to avoid toppling the 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.
- Read *General Safety Guidelines and Warnings* and *Chassis and Component Lifting Guidelines*.
- Power off the router.
- Ensure that you have disconnected all the cables or wires attached to the router.
- Have one person to support the weight of the router and another person to remove the screws that secure the router to the rack.

To remove the router from a rack:

1. Have one person support the weight of the router.
2. Have another person remove the screws that secure the router to the the rack posts. If the router is installed on a four-post rack, press the latch on the mounting brackets to disengage the brackets from the rails. See Figure 27 on page 118, Figure 28 on page 118, and Figure 29 on page 119.

Figure 27: Remove the Router from a Four-Post Rack with Square Hole Posts

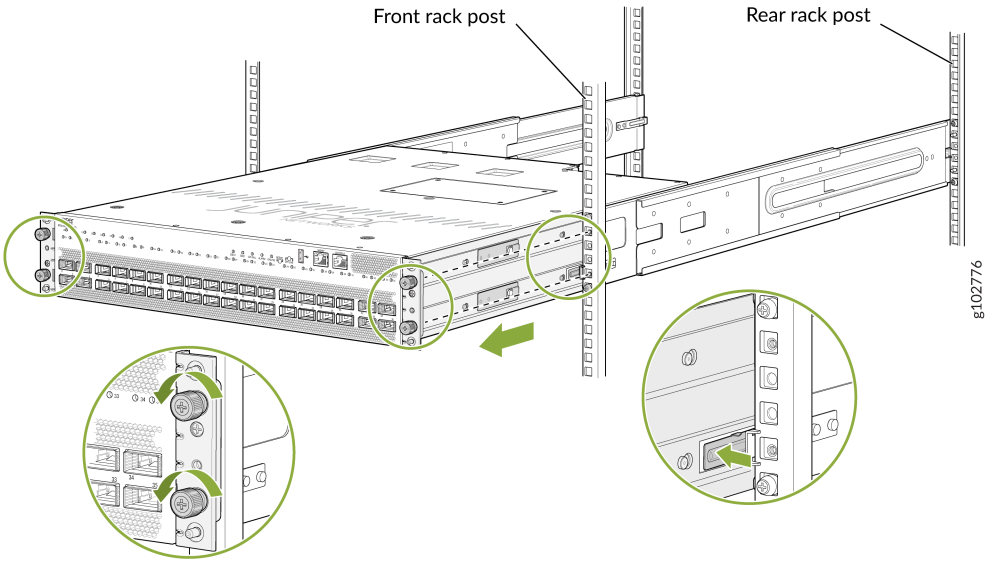


Figure 28: Remove the Router from a Four-Post Rack with Threaded Hole Posts

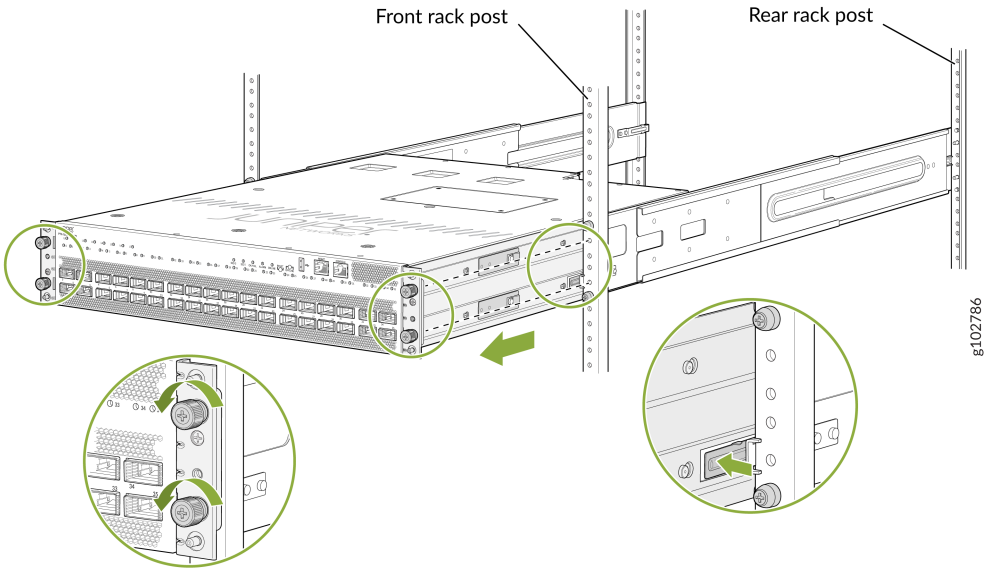
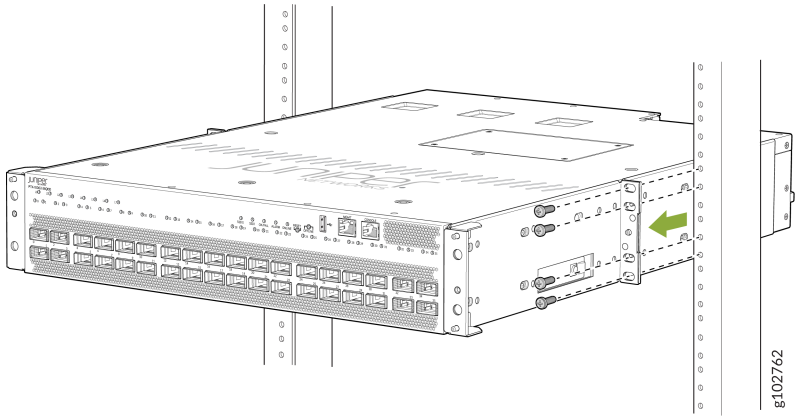


