

# MX204 Universal Routing Platform Hardware Guide

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# About This Guide

Use this guide to install hardware and perform initial software configuration, routine maintenance, and troubleshooting for the MX204 Universal Routing Platform. After completing the installation and basic configuration procedures covered in this guide, refer to the Junos OS documentation for information about further software configuration.

## RELATED DOCUMENTATION

| [MX204 Quick Start](#)

# 1

CHAPTER

## Overview

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# MX204 Router Overview

## IN THIS SECTION

- Benefits of MX204 Router | 2
- System Overview | 3

The Juniper Networks MX204 Universal Routing Platform is an Ethernet-optimized edge router with 400-Gbps capacity that provides both switching and carrier-class Ethernet routing. The MX204 router runs Junos operating system (Junos OS), enabling a wide range of business and residential applications and services, including high-speed transport and virtual private network (VPN) services, next-generation broadband multiplay services, and high-volume Internet data center internetworking. Each router provides full duplex, *high-density Ethernet* interfaces and high-capacity switching throughput and uses the Junos Trio chipset for increased scalability of Layer 2 and Layer 3 packet forwarding, buffering, and queuing.

**NOTE:** You can monitor the performance of an MX204 router by using Juniper Mist Routing Assurance. You can use the routing insights that Juniper Mist Routing Assurance provides to proactively respond to network events and anomalies. For more information, see [Juniper Mist Routing Assurance Documentation](#).

## Benefits of MX204 Router

- **System Capacity**—MX204 provides 400 Gbps of throughput and supports high-density 100-Gigabit Ethernet interfaces, and also discrete and breakout 10-Gigabit Ethernet and 1-Gigabit Ethernet interfaces—all in a single rack unit while consuming only 0.9 W/Gb.
- **The Programmable Chipset**—The chipset implemented in the MX Series routers has a programmable forwarding data structure that allows fast microcode changes in the hardware itself, and a programmable lookup engine that allows inline service processing. the chip's programmable QoS engine supports coarse and fine-grained queuing to address the requirements of core, edge, and aggregation use cases.

- **Application-Aware Networking**—On MX Series routers you can use deep packet inspection to detect applications, and by using the user-defined policies, you can determine traffic treatment for each application. This feature enables highly customized and differentiated services at scale.
- **Junos Telemetry Interface**—Using the Junos telemetry interface data, you can stream component-level data to monitor, analyze, and enhance the performance of the network. Analytics derived from this streaming telemetry can identify current and trending congestion, resource utilization, traffic volume, and buffer occupancy.
- **Integrated Hardware-Based Timing**— You do not need to use external clocks because MX Series routers support highly scalable and reliable hardware-based timing, including Synchronous Ethernet for frequency, and the Precision Time Protocol (PTP) for frequency and phase synchronization. Synchronous Ethernet and PTP can be combined in a hybrid mode to achieve a high level of frequency (10 ppb) and phase (<1.5 uS) accuracy.

## System Overview

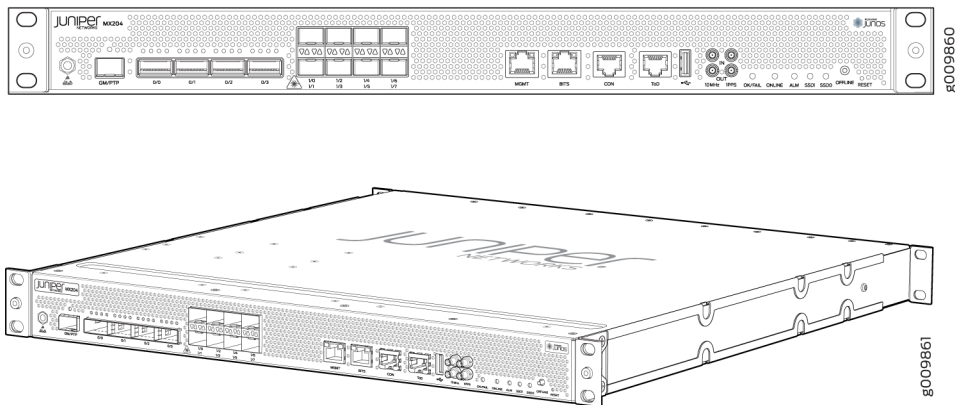
The MX204 router is compact and one rack unit (1 U) tall. Several routers can be stacked in a single floor-to-ceiling rack for increased port density per unit of floor space.

The MX204 router is a fixed-configuration router, and supports one built-in Routing Engine. The router runs on AC or DC power, with two dedicated power supply modules on each device. Cooling is handled by three fan modules.

The MX204 has four rate-selectable ports that can be configured as 100-Gigabit Ethernet ports or 40-Gigabit Ethernet ports, or each port can be configured as four 10-Gigabit Ethernet ports (by using a breakout cable). The MX204 also has eight 10-Gigabit Ethernet ports. The four rate-selectable ports support QSFP28 and QSFP+ transceivers, whereas the eight 10-Gigabit Ethernet ports support SFP+ transceivers.

[Figure 1 on page 4](#) shows the front view of the MX204 router.

Figure 1: Front View of the MX204 Router



The MX204 router is a fixed-configuration router, and supports one built-in Routing Engine. The router runs on AC or DC power, with two dedicated power supply modules on each device. Cooling is handled by three fan modules. [Table 1 on page 4](#) shows the components supported on the router.

Table 1: MX204 Router Components

Component	Description
Power supply module	2
Fan module	3

## MX204 Chassis

### IN THIS SECTION

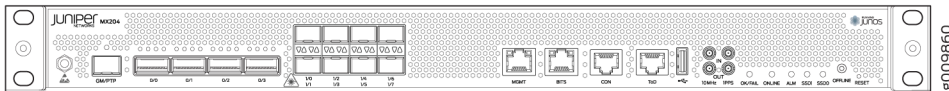
- [MX204 Chassis Description | 5](#)
- [MX204 Component Redundancy | 7](#)
- [MX204 Field-Replaceable Units | 8](#)

- [MX204 Hardware Components and CLI Terminology | 8](#)
- [MX204 Front and Rear Panel Components | 10](#)
- [Alarm LEDs on the MX204 Front Panel | 11](#)

## MX204 Chassis Description

The router chassis is a rigid sheet metal structure that houses all the other router components. [Figure 2 on page 5](#) shows the front of the fully configured chassis. The chassis measures 1.72 in. (4.37 cm) high, 19 in. (48.26 cm) wide, and 18.5 in. (47.0 cm) deep. You can install the router chassis in standard 760-mm deep (or larger) enclosed cabinets, 19-in. equipment racks, or telco open-frame racks. The total weight of fully loaded router is 22.7 lb (10.3 kg). For more information, see "[MX204 Router Physical Specifications](#)" on page 40.

**Figure 2: Front View of the MX204 Router**



The MX204 has four rate-selectable ports that can be configured as 100-Gigabit Ethernet ports or 40-Gigabit Ethernet ports, or each port can be configured as four 10-Gigabit Ethernet ports (by using a breakout cable). The MX204 also has eight 10-Gigabit Ethernet ports. The four rate-selectable ports support QSFP28 and QSFP+ transceivers, whereas the eight 10-Gigabit Ethernet ports support SFP+ transceivers. For more information on the rate selectability support for the MX204 router, see [MX204 Router Port Speed Overview](#).

Starting in Junos OS Release 18.3R1, you can use the Mellanox 10-Gbps pluggable adapter (QSFP+ to SFP+ adapter or QSA; model number: MAM1Q00A-QSA) to convert four lane-based ports to a single lane-based SFP+ port. The QSA adapter has the QSFP+ form factor with a receptacle for the SFP+ module. Use the QSA adapter to convert a 40-Gbps port to a 10-Gbps (SFP+) or a 1-Gbps (SFP) port. The 1-Gbps SFP port supports auto-negotiation. You can configure auto-negotiation by using the command set interfaces *interface-name* gigether-options auto-negotiation. For more information, see [auto-negotiation](#).

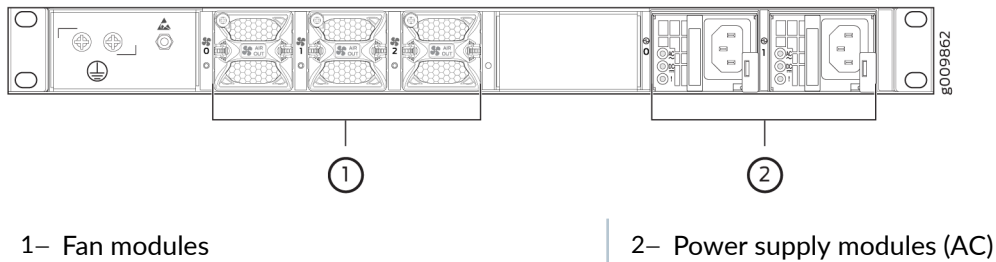
**NOTE:**

- The interface name prefix must be xe.
- Rate selectability at PIC level and port level does not support 1-Gbps speed.

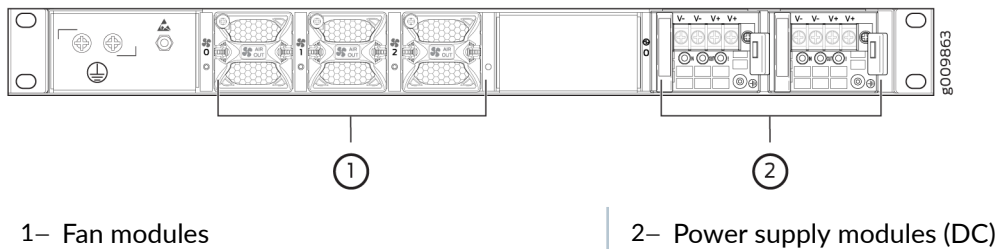
**NOTE:** For a complete list of supported optics on MX204, see [MX204 Transceivers](#).

The router comes in two variants—AC-powered and DC-powered. [Figure 3 on page 6](#) and [Figure 4 on page 6](#) shows the rear of the fully configured chassis.

**Figure 3: Rear View of the AC-Powered MX204 Router**



**Figure 4: Rear View of the DC-Powered MX204 Router**

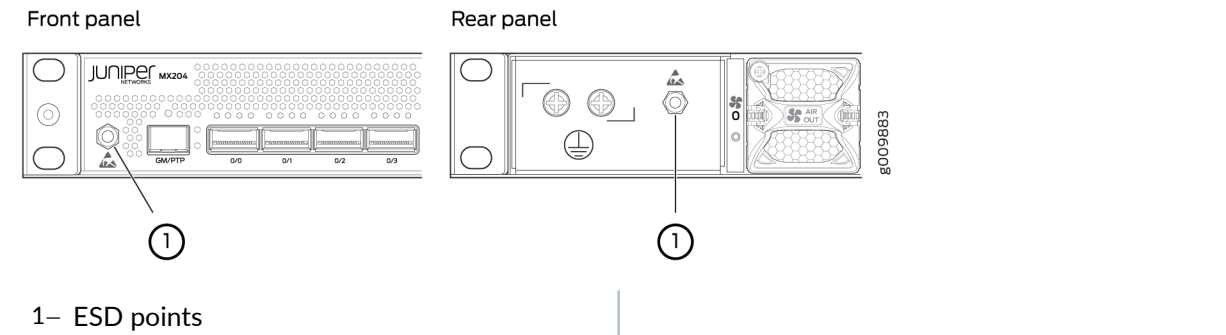


The electrostatic discharge (ESD) points on the router are located both on the front and on the rear of the chassis. [Figure 5 on page 7](#) shows the electrostatic discharge (ESD) point on the router.



**CAUTION:** Before removing or installing components, attach an ESD strap to an ESD point, and place the other end of the strap around your bare wrist. Failure to use an ESD strap could result in damage to the hardware components.

Figure 5: ESD Points on the MX204 Router



## MX204 Component Redundancy

A fully configured router is designed so that at no single point of failure can cause the entire system to fail. Only a fully configured router provides complete redundancy. All other configurations provide partial redundancy. The following major hardware components are redundant:

- **Power supplies**—The router supports two power supply modules. The MX204 router provides 1+1 redundancy for the system. Both AC and DC systems can withstand the failure of a single power supply without system interruption in 1+1 redundancy mode. If one power supply fails in a fully redundant system, the other power supply can provide full power to the router indefinitely.
- **Cooling system**—The cooling system has a total of three fan modules, which are controlled and monitored by the host subsystem. A fully configured router needs all the fan modules to operate normal. The fan modules are at the rear and are used to cool the router. If a fan fails or the temperature of the chassis rises above the temperature threshold, the speed of the remaining fans is automatically adjusted to keep the temperature within the acceptable range.



**CAUTION:** For a fully configured router, all the three fan modules and the two power supply modules must be operational, and in the event of any module failure the failed module must be replaced immediately.



**SEE ALSO**

[Locating the Serial Number on an MX204 Router or Component | 129](#)

[Guidelines for Packing Hardware Components for Shipment | 132](#)

*How to Return a Hardware Component to Juniper Networks, Inc.*

**MX204 Field-Replaceable Units**

Field-replaceable units (FRUs) are router components that can be replaced at the customer site. Replacing most FRUs requires minimal router downtime. The router uses the following types of FRUs:

- Power supply modules (if redundant)
- Fan modules (if redundant)
- Transceiver modules

**SEE ALSO**

[Replacing an MX204 AC Power Supply | 119](#)

[Replacing an MX204 DC Power Supply | 121](#)

[Replacing an MX204 Fan Module | 115](#)

**MX204 Hardware Components and CLI Terminology**

The MX204 router support the components in [Table 2 on page 8](#), listed in alphabetic order.

**Table 2: MX204 Router Hardware Components and CLI Terminology**

Component	Hardware Model Number	CLI Name	Description
Chassis	MX204	JNP204 [MX204]	<a href="#">"MX204 Chassis Description" on page 5</a>
Cooling system			<a href="#">"MX204 Cooling System Description" on page 13</a>

**Table 2: MX204 Router Hardware Components and CLI Terminology (Continued)**

Component	Hardware Model Number	CLI Name	Description
Fan module	JNP-FAN-1RU	Fan Tray, Front to Back Airflow - AFO	
Power system components			<a href="#">"MX204 Power System Description" on page 17</a>
Power supply module	<ul style="list-style-type: none"> <li>JPSU-650W-AC-AO</li> <li>JPSU-650W-DC-AFO</li> </ul>	<ul style="list-style-type: none"> <li>AC AFO 650W PSU</li> <li>DC AFO 650W PSU</li> </ul>	
MIC	N/A (built-in)	PIC	N/A
MPC	N/A (built-in)	FPC	N/A
Routing Engine	N/A (built-in)	RE-S-1600x8	N/A
Transceiver	See <a href="#">MX Series Interface Module Reference</a> .	Xcvr	<a href="#">Hardware Compatibility Tool</a>

[Table 3 on page 9](#) lists the spare parts and blank panels available for the router.

**Table 3: MX204 Spare Parts and Blank Panels**

Model Number	Description
JNP204-CHAS	MX204 chassis, spare
JNP-PWR-BLNK-1	MX204 power blank cover panel

## MX204 Front and Rear Panel Components

### IN THIS SECTION

- [Front Panel Components | 10](#)
- [Rear Panel Components | 10](#)

### Front Panel Components

The front panel on the front of the router enables you to view status and troubleshooting information at a glance. The front panel contains LEDs for the router components, online/offline and reset buttons, auxiliary and console ports, clocking ports, and interface ports. ["MX204 Chassis Description" on page 5](#) shows the front of the fully configured chassis.

### Rear Panel Components

The rear panel of the router has slots for the power supply modules and fan modules. The power and fan modules are installed from the rear of the router. ["MX204 Chassis Description" on page 5](#) and ["MX204 Chassis Description" on page 5](#) shows the rear of the fully configured chassis.

[Table 4 on page 10](#) lists the components on the rear panel of the MX204 router.

**Table 4: Rear Panel Components in a Fully Configured MX204 Router**

Component	Slots	Number of FRUs
Power supply module	0 and 1	2
Fan module	0 through 2	3

## Alarm LEDs on the MX204 Front Panel

One alarm LED—labeled **ALM**—is located on the front panel of the router. A red light indicates a critical condition that can result in a system shutdown, and a yellow light indicates a less severe condition that requires monitoring or maintenance.

Table 5 on page 11 describes the alarm LED in more detail.

**Table 5: Alarm LED on the MX204 Front Panel**


Shape	Color	S t a t e d i l y Description
	Red	<b>M</b> ajor alarm—Indicates a critical condition that can cause the router to stop functioning. Possible causes include component removal, failure, or overheating.
	Red	<b>B</b> oth major and minor alarms—Indicates that both major and minor alarm conditions are present.

Table 5: Alarm LED on the MX204 Front Panel *(Continued)*

Shape	Color	S t a t u s Description
	Yellow	Minor alarm—Indicates a serious but nonfatal error condition, such as a maintenance alert or a significant increase in component temperature.
	-	No alarm are present.

SEE ALSO

| [Routine Maintenance Procedures for MX204 Routers](#) | 102

## MX204 Cooling System

IN THIS SECTION

- [MX204 Cooling System Description](#) | 13
- [MX204 Fan Status LED](#) | 15

## MX204 Cooling System Description

### IN THIS SECTION

- Fan Trays | 13
- Airflow | 14
- Power Supply Cooling System | 15

The cooling system components work together to keep all router components within the acceptable temperature range.

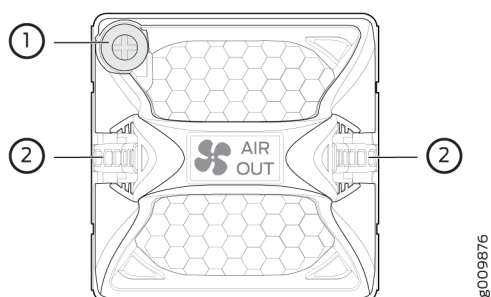
The cooling system consists of the following features and components:

### Fan Trays

The chassis monitors the temperature of the router components. When the router is operating normally, the fans function at lower than full speed. If a fan fails or the ambient temperature rises above a threshold, the speed of the remaining fans is automatically adjusted to keep the temperature within the acceptable range. If the ambient maximum temperature specification is exceeded and the system cannot be adequately cooled, the Routing Engine shuts down the system by disabling output power from each power supply.

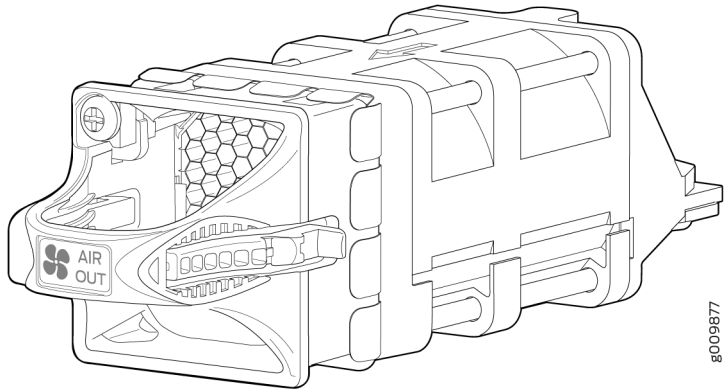
The router has three fan modules (or fan trays) that install in the rear of the router. Each fan modules contain one counter-rotating fan. The fan modules are hot-insertable and hot-removable field-replaceable units (FRUs) (see [Figure 6 on page 13](#)).

**Figure 6: Fan Module**



1- Captive screw

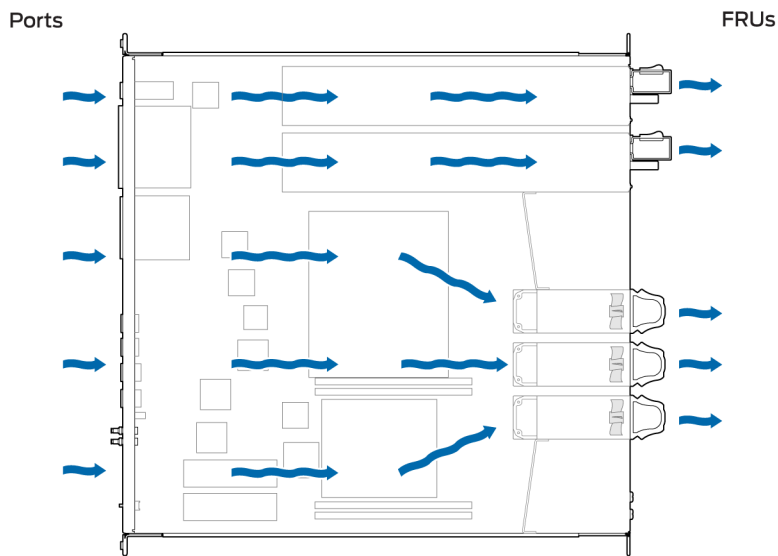
2- Latch



### Airflow

The router has front-to-back (AIR OUT) cooling system (see [Figure 7 on page 14](#)). Air is pulled through the front the chassis toward the fan tray, where it is exhausted out of the system.

**Figure 7: Airflow Through the Router**



## Power Supply Cooling System

The power supply modules are self-cooling and are located in the rear of the router. Each power supply module has its own built-in fan that cools the power supply module. The exhaust for the power supply modules are also located on the rear of the chassis.

### SEE ALSO

[Maintaining the MX204 Fan Module | 113](#)

[Maintaining the MX204 Power Supplies | 117](#)

[Maintaining the MX204 Routing Engine | 103](#)

[Replacing an MX204 AC Power Supply | 119](#)

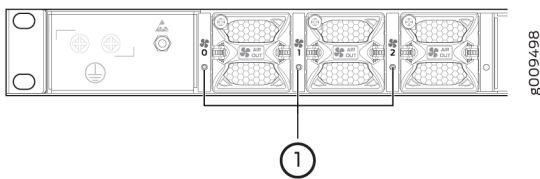
[Replacing an MX204 DC Power Supply | 121](#)

[Replacing an MX204 Fan Module | 115](#)

## MX204 Fan Status LED

The MX204 fan module does not have any LED—the fan status LEDs are located on the MX204 chassis. [Figure 8 on page 15](#) shows the fan status LEDs.

**Figure 8: Fan Status LEDs on the Router**



1– Fan status LEDs

The fan status LED is a bicolor LED. [Table 6 on page 15](#) describes the behavior of the fan status LED.

**Table 6: Fan Status LED**

Color	State	Description
Green	Blinking	Fan module hardware initialization is complete and software initialization is pending.



**Table 6: Fan Status LED (Continued)**

Color	State	Description
	On steadily	Software initialization is complete and the fan is functioning normally.
Red	On steadily	Fan module is faulty and not functioning normally.
-	Off	Fan module not present

**SEE ALSO**

[Replacing an MX204 Fan Module | 115](#)

[Maintaining the MX204 Fan Module | 113](#)

## MX204 AC Power System

**IN THIS SECTION**

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- [MX204 Router AC Power Specifications | 23](#)
- [AC Power Circuit Breaker Requirements for the MX204 Router | 24](#)
- [AC Power Cord Specifications for MX204 Routers | 25](#)

## MX204 Power System Description

### IN THIS SECTION

- [AC Power Supply Description | 18](#)
- [DC Power Supply Description | 18](#)

The MX204 is powered using either AC or DC power. It supports two power supply modules (PSMs) located at the rear of the chassis in slots **0** and **1**. [Figure 9 on page 18](#) and [Figure 10 on page 19](#) show the MX204 PSMs. The AC or DC power supply modules directly plug on to main board and are placed on the right side of the rear chassis. Each power supply has a handle, an ejector lever, and status LEDs. The power supply modules connect to the PSM board, which distributes the different output voltages produced by the power supply modules to the router components, depending on their voltage requirements. When both the power supply modules are present, they share power almost equally within a fully populated system. If the first power supply in a redundant configuration fails or is removed, the second power supply assumes the entire electrical load without interruption. A single power supply provides the maximum configuration with full power for as long as the router is operational. A second power supply can be installed for redundancy. The chassis is designed to support 1+1 feed redundancy.