Figure 29: Remove the Router from a Two-Post Rack



3. Gently slide the router out from the rack.
4. Place the router in the antistatic bag.

CHAPTER 6

Troubleshoot the Hardware

Troubleshoot the PTX10002-36QDD

IN THIS SECTION

Troubleshooting Overview

To troubleshoot a PTX10002-36QDD, you use the Junos OS Evolved CLI, alarms, and LEDs on the network ports, management panel, 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. You can also use component LEDs and network port LEDs to diagnose issues with the router.
- CLI—The CLI is the primary tool for controlling and troubleshooting hardware, Junos OS Evolved, 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 Evolved, see the appropriate Junos OS Evolved user guide.

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.

System Alarm Messages

When there is an alarm condition, the alarm LED on the management panel is lit. The alarms indicate a failure on the device or on one of its components. The alarms are preset; you cannot modify them.

The alarms on PTX10002-36QDD routers have two severity levels:

- Major (red)—Indicates a critical situation on the router that has resulted from one of the conditions described in Table 28 on page 122. A red alarm condition requires immediate action.

- Minor (yellow or amber)—Indicates a noncritical condition on the router that, if left unchecked, might cause an interruption in service or degradation in performance. A yellow alarm condition requires monitoring or maintenance.

Table 28: System Alarm Messages

Component	Alarm Type	CLI Message	Recommended Action
Fan module	Major (red)	`Fan Tray` *`fan-tray-number`* `Absent`	Replace the fan module.
	Major (red)	`Fan Tray` *`fan-tray-number`* `Fail`	Replace the fan module and report the failure to customer support.
Management Ethernet interface	Major (red)	`Management Ethernet 1 Link Down`	Check whether a cable is connected to the management Ethernet interface, or whether the cable is defective. Replace the cable, if required. If you are unable to resolve the problem, open a support case by using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US or 1-408-745-9500 (from outside the United States).
Power supply unit (PSU)	Major (red)	`PSM` *`psm-number`* `I2C Fail`	Report the failure to customer support.
		`PSM` *`psm-number`* `Not OK`	The input or output voltage is not in range. Replace the PSU.
		`PSM` *`psm-number`* `Health Check Fail`	The PSU health check has failed. Replace the PSU.
		`PSM` *`psm-number`* `Input1 Failed`	The input has failed. Replace the PSU.

Table 28: System Alarm Messages *(Continued)*

Component	Alarm Type	CLI Message	Recommended Action
		PSM *psm-number* High Temp	The PSU temperature is high. Replace the PSU.
	Minor (yellow)	PSM *psm-number* Fan1 Fail	Fan 1 in the PSU has failed. Replace the PSU.
		PSM *psm-number* Fan2 Fail	Fan 2 in the PSU has failed. Replace the PSU.
Routing engine	Minor (yellow)	RE *RE number* /var partition usage is high	Clean up the system file storage space on the router to reduce active disk usage. For more information, see *request system storage cleanup*.
Temperature sensors	Major (red)	*sensor-location* Temp Sensor Fail	Check the system log for the following message and report it to customer support: Temp sensor *sensor-number* failed, where *sensor-number* ranges from 1 through 10.
		sensor-location Temp Sensor Too Hot	Check environmental conditions and alarms on other devices installed near the router. Ensure that environmental factors (such as hot air blowing around the equipment) do not affect the temperature sensor. If the condition persists, the router might shut down.

Table 28: System Alarm Messages *(Continued)*

Component	Alarm Type	CLI Message	Recommended Action
	Minor (yellow)	*sensor-location* `Temp Sensor Too Warm`	For information only. Check environmental conditions and alarms on other devices installed near the router. Ensure that environmental factors (such as hot air blowing around the equipment) do not affect the temperature sensor.

CHAPTER 7

Contact Customer Support and Return the Chassis or Components

Return a PTX10002-36QDD Chassis or a Component

IN THIS SECTION

How to Return a PTX10002-36QDD Chassis or a Component for Repair or Replacement

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

1. Determine the serial number of the chassis if you need to return the router. If you need to return one or more components, determine the serial number for each component. For instructions, see "Locate the Serial Number on a PTX10002-36QDD Chassis or Component" on page 127.
2. Obtain a Return Material Authorization (RMA) number from Juniper Networks Technical Assistance Center (JTAC) as described in "Contact Customer Support to Obtain a Return Material Authorization" on page 135.

   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 "Pack a PTX10002-36QDD Router or Component for Shipping" on page 136.

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 PTX10002-36QDD Chassis or Component

IN THIS SECTION

If you are returning a router or hardware 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 JTAC when you contact them to obtain the RMA.

If the router is operational and you can access the CLI, you can list serial numbers of the router and for some components with a CLI command. If you do not have access to the CLI or if the serial number for the component does not appear in the command output, you can locate the serial number ID label on the physical router or component.

NOTE: If you want to find the serial number on the physical router component, you will need to remove the component from the router chassis, for which you must have the required parts and tools available.

List the Router and Components Details with the CLI

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

The following output lists the router components and their serial numbers:

```
user@host> show chassis hardware extensive
Item             Version  Part number  Serial number     Description
Chassis                                HE138             PTX10002-36QDD [PTX10002-36QDD]
 Jedec Code:   0x7fb0           EEPROM Version:    0x02
                                S/N:               HE138
 Assembly ID:  0x05bf           Assembly Version:  00.00
 Date:         0000-00-00       Assembly Flags:    0x00
 ID: PTX10002-36QDD [PTX10002-36QDD]
 Board Information Record:
  Address 0x00: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

```
  I2C Hex Data:
   Address 0x00: 7f b0 02 00 05 bf 00 00 00 00 00 00 00 00 00 00
   Address 0x10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
   Address 0x20: 48 45 31 33 38 00 00 00 00 00 00 00 00 00 00 00
   Address 0x30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
   Address 0x40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
   Address 0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
   Address 0x60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
   Address 0x70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Midplane 0       REV 05   750-172631   BCFN5212          Power Distribution Board
  Jedec Code:   0x7fb0            EEPROM Version:    0x01
  P/N:          750-172631        S/N:               BCFN5212
  Assembly ID:  0x0daa            Assembly Version:  02.05
  Date:         2024-05-23        Assembly Flags:    0x00
  Version:      REV 05
  ID: Power Distribution Board
  Board Information Record:
   Address 0x00: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
  I2C Hex Data:
   Address 0x00: 7f b0 01 ff 0d aa 02 05 52 45 56 20 30 35 00 00
   Address 0x10: 00 00 00 00 37 35 30 2d 31 37 32 36 33 31 00 00
   Address 0x20: 53 2f 4e 20 42 43 46 4e 35 32 31 32 00 17 05 07
   Address 0x30: e8 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
   Address 0x40: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
   Address 0x50: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
   Address 0x60: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
   Address 0x70: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
FPM 0            REV 03   750-170925   BCFN5197          FPM-PTX10002
  Jedec Code:   0x7fb0            EEPROM Version:    0x01
  P/N:          750-170925        S/N:               BCFN5197
  Assembly ID:  0x0dfe            Assembly Version:  01.03
  Date:         2024-05-21        Assembly Flags:    0x00
  Version:      REV 03
  ID: FPM-PTX10002
  Board Information Record:
   Address 0x00: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
  I2C Hex Data:
   Address 0x00: 7f b0 01 ff 0d fe 01 03 52 45 56 20 30 33 00 00
   Address 0x10: 00 00 00 00 37 35 30 2d 31 37 30 39 32 35 00 00
   Address 0x20: 53 2f 4e 20 42 43 46 4e 35 31 39 37 00 15 05 07
   Address 0x30: e8 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
   Address 0x40: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
   Address 0x50: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
```