Redundant power supply is hot-removable and hot-insertable. If you remove a power supply from a router that uses only one power supply, then the router shuts down.



**CAUTION:** Do not mix AC and DC power supply modules in the same chassis.

**NOTE:** Routers configured with only one power supply are shipped with a blank panel installed over the power supply slot that is not populated.

The power supply modules are cooled by its own internal cooling system. A fan present in the power supply module monitors and maintains the temperature inside.

## AC Power Supply Description

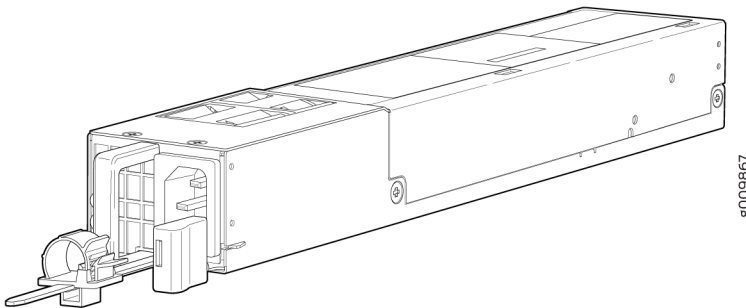
Each AC power supply weighs approximately 2.2 lb (1 kg) and consists of a handle, an ejector lever, an AC appliance inlet, a fan, and status LEDs to monitor the status of the power supply. [Figure 9 on page 18](#) shows the AC power supply.

Each inlet requires a dedicated AC power feed and a dedicated customer-site circuit breaker. We recommend that you use a minimum 20 A (110 VAC) or 16 A (220 VAC) customer-site circuit breaker, or as required by local code.



**WARNING:** The router is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal (sized for 10–32 screws) provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earthing terminal must be permanently connected to earth.

Figure 9: AC Power Supply

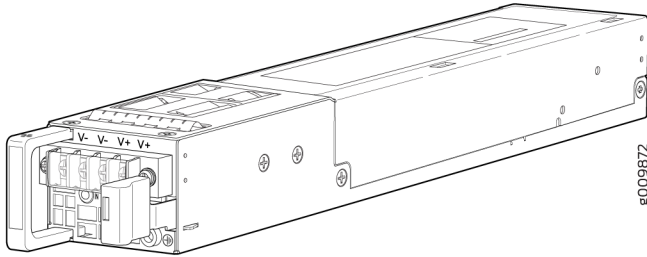


## DC Power Supply Description

Each DC power supply weighs approximately 2.2 lb (1 kg) and consists of a handle, an ejection lever, status LEDs, and a terminal block that provides a single DC input (-48 VDC and return) that requires a dedicated customer site circuit breaker. We recommend that you use a dedicated customer-site circuit breaker rated for 25 A (-48 VDC) minimum, or as required by local code.

[Figure 10 on page 19](#) shows the DC power supply.

Figure 10: DC Power Supply



## SEE ALSO

[Maintaining the MX204 Power Supplies](#) | 117

## MX204 Power Supply Module LEDs

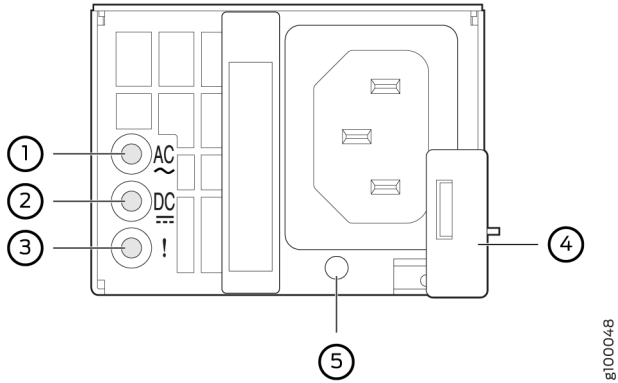
### IN THIS SECTION

- [AC Power Supply Module LEDs](#) | 19
- [DC Power Supply Module LEDs](#) | 21

## AC Power Supply Module LEDs

[Figure 11 on page 20](#) shows the AC power supply module components along with the status LEDs.

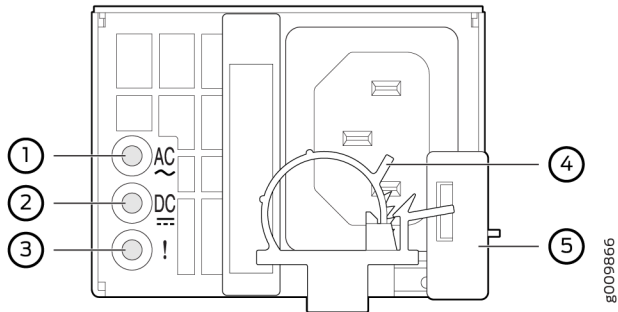
Figure 11: AC Power Supply Module LEDs and Components



1- Input status LED	4- Ejector lever
2- Output status LED	5- AC power cord retainer port
3- Fault LED	

Figure 12 on page 20 shows the AC power supply module components with the AC power cord retainer along with the status LEDs.

Figure 12: AC Power Supply Module LEDs and Components--with the AC Power Cord Retainer



1- Input status LED	4- AC power cord retainer installed
2- Output status LED	5- Ejector lever
3- Fault LED	

Table 7 on page 21 describes the LEDs on the AC power supply modules.

**Table 7: AC Power Supply Module LEDs**

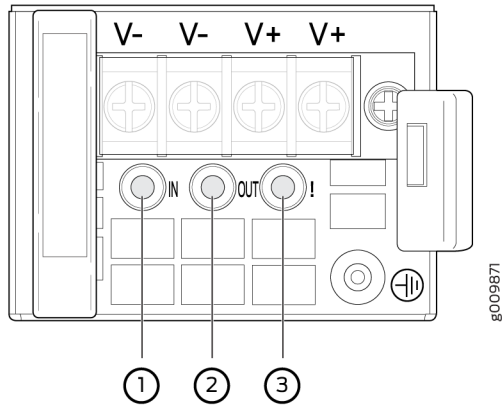
Label	Color	State	Description
<b>AC OK</b>	Unlit	Off	The power supply is disconnected from power source, or the power supply is not receiving power.
	Green	On steadily	Power supply is receiving power.
<b>DC OK</b>	Unlit	Off	Power supply output is off.
	Green	On steadily	The power supply is sending out power correctly.
<b>! (Fault)</b>	Amber	On steadily	An error has been detected in the power supply. Replace the power supply as soon as possible. To maintain proper airflow through the chassis, leave the power supply installed in the chassis until you are ready to replace it.

**NOTE:** If the **AC OK** LED and the **DC OK** LED are unlit, either the AC power cord is not installed properly or the power supply fuse has failed. If the **AC OK** LED is lit and the **DC OK** LED is unlit, the AC power supply is installed properly, but the power supply has an internal failure.

## DC Power Supply Module LEDs

Figure 13 on page 22 shows the DC power supply modules status LEDs.

Figure 13: DC Power Supply Module LEDs



1- Input LED

3- Fault LED

2- Output LED

**CAUTION:** On the DC power supply, the V+ terminals are shunted internally together, as are the V- terminals. The same polarity terminal can be wired together from the same source to provide an additional current path in a higher power chassis. Do not connect the terminals to different sources.

Table 8 on page 22 describes the LEDs on the DC power supply modules.

Table 8: DC Power Supply Module LEDs

Label	Color	State	Description
IN (Input)	Unlit	Off	The power supply is disconnected from power source, or the power supply is not receiving power.
	Green	On steadily	Power supply is receiving power.
OUT (Output)	Unlit	Off	Power supply output is off.
	Green	On steadily	The power supply is sending out power correctly.

**Table 8: DC Power Supply Module LEDs (Continued)**

Label	Color	State	Description
! (Fault)	Amber	On steadily	An error has been detected in the power supply. Replace the power supply as soon as possible. To maintain proper airflow through the chassis, leave the power supply installed in the chassis until you are ready to replace it.

**SEE ALSO**

[Routine Maintenance Procedures for MX204 Routers | 102](#)

[Maintaining the MX204 Power Supplies | 117](#)

## MX204 Router AC Power Specifications

[Table 9 on page 23](#) lists the AC power system electrical specifications.

**Table 9: AC Power System Electrical Specifications**

Item	Specification
AC input voltage	Operating range: 100 through 240 VAC
AC input line frequency	50 through 60 Hz (nominal)
AC system current rating	3.2 A @ 100 VAC 1.37 A @ 240 VAC
AC system input power	312 W

[Table 10 on page 24](#) lists the AC power supply electrical specifications.



**Table 10: AC Power Supply Electrical Specifications**

Item	Specification
Maximum output power	650 W
AC input voltage	Operating range: 100 through 127 VAC 200 through 240 VAC
AC input line frequency	50 to 60 Hz (nominal)
AC input current rating	7.8 A @ 100 VAC 3.8 A @ 240 VAC

**SEE ALSO**

[Maintaining the MX204 Power Supplies | 117](#)

## AC Power Circuit Breaker Requirements for the MX204 Router

We recommend that you use a dedicated customer-site circuit breaker rated for 20 A (110 VAC) minimum or 16 A (220 VAC) minimum for each AC power feed, or as required by local code. Doing so enables you to operate the router in any configuration without upgrading the power infrastructure.

**SEE ALSO**

[Replacing an MX204 AC Power Supply | 119](#)

[Power Consumption for an AC-Powered MX204 Router | 58](#)

[General Safety Guidelines and Warnings | 136](#)

[General Electrical Safety Guidelines and Warnings | 157](#)

[Prevention of Electrostatic Discharge Damage | 159](#)

## AC Power Cord Specifications for MX204 Routers

You can order detachable AC power cords based on your geographical location. The cord coupler is type C13 as described by International Electrotechnical Commission (IEC) standard 60320. The plug end of the power cord fits into the power source outlet that is standard for your geographical location.



**CAUTION:** Ensure that you use an AC power supply only with a power cord that is intended for it.

**NOTE:** In North America, AC power cords must not exceed 4.5 meters (approximately 14.75 feet) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52 and Canadian Electrical Code (CEC) Section 4-010(3). The cords supplied with the switch are in compliance.

Table 11 on page 25 gives the AC power cord specifications for the countries and regions listed in the table.

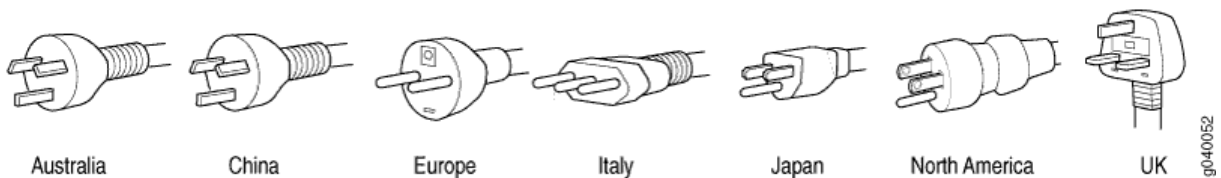
**Table 11: AC Power Cord Specifications**

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

**Table 11: AC Power Cord Specifications (Continued)**

Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number
Israel	250 VAC, 10 A, 50 Hz	SI 32/1971 Type IL/3G	CBL-EX-PWR-C13-IL
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16 Type I/3G	CBL-EX-PWR-C13-IT
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	SS-00259 Type VCTF	CBL-EX-PWR-C13-JP
Korea	250 VAC, 10 A, 50 Hz or 60 Hz	CEE (7) VII Type VIIGK	CBL-EX-PWR-C13-KR
North America	125 VAC, 13 A, 60 Hz	NEMA 5-15 Type N5-15	CBL-EX-PWR-C13-US
South Africa	250 VAC, 10 A, 50 Hz	SABS 164/1:1992 Type ZA/13	CBL-EX-PWR-C13-SA
Switzerland	250 VAC, 10 A, 50 Hz	SEV 6534-2 Type 12G	CBL-EX-PWR-C13-SZ
Taiwan	125 VAC, 11 A and 15 A, 50 Hz	NEMA 5-15P Type N5-15P	CBL-EX-PWR-C13-TW
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A Type BS89/13	CBL-EX-PWR-C13-UK

Figure 14 on page 26 illustrates the plug on the power cord for some of the countries or regions listed in Table 11 on page 25.

**Figure 14: AC Plug Types**

**SEE ALSO**

- [General Safety Guidelines and Warnings | 136](#)

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- [General Electrical Safety Guidelines and Warnings | 157](#)

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- [Prevention of Electrostatic Discharge Damage | 159](#)

## MX204 DC Power System

**IN THIS SECTION**

- [MX204 Router DC Power Specifications | 27](#)
- [DC Power Circuit Breaker Requirements for the MX204 Router | 28](#)
- [DC Power Source Cabling for MX204 Router | 29](#)
- [DC Power Cable Specifications for MX204 Router | 30](#)

### MX204 Router DC Power Specifications

[Table 12 on page 27](#) lists the DC power system electrical specifications.

**Table 12: DC Power System Electrical Specifications**

Item	Specification
DC input voltage	Operating range: -40 through -72 VDC
DC system input current rating	20 A @ -44 VDC (maximum)
DC system input power	331 W 7.75 A @ -44 VDC

[Table 13 on page 28](#) lists the DC power supply electrical specifications.

**Table 13: DC Power Supply Electrical Specifications**

Item	Specification
Maximum output power	650 W
DC input voltage	Minimum: -40 VDC Nominal: -48 VDC, -60 VDC Operating range: -40 to -72 VDC
DC input current rating	20 A @ -44 VDC

**SEE ALSO**

[Maintaining the MX204 Power Supplies | 117](#)

[Replacing an MX204 DC Power Supply | 121](#)

## DC Power Circuit Breaker Requirements for the MX204 Router

Each DC power supply has a single DC input (-48 VDC and return) that requires a dedicated circuit breaker. We recommend that you use a dedicated customer-site circuit breaker rated for 25 A (-48 VDC) minimum, or as required by local code. Doing so enables you to operate the router in any configuration without upgrading the power infrastructure.

If you plan to operate a DC-powered router at less than the maximum configuration and do not provision a 25 A (-48 VDC) circuit breaker, we recommend that you provision a dedicated customer-site circuit breaker for each DC power supply rated for at least 125 percent of the continuous current that the system draws at -48 VDC.

**SEE ALSO**

[Replacing an MX204 DC Power Supply | 121](#)

[Power Consumption for a DC-Powered MX204 Router | 60](#)

[General Safety Guidelines and Warnings | 136](#)

[General Electrical Safety Guidelines and Warnings | 157](#)

[Prevention of Electrostatic Discharge Damage | 159](#)

## DC Power Source Cabling for MX204 Router

The DC power supply in **PS0** must be powered by a dedicated power feed derived from feed **A**, and the DC power supply in **PS1** must be powered by a dedicated power feed derived from feed **B**. This configuration provides the commonly deployed **A/B** feed redundancy for the system.



**CAUTION:** You must ensure that power connections maintain the proper polarity. The power source cables might be labeled **(+)** and **(-)** to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the terminal studs on each power supply.



**WARNING:** For field-wiring connections, use copper conductors only.



**CAUTION:** Power cords and cables must not block access to device components or drape where people could trip on them.

### SEE ALSO

[Replacing an MX204 DC Power Supply | 121](#)

[Power Consumption for a DC-Powered MX204 Router | 60](#)

[General Safety Guidelines and Warnings | 136](#)

[General Electrical Safety Guidelines and Warnings | 157](#)

[Prevention of Electrostatic Discharge Damage | 159](#)

## DC Power Cable Specifications for MX204 Router

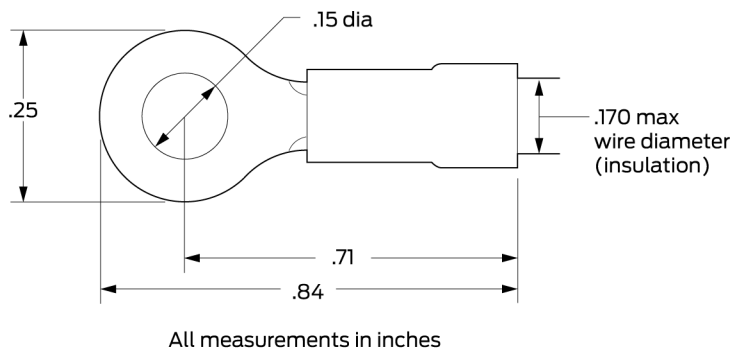
### IN THIS SECTION

- DC Power Cable Lug Specifications | 30
- DC Power Cable Specifications | 30

### DC Power Cable Lug Specifications

The accessory box shipped with the router includes the cable lugs that attach to the terminal of each power supply.

Figure 15: DC Power Cable Lug



**CAUTION:** Before you install the router, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the router.

### DC Power Cable Specifications

You must supply four DC power cables that meet the following specifications: 14-16 AWG (2.08 - 1.3 mm<sup>2</sup>), minimum 60° C wire, or as required by the local code.

**SEE ALSO**[Replacing an MX204 DC Power Supply | 121](#)[Power Consumption for a DC-Powered MX204 Router | 60](#)

## MX204 Host Subsystem

**IN THIS SECTION**

- [MX204 Routing Engine Description | 31](#)
- [MX204 Routing Engine LEDs | 34](#)

## MX204 Routing Engine Description

**IN THIS SECTION**

- [Routing Engine Functions | 32](#)
- [Routing Engine Components | 32](#)
- [Routing Engine Front Panel | 32](#)
- [Routing Engine Interface Ports | 33](#)

The host subsystem provides routing protocol processes, as well as software processes that control the router's interface, the chassis components, system management, and user access to the router. These routing processes run on top of a kernel that interacts with the Packet Forwarding Engine. The MX204 host subsystem consists of a single built-in Routing Engine.

This topic covers:



## Routing Engine Functions

The Routing Engine is built-in on the MX204 baseboard and cannot be replaced. The Routing Engine performs all route-processing functions, and provides chassis control and management plane functionality. The Routing Engine also provides control plane functions.

The Routing Engine supports the following functionalities to manage the operation of the router:

- System control functions such as environmental monitoring
- Routing Layer 2 and Layer 3 protocols
- Communication to components such as line cards, power supply, and cooling system
- Transparent clocking
- Alarm and logging functions

## Routing Engine Components

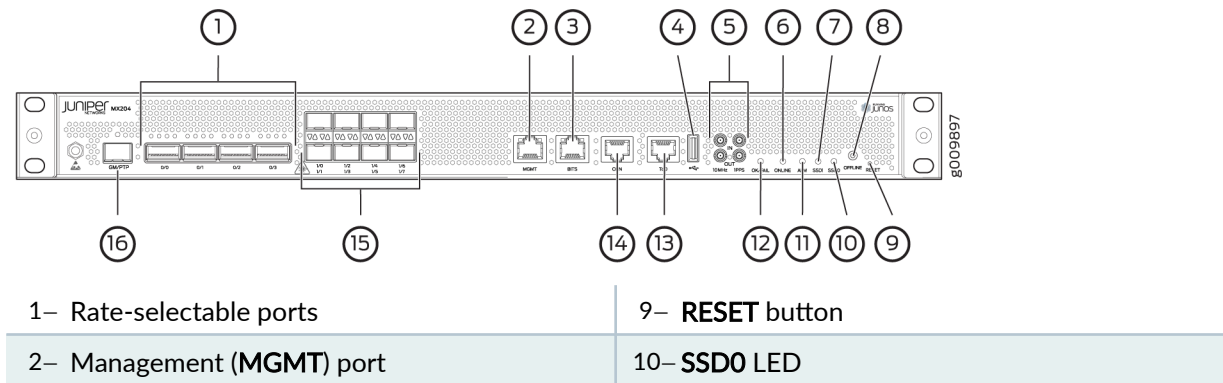
The Routing Engine consists of the following internal components:

- High-performance 1.6-GHz Intel 8 Core X86 CPU
- 32-GB DDR4 RAM
- 100-GB SATA SSD

## Routing Engine Front Panel

Figure 16 on page 32 shows the front panel of the MX204 chassis.

Figure 16: MX204 Ports



3– <b>BITS</b> port with LEDs	11– Alarm ( <b>ALM</b> ) LED
4– USB port	12– <b>OK/FAIL</b> LED
5– <b>1PPS</b> and <b>10MHz</b> GPS input and output ports	13– Time of day ( <b>ToD</b> ) port with LEDs (This port is reserved for future use)
6– <b>ONLINE</b> LED	14– Console ( <b>CON</b> ) port
7– <b>SSD1</b> LED	15– 10-Gigabit Ethernet SFP+ ports
8– <b>OFFLINE</b> button	16– PTP grandmaster clock ( <b>GM/PTP</b> ) port

## Routing Engine Interface Ports

The ports located on the router connect the Routing Engine to one or more external devices on which system administrators can issue Junos OS CLI commands to manage the router. In addition, ports to connect external clock interfaces for BITS and GPS function are also available on the router.

The Routing Engine interface ports with the indicated labels function are as follows (see [Figure 16 on page 32](#)):

- **CON**—Connects the Routing Engine to a system console through a serial cable with an RJ-45 connector.
- **MGMT**—Connects the Routing Engine through an Ethernet connection to a management LAN (or any other device that plugs into an Ethernet connection) for out-of-band management. The port uses an autosensing RJ-45 connector to support 10-Mbps, 100-Mbps, or 1000-Mbps connections. Two small LEDs (an activity LED and a link LED) on the port indicate the connection in use.

The link LED is:

- lit amber (steady) when the 1000-Mbps link is up.
- lit green (steady) when the 100-Mbps link is up.
- Off when the 10-Mbps link is up.

The activity LED is:

- lit green (blinking) when traffic is passing through the port.
- lit green (steady) when traffic is not passing through the port.

Both activity and link LEDs are off when the link is down.

- **BITS**—Building-integrated timing supply (BITS) external clocking interface for connecting to external clocking devices.
- **ToD**—Time-of-day (TOD) port on the front panel of the router that enables you to connect external timing signal sources.

**NOTE:** This port is reserved for future use.

- **10MHZ** (one input and one output)—The 10-MHz timing connectors on the front panel of the router that connect to external clock signal sources. The clocking ports provide the synchronized output clocks from any one of the reference clock inputs based on the clock's priority.
- **PPS** (one input and one output)—1-pulse-per-second (PPS) connectors on the front panel of the router that connect to external clock signal sources. The clocking ports provide the synchronized output clocks from any one of the reference clock inputs based on the clock's priority.
- **USB**—Provides a removable media interface through which you can install Junos OS manually. Junos OS supports USB version 1.0 and later.

#### SEE ALSO

[RJ-45 Connector Pinouts for MX Series CB-RE or RCB Auxillary and Console Ports | 55](#)

[RJ-45 Connector Pinouts for an MX Series CB-RE or RCB Management Port | 56](#)

[MX204 Chassis Description | 5](#)

## MX204 Routing Engine LEDs

The Routing Engine is built-in on the MX204 and is attached to the baseboard and cannot be replaced. The status of the Routing Engine is displayed by the **ONLINE** and **OK/FAIL** LEDs on the front panel of the MX204 chassis.