```
  Address 0x60: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
  Address 0x70: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
PSM 0            REV 10   740-073765   1GE2D512503       AC AFO 3000W PSU
 Jedec Code:   0x7fb0            EEPROM Version:    0x02
 P/N:          740-073765        S/N:               1GE2D512503
 Assembly ID:  0x04b2            Assembly Version:  13.10
 Date:         2024-01-04        Assembly Flags:    0x00
 Version:      REV 10            CLEI Code:         INPSAB2BAF
 ID: AC AFO 3000W PSU            FRU Model Number:  JNP-3000W-AC-AFO
 Board Information Record:
  Address 0x00: b0 01 ff ff ff ff ff ff ff ff ff 00 00 00 ff
 I2C Hex Data:
  Address 0x00: 7f b0 02 ff 04 b2 0d 0a 52 45 56 20 31 30 00 00
  Address 0x10: 00 00 00 00 37 34 30 2d 30 37 33 37 36 35 00 00
  Address 0x20: 31 47 45 32 44 35 31 32 35 30 33 00 00 04 01 07
  Address 0x30: e8 ff ff ff b0 01 ff ff ff ff ff ff ff ff ff ff
  Address 0x40: 00 00 00 ff 01 49 4e 50 53 41 42 32 42 41 46 4a
  Address 0x50: 4e 50 2d 33 30 30 30 57 2d 41 43 2d 41 46 4f 00
  Address 0x60: 00 00 00 00 00 00 46 30 30 ff ff ff ff ff ff ff
  Address 0x70: ff ff ff 38 ff ff ff ff ff ff ff ff ff ff ff ff
PSM 1            REV 10   740-073765   1GE2D512313       AC AFO 3000W PSU
 Jedec Code:   0x7fb0            EEPROM Version:    0x02
 P/N:          740-073765        S/N:               1GE2D512313
 Assembly ID:  0x04b2            Assembly Version:  13.10
 Date:         2024-01-03        Assembly Flags:    0x00
 Version:      REV 10            CLEI Code:         INPSAB2BAF
 ID: AC AFO 3000W PSU            FRU Model Number:  JNP-3000W-AC-AFO
 Board Information Record:
  Address 0x00: b0 01 ff ff ff ff ff ff ff ff ff 00 00 00 ff
 I2C Hex Data:
  Address 0x00: 7f b0 02 ff 04 b2 0d 0a 52 45 56 20 31 30 00 00
  Address 0x10: 00 00 00 00 37 34 30 2d 30 37 33 37 36 35 00 00
  Address 0x20: 31 47 45 32 44 35 31 32 33 31 33 00 00 03 01 07
  Address 0x30: e8 ff ff ff b0 01 ff ff ff ff ff ff ff ff ff ff
  Address 0x40: 00 00 00 ff 01 49 4e 50 53 41 42 32 42 41 46 4a
  Address 0x50: 4e 50 2d 33 30 30 30 57 2d 41 43 2d 41 46 4f 00
  Address 0x60: 00 00 00 00 00 00 46 30 30 ff ff ff ff ff ff ff
  Address 0x70: ff ff ff 38 ff ff ff ff ff ff ff ff ff ff ff ff
Routing Engine 0          BUILTIN      BUILTIN           RE-PTX10002-36QDD
 Jedec Code:   0x7fb0            EEPROM Version:    0x02
 P/N:          BUILTIN           S/N:               BUILTIN
 Assembly ID:  0xf0ed            Assembly Version:  255.09
 Date:         0049-52-49        Assembly Flags:    0x20
```

```
  ID: RE-PTX10002-36QDD
  Board Information Record:
   Address 0x00: ad 01 fd fe f4 b5 2f 38 00 00 00 00 00 00 00 00
  I2C Hex Data:
   Address 0x00: 7f b0 02 ff f0 ed ff 09 02 ff 09 b1 ff 09 b1 01
   Address 0x10: 09 b1 01 0e 42 55 49 4c 54 49 4e 20 20 20 20 20
   Address 0x20: 42 55 49 4c 54 49 4e 20 20 20 20 20 20 31 34 00
   Address 0x30: 31 34 00 00 ad 01 fd fe f4 b5 2f 38 00 00 00 00
   Address 0x40: 00 00 00 00 00 00 00 37 00 00 37 35 00 37 35 30
   Address 0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
   Address 0x60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
   Address 0x70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
   sda   200049 MB  SFSA200GM2AK1TO-    000060236796970000A6 Solid State Disk
   sdb   200049 MB  SFSA200GM2AK1TO-    00006023679697000083 Solid State Disk
CB 0             REV 31   750-172577   BCFN4878          Control Board
  Jedec Code:   0x7fb0            EEPROM Version:    0x02
  P/N:          750-172577        S/N:               BCFN4878
  Assembly ID:  0x0da9            Assembly Version:  03.31
  Date:         2024-05-24        Assembly Flags:    0x00
  Version:      REV 31            CLEI Code:         INMMB00BRA
  ID: Control Board               FRU Model Number:  PTX10002-36QDD-S
  Board Information Record:
   Address 0x00: ad 01 09 00 9c 5a 80 15 4e 5c ff ff ff ff ff ff
  I2C Hex Data:
   Address 0x00: 7f b0 02 ff 0d a9 03 1f 52 45 56 20 33 31 00 00
   Address 0x10: 00 00 00 00 37 35 30 2d 31 37 32 35 37 37 00 00
   Address 0x20: 53 2f 4e 20 42 43 46 4e 34 38 37 38 00 18 05 07
   Address 0x30: e8 fd ff ff ad 01 09 00 9c 5a 80 15 4e 5c ff ff
   Address 0x40: ff ff ff ff 01 49 4e 4d 4d 42 30 30 42 52 41 50
   Address 0x50: 54 58 31 30 30 30 32 2d 33 36 51 44 44 2d 53 00
   Address 0x60: 00 00 00 00 00 00 32 41 00 ff ff ff ff ff ff ff
   Address 0x70: ff ff ff f0 48 45 31 33 38 00 00 00 00 00 00 00
FPC 0            REV 10   750-172629   BCFN4462          FPC-PTX10002-36QDD
  Jedec Code:   0x7fb0            EEPROM Version:    0x01
  P/N:          750-172629        S/N:               BCFN4462
  Assembly ID:  0x0dac            Assembly Version:  03.10
  Date:         2024-05-22        Assembly Flags:    0x00
  Version:      REV 10
  ID: FPC-PTX10002-36QDD
  Board Information Record:
   Address 0x00: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
  I2C Hex Data:
   Address 0x00: 7f b0 01 ff 0d ac 03 0a 52 45 56 20 31 30 00 00
```

```
 Address 0x10: 00 00 00 00 37 35 30 2d 31 37 32 36 32 39 00 00
 Address 0x20: 53 2f 4e 20 42 43 46 4e 34 34 36 32 00 16 05 07
 Address 0x30: e8 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
 Address 0x40: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
 Address 0x50: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
 Address 0x60: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
 Address 0x70: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
 PIC 0                   BUILTIN      BUILTIN           MRATE-36xQDD PIC
Jedec Code:   0x7fb0            EEPROM Version:    0x02
P/N:          BUILTIN           S/N:               BUILTIN
Assembly ID:  0x0e34            Assembly Version:  255.09
Date:         0000-00-00        Assembly Flags:    0x20
ID: MRATE-36xQDD PIC
Board Information Record:
 Address 0x00: ad 01 fd fe f4 b5 2f 38 00 00 00 00 00 00 00 00
I2C Hex Data:
 Address 0x00: 7f b0 02 ff 0e 34 ff 09 02 ff 09 b1 ff 09 b1 01
 Address 0x10: 09 b1 01 0e 42 55 49 4c 54 49 4e 20 20 20 20 20
 Address 0x20: 42 55 49 4c 54 49 4e 20 20 20 20 20 20 00 00 00
 Address 0x30: 00 34 00 00 ad 01 fd fe f4 b5 2f 38 00 00 00 00
 Address 0x40: 00 00 00 00 00 00 00 37 00 00 37 35 00 37 35 30
 Address 0x50: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 Address 0x60: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 Address 0x70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
   Xcvr 0       REV 17   750-152172   ZP3924090091      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 1       REV 11   750-152172   ZP3923190025      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 2       REV 11   750-152172   ZP3923190016      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 3       REV 11   750-152172   ZP3923190019      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 4       REV 11   750-152172   ZP3923190157      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 5       REV 01   750-152172   2F1CZ7A           QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 6       REV 17   750-152172   ZP3924090087      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 7       REV 11   750-152172   ZP3923190035      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 8       REV 11   750-152172   ZP3923190024      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 9       REV 15   750-152172   ZP3923440044      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 10      REV 11   750-152172   ZP3923190014      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 11      REV 15   750-152172   ZP3923440062      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 12      REV 11   750-152172   ZP3923190133      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 13      REV 11   750-152172   ZP3923190058      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 14      REV 11   750-152172   ZP3923190128      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 15      REV 11   750-152172   ZP3923190161      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 16      REV 12   750-152172   ZP3923330123      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 17      REV 11   750-152172   ZP3923190054      QSFP-DD800-ACTIVE-E-LPBK
   Xcvr 18      REV 12   750-152172   ZP3923330205      QSFP-DD800-ACTIVE-E-LPBK