[Table 14 on page 35](#) describes the functions and LEDs on the MX204 router.

**NOTE:** The functioning of the MX204 router is controlled by the Routing Engine, and the LEDs present on the front panel of the router displays the status and functioning of the MX204 router.

Table 14: MX204 LEDs

Label	Color	State	Description
<b>ONLINE</b>	Green	On steadily	Both Junos OS and Linux are successfully loaded on the router.
		Blinking	Router is starting Junos OS.
	Red	On steadily	Router has loaded Linux.
		Blinking	Router is starting Linux.
	-	Off	Router is offline.
<b>OK/FAIL</b>	Green	On steadily	Router is functioning normally.
	Red	Blinking	Router has failed.
	-	Off	Router is not powered on.
<b>ALM</b>	Red	On steadily	Major alarm—Indicates a critical condition that can cause the router to stop functioning. Possible causes include component failure, or any major software failure.
	Yellow	On steadily	Minor alarm—Indicates a serious but nonfatal error condition, such as a maintenance alert or a significant increase in component temperature.
	Red	Blinking	Both major and minor alarms—Indicates that both major and minor alarm conditions are present.
	-	Off	No alarms are present.
<b>SSDO</b>	Green	Blinking	SSDO is being accessed by the router.

Table 14: MX204 LEDs (Continued)

Label	Color	State	Description
	-	Off	SSD0 is not active or not being accessed.
<b>SSD1</b>	Green	Blinking	SSD1 is being accessed by the router.
	-	Off	SSD1 is not active or not being accessed.
<b>BITS</b>	Green	On Steadily (Activity LED; left)	When there is no loss (BITS is in locked state).
	-	Off (Activity LED; left)	When there is loss of signal or loss of line.
	Amber	On steadily (Link LED; right)	When there is loss of signal or loss of line.
	-	Off (Link LED; right)	When there is no loss (BITS is in locked state).

# 2

CHAPTER

## Site Planning, Preparation, and Specifications

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[MX204 Site Preparation Checklist | 38](#)

[MX204 Site Guidelines and Requirements | 40](#)

[MX204 Network Cable and Transceiver Planning | 49](#)

[MX204 Management and Console Port Specifications and Pinouts | 54](#)

[MX204 Power Planning | 58](#)

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# MX204 Site Preparation Checklist

The checklist in [Table 15 on page 38](#) summarizes the tasks you must perform when preparing a site for router installation.

**Table 15: MX204 Site Preparation Checklist**

Item or Task	For More Information	Performed by	Date
<b>Environment</b>			
Verify that environmental factors such as temperature and humidity do not exceed router tolerances.	<a href="#">"MX204 Router Environmental Specifications" on page 41</a>		
<b>Power</b>			
Locate sites for connection of system grounding.	<a href="#">"MX204 Router Grounding Specifications" on page 42</a>		
Measure distance between external power sources and router installation site.	<a href="#">"MX204 Router DC Power Specifications" on page 27</a> <a href="#">"MX204 Router AC Power Specifications" on page 23</a>		
Calculate the power consumption and requirements.	<a href="#">"Power Consumption for a DC-Powered MX204 Router" on page 60</a> <a href="#">"Power Consumption for an AC-Powered MX204 Router" on page 58</a>		
<b>Rack</b>			

Table 15: MX204 Site Preparation Checklist (Continued)

Item or Task	For More Information	Performed by	Date
Select the type of rack or cabinet.	<a href="#">"MX204 Router Rack Requirements" on page 47</a> <a href="#">"MX204 Router Cabinet Requirements and Specifications" on page 44</a>		
Plan rack or cabinet location, including required space clearances.	<a href="#">"MX204 Router Clearance Requirements for Airflow and Hardware Maintenance" on page 46</a>		
If a rack is used, secure rack to floor and building structure.	<a href="#">"MX204 Router Rack Requirements" on page 47</a>		

#### Cables

<p>Acquire cables and connectors:</p> <ul style="list-style-type: none"> <li>Determine the number of cables needed based on your planned configuration.</li> <li>Review the maximum distance allowed for each cable. Choose the length of cable based on the distance between the hardware components being connected.</li> </ul>	<a href="#">"Calculating Power Budget and Power Margin for Fiber-Optic Cables" on page 49</a>		
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#### RELATED DOCUMENTATION

[MX204 Installation Overview | 64](#)

[Tools Required to Install the MX204 Chassis in Rack | 69](#)

[Installing the MX204 Chassis in a Rack | 69](#)



# MX204 Site Guidelines and Requirements

## IN THIS SECTION

- [MX204 Router Physical Specifications | 40](#)
- [MX204 Router Environmental Specifications | 41](#)
- [MX204 Router Grounding Specifications | 42](#)
- [MX204 Router Cabinet Requirements and Specifications | 44](#)
- [MX204 Router Clearance Requirements for Airflow and Hardware Maintenance | 46](#)
- [MX204 Router Rack Requirements | 47](#)

## MX204 Router Physical Specifications

[Table 16 on page 40](#) summarizes the physical specifications for the router.

**Table 16: Router Physical Specifications**

Description	Weight	Width	Depth	Height
Chassis fully loaded with all FRUs	AC-powered chassis: 22.7 lb (10.3 kg)	19 in. (48.26 cm)	18.50 in. (47.0 cm) 20.43 in. (51.89 cm) with fan and power handles	1.72 in. (4.37 cm; 1 U)
Fan tray	1.5 lb (0.68 kg)	1.89 in. (4.8 cm)	5.78 in. (14.68 cm)	1.64 in. (4.17 cm)
AC power supply	2.2 lb (1 kg)	2.23 in. (5.66 cm)	14.50 in. (36.83 cm)	1.58 in. (4.01 cm)
DC power supply	2.2 lb (1 kg)	2.23 in. (5.66 cm)	14.53 in. (36.91 cm)	1.67 in. (4.24 cm)

**SEE ALSO**

[MX204 Router Overview | 2](#)

[MX204 Chassis Description | 5](#)

## MX204 Router Environmental Specifications

Table 17 on page 41 specifies the environmental specifications required for normal router operation. In addition, the site should be as dust-free as possible.

**Table 17: Router Environmental Specifications**

Description	Value
Altitude	No performance degradation up to 10,000 ft (3048 m)
Relative humidity	Normal operation ensured in relative humidity range of 5% through 90%, noncondensing
Temperature	<ul style="list-style-type: none"> <li>• Normal operation ensured in temperature range of 32°F (0°C) through 104°F (40°C)</li> <li>• Short-term operation ensured in temperature range of 23° F (-5° C) through 131° F (55° C).</li> </ul> <p><b>NOTE:</b> As defined in NEBS GR-63-CORE, Issue 4, short-term events can be up to 96 hours in duration but not more than 15 days per year.</p> <ul style="list-style-type: none"> <li>• Nonoperating storage temperature in shipping container: -40°F (-40°C) through 158°F (70°C)</li> </ul>
Seismic	Designed to meet Telcordia Technologies Zone 4 earthquake requirements
Maximum thermal output	1705 BTU/hour (500 W)

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

## SEE ALSO

[Routine Maintenance Procedures for MX204 Routers | 102](#)

*General Safety Guidelines for Juniper Networks Devices*

[General Safety Warnings for Juniper Networks Devices | 138](#)

## MX204 Router Grounding Specifications

### IN THIS SECTION

- [Grounding Points Specifications | 42](#)
- [Grounding Cable Lug Specifications | 43](#)
- [Grounding Cable Specifications | 43](#)

### Grounding Points Specifications

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, the router must be adequately grounded before power is connected. To ground AC-powered and DC-powered routers, you must connect a grounding cable to earth ground and then attach it to the chassis grounding points by using the two screws provided.

[Figure 17 on page 43](#) shows the grounding point location on the router.

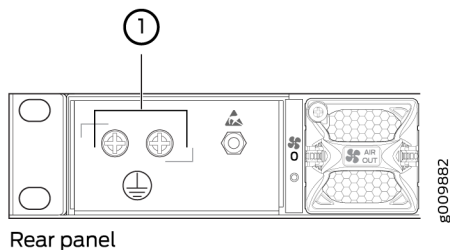
A protective earthing terminal bracket is required for connecting the chassis to earth ground. This two-holed bracket attaches on the side of the chassis through the mounting rail and provides a protective earthing terminal for the router. The grounding points are studs sized for 10-32 screws. The 10-32 screws are provided with the MX204 router. The grounding points are spaced at 0.75-in. (19.1-mm) centers.

Two threaded holes are provided on the rear left side of the chassis for connecting the router to earth ground. The grounding points fit 10–32 screws.

**NOTE:** Additional grounding is provided to an AC-powered router when you plug its power supply modules into grounded AC power receptacles.

You must install the MX204 router in a restricted-access location and ensure that the chassis is always properly grounded. The MX204 router has a two-hole protective grounding terminal provided on the chassis. See [Figure 17 on page 43](#). We recommend that you use this protective grounding terminal as the preferred method for grounding the chassis regardless of the power supply configuration. However, if additional grounding methods are available, you can also use those methods. For example, you can use the grounding wire in the AC power cord or use the grounding terminal or lug on a DC power supply. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.

**Figure 17: Grounding Points on the Router**



## Grounding Cable Lug Specifications

You must provide one grounding cable lug that attaches to the grounding cable and 10–32 screws used to secure the grounding cable to the grounding points.



**CAUTION:** Before you install the router, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the router.

## Grounding Cable Specifications

The grounding lug required is a Panduit LCD10-10A-L or equivalent (not provided). The grounding lug accommodates 12 AWG (2.5 mm<sup>2</sup>) stranded wire. The grounding cable that you provide for the chassis

must be the same size or heavier than the input wire of each power supply module. Minimum recommendations are 12 AWG (2.5 mm<sup>2</sup>) stranded wire, 60° C wire, or as permitted by local code.

## SEE ALSO

[Tools and Parts Required for MX204 Router Grounding and Power Connections | 77](#)

[Prevention of Electrostatic Discharge Damage | 159](#)

[MX204 Router AC Power Specifications | 23](#)

[MX204 Router DC Power Specifications | 27](#)

## MX204 Router Cabinet Requirements and Specifications

[Table 18 on page 44](#) summarizes cabinet requirements and specifications for the MX204 router.

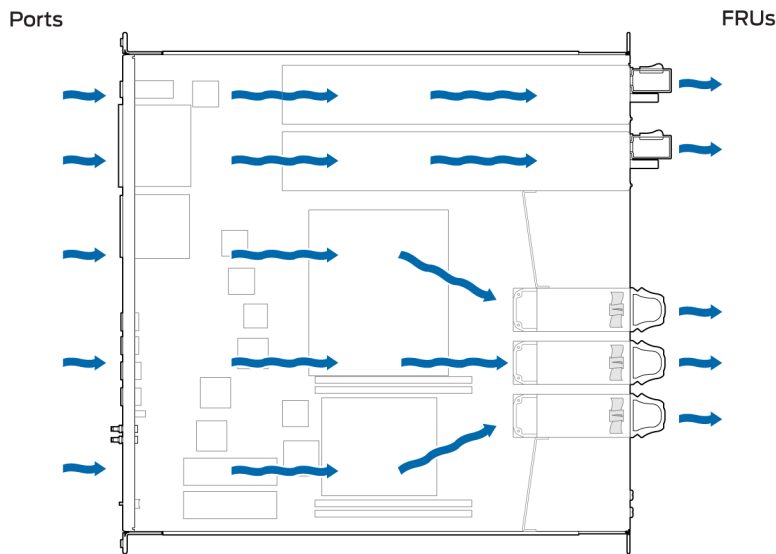
**Table 18: Cabinet Requirements and Specifications for an MX204 Router**

Cabinet Requirement	Guidelines for the MX204 Router
Cabinet size and clearance	<ul style="list-style-type: none"> <li>• The minimum-sized cabinet that can accommodate the router is 19-in. (482-mm) wide, and 23.62-in. (600-mm) deep. A cabinet larger than the minimum requirement provides better airflow and reduces the chance of overheating. If you provide adequate cooling air and airflow clearance, you can stack several routers in a cabinet that has sufficient usable vertical space. Each router requires 1 U.</li> </ul> <p>A U is the standard rack unit defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronic Components Industry Association (ECIA) (<a href="http://www.ecianow.org">http://www.ecianow.org</a>).</p> <ul style="list-style-type: none"> <li>• With adequate cooling air and airflow clearance, you can stack multiple MX204 routers in a cabinet with a four-post rack. In all cases, the rack must meet the strength requirements to support the weight.</li> <li>• The minimum total clearance inside the cabinet is 30.7 in. (780 mm) between the inside of the front door and the inside of the rear door.</li> </ul>

**Table 18: Cabinet Requirements and Specifications for an MX204 Router (Continued)**

Cabinet Requirement	Guidelines for the MX204 Router
Cabinet airflow requirements	<p>When you install the router in a cabinet, you must ensure that ventilation through the cabinet is sufficient to prevent overheating. Consider the following requirements to when planning for chassis cooling:</p> <ul style="list-style-type: none"> <li>• Airflow must always be from front to back with respect to the rack. If the device has side to rear airflow, then provisions must be made to ensure that fresh air from the front of the rack is supplied to the inlets, and exhaust exits from the rear of the rack. The device must not interfere with the cooling of other systems in the rack. Fillers must be used as appropriate in the rack to ensure there is no recirculation of heated exhaust air back to the front of the rack. Care must also be taken around cables to ensure no leakage of air in situations where recirculation might result.</li> <li>• Ensure that the cabinet allows the chassis hot exhaust air to exit from the cabinet without recirculating into the router. An open cabinet (without a top or doors) that employs hot air exhaust extraction from the top allows 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. For an illustration of chassis airflow, see <a href="#">Figure 18 on page 46</a>.</li> <li>• Ensure that the cool air supply you provide through the cabinet can adequately dissipate the thermal output of the router.</li> <li>• Route and dress all cables to minimize the blockage of airflow to and from the chassis.</li> <li>• Ensure that the spacing of rails and adjacent racks allows for the proper clearance around the router and rack as specified in "<a href="#">MX204 Router Clearance Requirements for Airflow and Hardware Maintenance</a>" on <a href="#">page 46</a>.</li> <li>• Install the router as close as possible to the front of the cabinet so that the chassis just clears the inside of the front door. This maximizes the clearance in the rear of the cabinet for critical airflow.</li> </ul>

Figure 18: Airflow Through MX204 Chassis



#### SEE ALSO

[MX204 Installation Overview | 64](#)

[MX204 Cooling System Description | 13](#)

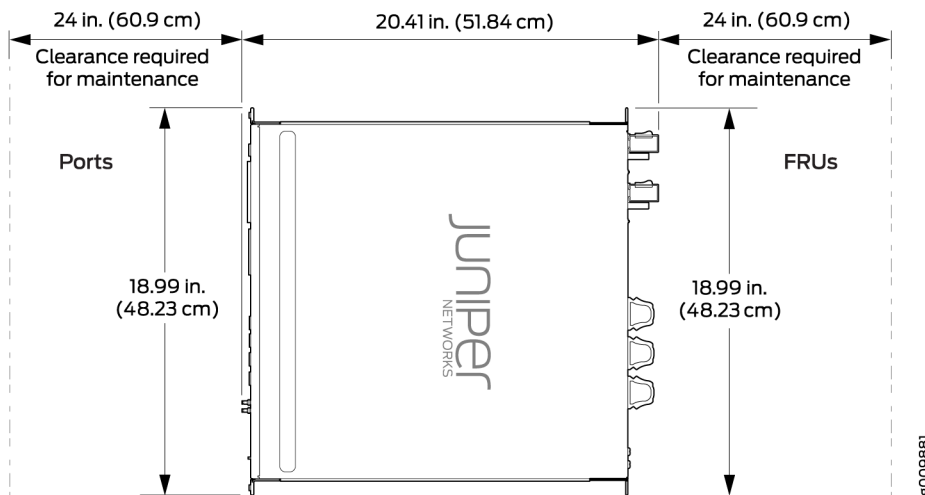
## MX204 Router Clearance Requirements for Airflow and Hardware Maintenance

When planning the installation site, allow sufficient clearance around the rack (see [Figure 19 on page 47](#)):

- For the cooling system to function properly, the airflow around the chassis must be unrestricted. Allow at least 6 in. (15.2 cm) of clearance between side-cooled routers. Allow 2.8 in. (7 cm) between the side of the chassis and any non-heat-producing surface such as a wall.
- For service personnel to remove and install hardware components, there must be adequate space at the front and back of the router. At least 24 in. (61 cm) are required both in front of and behind the router. NEBS GR-63 recommends that you allow at least 30 in. (76.2 cm) in front of the rack and 24 in. (61 cm) behind the router.

- To accommodate power cable bend radius at the rear of the chassis and the interface cable bend radius at the front of the chassis, provide at least 2.75 in. (7 cm) at the rear and 3.5 in. (8.9 cm) at the front.

Figure 19: MX204 Chassis Dimensions and Clearance Requirements



## MX204 Router Rack Requirements

The MX204 router can be installed in a standard 19-in. rack. Many types of racks are acceptable, including four-post (telco) racks and open-frame racks. [Table 19 on page 47](#) summarizes rack requirements and specifications for the router.

Table 19: Rack Requirements and Specifications for an MX204 Router

Rack Requirement	Guidelines
Rack type and mounting bracket hole spacing	<p>Use a four-post rack. You can mount the router on any four-post rack that provides bracket holes or hole patterns spaced at 1 U (1.75-in./4.44-cm) increments and that meets the size and strength requirements specified in this table.</p> <p>A U is the standard rack unit defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Components Industry Association (<a href="http://www.ecianow.org/">http://www.ecianow.org/</a>).</p>



**Table 19: Rack Requirements and Specifications for an MX204 Router (Continued)**

Rack Requirement	Guidelines
Rack size and strength	<ul style="list-style-type: none"> <li>• Ensure that the rack is 19-in. wide as defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Components Industry Association (<a href="http://www.ecianow.org/">http://www.ecianow.org/</a>).</li> <li>• Ensure that the rack is of one of the following standard depths: <ul style="list-style-type: none"> <li>• 23.6 in. (600 mm)</li> <li>• 30.0 in. (762 mm)</li> <li>• 31.5 in. (800 mm)</li> </ul> </li> <li>• The rack rails must be spaced widely enough to accommodate the router chassis's external dimensions (see "<a href="#">MX204 Router Physical Specifications</a>" on page 40). The outer edges of the mounting brackets extend the width to 19 in. (48.3 cm). The spacing of rails and adjacent racks must also allow for the clearances around the router and rack.</li> <li>• The router ships with the front-mounting brackets fixed in the front-mount position on the chassis. You can move the rear-mounting brackets based on the depth of the rack.</li> <li>• The chassis height of 1.72 in. (4.37 cm) is approximately 1 U (rack unit).</li> <li>• The rack must be strong enough to support the weight of the fully configured router, up to 22.7 lb (10.3 kg).</li> <li>• Either end of the router must be mounted flush with the rack and still be adjustable for racks with different depths. The front and rear rack rails must be spaced between 23.62 in. (600 mm) and 31.5 in. (800 mm) front to back.</li> <li>• Ensure that the spacing of rails and adjacent racks allows for the proper clearance around the router and rack.</li> </ul>

**Table 19: Rack Requirements and Specifications for an MX204 Router (Continued)**

Rack Requirement	Guidelines
Rack connection to the building structure	<ul style="list-style-type: none"> <li>• Secure the rack to the building structure.</li> <li>• If earthquakes are a possibility in your geographic area, secure the rack to the floor.</li> <li>• Secure the rack to the ceiling brackets as well as wall or floor brackets for maximum stability.</li> </ul>

**SEE ALSO**

| [MX204 Installation Overview](#) | 64

## MX204 Network Cable and Transceiver Planning

**IN THIS SECTION**

- [Calculating Power Budget and Power Margin for Fiber-Optic Cables](#) | 49
- [CB-RE and RCB Interface Cable and Wire Specifications for MX Series Routers](#) | 52
- [Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion](#) | 53

### Calculating Power Budget and Power Margin for Fiber-Optic Cables

**IN THIS SECTION**

- [How to Calculate Power Budget for Fiber-Optic Cables](#) | 50
- [How to Calculate Power Margin for Fiber-Optic Cables](#) | 50

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:

### How to 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, 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 power budget ( $P_B$ ), 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 power budget, you can calculate the power margin ( $P_M$ ), which represents the amount of power available after subtracting attenuation or link loss (LL) from the power budget ( $P_B$ ). 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 20 on page 51](#) 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 20: 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
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 power budget ( $P_B$ ) of 13 dB uses the estimated values from [Table 20 on page 51](#). This example calculates link loss (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 power margin ( $P_M$ ) is calculated as follows:

$$P_M = P_B - LL$$

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

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

$$P_M = 7 \text{ dB}$$

The following sample calculation for an 8-km-long single-mode link with a power budget ( $P_B$ ) of 13 dB uses the estimated values from [Table 20 on page 51](#). This example calculates link loss (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 power margin ( $P_M$ ) is calculated as follows:

$$P_M = P_B - LL$$

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

$$P_M = 13 \text{ dB} - 4 \text{ dB} - 3.5 \text{ dB}$$

$$P_M = 5.5 \text{ dB}$$

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

## CB-RE and RCB Interface Cable and Wire Specifications for MX Series Routers

Table 21 on page 52 lists the specifications for the cables that connect to management ports and the wires that connect to the alarm relay contacts.

**NOTE:** In routers where the Routing Engine (RE) and Control Board (CB) are integrated into a single board, a CB-RE is known as Routing and Control Board (RCB). The RCB is a single FRU that provides RE and CB functionality.

**Table 21: Cable and Wire Specifications for Routing Engine and RCB Management and Alarm Interfaces**

Port	Cable Specification	Maximum Length	Router Receptacle
Routing Engine console or auxiliary interface	RS-232 (EIA-232) serial cable	1.83 m	RJ-45 socket
Routing Engine Ethernet interface	Category 5 cable or equivalent suitable for 100Base-T operation	100 m	RJ-45 autosensing
Alarm relay contacts	Wire with gauge between 28-AWG and 14-AWG (0.08 and 2.08 mm <sup>2</sup> )	None	—

**NOTE:** We no longer include a DB-9 to RJ-45 cable or a DB-9 to RJ-45 adapter with a CAT5E copper cable as part of the device package. If you require a console cable, you can order it

separately with the part number JNP-CBL-RJ45-DB9 (DB-9 to RJ-45 adapter with a CAT5E copper cable).

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

### IN THIS SECTION

- [Signal Loss in Multimode and Single-Mode Fiber-Optic Cable | 53](#)
- [Attenuation and Dispersion in Fiber-Optic Cable | 53](#)

### 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 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.

## MX204 Management and Console Port Specifications and Pinouts

### IN THIS SECTION

- [RJ-45 Connector Pinouts for MX Series CB-RE or RCB Auxillary and Console Ports | 55](#)
- [RJ-45 Connector Pinouts for an MX Series CB-RE or RCB Management Port | 56](#)
- [RJ-45 Connector Pinouts for the External Clock Ports | 57](#)

## RJ-45 Connector Pinouts for MX Series CB-RE or RCB Auxillary and Console Ports

The ports—labeled—**AUX** and **CONSOLE**—on the Control Board and Routing Engine (CB-RE) or the Routing and Control Board (RCB) are asynchronous serial interfaces that accept an RJ-45 connector. The ports connect the Routing Engine to an auxiliary or console management device. [Table 22 on page 55](#) describes the RJ-45 connector pinout.