```

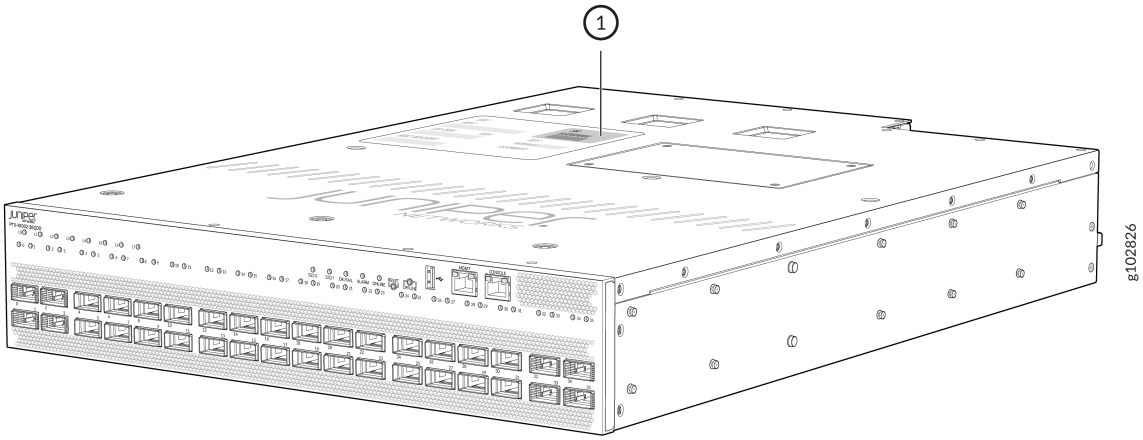
```
    Xcvr 19      REV 08   750-152172   ZP3923110103      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 20      REV 15   750-152172   ZP3923440015      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 21      REV 15   750-152172   ZP3923430003      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 22      REV 11   750-152172   ZP3923190036      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 23      REV 08   750-152172   ZP3923110197      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 24      REV 08   750-152172   ZP3923110202      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 25      REV 11   750-152172   ZP3923190029      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 26      REV 08   750-152172   ZP3923110020      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 27      REV 15   750-152172   ZP3923440066      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 28      REV 11   750-152172   ZP3923190005      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 29      REV 11   750-152172   ZP3923190007      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 30      REV 15   750-152172   ZP3923440032      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 31      REV 11   750-152172   ZP3923190147      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 32      REV 17   750-152172   ZP3924090083      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 33      REV 12   750-152172   ZP3923330223      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 34      REV 11   750-152172   ZP3923190012      QSFP-DD800-ACTIVE-E-LPBK
    Xcvr 35      REV 15   750-152172   ZP3923430126      QSFP-DD800-ACTIVE-E-LPBK
Fan Tray 0       REV 06   760-144017   BCFN7686          PTX10002 Fan Tray, Front to Back
Airflow - AFO
 Jedec Code:   0x7fb0            EEPROM Version:    0x02
 P/N:          760-144017        S/N:               BCFN7686
 Assembly ID:  0x0dab            Assembly Version:  01.06
 Date:         2024-05-21        Assembly Flags:    0x00
 Version:      REV 06            CLEI Code:         INCPANJAAA
 ID: PTX10002 Fan Tray, Front to Back Airflow - AFO FRU Model Number:  JNP10002-FAN2
 Board Information Record:
  Address 0x00: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
 I2C Hex Data:
  Address 0x00: 7f b0 02 ff 0d ab 01 06 52 45 56 20 30 36 00 00
  Address 0x10: 00 00 00 00 37 36 30 2d 31 34 34 30 31 37 00 00
  Address 0x20: 53 2f 4e 20 42 43 46 4e 37 36 38 36 00 15 05 07
  Address 0x30: e8 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
  Address 0x40: ff ff ff ff 01 49 4e 43 50 41 4e 4a 41 41 41 4a
  Address 0x50: 4e 50 31 30 30 30 32 2d 46 41 4e 32 00 00 00 00
  Address 0x60: 00 00 00 00 00 00 41 00 00 ff ff ff ff ff ff ff
  Address 0x70: ff ff ff 0d ff ff ff ff ff ff ff ff ff ff ff ff
Fan Tray 1       REV 06   760-144017   BCFN7699          PTX10002 Fan Tray, Front to Back
Airflow - AFO
 Jedec Code:   0x7fb0            EEPROM Version:    0x02
 P/N:          760-144017        S/N:               BCFN7699
 Assembly ID:  0x0dab            Assembly Version:  01.06
 Date:         2024-05-21        Assembly Flags:    0x00
 Version:      REV 06            CLEI Code:         INCPANJAAA
```

```
  ID: PTX10002 Fan Tray, Front to Back Airflow - AFO FRU Model Number:  JNP10002-FAN2
  Board Information Record:
   Address 0x00: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
  I2C Hex Data:
   Address 0x00: 7f b0 02 ff 0d ab 01 06 52 45 56 20 30 36 00 00
   Address 0x10: 00 00 00 00 37 36 30 2d 31 34 34 30 31 37 00 00
   Address 0x20: 53 2f 4e 20 42 43 46 4e 37 36 39 39 00 15 05 07
   Address 0x30: e8 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
   Address 0x40: ff ff ff ff 01 49 4e 43 50 41 4e 4a 41 41 41 4a
   Address 0x50: 4e 50 31 30 30 30 32 2d 46 41 4e 32 00 00 00 00
   Address 0x60: 00 00 00 00 00 00 41 00 00 ff ff ff ff ff ff ff
   Address 0x70: ff ff ff 0d ff ff ff ff ff ff ff ff ff ff ff ff
Fan Tray 2       REV 06   760-144017   BCFN7695          PTX10002 Fan Tray, Front to Back
Airflow - AFO
  Jedec Code:   0x7fb0            EEPROM Version:    0x02
  P/N:          760-144017        S/N:               BCFN7695
  Assembly ID:  0x0dab            Assembly Version:  01.06
  Date:         2024-05-21        Assembly Flags:    0x00
  Version:      REV 06            CLEI Code:         INCPANJAAA
  ID: PTX10002 Fan Tray, Front to Back Airflow - AFO FRU Model Number:  JNP10002-FAN2
  Board Information Record:
   Address 0x00: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
  I2C Hex Data:
   Address 0x00: 7f b0 02 ff 0d ab 01 06 52 45 56 20 30 36 00 00
   Address 0x10: 00 00 00 00 37 36 30 2d 31 34 34 30 31 37 00 00
   Address 0x20: 53 2f 4e 20 42 43 46 4e 37 36 39 35 00 15 05 07
   Address 0x30: e8 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
   Address 0x40: ff ff ff ff 01 49 4e 43 50 41 4e 4a 41 41 41 4a
   Address 0x50: 4e 50 31 30 30 30 32 2d 46 41 4e 32 00 00 00 00
   Address 0x60: 00 00 00 00 00 00 41 00 00 ff ff ff ff ff ff ff
   Address 0x70: ff ff ff 0d ff ff ff ff ff ff ff ff ff ff ff ff
```

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

Locate the Chassis Serial Number ID Label on a PTX10002-36QDD Router

The serial number ID label is located on the right side panel of the chassis on PTX10002-36QDD routers.

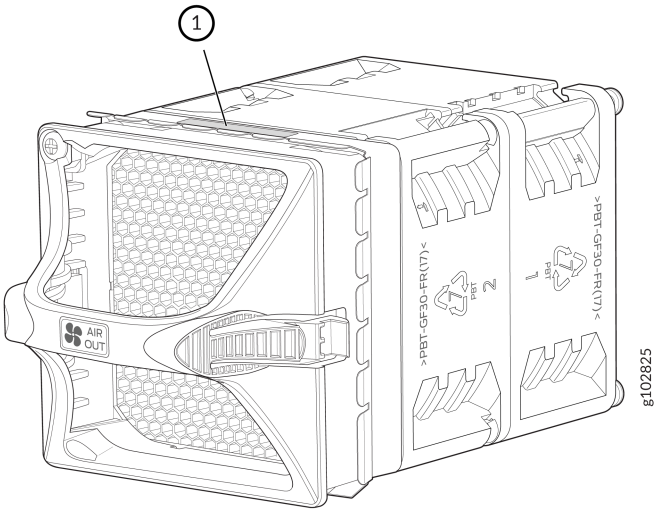


1– Serial number ID label

Locate the Serial Number ID Labels on FRUs in a PTX10002-36QDD Router

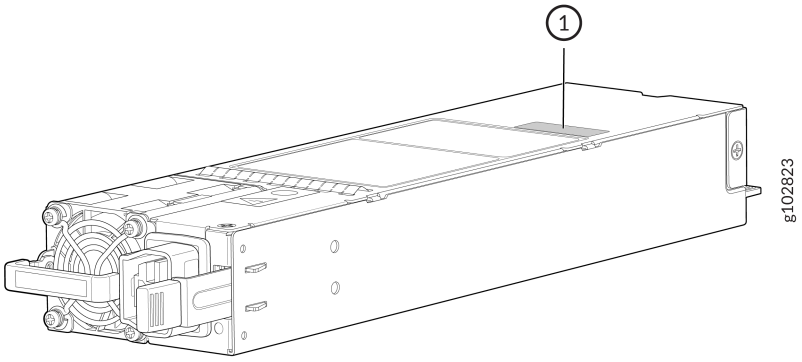
The fan modules and power supply units (PSUs) installed in PTX10002-36QDD routers are field-replaceable units (FRUs). You must remove the FRU from the router chassis to see its serial number ID label.

- *Fan module*—The serial number ID label is on the top of the fan module.

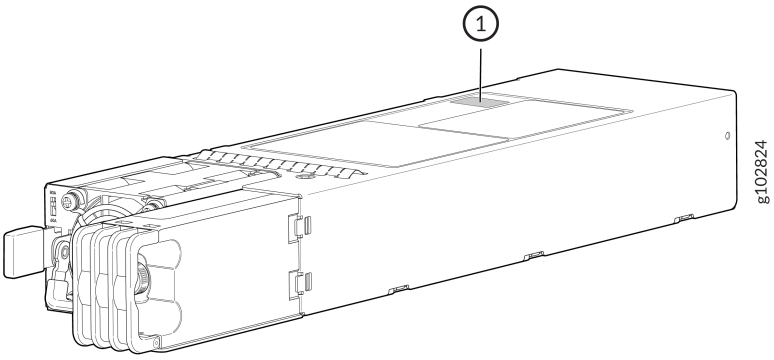


1– Serial number ID label

- *PSU*—The serial number ID label is on the top of the PSU.



1– Serial number ID label



1– Serial number ID label

Contact Customer Support to Obtain a Return Material Authorization

If you need to return a device or hardware component to Juniper Networks for repair or replacement, obtain an RMA number from JTAC. You must obtain an RMA number before you attempt to return the component.

After locating the serial number of the device or hardware component you want to return, open a service request with the JTAC on the Web or by telephone.

Before you request an RMA number from JTAC, be prepared to provide the following information:

- Your existing service request number, if you have one
- Serial number of the component
- Your name, organization name, telephone number, fax number, and shipping address

- Details of the failure or problem
- Type of activity being performed on the device when the problem occurred
- Configuration data displayed by one or more `show` commands

You can contact JTAC 24 hours a day, seven days a week, on the Web or by telephone:

- Service Request Manager: https://support.juniper.net/support
- Telephone: +1-888-314-JTAC (+1-888-314-5822), toll free in U.S., Canada, and Mexico

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

If you are contacting JTAC by telephone, enter your 12-digit service request number followed by the pound (#) key for an existing case, or press the star (*) key to be routed to the next available support engineer.

The support representative validates your request and issues an RMA number for return of the component.

Pack a PTX10002-36QDD Router or Component for Shipping

IN THIS SECTION

If you are returning a PTX10002-36QDD router or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

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

- Followed all the steps listed in "Contact Customer Support to Obtain a Return Material Authorization" on page 135.