**NOTE:** In routers where the Routing Engine and Control Board (CB) are integrated into a single board, a CB-RE is known as Routing and Control Board (RCB). The RCB is a single FRU that provides Routing Engine and CB functionality.

**Table 22: RJ-45 Connector Pinout for the AUX and CONSOLE Ports**

Pin	Signal	Description
1	RTS	Request to Send
2	DTR	Data Terminal Ready
3	TXD	Transmit Data
4	Ground	Signal Ground
5	Ground	Signal Ground
6	RXD	Receive Data
7	DSR/DCD	Data Set Ready
8	CTS	Clear to Send



## RJ-45 Connector Pinouts for an MX Series CB-RE or RCB Management Port

The port on the Control Board and Routing Engine (CB-RE; Routing and Control Board (RCB)) labeled **MGMT** is an autosensing 10/100/1000-Mbps Ethernet RJ-45 receptacle that accepts an Ethernet cable for connecting the Routing Engine to a management LAN (or other device that supports out-of-band management).

**NOTE:** In routers where the Routing Engine and Control Board (CB) are integrated into a single board, a CB-RE is known as Routing and Control Board (RCB). The RCB is a single FRU that provides Routing Engine and CB functionality.

Table 23 on page 56 describes the RJ-45 connector pinout.

**Table 23: RJ-45 Management Port Connector Pinouts for the CB-RE or RCB MGMT Port**

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

## RJ-45 Connector Pinouts for the External Clock Ports

The Routing and Control Board (RCB) contains two RJ-45 connectors for building-integrated timing supply (BITS) external clock support. [Table 24 on page 57](#) provides the pinout information of the RJ-45 management port connectors

**Table 24: External Clock Pinouts**

Pin	Description	Direction
A1	PortA, Rx, Ring	Input
A2	PortA, Rx, Tip	Input
A3	Reserved	-
A4	PortA, Rx, Ring	Output
A5	PortA, Rx, Tip	Output
A6	Reserved	-
A7	Reserved	-
A8	Reserved	-
B1	PortB Rx, Ring	Input
B2	PortB Rx, Tip	Input
B3	Reserved	-
B4	PortB Rx, Ring	Output
B5	PortB Rx, Tip	Output

Table 24: External Clock Pinouts (*Continued*)

Pin	Description	Direction
B6	Reserved	–
B7	Reserved	–
B8	Reserved	–

**SEE ALSO**

| *Routing and Control Board Components*

## MX204 Power Planning

**IN THIS SECTION**

- [Power Consumption for an AC-Powered MX204 Router | 58](#)
- [Power Consumption for a DC-Powered MX204 Router | 60](#)

### Power Consumption for an AC-Powered MX204 Router

**IN THIS SECTION**

- [Power Requirements for MX204 Components | 59](#)
- [Calculating System Thermal Output | 60](#)

Use the information in this topic to determine the power consumption for your router and plan the amount of power you need to provide to the router.

- ["Power Requirements for MX204 Components" on page 59](#)
- ["Calculating System Thermal Output" on page 60](#)

## Power Requirements for MX204 Components

[Table 25 on page 59](#) lists the power requirements for various hardware components when the router is operating under typical and maximum voltage conditions.

**Table 25: Power Requirements for MX204 Components**

Component	Power Requirement at 25° C (Watts; Typical)	Power Requirement at 55° C (Watts; Maximum)
Fully loaded MX204 router	240 W	280 W

[Table 26 on page 59](#) lists the power requirements for the fully configured AC-powered routers operating under typical voltage conditions.

**Table 26: MX204 Router AC Router Power Requirements at Typical Temperature (25° C)**

Chassis Configuration	Power Requirement at 25° C (Watts)	Power Requirement (Watts) with 90% Efficiency
Fully configured chassis running at high activity	240 W	266 W

[Table 27 on page 59](#) lists the power requirements for the fully configured AC-powered routers operating under maximum voltage conditions.

**Table 27: MX204 Router AC Router Power Requirements at Maximum Temperature (55° C)**

Chassis Configuration	Power Requirement at 55° C (Watts)	Power Requirement (Watts) with 90% Efficiency
Fully configured chassis running at high activity	280 W	311 W

## Calculating System Thermal Output

After you have calculated the power consumption for your configuration, you can use that information to determine the system thermal output (BTUs per hour). To do so, multiply the power consumption in watts by 3.41.

For example, in [Table 26 on page 59](#) we calculated the power consumption for a fully configured chassis running at high activity at 25° C typical temperature to be 240 W. Using that information we can calculate the system thermal output for the configuration:

```
Power consumption in watts * 3.41 = system thermal output in BTU/hr
240 W * 3.41 = 818.4 BTU/hr
```

### SEE ALSO

[MX204 Power System Description | 17](#)

[Replacing an MX204 AC Power Supply | 119](#)

[AC Power Cord Specifications for MX204 Routers | 25](#)

[AC Power Circuit Breaker Requirements for the MX204 Router | 24](#)

[General Safety Guidelines and Warnings | 136](#)

[General Electrical Safety Guidelines and Warnings | 157](#)

[Prevention of Electrostatic Discharge Damage | 159](#)

## Power Consumption for a DC-Powered MX204 Router

### IN THIS SECTION

- [Power Requirements for MX204 Components | 61](#)
- [Calculating System Thermal Output | 62](#)

Use the information in this topic to determine the power consumption for your router and plan the amount of power you need to provide to the router.

- ["Power Requirements for MX204 Components" on page 61](#)

- ["Calculating System Thermal Output" on page 62](#)

## Power Requirements for MX204 Components

[Table 28 on page 61](#) lists the power requirements for various hardware components when the router is operating under typical and maximum voltage conditions.

**Table 28: Power Requirements for MX204 Components**

Component	Power Requirement at 25° C (Watts; Typical)	Power Requirement at 55° C (Watts; Maximum)
Fully loaded MX204 router	240 W	280 W

[Table 29 on page 61](#) lists the power requirements for the fully configured DC-powered routers operating under typical voltage conditions.

**Table 29: MX204 Router DC Router Power Requirements at Typical Temperature (25° C)**

Chassis Configuration	Power Requirement at 25° C (Watts)	Power Requirement (Watts) with 90% Efficiency
Fully configured chassis running at high activity	240 W	266 W

[Table 30 on page 61](#) lists the power requirements for the fully configured DC-powered routers operating under maximum voltage conditions.

**Table 30: MX204 Router DC Router Power Requirements at Maximum Temperature (55° C)**

Chassis Configuration	Power Requirement at 55° C (Watts)	Power Requirement (Watts) with 90% Efficiency
Fully configured chassis running at high activity	280 W	311 W

## Calculating System Thermal Output

After you have calculated the power consumption for your configuration, you can use that information to determine the system thermal output (BTUs per hour). To do so, multiply the power consumption in watts by 3.41.

For example, in [Table 29 on page 61](#) we calculated the power consumption for a fully configured chassis running at high activity at 25° C typical temperature to be 240 W. Using that information we can calculate the system thermal output for the configuration:

```
Power consumption in watts * 3.41 = system thermal output in BTU/hr
240 W * 3.41 = 818.4 BTU/hr
```

### SEE ALSO

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[MX204 Power System Description | 17](#)

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[Replacing an MX204 DC Power Supply | 121](#)

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[DC Power Circuit Breaker Requirements for the MX204 Router | 28](#)

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[DC Power Source Cabling for MX204 Router | 29](#)

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[DC Power Cable Specifications for MX204 Router | 30](#)

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[General Safety Guidelines and Warnings | 136](#)

---

[General Electrical Safety Guidelines and Warnings | 157](#)

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[Prevention of Electrostatic Discharge Damage | 159](#)

# 3

CHAPTER

## Initial Installation and Configuration

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[MX204 Installation Overview | 64](#)

[Unpacking the MX204 | 65](#)

[Installing the MX204 | 69](#)

[Connecting the MX204 to Power | 77](#)

[Connecting the MX204 to the Network | 89](#)

[Performing the Initial Software Configuration for the MX204 Router | 96](#)

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# MX204 Installation Overview

To install the router:

1. Prepare your installation site.  
See ["MX204 Site Preparation Checklist"](#) on page 38.
2. Review the safety guidelines and warnings:
  - See ["General Safety Guidelines and Warnings"](#) on page 136.
  - See ["General Safety Warnings for Juniper Networks Devices"](#) on page 138.
3. Unpack the router and verify the parts:
  - a. See ["Unpacking MX204 Router"](#) on page 65.
  - b. See ["Verifying the MX204 Router Parts Received"](#) on page 66.
4. (*Optional*) Remove components from the MX204 router chassis before installing it in a rack.  
See individual topics listed in *Removing, Installing, and Upgrading Components* for removing components.
5. Install the router in the rack.  
See ["Installing the MX204 Chassis in a Rack"](#) on page 69.
6. (*Optional*; Required only if you have removed the components from the router in step 4) Reinstall components in the MX204 router after installing the chassis in a rack.  
See individual topics listed in *Removing, Installing, and Upgrading Components* for installing components.
7. Connect cables to the network and external devices.  
See ["Connecting the MX204 Router to External Devices and Cables"](#) on page 90.
8. Connect the grounding cable.  
See ["Grounding the MX204 Router"](#) on page 78.
9. Connect the AC power cord or DC power cables:
  - See ["Connecting Power to an AC-Powered MX204 Router"](#) on page 79.
  - See ["Connecting Power to a DC-Powered MX204 Router"](#) on page 83.
10. Power on the router:
  - See ["Powering On an AC-Powered MX204 Router"](#) on page 82.
  - See ["Powering On a DC-Powered MX204 Router"](#) on page 86.
11. Perform the initial system configuration.  
See ["Performing the Initial Software Configuration for the MX204 Router"](#) on page 96.

## RELATED DOCUMENTATION

[MX204 Router Rack Requirements | 47](#)

[MX204 Router Clearance Requirements for Airflow and Hardware Maintenance | 46](#)

[MX204 Router Cabinet Requirements and Specifications | 44](#)

# Unpacking the MX204

## IN THIS SECTION

- [Tools and Parts Required to Unpack the MX204 Router | 65](#)
- [Unpacking MX204 Router | 65](#)
- [Verifying the MX204 Router Parts Received | 66](#)

## Tools and Parts Required to Unpack the MX204 Router

To unpack the router and prepare for installation, you need the following tools:

- Phillips (+) screwdriver, number 2
- 1/2-in. or 13-mm open-end or socket wrench to remove bracket bolts from the shipping pallet

## SEE ALSO

[MX204 Chassis Description | 5](#)

[MX204 Field-Replaceable Units | 8](#)

[Unpacking MX204 Router | 65](#)

## Unpacking MX204 Router

The router is shipped in a cardboard carton and secured with foam packing material. The carton also contains an accessory box and quick start instructions.

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

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 router.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Remove the accessory box, and verify the contents against the parts inventory on the label attached to the carton.
5. Pull out the packing material holding the router in place.
6. Verify the contents of the carton against the packing list included with the router.
7. Save the shipping carton and packing materials in case you later need to move or ship the router.

#### SEE ALSO

| [MX204 Site Preparation Checklist](#) | 38

## Verifying the MX204 Router Parts Received

A packing list is included in each shipment. Check the parts in the shipment against the items on the packing list. The packing list specifies the part numbers and descriptions of each part in your order.

If any part is missing, contact a customer service representative.

A fully configured router contains the router chassis with installed components, listed in [Table 31 on page 66](#), and an accessory box, which contains the parts listed in [Table 32 on page 67](#). The parts shipped with your router can vary depending on the configuration you ordered.

**Table 31: Parts List for a Fully Configured Router**

Component	Quantity
Chassis	1

**Table 31: Parts List for a Fully Configured Router (Continued)**

Component	Quantity
AC or DC power supply	2
Fan module	3
Documentation Roadmap and Product Warranty	1
Blank panels for slots without components installed	One blank panel for each slot not occupied by a component
Rack mount kit	2
Philips M4x7mm flat head screws	16

**Table 32: Accessory Box Parts List**

Part	Quantity
Screws to mount chassis	16
Screws to secure the ground cable lug	2
DC power ring terminal lugs, 14 - 16 AWG, sized for #6 screw	8
Label, "Small Parts Enclosed"	1
Label, "Accessories Contents"	1
USB flash drive with Junos OS	1
Read me first document	1

**Table 32: Accessory Box Parts List (Continued)**

Part	Quantity
Affidavit for T1 connection	1
Juniper Networks Product Warranty	1
End User License Agreement	1
Document sleeve	1
3 in. x 5 in. pink bag	2
9 in. x 12 in. pink bag, ESD	2
Accessory box, 19 in. x 12 in. x 3 in.	1
ESD wrist strap with cable	1
ETSI brackets	4

**NOTE:** We no longer include a DB-9 to RJ-45 cable or a DB-9 to RJ-45 adapter with a CAT5E copper cable as part of the device package. If you require a console cable, you can order it separately with the part number JNP-CBL-RJ45-DB9 (DB-9 to RJ-45 adapter with a CAT5E copper cable).

**SEE ALSO**

| [MX204 Site Preparation Checklist](#) | 38

# Installing the MX204

## IN THIS SECTION

- [Tools Required to Install the MX204 Chassis in Rack | 69](#)
- [Installing the MX204 Chassis in a Rack | 69](#)

## Tools Required to Install the MX204 Chassis in Rack

To install the router, you need the following tools and parts:

- Phillips (+) screwdriver, number 2
- ESD grounding wrist strap
- Blank panels to cover any slots not occupied by a component
- Mounting brackets, supplied with the router
- Sixteen screws for securing the mounting brackets to the chassis, supplied with the router
- Four mounting screws, supplied with the router

## SEE ALSO

| [MX204 Site Preparation Checklist | 38](#)

## Installing the MX204 Chassis in a Rack

### IN THIS SECTION

- [Installing the MX204 Chassis in a 19-in. Rack | 70](#)
- [Installing the MX204 in a 21-in. ETSI Rack | 73](#)

**CAUTION:**

- If you are installing more than one router in a rack, install the lowest one first. Installing a router in an upper position in a rack or cabinet requires a lift.
- Before front-mounting the router in a rack, have a qualified technician verify that the rack is strong enough to support the router's weight and is adequately supported at the installation site.
- Lifting the chassis and mounting it in a rack requires two people (one person to hold the router in place and a second person to install the screws). The fully loaded chassis weighs approximately 22.7 lb (10.3 kg).

The MX204 router is designed for installation in a rack that complies with either of the following standards:

- 19-in. rack—A 19-in. (450 mm) rack as defined in Cabinets, Racks, Panels, and Associated Equipment (document number EIA-310-D) published by the Electronics Industry Association (<http://www.ecianow.org/>).
- ETSI rack—A 21-in. (500 mm) ETSI rack as defined in the European Telecommunications Standards Institute (ETS 300 119) published by the European Telecommunications Standards Institute (ETSI).

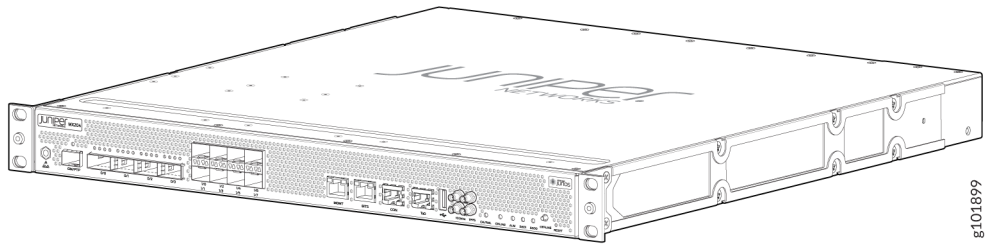
Based on the rack, follow the steps mentioned on the below topics to install the router:

### Installing the MX204 Chassis in a 19-in. Rack

To install the router in a 19-in. rack or cabinet:

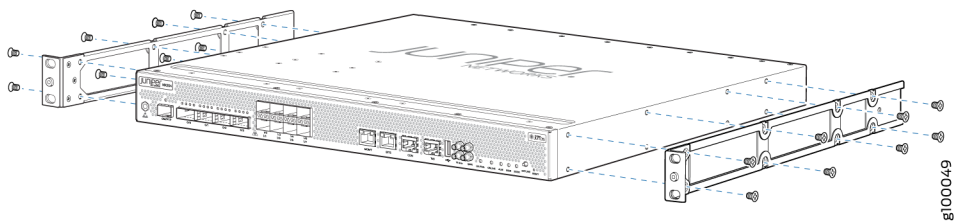
1. Position the router in front of the rack or cabinet.
2. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and to a site ESD point.
3. If you receive a switch that has pre-attached mounting rails, you can skip Step 4 and Step 5. See Figure 1.

Figure 20: Pre-attached mounting rails on the MX204



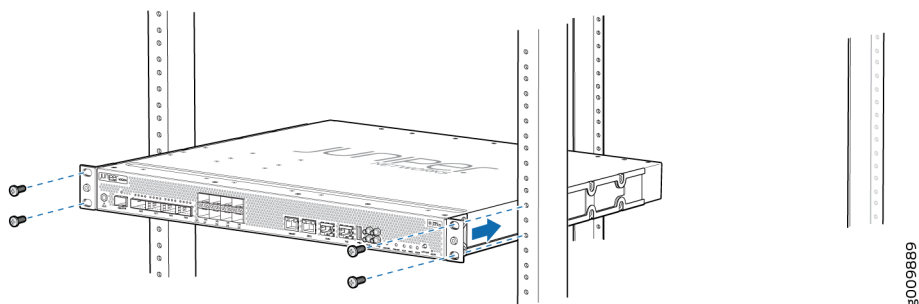
4. Align the holes in the front mounting brackets with the holes on the side of the chassis (see Figure 2).

Figure 21: Attaching the Mounting Brackets



5. Using a Phillips (+) number 2 screwdriver, secure the mounting brackets to the router using the mounting screws.
6. With one person on each side, hold on to the bottom of the chassis and carefully lift it so that the mounting brackets contact the rack rails.
7. Carefully slide the router onto the mounting brackets until the front-mounting brackets attached to the chassis contact the rack rails (see Figure 3).

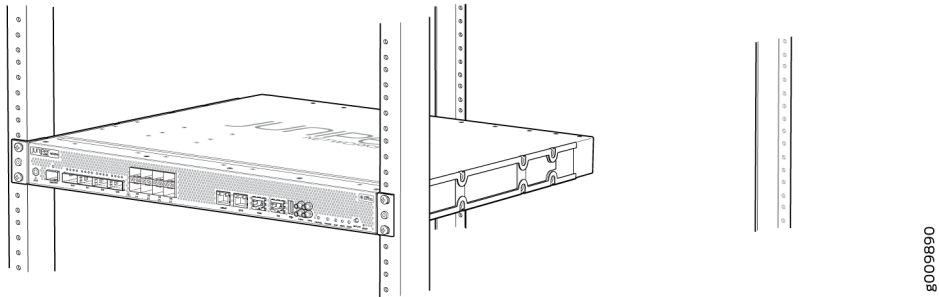
Figure 22: Installing the Router in a Four-Post Rack





8. Install mounting screws into each of the open front-mounting holes aligned with the rack, starting from the bottom, and secure them tightly. Figure 4 shows the router fully secured to the front rails of the four-post rack.

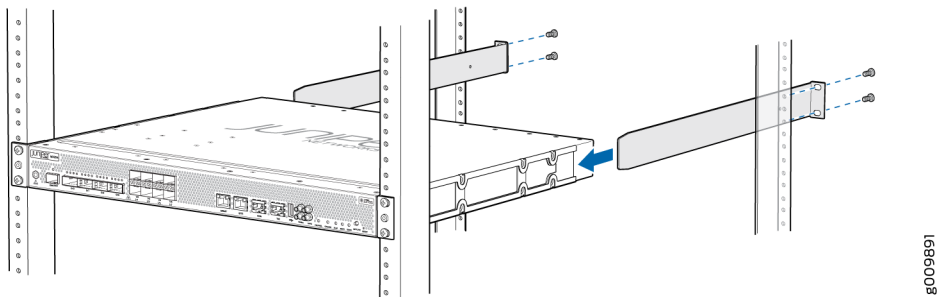
**Figure 23: Router Secured by Front-Mounting Brackets**



9. On the rear of the chassis, slide the rear-mounting brackets on either side of the chassis until the rear-mounting brackets contact the rack rails (see Figure 5).

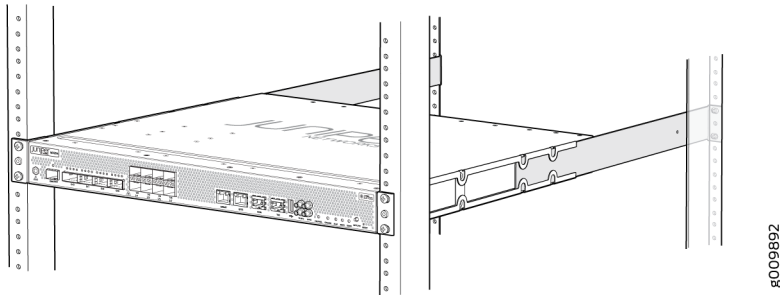
The rear-mounting brackets on each side of the chassis are movable. You can adjust the brackets according to the depth of the rack.

**Figure 24: Installing the Rear-Mounting Brackets**



10. Install mounting screws into each of the open rear-mounting holes aligned with the rack, starting from the bottom, and secure them tightly.
11. Visually inspect the alignment of the chassis. If the chassis is installed properly in the rack, all the mounting screws on one side of the rack are aligned with the mounting screws on the opposite side and the router is level. Figure 6 shows the router fully secured and installed in a four-post rack.

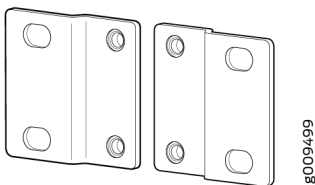
**Figure 25: Router Installed in the Rack**



### Installing the MX204 in a 21-in. ETSI Rack

The ETSI racks are little wider than the standard 19-in. rack. To install the router in an ETSI rack, you need to install the ETSI brackets on to the router. [Figure 26 on page 73](#) shows the ETSI brackets supported by MX204 router.

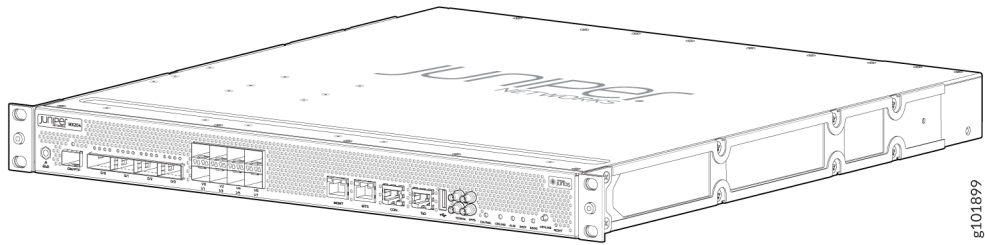
**Figure 26: ETSI Brackets**



To install the router in a 21-in. ETSI rack or cabinet:

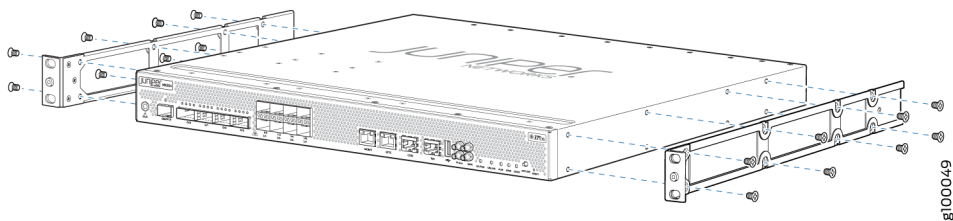
1. Position the router in front of the rack or cabinet.
2. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and to a site ESD point.
3. If you receive a switch that has pre-attached mounting rails, you can skip Step 4. See [Figure 27 on page 74](#).