- Retrieved the original shipping carton and packing materials. Contact your JTAC representative if you do not have these materials, to learn about approved packing materials (see "Contact Customer Support to Obtain a Return Material Authorization" on page 135).
- Ensure that you understand how to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- An ESD grounding strap—not provided

Pack the Router for Shipping

Before you pack the router:

1. Shut down the router by issuing the `request node power-off (Junos OS Evolved)` command from the external management device.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to a site ESD point.
3. Disconnect power from the router.
4. Remove the cables that connect the router to external devices.
5. Remove all optical transceivers installed in the router.
6. Remove the fan modules and PSUs from the router.

Ensure that you have the following parts and tools:

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

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

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

To pack the router:

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

2. If the router is installed in a rack or cabinet, have one person support the weight of the router while another person unscrews and removes the mounting screws.
3. Remove the router from the rack or cabinet and place the router on a flat, stable surface.
4. Use the screwdriver to remove the rack mounting brackets from the router chassis.
5. Place the router in an antistatic bag.
6. Place the bottom portion of the packaging foam in the shipping carton.
7. Place the router inside the cavity in the bottom packaging foam.
8. Place the top portion of the packaging foam on top of the router.
9. If you are returning accessories or field-replaceable units (FRUs) with the router, pack them as instructed in "Pack Router Components for Shipping" on page 138.
10. Place the accessory box by the rear end of the chassis in the shipping carton.
11. Close the top of the cardboard shipping box and seal it with packing tape.
12. Write the RMA number on the exterior of the box to ensure proper tracking.

Pack Router Components for Shipping

Ensure that you have the following parts and tools available:

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

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

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 the router components:

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

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

8
CHAPTER

Safety and Compliance Information

Safety Information for PTX10002-36QDD

The Juniper Networks Safety Guide provides general safety information and guidelines for all Juniper Networks products. Follow the guidelines provided in the guide to reduce the likelihood of personal injury, equipment damage, and damage to surrounding areas.

Along with the information provided in the Juniper Networks Safety Guide, you must read and understand the specific safety information for PTX10002-36QDD provided in this hardware guide.

PTX10002-36QDD Agency Approvals

PTX10002-36QDD complies with the following standards:

- Safety Requirements for Chassis
  - CAN/CSA-C22.2 No. 62368-1
  - UL 62368-1
  - UL/CSA 60950-1
  - IEC 62368-1 (All country deviations): CB Scheme report
- Environmental Safety Requirements for Chassis
  - Operating temperature: 0° C to 40° C
  - Storage temperature: –40° C to 70° C
  - Relative humidity (operating): 5 to 90% non-condensing
  - GR-3160-CORE (DC NEBS)
  - ETSI EN 300 019: Environmental Conditions & Environmental Tests for Telecommunications Equipment (Specific test requirements in Tables 7 & 8)
  - ETSI EN 300 019-2-1 Storage (ETSI EN 300 019 -1-1 Class 1.2)
  - ETSI EN 300 019-2-2 Transportation (ETSI EN 300 019-1-2 Class 2.3)
  - ETSI EN 300 019-2-3 Stationary Use at Weather-protected Locations (ETSI EN 300 019-1-3 Class 3.2)
- Safety Requirements for Optics

  - CFR, Title 21, Chapter 1, Subchapter J, Part 1040
  - REDR c 1370 OR CAN/CSA-E 60825-1 - Part 1
  - IEC 60825-1
  - IEC 60825-2
- EMC
  - Electromagnetic Compatibility (EMC) Requirements (Non-Radio & Telecom)
  - FCC 47 CFR Part 15
  - ICES-003 / ICES-GEN
  - BS EN 55032
  - BS EN 55035
  - EN 300 386 V1.6.1
  - EN 300 386 V2.2.1
  - BS EN 300 386
  - EN 55032
  - CISPR 32
  - EN 55035
  - CISPR 35
  - IEC/EN 61000 Series
  - IEC/EN 61000-3-2
  - IEC/EN 61000-3-3
  - AS/NZS CISPR 32
  - VCCI-CISPR 32
  - BSMI CNS 15936
  - KS C 9835 (Old KN 35)
  - KS C 9832 (Old KN 32)
  - KS C 9610

    - BS EN 61000 Series
- Customer-Specific Compliance Statements for EMC
    - GR-1089-Core, Issue 8
    - Juniper Inductive GND (IGS)
    - Deutsche Telekom (DT) 1TR9
    - British Telecommunications (BT) GS7
- Compliance Statement for Argentina
    - EQUIPO DE USO IDÓNEO.