Figure 27: Pre-attached mounting rails on the MX204



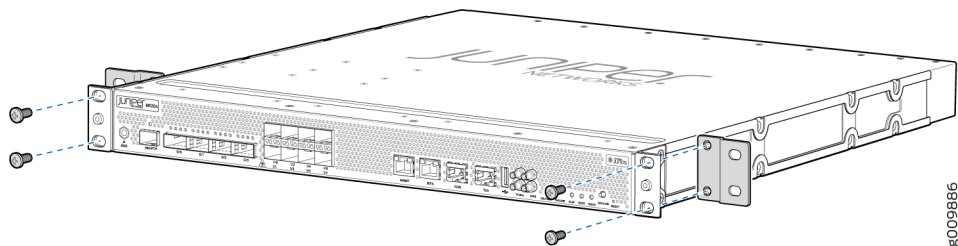
4. Align the holes in the front mounting brackets with the holes on the side of the chassis (see [Figure 28 on page 74](#)).

Figure 28: Attaching the Mounting Brackets



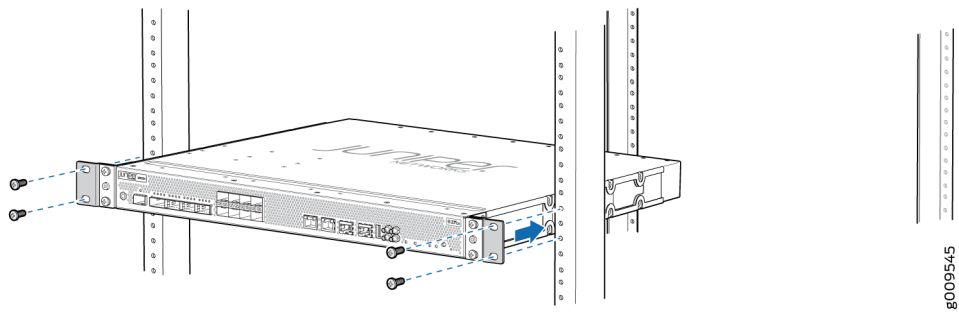
5. Install the two front ETSI brackets on the front-mounting brackets on each side of the chassis (see [Figure 29 on page 74](#)).

Figure 29: Installing the Front ETSI Brackets



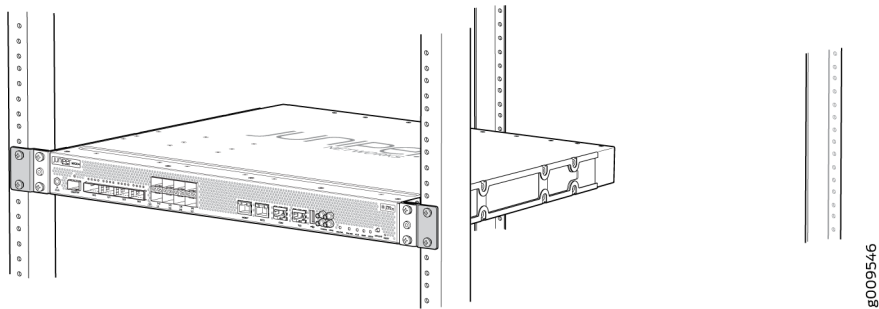
6. With one person on each side, hold on to the bottom of the chassis and carefully lift it so that the mounting brackets contact the rack rails.
7. Carefully slide the router onto the mounting brackets until the front-mounting brackets attached to the chassis contact the rack rails (see [Figure 30 on page 75](#)).

**Figure 30: Installing the Router in a Four-Post Rack**



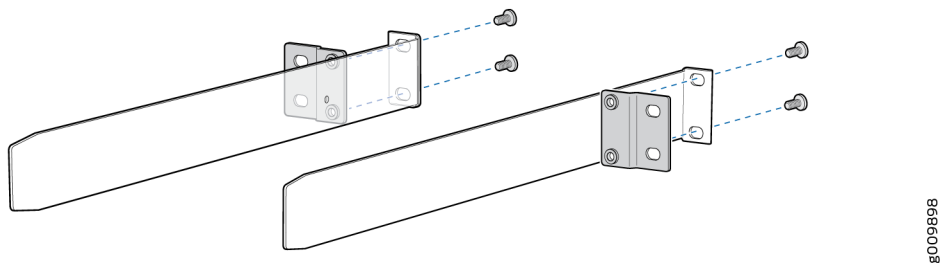
8. Install mounting screws into each of the open front-mounting holes aligned with the rack, starting from the bottom, and secure them tightly. [Figure 31 on page 75](#) shows the router fully secured to the front rails of the four-post rack.

**Figure 31: Router Secured by Front-Mounting Brackets with ETSI Brackets**



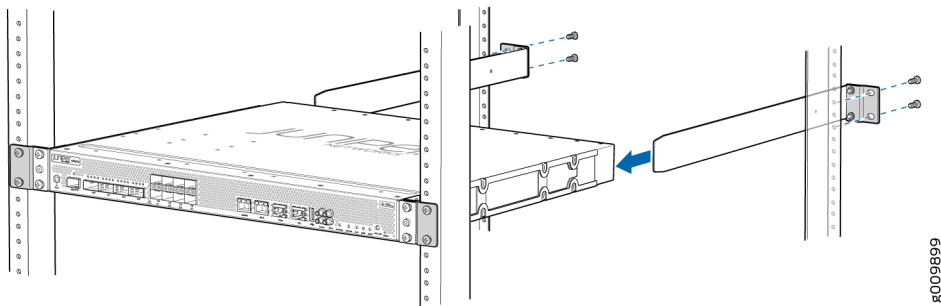
9. Install the two rear ETSI brackets on the rear-mounting brackets (see [Figure 32 on page 75](#)). The rear-mounting brackets on each side of the chassis are movable. You can adjust the brackets according to the depth of the rack.

**Figure 32: Installing the Rear ETSI Brackets**



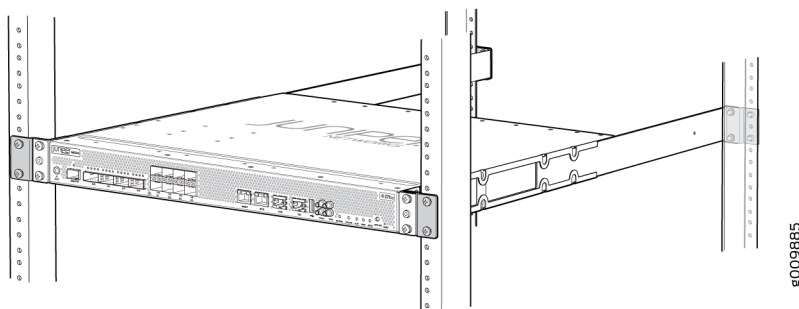
10. On the rear of the chassis, slide the rear-mounting brackets (with the ETSI brackets installed) on either side of the chassis until the rear-mounting brackets contact the rack rails (see [Figure 33 on page 76](#)).

**Figure 33: Installing the Rear-Mounting Brackets with ETSI Brackets**



11. Install mounting screws into each of the open rear-mounting holes aligned with the rack, starting from the bottom, and secure them tightly.
12. Visually inspect the alignment of the chassis. If the chassis is installed properly in the rack, all the mounting screws on one side of the rack are aligned with the mounting screws on the opposite side and the router is level. [Figure 34 on page 76](#) shows the router fully secured and installed in a four-post rack with ETSI brackets.

**Figure 34: Router Installed in the Rack with ETSI Brackets**



## RELATED DOCUMENTATION

[MX204 Site Preparation Checklist | 38](#)

[MX204 Router Grounding Specifications | 42](#)

[MX204 Router Clearance Requirements for Airflow and Hardware Maintenance | 46](#)

# Connecting the MX204 to Power

## IN THIS SECTION

- [Tools and Parts Required for MX204 Router Grounding and Power Connections | 77](#)
- [Grounding the MX204 Router | 78](#)
- [Connecting Power to an AC-Powered MX204 Router | 79](#)
- [Powering On an AC-Powered MX204 Router | 82](#)
- [Connecting Power to a DC-Powered MX204 Router | 83](#)
- [Powering On a DC-Powered MX204 Router | 86](#)
- [Powering Off the MX204 Router | 88](#)

## Tools and Parts Required for MX204 Router Grounding and Power Connections

To ground and provide power to the router, you need the following tools and parts:

- Phillips (+) screwdrivers, numbers 1 and 2
- Socket nut driver
- 2.5-mm flat-blade (-) screwdriver
- Torque-controlled driver, with a maximum torque capacity of 6 lb-in. (0.7 Nm), for tightening screws to terminals on each power supply on a DC-powered router



**CAUTION:** The maximum torque rating of the terminal screws on the DC power supply is 6 lb-in. (0.7 Nm). The terminal screws might be damaged if excessive torque is applied. Use only a torque-controlled driver to tighten screws on the DC power supply terminals. Use an appropriately sized driver, with a maximum torque capacity of 6 lb-in. or less. Ensure that the driver is undamaged and properly calibrated and that you have been trained in its use. You might want to use a driver that is designed to prevent overtorque when the preset torque level is achieved.

- Wire cutters

- Electrostatic discharge (ESD) grounding wrist strap

## SEE ALSO

[MX204 Router Grounding Specifications | 42](#)

[General Safety Guidelines and Warnings | 136](#)

[General Electrical Safety Guidelines and Warnings | 157](#)

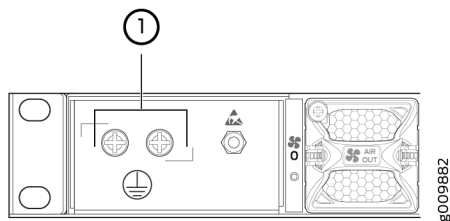
[Prevention of Electrostatic Discharge Damage | 159](#)

## Grounding the MX204 Router

You must install the MX204 in a restricted-access location and ensure that the chassis is always properly grounded. The MX204 has a two-hole protective grounding terminal provided on the chassis. See [Figure 36 on page 79](#). Under all circumstances, use this grounding connection to ground the chassis. For AC-powered systems, you must also use the grounding wire in the AC power cord along with the two-hole grounding lug connection.. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.

You ground the router by connecting a grounding cable to earth ground and then attaching it to the chassis grounding points by using two 10–32 screws. [Figure 35 on page 78](#) shows the grounding point location on the chassis. You must provide the grounding cables (the cable lugs are supplied with the router). For grounding cable specifications, see "[MX204 Router Grounding Specifications](#)" on [page 42](#).

**Figure 35: Grounding Point on the MX204 Router**



Rear panel

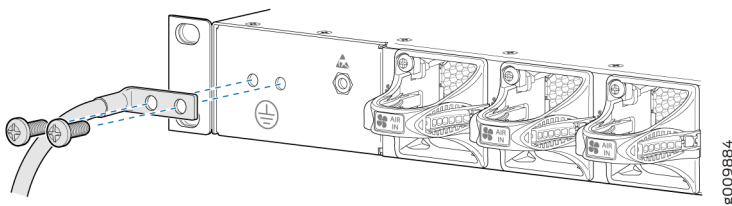
1– Grounding point

To ground the router:

1. Verify that a licensed electrician has attached the cable lug provided with the router to the grounding cable.

2. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to an approved site ESD grounding point. See the instructions for your site.
3. Ensure that all grounding surfaces are clean and brought to a bright finish before grounding connections are made.
4. Connect the grounding cable to a proper earth ground.
5. Detach the ESD grounding strap from the site ESD grounding point.
6. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
7. Place the grounding cable lug over the grounding point on the chassis.
8. Secure the grounding cable lug with the screws. The holes are sized for 10–32 screws (see [Figure 36 on page 79](#)).
9. Dress the grounding cable, and verify that it does not touch or block access to router components, and that it does not drape where people could trip on it.

**Figure 36: Connecting Grounding Lug to the MX204 Router**



#### SEE ALSO

[General Safety Guidelines and Warnings | 136](#)

[General Electrical Safety Guidelines and Warnings | 157](#)

[Prevention of Electrostatic Discharge Damage | 159](#)

## Connecting Power to an AC-Powered MX204 Router



**CAUTION:** Do not mix AC and DC power supply modules within the same device. Mixing currents can damage the device.



You connect AC power to the router by attaching power cords from the AC power sources to the AC appliance inlets located on the power supply modules.

To connect the AC power cords to the router for each power supply module:

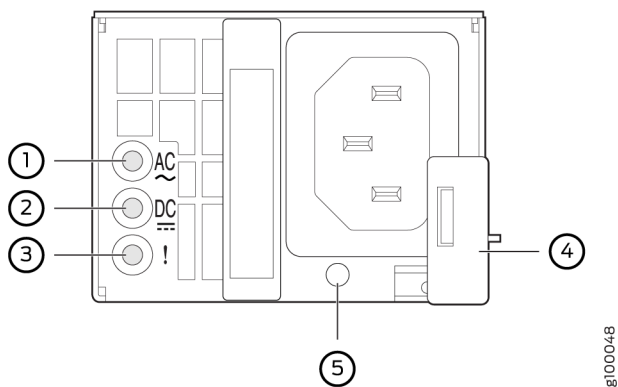
1. Locate power cords that have a plug appropriate for your geographic location. For more information, see ["AC Power Cord Specifications for MX204 Routers" on page 25](#).
2. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
3. Power off the AC input appliance inlet on the source power supply.
4. Connect the power cord to the power supply source.

**NOTE:** Each power supply must be connected to a dedicated AC power feed and a dedicated customer-site circuit breaker. We recommend that you use a dedicated customer-site circuit breaker rated for 20 A (110 VAC) or 16 A (220 VAC) minimum, or as required by local code.

5. Push the end of the AC power cord retainer strip into the hole next to the inlet on the power supply face plate on the router until it snaps into place. Ensure that the loop in the retainer strip faces toward the power cord.

[Figure 37 on page 80](#) shows the port on the AC power supply module where the power cord retainer is installed.

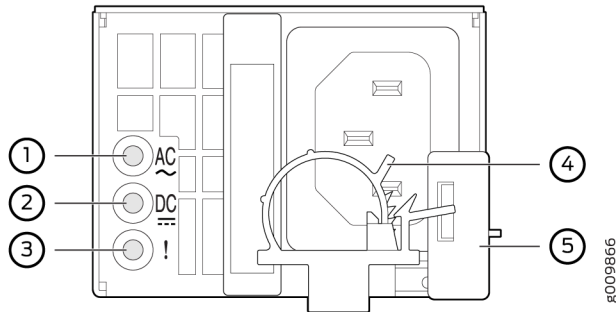
**Figure 37: Power Cord Retainer Port on the AC Power Supply Module**



1– Input status LED	4– Ejector lever
2– Output status LED	5– AC power cord retainer port
3– Fault LED	

Figure 38 on page 81 shows the power cord retainer installed on the AC power supply module.

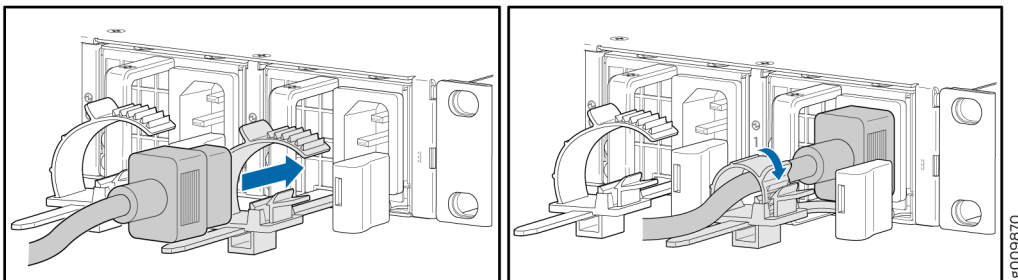
**Figure 38: Power Cord Retainer Installed on the AC Power Supply Module**



1– Input status LED	4– AC power cord retainer installed
2– Output status LED	5– Ejector lever
3– Fault LED	

6. Press the small tab on the retainer strip to loosen the loop. Slide the loop until you have enough space to insert the power cord coupler into the inlet.
7. Insert the power cord coupler firmly into the inlet.
8. Slide the loop toward the power supply until it is snug against the base of the coupler.
9. Press the tab on the loop and draw out the loop into a tight circle (see [Figure 39 on page 81](#)).
10. Route the power cord appropriately. Verify that the power cord does not block the air exhaust and access to router components, or drape where people could trip on it.
11. Power on the power supply at source.
12. Repeat Step 1 through Step 10 for the installing the remaining power supply.

**Figure 39: Connecting AC Power to the Router**



## SEE ALSO

[MX204 Router Grounding Specifications | 42](#)

[General Safety Guidelines and Warnings | 136](#)

[General Electrical Safety Guidelines and Warnings | 157](#)

[Prevention of Electrostatic Discharge Damage | 159](#)

## Powering On an AC-Powered MX204 Router

To power on an AC-powered router:

1. Verify that the power supply modules are fully inserted in the chassis.
2. Verify that each AC power cord is securely inserted into its appliance inlet.
3. Verify that an external management device is connected to the **CON** port on the chassis.
4. Turn on power to the external management device.
5. Switch on the dedicated customer-site circuit breakers for the power supply modules. Follow the instructions for your site.
6. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
7. Observe the status LED on each power supply faceplate. If an AC power supply is correctly installed and functioning normally, the status LED on the router beside the AC power supply lights steadily green.

If the status LED on the power supply is lit red, the power supply is not functioning normally. Repeat the installation and cabling procedures.

**NOTE:** After you power off a power supply, wait at least 60 seconds before you turn it back on. Likewise, after you power on a power supply, wait at least 60 seconds before you turn it off.

If the system is completely powered off when you power on the power supply, the Routing Engine (or RCB) boots as the power supply completes its startup sequence. If the Routing Engine finishes booting and you need to power off the system again, first issue the CLI request `system halt` command.

After a power supply is powered on, it can take up to 60 seconds for status indicators—such as the status LEDs on the power supply and the `show chassis` command display—to indicate that the power supply is functioning normally. Ignore error indicators that appear during the first 60 seconds.

8. On the external management device connected to the Routing Engine, monitor the startup process to verify that the system has booted properly.

## SEE ALSO

[MX204 Router Grounding Specifications | 42](#)

*request system halt*

*show chassis power*

[General Safety Guidelines and Warnings | 136](#)

[General Electrical Safety Guidelines and Warnings | 157](#)

[Prevention of Electrostatic Discharge Damage | 159](#)

## Connecting Power to a DC-Powered MX204 Router



**CAUTION:** Do not mix AC and DC power supply modules within the same device. Mixing currents can damage the device.



**WARNING:** Before you perform DC power procedures, ensure there is no power to the DC circuit. To ensure that all power is off, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the off position, and tape the switch handle of the circuit breaker in the off position.

You connect DC power to the router by attaching power cables from the external DC power sources to the terminal on the power supply faceplate. You must provide the power cables (the cable lugs are supplied with the router). For power cable specifications, see "[DC Power Cable Specifications for MX204 Router](#)" on page 30.

To connect the DC source power cables to the router for each power supply:

1. Switch off the dedicated customer-site circuit breakers. Ensure that the voltage across the DC power source cable leads is 0 V and that there is no chance that the cable leads might become active during installation.
2. Attach an ESD grounding strap to your bare wrist, and connect the other end of the strap to an ESD grounding point.
3. Verify that the DC power cables are correctly labeled before making connections to the power supply. In a typical power distribution scheme where the return is connected to chassis ground at the

battery plant, you can use a multimeter to verify the resistance of the **-48V** and **RTN** DC cables to chassis ground:

- The cable with very large resistance (indicating an open circuit) to chassis ground is **-48V**.
- The cable with very low resistance (indicating a closed circuit) to chassis ground is **RTN**.



**CAUTION:** You must ensure that power connections maintain the proper polarity. The power source cables might be labeled **(+)** and **(-)** to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the terminal studs on each power supply.

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

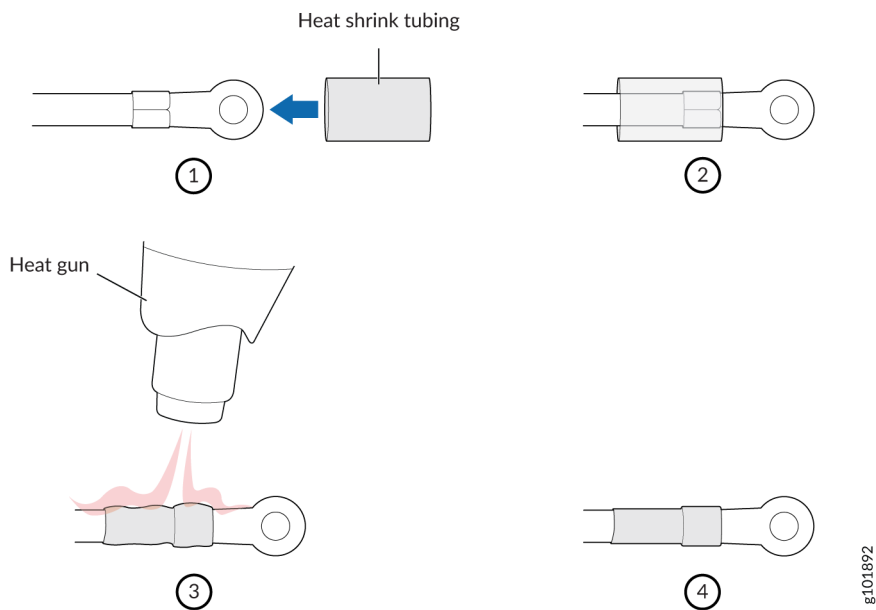
To install heat-shrink tubing:

- a. Slide the tubing over the portion of the cable where it is attached to the lug barrel. Ensure that tubing covers the end of the wire and the barrel of the lug attached to it.
- b. Shrink the tubing with a heat gun. Ensure that you heat all sides of the tubing evenly so that it shrinks around the cable tightly.

Figure 40 on page 85 shows the steps to install heat-shrink tubing.

**NOTE:** Do not overheat the tubing.

Figure 40: How to Install Heat-Shrink Tubing



5. Remove the screws from the terminals.
6. Secure each power cable lug to the terminal with the screws (see [Figure 41 on page 86](#)). Apply between 5 lb-in. (0.6 Nm) and 6 lb-in. (0.7 Nm) of torque to the screws. Do not overtighten the screws. (Use a socket nut driver.)
  - a. Secure the positive (+) DC source power cable lug to the **RTN** (return) terminal.
  - b. Secure the negative (-) DC source power cable lug to the **-48V** (input) terminal.



**CAUTION:** Ensure that each power cable lug seats flush against the surface of the terminal block as you are tightening the screws. Ensure that each nut is properly threaded into the terminal. Applying installation torque to the screws when improperly threaded can result in damage to the terminal.

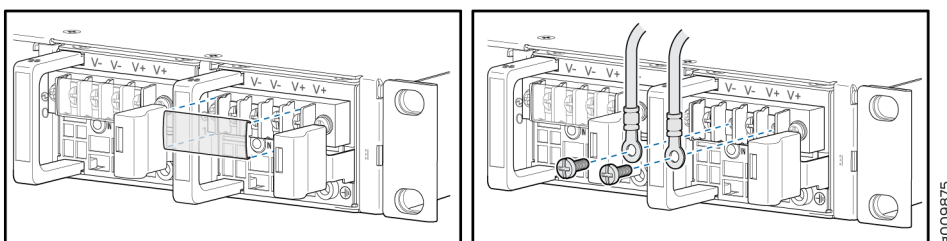


**CAUTION:** You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (-) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the terminal studs on each power supply.

**NOTE:** For information about connecting to DC power sources, see "[MX204 Router DC Power Specifications](#)" on page 27.

7. Verify that the power cables are connected correctly, that they do not touch or block access to router components, and that they do not drape where people could trip on them.
8. Repeat Step 1 through Step 7 for installing the other power supply modules.

**Figure 41: Connecting DC Power to the Router**



#### SEE ALSO

[MX204 Router Grounding Specifications](#) | 42

[General Safety Guidelines and Warnings](#) | 136

[General Electrical Safety Guidelines and Warnings](#) | 157

[Prevention of Electrostatic Discharge Damage](#) | 159

## Powering On a DC-Powered MX204 Router

To power on a DC-powered router:

1. Verify that an external management device is connected to the **CON** port on the chassis.
2. Turn on power to the external management device.
3. Verify that the power supply modules are fully inserted in the chassis.
4. Verify that the source power cables are connected to the appropriate terminal: the positive (+) source cable to the return terminal (labeled **RTN**) and the negative (-) source cable to the input terminal (labeled **-48V**).
5. Switch on the dedicated customer-site circuit breakers to provide power to the DC power cables.

6. Check that the status LED on the power supply faceplate is lit steadily green to verify that power is present.
7. If power is not present:
  - Verify that the fuse is installed correctly, and turn on the breaker at the battery distribution fuse board or fuse bay.
  - Check the voltage with a meter at the terminals of the power supply for correct voltage level and polarity.
8. Attach an ESD grounding strap to your bare wrist, and connect the other end of the strap to an ESD grounding point.
9. Observe the status LED on each power supply faceplate. If a DC power supply is correctly installed and functioning normally, the status LED lights green steadily.

If the status LED on the power supply is unlit, the power supply is not functioning normally. Repeat the installation and cabling procedures.

**NOTE:** After you power off a power supply, wait at least 60 seconds before you turn it back on. Likewise, after you power on a power supply, wait at least 60 seconds before you turn it off.

If the system is completely powered off when you power on the power supply, the Routing Engine (or RCB) boots as the power supply completes its startup sequence. If the Routing Engine finishes booting and you need to power off the system again, first issue the CLI `request system halt` command.

After a power supply is powered on, it can take up to 60 seconds for status indicators—such as the status LEDs on the power supply and the `show chassis` command display—to indicate that the power supply is functioning normally. Ignore error indicators that appear during the first 60 seconds.

10. On the external management device connected to the Routing Engine, monitor the startup process to verify that the system has booted properly.

## SEE ALSO

[MX204 Router Grounding Specifications | 42](#)

`request system halt`

`show chassis power`

[General Safety Guidelines and Warnings | 136](#)

[General Electrical Safety Guidelines and Warnings | 157](#)

[Prevention of Electrostatic Discharge Damage | 159](#)



## Powering Off the MX204 Router

Before you power off an MX204:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See ["Prevention of Electrostatic Discharge Damage" on page 159](#).
- Ensure that you do not need to route traffic through the MX204.
- Ensure that you have the following parts and tools available to power off the MX204:
  - An ESD grounding strap
  - An external management device such as a PC
  - An RJ-45 to DB-9 rollover cable to connect the external management device to the console port

**NOTE:** After powering off a power supply, wait at least 60 seconds before turning it back on.

To power off the router:

1. Connect a management device to the console (see ["Connecting the MX204 Router to External Devices and Cables" on page 90](#)).
2. On the external management device connected to the Routing Engine, issue the request system halt command.

```
user@host> request vmhost halt
Halt the system ? [yes,no] (no) yes
```

You see the following output (or something similar) after entering the command:

```
Initiating vmhost halt... ok
Initiating Junos shutdown... shutdown: [pid 14318]
Shutdown NOW!
ok
Junos shutdown is in progress...
*** FINAL System shutdown message ***

System going down IMMEDIATELY

...
...
```

```
Operating system halted.  
Please press any key to reboot.
```

3. Wait until a message appears on the console confirming that the operating system has halted. For more information about the command, see the [CLI Explorer](#).
4. Attach an ESD grounding strap to your bare wrist, and connect the other end of the strap to an ESD grounding point.
5. Switch off the power supply source.

#### SEE ALSO

| [request vmhost halt](#)

## Connecting the MX204 to the Network

#### IN THIS SECTION

- [Tools and Parts Required to Connect the MX204 Router to External Devices | 89](#)
- [Connecting the MX204 Router to External Devices and Cables | 90](#)

### Tools and Parts Required to Connect the MX204 Router to External Devices

To connect the router to external devices, you need the following tools and parts:

- 2.5-mm flat-blade (-) screwdriver for the alarm relay contacts
- Electrostatic discharge (ESD) grounding wrist strap (provided in the accessory kit)

#### SEE ALSO

| [Verifying the MX204 Router Parts Received | 66](#)  
| [Prevention of Electrostatic Discharge Damage | 159](#)

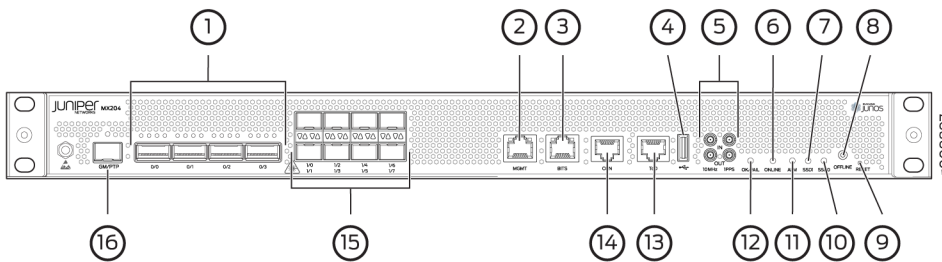
## Connecting the MX204 Router to External Devices and Cables

### IN THIS SECTION

- Connecting the Router to a Network for Out-of-Band Management | 90
- Connecting the Router to a Console Device | 91
- Connecting the Router to External Clocking and Timing Devices | 93

Figure 42 on page 90 shows the front panel of the MX204 router. All the connections to the router are made through the front panel.

Figure 42: MX204 Front Panel Ports, LEDs and Buttons



1– Rate-selectable ports	9– <b>RESET</b> button
2– Management ( <b>MGMT</b> ) port	10– <b>SSD0</b> LED
3– <b>BITS</b> port with LEDs	11– Alarm ( <b>ALM</b> ) LED
4– USB port	12– <b>OK/FAIL</b> LED
5– <b>1PPS</b> and <b>10MHz</b> GPS input and output ports	13– Time of day ( <b>ToD</b> ) port with LEDs
6– <b>ONLINE</b> LED	14– Console ( <b>CON</b> ) port
7– <b>SSD1</b> LED	15– 10-Gigabit Ethernet SFP+ ports
8– <b>OFFLINE</b> button	16– PTP grandmaster clock ( <b>GM/PTP</b> ) port

### Connecting the Router to a Network for Out-of-Band Management

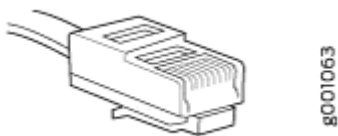
To connect the router to a network for out-of-band management, connect an Ethernet cable with RJ-45 connectors to the **MGMT** port on the router.

**NOTE:** Use shielded CAT5e cable for the **CON** and **MGMT** ports on the chassis.

To connect to the **MGMT** port on the router faceplate:

1. Turn off power to the management device.
2. Plug one end of the Ethernet cable (Figure 2 shows the connector) into the **MGMT** port on the router.
3. Plug the other end of the cable into the network device.

**Figure 43: Out-of-Band Management Cable Connector**



**Table 33: Out-of-Band Management Port on the MX204 Router**

Callout	Label	Description
2 (See <a href="#">Figure 42 on page 90</a> )	<b>MGMT</b>	Dedicated management channel for device maintenance. It is also used by system administrators to monitor and manage the router remotely.

## Connecting the Router to a Console Device

To use a system console to configure and manage the router, connect it to the appropriate **CON** port on the router. The console port is used to connect a laptop or console terminal to configure the router (see [Figure 45 on page 92](#) and [Figure 46 on page 92](#)). The console port accepts a cable with an RJ-45 connector.

**NOTE:** Use shielded CAT5e cable for connecting the **CON** and **MGMT** ports on the MX204 router.

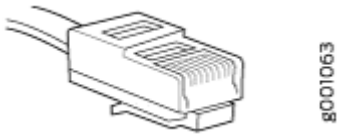
To connect a management console:

1. Turn off power to the console device.
2. Plug the RJ-45 end of the serial cable (see [Figure 44 on page 92](#)) into the **CON** port on the router.
3. Plug the socket DB-9 end into the device's serial port.

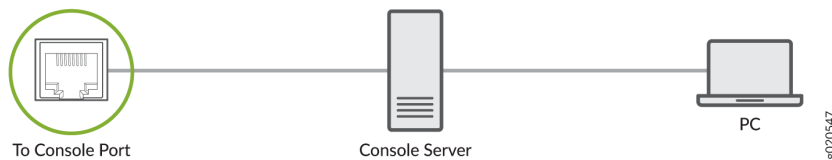
**NOTE:** For console devices, configure the serial port to the following values:

- Baud rate—9600
- Parity—N
- Data bits—8
- Stop bits—1
- Flow control—none

**Figure 44: Console and Auxiliary Cable Connector**



**Figure 45: Connecting the MX204 Router to a Management Console Through a Console Server**



**Figure 46: Connecting the MX204 Router Directly to a Management Console**



**Table 34: Console Port on the MX204 Router**

Callout	Label	Description
14 (See <a href="#">Figure 42 on page 90</a> )	<b>CON</b>	Connect a laptop or console terminal to configure the router.

## Connecting the Router to External Clocking and Timing Devices

### IN THIS SECTION

- [Connecting 1-PPS and 10-MHz Timing Devices to the Router | 93](#)
- [Connecting a Time-of-Day Device to the Router | 95](#)
- [Connecting a BITS External Clocking Device to the Router | 95](#)

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

### Connecting 1-PPS and 10-MHz Timing Devices to the Router

The router has two 2x1 DIN 1.0/2.3 right angle connectors that support 1-PPS-IN, 1-PPS-OUT, 10-MHz-IN, and 10-MHz-OUT timing ports.

**NOTE:** MX204 can be configured as a timing primary or a client device. If the MX204 is configured as a timing primary device, the router gets 1-PPS-IN and 10-MHz-IN input (connected to the ports marked **IN**) from the timing source and sends 1-PPS-OUT and 10-MHz-OUT to a client device. If the MX204 is configured as a timing client device, it receives 1-PPS-IN and 10-MHz-IN (connected to ports marked **IN**) as input from the timing source.

**NOTE:** Ensure a cable of 3 m or less in length is used for the 10-MHz and 1-PPS connectors.

To connect the DIN cable to the external clocking device:

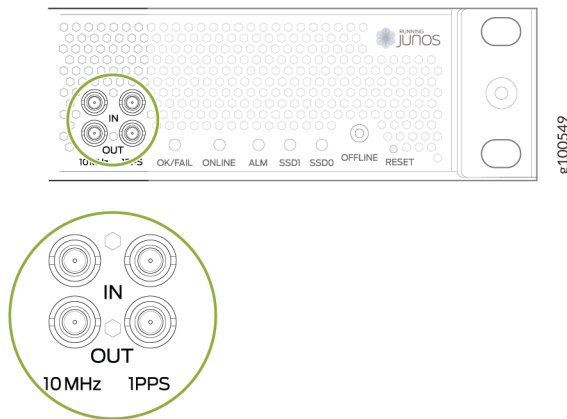
1. Connect one end of the DIN cable connectors to the 1-PPS-IN and the 10-MHz-IN ports marked **IN** on the router.

If the MX204 is a timing primary device, use the 1-PPS-OUT and the 10-MHz-OUT ports marked **OUT** to connect to a client router or device.

2. Connect the other end of the DIN cable connectors to the 1-PPS and 10-MHz of the source network equipment.

**NOTE:** Ensure that the 10-MHz and 1-PPS source network equipment contains a low voltage complementary metal oxide semiconductor (LVCMOS) of 50 ohms or is compatible with low-voltage transistor-transistor logic (LVTTTL) (3.3v).

**Figure 47: Clocking Ports on the MX204 Router**



**Table 35: Clocking Ports on the MX204 Router**

Label	Description
<b>10MHz-IN</b>	1 PPS input port
<b>1PPS-IN</b>	10 MHz input port
<b>10MHz-OUT</b>	1 PPS output port
<b>1PPS-OUT</b>	10 MHz output port

### Connecting a Time-of-Day Device to the Router

A time-of-day port, labeled **ToD**, on the front panel of the router enables you to connect external timing devices.

To connect the router to a ToD external timing device:

1. Attach an electrostatic discharge (ESD) grounding trap on your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Plug one end of the RJ-45 cable into the **ToD** port on the front panel of the router.
3. Plug the other end of the RJ-45 cable into the ToD timing device.
4. Verify that the LEDs for the **ToD** port on the router are lit steadily green.
5. Configure the port. See *Configuring Clock Synchronization Interface on MX Series Routers*.

**Table 36: Time-of-Day Port on the MX204 Router**

Callout	Label	Description
13  (See <a href="#">Figure 42 on page 90</a> )	<b>ToD</b>	ToD RJ-45 port with LED.

### Connecting a BITS External Clocking Device to the Router

The router has an external building-integrated timing supply (BITS) port, labeled **BITS**, on the front panel of the router.

To connect the router to a BITS external clocking device:

1. Attach an electrostatic discharge (ESD) grounding trap on your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Plug one end of the RJ-45 cable into the internal clock port on the craft interface.
3. Plug the other end of the RJ-45 cable into the BITS external clocking device.
4. Verify that the LEDs for the **BITS** port are lit steadily green.
5. Configure the port. See *Configuring Clock Synchronization Interface on MX Series Routers*.



**Table 37: BITS Port on the MX204 Router**

Callout	Label	Description
3 (See <a href="#">Figure 42 on page 90</a> )	<b>BITS</b>	Building-Integrated Timing Supply (BITS) clock interface port with LED.

**RELATED DOCUMENTATION**

[MX204 Routing Engine Description | 31](#)

[Prevention of Electrostatic Discharge Damage | 159](#)

## Performing the Initial Software Configuration for the MX204 Router

The router is shipped with the Junos operating system (OS) preinstalled and ready to be configured when the router is powered on. Two 16-MB internal NAND Flash memory devices are located on the baseboard for BIOS storage. The USB storage device can be inserted into the USB slot on the chassis faceplate. The router also supports two built-in M.2-based solid-state drive (SSD) slots. These two SSD devices act as the primary boot devices (**SSD0** and **SSD1**). When the router boots, it first attempts to start the Junos OS image on the USB flash drive if it detects one. If a USB flash drive is not inserted into the router, or the attempt otherwise fails, the router next tries the primary boot device, and then tries the secondary boot device.

You configure the router by issuing Junos OS command-line interface (CLI) commands, either on a console device attached to the **CON** port on the front panel, or over a Telnet connection to a network connected to the **MGMT** port on the front panel.

Gather the following information before configuring the router:

- Name the router will use on the network
- Domain name the router will use
- IP address and prefix length information for the Ethernet interface
- IP address of a default router

- IP address of a DNS server
- Password for the root user

This procedure connects the router to the network but does not enable it to forward traffic. For complete information about enabling the router to forward traffic, including examples, see the Junos OS configuration guides.

To configure the software:

1. Verify that the router is powered on.
2. Log in as the “root” user. There is no password.
3. Start the CLI. For more information about CLI commands, see the [CLI Explorer](#).

```
root# cli
root@>
```

4. Enter configuration mode.

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

5. 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
```

6. Create a management console user account.

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

7. Set the user account class to **super-user**.

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

8. Configure the router's domain name.

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

9. Configure the IP address and prefix length for the router's Ethernet interface.

```
[edit]  
root@# set interfaces fxp0 unit 0 family inet address address/prefix-length
```

10. Configure the IP address of a backup router, which is used only while the routing protocol is not running.

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

11. Configure the IP address of a DNS server.

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

12. Set the root authentication password by entering either a cleartext password, an encrypted password, or an SSH public key string (DSA or RSA).

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

or

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

or

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

or

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

- 13.** (Optional) Configure the static routes to remote subnets with access to the management port. Access to the management port is limited to the local subnet. To access the management port from a remote subnet, you need to add a static route to that subnet within the routing table. For more information about static routes, see the [Junos OS Administration Library for Routing Devices](#).

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

- 14.** Configure the Telnet service at the [edit system services] hierarchy level.

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

- 15.** (Optional) Display the configuration to verify that it is correct.

```
[edit]
root@# show
system {
  host-name host-name;
  domain-name domain-name;
  backup-router address;
  root-authentication {
    authentication-method (password | public-key);
  }
  name-server {
    address;
  }
}
interfaces {
  fxp0 {
    unit 0 {
      family inet {
        address address/prefix-length;
      }
    }
  }
}
```

```
    }  
  }  
}
```

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

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

17. (Optional) Configure additional properties by adding the necessary configuration statements. Then commit the changes to activate them on the router.

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

18. When you have finished configuring the router, exit configuration mode.

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

## RELATED DOCUMENTATION

| [Prevention of Electrostatic Discharge Damage](#) | 159

# 4

CHAPTER

## Maintaining Components

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Maintaining MX204 Components | 102

Maintaining MX204 Cooling System Components | 113

Maintaining MX204 Power System Components | 117

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# Maintaining MX204 Components

## IN THIS SECTION

- [Routine Maintenance Procedures for MX204 Routers | 102](#)
- [Maintaining the MX204 Routing Engine | 103](#)
- [Replace an SFP, SFP+, or QSFP+ Transceiver | 104](#)
- [Replace a QSFP28 Transceiver | 109](#)

## Routine Maintenance Procedures for MX204 Routers

### IN THIS SECTION

- [Purpose | 102](#)
- [Action | 102](#)

### Purpose

For optimum router performance, perform preventive maintenance procedures.

### Action

- Inspect the installation site for moisture, loose wires or cables, and excessive dust. Make sure that airflow is unobstructed around the router and into the air intake vents.
- Check the status-reporting devices on the front panel—system alarms and LEDs.

### SEE ALSO

| [Alarm LEDs on the MX204 Front Panel | 11](#)

## Maintaining the MX204 Routing Engine

### IN THIS SECTION

- Purpose | 103
- Action | 103

### Purpose

For optimum router performance, verify the condition of the Routing Engine on a regular basis.

### Action

On a regular basis:

- Check the LEDs on the front panel to view information about the status of the Routing Engine.
- To check the status of the Routing Engine on the router, issue the `show chassis routing-engine` command. The output is similar to the following:

```
user@host> show chassis routing-engine
Routing Engine status:
  Temperature           53 degrees C / 127 degrees F
  CPU temperature       53 degrees C / 127 degrees F
  DRAM                  16341 MB (16384 MB installed)
  Memory utilization    6 percent
  5 sec CPU utilization:
    User                0 percent
    Background          0 percent
    Kernel              0 percent
    Interrupt           0 percent
    Idle                100 percent
  1 min CPU utilization:
    User                0 percent
    Background          0 percent
    Kernel              0 percent
    Interrupt           0 percent
    Idle                100 percent
```



```

5 min CPU utilization:
  User           0 percent
  Background     0 percent
  Kernel         0 percent
  Interrupt      0 percent
  Idle           100 percent

15 min CPU utilization:
  User           0 percent
  Background     0 percent
  Kernel         0 percent
  Interrupt      0 percent
  Idle           100 percent

Model            RE-S-2X00x6
Start time       2017-11-29 19:04:56 PST
Uptime           5 days, 4 hours, 58 minutes, 44 seconds
Last reboot reason 0x2000:hypervisor reboot
Load averages:   1 minute   5 minute   15 minute
                  0.10      0.14      0.15

```

## SEE ALSO

[MX204 Routing Engine Description | 31](#)

[MX204 Routing Engine LEDs | 34](#)

*show chassis routing-engine*

## Replace an SFP, SFP+, or QSFP+ Transceiver

### IN THIS SECTION

- [Remove a Transceiver | 105](#)
- [Install a Transceiver | 107](#)

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

## Remove a Transceiver

Before you begin removing 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

**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.

To remove a transceiver:

1. Place the antistatic bag or antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end of the strap to an ESD point.
3. Label the cables connected to the transceiver so that you can reconnect them correctly later.
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.



**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 a transceiver emit laser light that can damage your eyes.



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

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



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

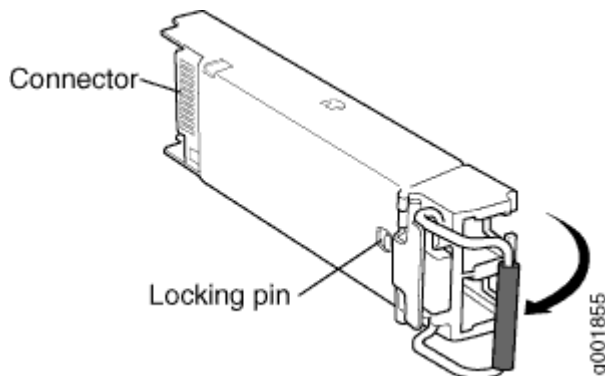
6. By using your fingers, pull open the ejector lever on the transceiver to unlock the transceiver.



**CAUTION:** Ensure that you open the ejector handle completely until you hear it click. Doing this prevents damage to the transceiver.

Figure 1 shows how to remove an SFP transceiver. The procedure is the same for SFP+ and QSFP+ transceivers.

**Figure 48: Small Form-Factor Pluggable (SFP) Transceiver**



7. Grasp the transceiver ejector handle, and pull the transceiver approximately 0.5 in. (1.3 cm) out of the interface port.
8. Using your fingers, grasp the body of the transceiver, and pull it the rest of the way out of the interface port.
9. Place a rubber safety cap over the transceiver.
10. Place the removed transceiver on an antistatic mat or in an electrostatic bag.
11. Place the dust cover over the empty port or install the replacement transceiver.



**CAUTION:** After removing a transceiver from the chassis, wait at least 30 seconds before reinserting it or inserting a transceiver into a different slot.

## Install a Transceiver

Before you begin to 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.

**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.

To install a transceiver:

1. Attach an ESD grounding strap to your bare wrist, and connect the other end of the strap to an ESD grounding point.
2. Remove the transceiver from its bag.
3. Verify that each transceiver is covered by a rubber safety cap. If it is not, cover the transceiver with a safety cap.



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

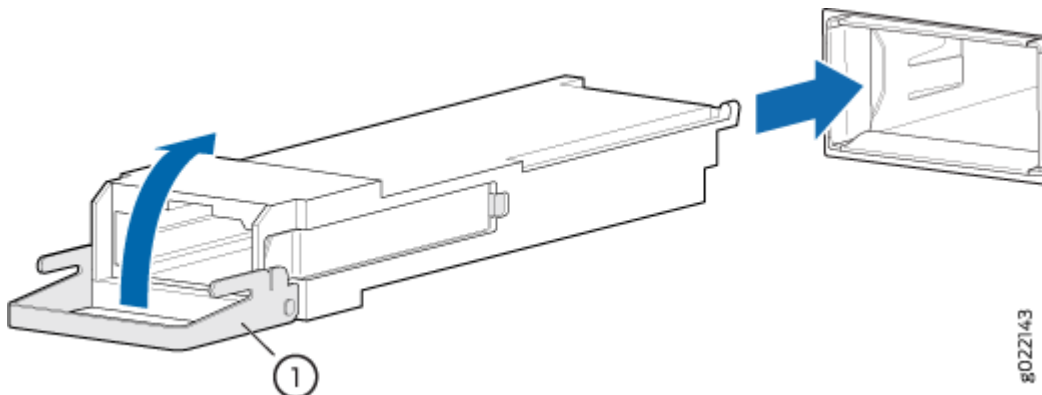
- Using both hands, carefully place the transceiver in the empty port. The connectors must face the chassis.



**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.

- Slide in the transceiver until it is fully seated. If you are unable to fully insert the transceiver, ensure that the connector is facing the right way.

Figure 49: Install a Transceiver



1- Ejector lever

- Close the ejector handle of the transceiver.
- Remove the rubber safety cap from the transceiver and from the end of the cable. 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 cables connected to a transceiver emit laser light that can damage your eyes.

## Replace a QSFP28 Transceiver

### IN THIS SECTION

- [Remove a QSFP28 Transceiver | 109](#)
- [Install a QSFP28 Transceiver | 111](#)

28-Gbps quad small form-factor pluggable (QSFP28) transceivers are hot-insertable and hot-removable. Removing a QSFP28 transceiver does not interrupt router functioning, but the removed QSFP28 transceiver no longer receives or transmits data.

### Remove a QSFP28 Transceiver

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

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 them without powering off the device or disrupting the device functions.

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

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

To remove a QSFP28 transceiver (see Figure 3):

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

2. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end of the strap to an ESD point.
3. Label the cable connected to the QSFP28 transceiver so that you can later reconnect the cable to the correct QSFP28 transceiver.
4. Disconnect the cable from the transceiver. Immediately cover the transceiver and the end of the cable with a rubber safety cap.



**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 a cable. The safety cap keeps the port clean and protects your eyes from accidental exposure to laser light.

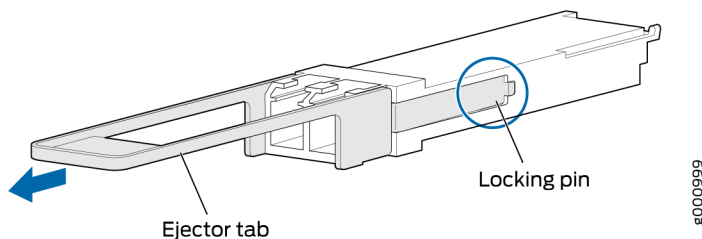
5. If there is a cable management system, arrange the cable in the cable management system to prevent it from dislodging or developing stress points. Secure the cable so that it does not support its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop in the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



**CAUTION:** 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.

6. Pull the transceiver's rubber handle straight back.  
The locking pins on the transceiver automatically releases the transceiver.

**Figure 50: 28-Gbps Quad Small Form-Factor Pluggable (QSFP28) Transceiver**



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

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

## Install a QSFP28 Transceiver

Before you begin to 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 them without powering off the device or disrupting the device functions.

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

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



**CAUTION:** 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.

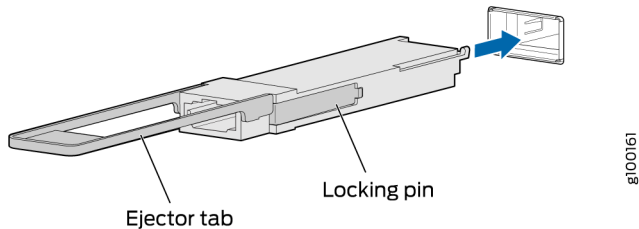
To install a replacement QSFP28 transceiver (see [Figure 51 on page 112](#)):

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end of the strap to an ESD point.
2. Verify that a rubber safety cap covers the QSFP28 transceiver. If it is not, cover the transceiver with a safety cap.



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

Figure 51: Install a QSFP28 Transceiver



4. Slide the transceiver into the slot until the locking pins lock in place. If there is resistance, remove the transceiver and flip it so that the connector faces the other direction.
5. Remove the rubber safety cap from the transceiver and from 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 a cable. The safety cap keeps the port clean and protects your eyes from accidental exposure to laser light.

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



**CAUTION:** Do not let the fiber-optic cable hang free from the connector. Do not allow fastened loops of the 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.

7. Verify that the status LEDs on the router indicate that the QSFP28 transceiver is functioning correctly. You can also verify that the interface port is functioning by running the `show chassis fpc pic-status` command.

## Maintaining MX204 Cooling System Components

### IN THIS SECTION

- [Maintaining the MX204 Fan Module | 113](#)
- [Replacing an MX204 Fan Module | 115](#)

## Maintaining the MX204 Fan Module

### IN THIS SECTION

- [Purpose | 113](#)
- [Action | 114](#)

### Purpose

For optimum cooling, verify the condition of the fans.

## Action

- Monitor the status of the fans. A fan module contains multiple fans that work in unison to cool the router components. If one fan fails, the router adjusts the speed of the remaining fans to maintain proper cooling. A red alarm is triggered when a fan fails, and when a fan module is removed.
- To display the status of the cooling system, issue the `show chassis environment` command. The output is similar to the following:

```

user@host> show chassis environment
Class Item                               Status  Measurement
Temp  CB 0 Top Right Inlet Sensor            OK      35 degrees C / 95 degrees F
      CB 0 Top Left Inlet Sensor           OK      38 degrees C / 100 degrees F
      CB 0 Top Right Exhaust Sensor        OK      45 degrees C / 113 degrees F
      CB 0 Top Left Exhaust Sensor         OK      64 degrees C / 147 degrees F
      CB 0 CPU Core-0 Temp                 OK      49 degrees C / 120 degrees F
      CB 0 CPU Core-1 Temp                 OK      49 degrees C / 120 degrees F
      CB 0 CPU Core-2 Temp                 OK      48 degrees C / 118 degrees F
      CB 0 CPU Core-3 Temp                 OK      49 degrees C / 120 degrees F
      CB 0 CPU Core-4 Temp                 OK      49 degrees C / 120 degrees F
      CB 0 CPU Core-5 Temp                 OK      48 degrees C / 118 degrees F
      CB 0 CPU Core-6 Temp                 OK      48 degrees C / 118 degrees F
      CB 0 CPU Core-7 Temp                 OK      48 degrees C / 118 degrees F
      FPC 0 EA0_HMC0 Logic die             OK      81 degrees C / 177 degrees F
      FPC 0 EA0_HMC0 DRAM botm            OK      78 degrees C / 172 degrees F
      FPC 0 EA0_HMC1 Logic die            OK      85 degrees C / 185 degrees F
      FPC 0 EA0_HMC1 DRAM botm           OK      82 degrees C / 179 degrees F
      FPC 0 EA0 Chip                      OK      93 degrees C / 199 degrees F
      FPC 0 EA0-XR0 Chip                  OK      69 degrees C / 156 degrees F
      FPC 0 EA0-XR1 Chip                  OK      73 degrees C / 163 degrees F
Power PEM 0                               ok
      PEM 1                               OK      49 degrees C / 120 degrees F
Fans  Fan Tray 0 Fan 0                    OK      Spinning at normal speed
      Fan Tray 0 Fan 1                    OK      Spinning at normal speed
      Fan Tray 1 Fan 0                    OK      Spinning at normal speed
      Fan Tray 1 Fan 1                    OK      Spinning at normal speed
      Fan Tray 2 Fan 0                    OK      Spinning at normal speed
      Fan Tray 2 Fan 1                    OK      Spinning at normal speed

```

## SEE ALSO

[MX204 Cooling System Description | 13](#)

*show chassis environment*

## Replacing an MX204 Fan Module

### IN THIS SECTION

- [Removing an MX204 Fan Module | 115](#)
- [Installing an MX204 Fan Module | 116](#)

## Removing an MX204 Fan Module

**NOTE:** To prevent overheating, install the replacement fan module immediately after removing the existing fan module.

To remove the fan module (see Figure 1):

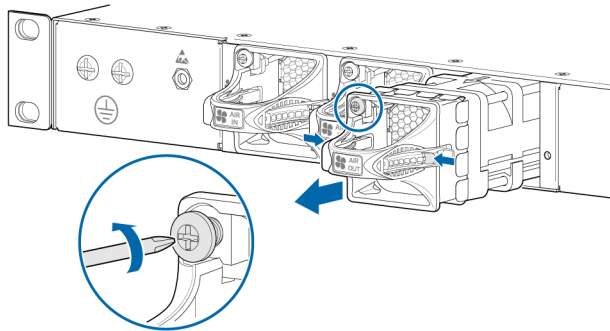
1. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
2. Loosen the captive screw on the fan module faceplate (use a number-2 Phillips screwdriver).
3. Hold and press the latch located on the inside of the fan module to release it from the chassis.



**WARNING:** To prevent injury, keep tools and your fingers away from the fans as you slide the fan module out of the device. The fans might still be spinning.

4. Place one hand under the fan module to support it, and pull the fan module completely out of the chassis.

**Figure 52: Removing the Fan Module**



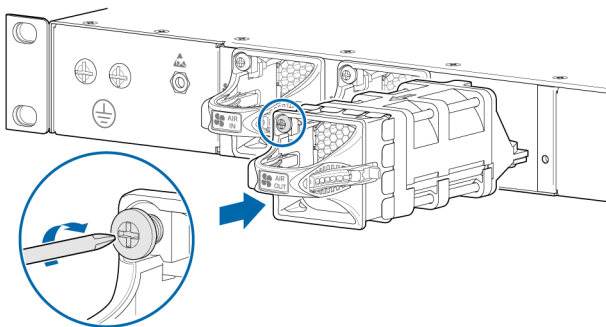
8009879

### Installing an MX204 Fan Module

To install the fan module (see [Figure 53 on page 116](#)):

1. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
2. Grasp the fan module by the handle, and place one hand under the fan module for support.
3. Place the fan module on the respective slot, and carefully push the fan module into the chassis until the socket lock snaps into place and holds it.
4. Using a number-2 Phillips screwdriver, turn the locking screw on the fan module faceplate until it is tight and secured.

**Figure 53: Installing the Fan Module**



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### RELATED DOCUMENTATION

[MX204 Cooling System Description | 13](#)

[Prevention of Electrostatic Discharge Damage | 159](#)

# Maintaining MX204 Power System Components

## IN THIS SECTION

- [Maintaining the MX204 Power Supplies | 117](#)
- [Replacing an MX204 AC Power Supply | 119](#)
- [Replacing an MX204 DC Power Supply | 121](#)

## Maintaining the MX204 Power Supplies

### IN THIS SECTION

- [Purpose | 117](#)
- [Action | 117](#)

### Purpose

For optimum router performance, verify the condition of the power supply modules.

### Action

On a regular basis, check the power supply status:

- To check the power supply status, issue the `show chassis environment` CLI command. The output is similar to the following:

```
user@host> show chassis environment
Class Item                               Status   Measurement
Temp  CB 0 Top Right Inlet Sensor            OK       26 degrees C / 78 degrees F
      CB 0 Top Left Inlet Sensor          OK       22 degrees C / 71 degrees F
      CB 0 Top Right Exhaust Sensor       OK       31 degrees C / 87 degrees F
      CB 0 Top Left Exhaust Sensor        OK       44 degrees C / 111 degrees F
```

```

CB 0 CPU Core-0 Temp      OK      35 degrees C / 95 degrees F
CB 0 CPU Core-1 Temp      OK      34 degrees C / 93 degrees F
CB 0 CPU Core-2 Temp      OK      34 degrees C / 93 degrees F
CB 0 CPU Core-3 Temp      OK      34 degrees C / 93 degrees F
CB 0 CPU Core-4 Temp      OK      33 degrees C / 91 degrees F
CB 0 CPU Core-5 Temp      OK      33 degrees C / 91 degrees F
CB 0 CPU Core-6 Temp      OK      33 degrees C / 91 degrees F
CB 0 CPU Core-7 Temp      OK      33 degrees C / 91 degrees F
FPC 0 EA0_HMC0 Logic die  OK      55 degrees C / 131 degrees F
FPC 0 EA0_HMC0 DRAM botm  OK      52 degrees C / 125 degrees F
FPC 0 EA0_HMC1 Logic die  OK      55 degrees C / 131 degrees F
FPC 0 EA0_HMC1 DRAM botm  OK      52 degrees C / 125 degrees F
FPC 0 EA0 Chip            OK      64 degrees C / 147 degrees F
FPC 0 EA0-XR0 Chip        OK      56 degrees C / 132 degrees F
FPC 0 EA0-XR1 Chip        OK      57 degrees C / 134 degrees F

Power PEM 0               OK
    PEM 1                 Ok

Fans Fan Tray 0 Fan 0     OK      Spinning at normal speed
    Fan Tray 0 Fan 1     OK      Spinning at normal speed
    Fan Tray 1 Fan 0     OK      Spinning at normal speed
    Fan Tray 1 Fan 1     OK      Spinning at normal speed
    Fan Tray 2 Fan 0     OK      Spinning at normal speed
    Fan Tray 2 Fan 1     OK      Spinning at normal speed

```

- Make sure that the power and grounding cables are arranged so that they do not obstruct access to other router components.
- Routinely check the status LEDs on the power supply faceplates and the craft interface to determine if the power supplies are functioning normally.
- Check the red and yellow alarm LEDs on the craft interface. Power supply failure or removal triggers an alarm that causes one or both of the LEDs to light. You can display the associated error messages by issuing the following command:

```
user@host> show chassis alarms
```

- Periodically inspect the site to ensure that the grounding and power cables connected to the router are securely in place and that there is no moisture accumulating near the router.



**CAUTION:** Do not mix AC and DC power supplies in the same chassis.

## SEE ALSO

[MX204 Power System Description | 17](#)

[MX204 Power Supply Module LEDs | 19](#)

## Replacing an MX204 AC Power Supply

### IN THIS SECTION

- [Removing an MX204 AC Power Supply | 119](#)
- [Installing an MX204 AC Power Supply | 120](#)

## Removing an MX204 AC Power Supply

Before you remove a power supply, be aware of the following:

**NOTE:** The minimum required number of power supply modules must be present in the router at all times.



**CAUTION:** To maintain proper cooling and prevent thermal shutdown of the operating power supply unit, each power supply slot must contain either a power supply or a blank panel. If you remove a power supply, you must install a replacement power supply or a blank panel shortly after the removal.

**NOTE:** After powering off a power supply, wait at least 60 seconds before turning it back on.



**CAUTION:** Do not mix AC and DC power supply modules in the same chassis.

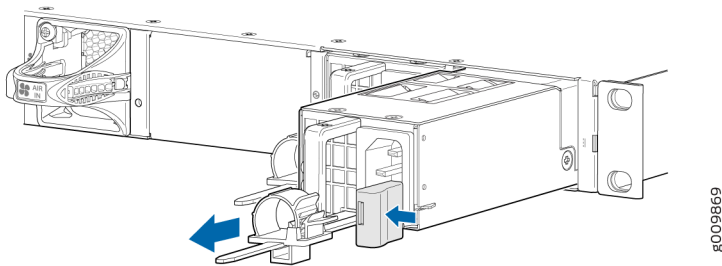
To remove an AC power supply (see Figure 1):

1. Switch off the dedicated customer-site circuit breaker for the power supply, and remove the power cord from the AC power source. Follow the instructions for your site.



2. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
3. Remove the power cord from the power supply.
4. Press the release latch on the side of the AC power supply to disconnect the power supply from the chassis (see Figure 1).
5. Pull the power supply straight out of the chassis.

**Figure 54: Removing an AC Power Supply**

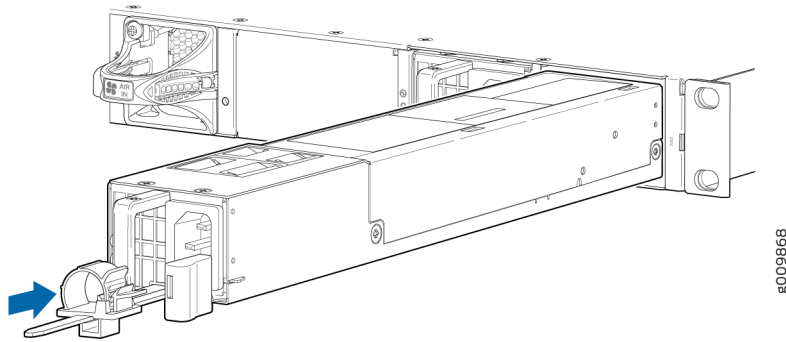


## Installing an MX204 AC Power Supply

To install an AC power supply (see [Figure 55 on page 121](#)):

1. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
2. Using both hands, hold and slide the AC power supply straight into the chassis until the power supply is fully seated in the chassis slot. The power supply faceplate must alligned with any adjacent power supply faceplate or blank installed in the power supply slot.
3. Press the latch located on the side of the power supply to slide it into the chassis.
4. Attach the power cord to the power supply.
5. Attach the power cord to the AC power source, and switch on the dedicated customer-site circuit breaker. Follow the instructions for your site.
6. Observe the status LED on the power supply faceplate. If the power supply is correctly installed and functioning normally, the status LED lights green steadily.

Figure 55: Installing an AC Power Supply



## RELATED DOCUMENTATION

[MX204 Power System Description | 17](#)

[MX204 Router AC Power Specifications | 23](#)

[AC Power Circuit Breaker Requirements for the MX204 Router | 24](#)

[Prevention of Electrostatic Discharge Damage | 159](#)

## Replacing an MX204 DC Power Supply

### IN THIS SECTION

- [Removing an MX204 DC Power Supply | 121](#)
- [Installing an MX204 DC Power Supply | 123](#)

## Removing an MX204 DC Power Supply

Before you remove a power supply, be aware of the following:

**NOTE:** The minimum required number of power supply modules must be present in the router at all times.



**WARNING:** Before you perform DC power procedures, ensure there is no power to the DC circuit. To ensure that all power is off, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the off position, and tape the switch handle of the circuit breaker in the off position.



**CAUTION:** To maintain proper cooling and prevent thermal shutdown of the operating power supply unit, each power supply slot must contain either a power supply or a blank panel. If you remove a power supply, you must install a replacement power supply or a blank panel shortly after the removal.

**NOTE:** After powering off a power supply, wait at least 60 seconds before turning it back on.



**CAUTION:** Do not mix AC and DC power supply modules in the same chassis.

To remove a DC power supply:

1. Switch off the dedicated customer-site circuit breaker for the power supply being removed. Follow your site's procedures for ESD.
2. Make sure that the voltage across the DC power source cable leads is 0 V and that there is no chance that the cables might become active during the removal process.
3. Verify that the status LED on the power supply is not lit.
4. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
5. Remove the clear plastic cover protecting the terminal studs on the faceplate.
6. Using a socket screw driver, remove the screw from each of the DC power terminals (see Figure 3).
7. Remove the cable lugs from the terminals.
8. Carefully move the power cables out of the way.
9. Press the latch located on the DC power supply, to release it from the chassis.
10. Pull the power supply straight out of the chassis (see Figure 4).

Figure 56: Disconnecting the DC Power Cables

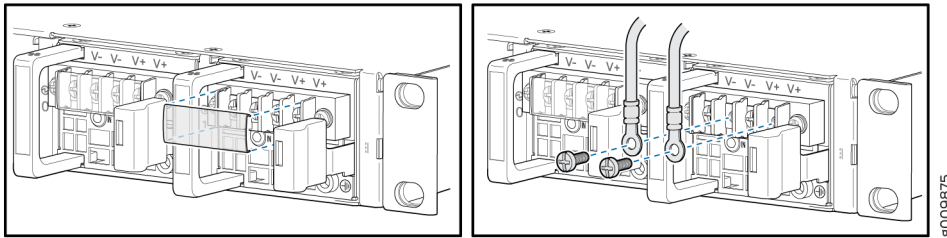
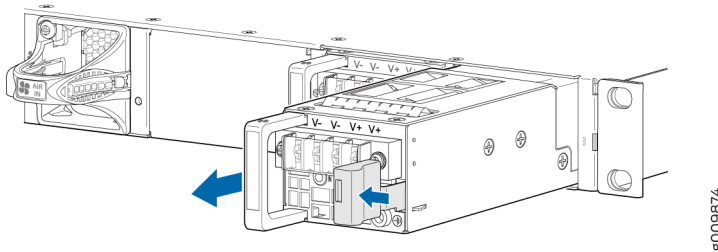


Figure 57: Removing a DC Power Supply



### Installing an MX204 DC Power Supply



**WARNING:** Before you perform DC power procedures, ensure there is no power to the DC circuit. To ensure that all power is off, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the off position, and tape the switch handle of the circuit breaker in the off position.

To install a DC power supply (see [Figure 58 on page 125](#)):

1. Ensure that the voltage across the DC power source cable leads is 0 V and that there is no chance that the cable leads might become active during installation.
2. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
3. Using both hands, slide the DC power supply straight into the chassis until the power supply is fully seated in the chassis slot. The power supply faceplate must be aligned with any adjacent power supply faceplate or blank installed in the power supply slot.
4. Remove the clear plastic cover protecting the terminal on the faceplate.
5. Remove the screws from the terminals.

6. Secure each power cable lug to the terminal with the screw (see [Figure 59 on page 125](#)). Apply between 5 lb-in. (0.6 Nm) and 6 lb-in. (0.7 Nm) of torque to the screw. Do not overtighten the screw (use a socket nut driver).
  - a. Secure the positive (+) DC source power cable lug to the **RTN** (return) terminal.
  - b. Secure the negative (-) DC source power cable lug to the **-48V** (input) terminal.



**CAUTION:** Ensure that each power cable lug seats flush against the surface of the terminal block as you are tightening the screws. Ensure that each screw is properly threaded into the terminal. Applying installation torque to the screw when improperly threaded can result in damage to the terminal.



**CAUTION:** You must ensure that power connections maintain the proper polarity. The power source cables might be labeled **(+)** and **(-)** to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the terminal studs on each power supply.

7. Replace the clear plastic cover over the terminals on the faceplate.
8. Verify that the power cabling is correct, that the cables do not touch or block access to router components, and that they do not drape where people could trip on them.
9. Attach the power cable to the DC power source, and switch on the dedicated customer-site circuit breaker. Follow the instructions for your site.

**NOTE:** If more than one power supply is being installed, turn on all power supply modules at the same time.

10. Observe the status LED on the power supply faceplate. If the power supply is correctly installed and functioning normally, the status LED lights green steadily.

Figure 58: Installing a DC Power Supply

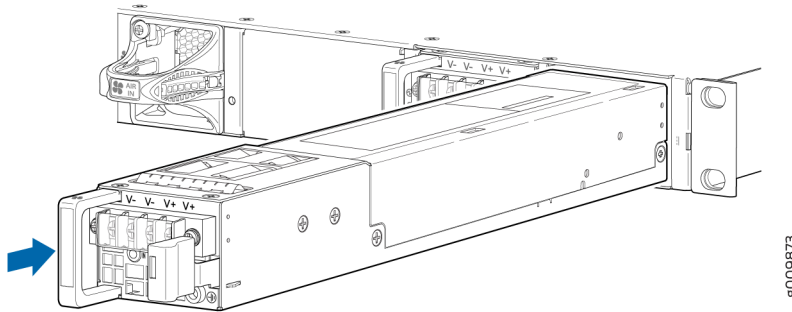
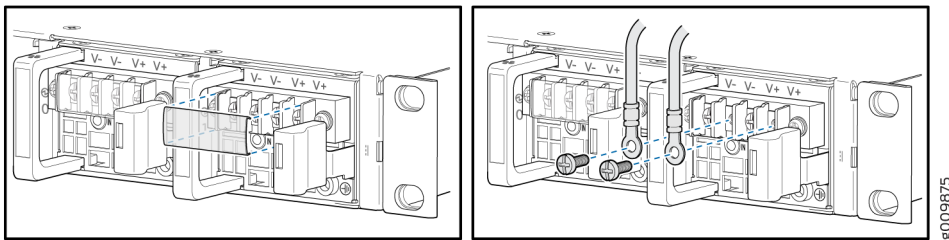


Figure 59: Connecting the DC Power Cables



## RELATED DOCUMENTATION

[MX204 Power System Description | 17](#)

[MX204 Router DC Power Specifications | 27](#)

[DC Power Circuit Breaker Requirements for the MX204 Router | 28](#)

[DC Power Source Cabling for MX204 Router | 29](#)

[DC Power Cable Specifications for MX204 Router | 30](#)

[Prevention of Electrostatic Discharge Damage | 159](#)

# 5

CHAPTER

## Contacting Customer Support and Returning the Chassis or Components

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Contacting Customer Support and Returning the Chassis or Components | 127

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# Contacting Customer Support and Returning the Chassis or Components

## IN THIS SECTION

- [Contact Customer Support | 127](#)
- [Contact Customer Support to Obtain a Return Material Authorization | 128](#)
- [Locating the Serial Number on an MX204 Router or Component | 129](#)
- [Guidelines for Packing Hardware Components for Shipment | 132](#)

## Contact Customer Support

You can contact Juniper Networks Technical Assistance Center (JTAC) 24 hours a day, 7 days a week in one of the following ways:

- On the Web, using the Service Request Manager link at:

<https://support.juniper.net/support/>

- By telephone:
  - From the US and Canada: 1-888-314-JTAC
  - From all other locations: 1-408-745-9500

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

When requesting support from JTAC by telephone, be prepared to provide the following information:

- Your existing service request number, if you have one
- Details of the failure or problem
- Type of activity being performed on the device when the problem occurred



- Configuration data displayed by one or more `show` commands
- Your name, organization name, telephone number, fax number, and shipping address

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

## 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 a Return Material Authorization (RMA) number from Juniper Networks Technical Assistance Center (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 Juniper Networks Technical Assistance Center (JTAC) on the Web or by telephone.

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

- Your existing service request number, if you have one
- Serial number of the component
- Your name, organization name, telephone number, fax number, and shipping address
- Details of the failure or problem
- Type of activity being performed on the device when the problem occurred
- Configuration data displayed by one or more `show` commands

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

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

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

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

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

## Locating the Serial Number on an MX204 Router or Component

### IN THIS SECTION

- [Listing the Chassis and Component Details Using the CLI | 129](#)
- [Locating the Chassis Serial Number ID Label on an MX204 | 130](#)
- [Locating the Serial Number ID Labels on MX204 Power Supplies | 130](#)
- [Locating the Serial Number ID Label on an MX204 Fan Module | 131](#)

If you are returning a router or component to Juniper Networks for repair or replacement, you must locate the serial number of the router or component. You must provide the serial number to the Juniper Networks Technical Assistance Center (JTAC) when you contact them to obtain a Return Materials Authorization (RMA). See ["Contacting Customer Support and Returning the Chassis or Components" on page 127](#).

If the router is operational and you can access the command-line interface (CLI), you can list serial numbers for 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 router or component.

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

### Listing the Chassis and Component Details Using the CLI

To list the MX204 chassis and the components and their serial numbers, use the `show chassis hardware` CLI operational mode command.

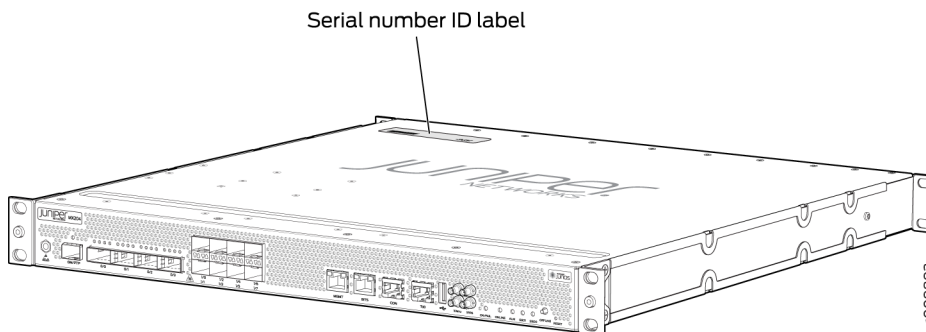
```
user@device> show chassis hardware
Hardware inventory:
Item           Version  Part number  Serial number  Description
```

Chassis			BB768	JNP204 [MX204]
Routing Engine 0		BUILTIN	BUILTIN	RE-S-2X00x6
CB 0	REV 11	750-069579	CAJD3113	JNP204 [MX204]
FPC 0		BUILTIN	BUILTIN	MPC
PIC 0		BUILTIN	BUILTIN	4XSFP28 PIC
Xcvr 0	REV 01	740-058732	F5I2018309	QSFP-100GBASE-LR4
Xcvr 1	REV 01	740-054053	QF027546	QSFP+-4X10G-SR
Xcvr 2	REV 01	740-058732	1AMQA14203X	QSFP-100GBASE-LR4
Xcvr 3	REV 01	740-058732	1GCQA0370CK	QSFP-100GBASE-LR4
PIC 1		BUILTIN	BUILTIN	8XSFP PIC
PEM 0	REV 02	740-070749	1F186390026	AC AFO 650W PSU
PEM 1	REV 04	740-043886	1GA46361256	JPSU-650W-DC-AFO
Fan Tray 0				Fan Tray, Front to Back Airflow - AFO
Fan Tray 1				Fan Tray, Front to Back Airflow - AFO
Fan Tray 2				Fan Tray, Front to Back Airflow - AFO

## Locating the Chassis Serial Number ID Label on an MX204

The serial number ID label is located on a label on the top of the chassis. See [Figure 60 on page 130](#) for the location on an MX204.

**Figure 60: MX204 Chassis Serial Number Label**

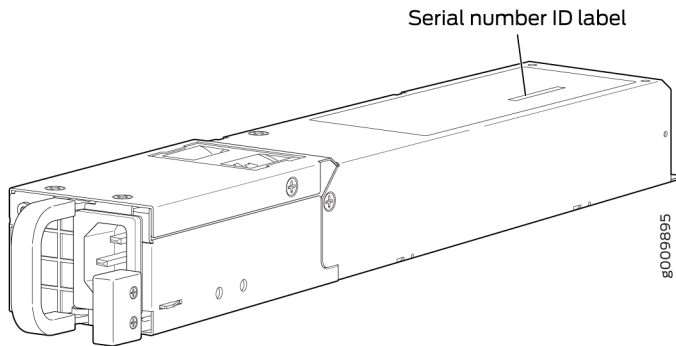


## Locating the Serial Number ID Labels on MX204 Power Supplies

The power supplies installed in an MX204 are field-replaceable units (FRUs). For each FRU, you must remove the FRU from the router chassis to see the FRU serial number ID label.

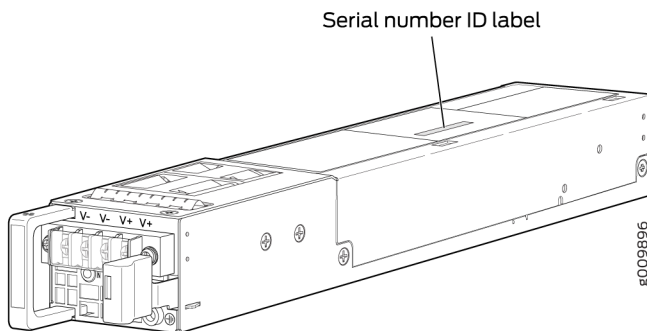
- AC power supply—The serial number ID label is on the top of the AC power supply. See [Figure 61 on page 131](#).

**Figure 61: MX204 AC Power Supply Serial Number Location**



- DC power supply—The serial number ID label is on the top of the DC power supply. See [Figure 62 on page 131](#).

**Figure 62: MX204 DC Power Supply Serial Number Location**

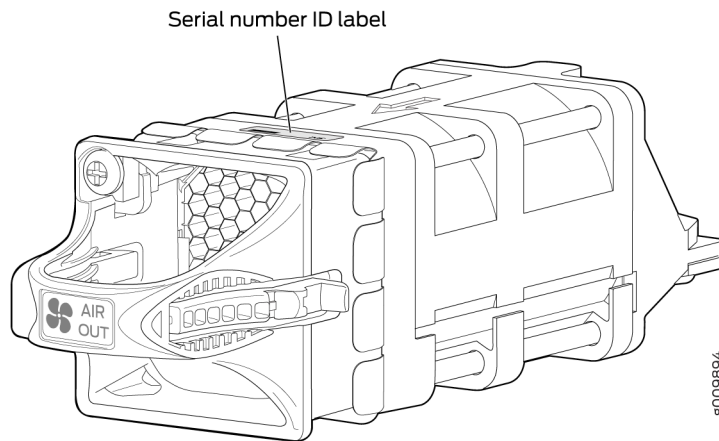


### Locating the Serial Number ID Label on an MX204 Fan Module

The fan modules installed in an MX204 are field-replaceable units (FRUs). For each FRU, you must remove the FRU from the router chassis to see the FRU serial number ID label.

Fan module—The serial number ID label is located at the base of the fan module. See [Figure 63 on page 132](#).

Figure 63: MX204 Fan Module Serial Number Location



#### RELATED DOCUMENTATION

| [MX204 Hardware Components and CLI Terminology](#) | 8

## Guidelines for Packing Hardware Components for Shipment

To pack and ship individual components:

- When you return components, make sure that they are adequately protected with packing materials and packed so that the pieces are prevented from moving around inside the carton.
- Use the original shipping materials if they are available.
- Place individual components in antistatic bags.
- Write the RMA number on the exterior of the box to ensure proper tracking.



**CAUTION:** Do not stack any of the hardware components.



# Safety and Compliance Information

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# Definitions of Safety Warning Levels

The documentation uses the following levels of safety warnings (there are two *Warning* formats):

**NOTE:** You might find this information helpful in a particular situation, or you might overlook this important information if it was not highlighted in a Note.



**CAUTION:** You need to observe the specified guidelines to prevent minor injury or discomfort to you or severe damage to the device.

**Attention** Veillez à respecter les consignes indiquées pour éviter toute incommodité ou blessure légère, voire des dégâts graves pour l'appareil.



**LASER WARNING:** This symbol alerts you to the risk of personal injury from a laser.

**Avertissement** Ce symbole signale un risque de blessure provoquée par rayon laser.



**WARNING:** This symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry, and familiarize yourself with standard practices for preventing accidents.

**Waarschuwing** Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen.

**Varoitus** Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista.

**Avertissement** Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents.



**Warnung** Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt.

**Avvertenza** Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti.

**Advarsel** Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker.

**Aviso** Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes.

**¡Atención!** Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes.

**Varning!** Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador.

## General Safety Guidelines and Warnings

The following guidelines help ensure your safety and protect the device from damage. The list of guidelines might not address all potentially hazardous situations in your working environment, so be alert and exercise good judgment at all times.

- Perform only the procedures explicitly described in the hardware documentation for this device. Make sure that only authorized service personnel perform other system services.
- Keep the area around the device clear and free from dust before, during, and after installation.
- Keep tools away from areas where people could trip over them while walking.

- Do not wear loose clothing or jewelry, such as rings, bracelets, or chains, which could become caught in the device.
- Wear safety glasses if you are working under any conditions that could be hazardous to your eyes.
- Do not perform any actions that create a potential hazard to people or make the equipment unsafe.
- Never attempt to lift an object that is too heavy for one person to handle.
- Never install or manipulate wiring during electrical storms.
- Never install electrical jacks in wet locations unless the jacks are specifically designed for wet environments.
- Operate the device only when it is properly grounded.
- Follow the instructions in this guide to properly ground the device to earth.
- Replace fuses only with fuses of the same type and rating.
- Do not open or remove chassis covers or sheet-metal parts unless instructions are provided in the hardware documentation for this device. Such an action could cause severe electrical shock.
- Do not push or force any objects through any opening in the chassis frame. Such an action could result in electrical shock or fire.
- Avoid spilling liquid onto the chassis or onto any device component. Such an action could cause electrical shock or damage the device.
- Avoid touching uninsulated electrical wires or terminals that have not been disconnected from their power source. Such an action could cause electrical shock.
- Some parts of the chassis, including AC and DC power supply surfaces, power supply unit handles, SFB card handles, and fan tray handles might become hot. The following label provides the warning for hot surfaces on the chassis:



- Always ensure that all modules, power supplies, and cover panels are fully inserted and that the installation screws are fully tightened.

# General Safety Warnings for Juniper Networks Devices

## IN THIS SECTION

- [Qualified Personnel Warning | 138](#)
- [Restricted-Access Area Warning | 139](#)

## Qualified Personnel Warning



**WARNING:** Only trained and qualified personnel should install or replace the hardware equipment.

**Waarschuwing** Installatie en reparaties mogen uitsluitend door getraind en bevoegd personeel uitgevoerd worden.

**Varoitus** Ainoastaan koulutettu ja pätevä henkilökunta saa asentaa tai vaihtaa tämän laitteen.

**Attention** Tout installation ou remplacement de l'appareil doit être réalisé par du personnel qualifié et compétent.

**Warnung** Gerät nur von geschultem, qualifiziertem Personal installieren oder auswechseln lassen.

**Avvertenza** Solo personale addestrato e qualificato deve essere autorizzato ad installare o sostituire questo apparecchio.

**Advarsel** Kun kvalifisert personell med riktig opplæring bør montere eller bytte ut dette utstyret.

**Aviso** Este equipamento deverá ser instalado ou substituído apenas por pessoal devidamente treinado e qualificado.

**¡Atención!** Estos equipos deben ser instalados y reemplazados exclusivamente por personal técnico adecuadamente preparado y capacitado.

**Warning!** Denna utrustning ska endast installeras och bytas ut av utbildad och kvalificerad personal.

## Restricted-Access Area Warning



**WARNING:** The hardware equipment is intended for installation in restricted-access areas. A restricted-access area is an area to which access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and which is controlled by the authority responsible for the location.

**Waarschuwing** Dit toestel is bedoeld voor installatie op plaatsen met beperkte toegang. Een plaats met beperkte toegang is een plaats waar toegang slechts door servicepersoneel verkregen kan worden door middel van een speciaal instrument, een slot en sleutel, of een ander veiligheidsmiddel, en welke beheerd wordt door de overheidsinstantie die verantwoordelijk is voor de locatie.

**Varoitus** Tämä laite on tarkoitettu asennettavaksi paikkaan, johon pääsy on rajoitettua. Paikka, johon pääsy on rajoitettua, tarkoittaa paikkaa, johon vain huoltohenkilöstö pääsee jonkin erikoistyökalun, lukkoon sopivan avaimen tai jonkin muun turvalaitteen avulla ja joka on paikasta vastuussa olevien toimivaltaisten henkilöiden valvoma.

**Attention** Cet appareil est à installer dans des zones d'accès réservé. Ces dernières sont des zones auxquelles seul le personnel de service peut accéder en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout autre moyen de sécurité. L'accès aux zones de sécurité est sous le contrôle de l'autorité responsable de l'emplacement.

**Warnung** Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Ein Bereich mit beschränktem Zutritt ist ein Bereich, zu dem nur Wartungspersonal mit einem Spezialwerkzeugs, Schloß und Schlüssel oder anderer Sicherheitsvorkehrungen Zugang hat, und der von dem für die Anlage zuständigen Gremium kontrolliert wird.

**Avvertenza** Questa unità deve essere installata in un'area ad accesso limitato. Un'area ad accesso limitato è un'area accessibile solo a personale di assistenza tramite un'attrezzo speciale, lucchetto, o altri dispositivi di sicurezza, ed è controllata dall'autorità responsabile della zona.

**Advarsel** Denne enheten er laget for installasjon i områder med begrenset adgang. Et område med begrenset adgang gir kun adgang til servicepersonale som bruker et

spesielt verktøy, lås og nøkkel, eller en annen sikkerhetsanordning, og det kontrolleres av den autoriteten som er ansvarlig for området.

**Aviso** Esta unidade foi concebida para instalação em áreas de acesso restrito. Uma área de acesso restrito é uma área à qual apenas tem acesso o pessoal de serviço autorizado, que possua uma ferramenta, chave e fechadura especial, ou qualquer outra forma de segurança. Esta área é controlada pela autoridade responsável pelo local.

**¡Atención!** Esta unidad ha sido diseñada para instalarse en áreas de acceso restringido. Área de acceso restringido significa un área a la que solamente tiene acceso el personal de servicio mediante la utilización de una herramienta especial, cerradura con llave, o algún otro medio de seguridad, y que está bajo el control de la autoridad responsable del local.

**Varning!** Denna enhet är avsedd för installation i områden med begränsat tillträde. Ett område med begränsat tillträde får endast tillträdas av servicepersonal med ett speciellt verktyg, lås och nyckel, eller annan säkerhetsanordning, och kontrolleras av den auktoritet som ansvarar för området.

## RELATED DOCUMENTATION

*Installation Safety Warnings for Juniper Networks Devices*

*Maintenance and Operational Safety Warnings for Juniper Networks Devices*

*General Electrical Safety Warnings for Juniper Networks Devices*

*DC Power Electrical Safety Warnings for Juniper Networks Devices*

# Fire Safety Requirements

## IN THIS SECTION

- [Fire Suppression](#) | 141
- [Fire Suppression Equipment](#) | 141

In the event of a fire emergency, the safety of people is the primary concern. You should establish procedures for protecting people in the event of a fire emergency, provide safety training, and properly provision fire-control equipment and fire extinguishers.

In addition, you should establish procedures to protect your equipment in the event of a fire emergency. Juniper Networks products should be installed in an environment suitable for electronic equipment. We recommend that fire suppression equipment be available in the event of a fire in the vicinity of the equipment and that all local fire, safety, and electrical codes and ordinances be observed when you install and operate your equipment.

## Fire Suppression

In the event of an electrical hazard or an electrical fire, you should first turn power off to the equipment at the source. Then use a Type C fire extinguisher, which uses noncorrosive fire retardants, to extinguish the fire.

## Fire Suppression Equipment

Type C fire extinguishers, which use noncorrosive fire retardants such as carbon dioxide and Halotron™, are most effective for suppressing electrical fires. Type C fire extinguishers displace oxygen from the point of combustion to eliminate the fire. For extinguishing fire on or around equipment that draws air from the environment for cooling, you should use this type of inert oxygen displacement extinguisher instead of an extinguisher that leaves residues on equipment.

Do not use multipurpose Type ABC chemical fire extinguishers (dry chemical fire extinguishers). The primary ingredient in these fire extinguishers is monoammonium phosphate, which is very sticky and difficult to clean. In addition, in the presence of minute amounts of moisture, monoammonium phosphate can become highly corrosive and corrodes most metals.

Any equipment in a room in which a chemical fire extinguisher has been discharged is subject to premature failure and unreliable operation. The equipment is considered to be irreparably damaged.

**NOTE:** To keep warranties effective, do not use a dry chemical fire extinguisher to control a fire at or near a Juniper Networks device. If a dry chemical fire extinguisher is used, the unit is no longer eligible for coverage under a service agreement.

We recommend that you dispose of any irreparably damaged equipment in an environmentally responsible manner.

## Installation Instructions Warning



**WARNING:** Read the installation instructions before you connect the device to a power source.

**Waarschuwing** Raadpleeg de installatie-aanwijzingen voordat u het systeem met de voeding verbindt.

**Varoitus** Lue asennusohjeet ennen järjestelmän yhdistämistä virtälähteeseen.

**Avertissement** Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.

**Warnung** Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen.

**Avvertenza** Consultare le istruzioni di installazione prima di collegare il sistema all'alimentatore.

**Advarsel** Les installasjonsinstruksjonene før systemet kobles til strømkilden.

**Aviso** Leia as instruções de instalação antes de ligar o sistema à sua fonte de energia.

**¡Atención!** Ver las instrucciones de instalación antes de conectar el sistema a la red de alimentación.

**Varning!** Läs installationsanvisningarna innan du kopplar systemet till dess strömförsörjningsenhet.

## Chassis and Component Lifting Guidelines

- Before moving the device to a site, ensure that the site meets the power, environmental, and clearance requirements.
- Before lifting or moving the device, disconnect all external cables and wires.
- As when lifting any heavy object, ensure that your legs bear most of the weight rather than your back. Keep your knees bent and your back relatively straight. Do not twist your body as you lift. Balance the load evenly and be sure that your footing is firm.
- Use the following lifting guidelines to lift devices and components:

- Up to 39.7 lb (18 kg): One person.
- From 39.7 lb (18 kg) to 70.5 lb (32 kg): Two or more people.
- From 70.5 lb (32 kg) to 121.2 lb (55 kg): Three or more people.
- Above 121.2 lb (55 kg): Use material handling systems (such as levers, slings, lifts, and so on).  
When this is not practical, engage specially trained persons or systems (such as riggers or movers).

## Ramp Warning



**WARNING:** When installing the device, do not use a ramp inclined at more than 10 degrees.

**Waarschuwing** Gebruik een oprijplaat niet onder een hoek van meer dan 10 graden.

**Varoitus** Älä käytä sellaista kaltevaa pintaa, jonka kaltevuus ylittää 10 astetta.

**Avertissement** Ne pas utiliser une rampe dont l'inclinaison est supérieure à 10 degrés.

**Warnung** Keine Rampen mit einer Neigung von mehr als 10 Grad verwenden.

**Avvertenza** Non usare una rampa con pendenza superiore a 10 gradi.

**Advarsel** Bruk aldri en rampe som heller mer enn 10 grader.

**Aviso** Não utilize uma rampa com uma inclinação superior a 10 graus.

**¡Atención!** No usar una rampa inclinada más de 10 grados.

**Varning!** Använd inte ramp med en lutning på mer än 10 grader.

## Rack-Mounting and Cabinet-Mounting Warnings

Ensure that the rack or cabinet in which the device is installed is evenly and securely supported. Uneven mechanical loading could lead to a hazardous condition.





**WARNING:** To prevent bodily injury when mounting or servicing the device in a rack, take the following precautions to ensure that the system remains stable. The following directives help maintain your safety:

- Install the device in a rack that is secured to the building structure.
- Mount the device at the bottom of the rack if it is the only unit in the rack.
- When mounting the device on a partially filled rack, load the rack from the bottom to the top, with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing equipment, install the stabilizers before mounting or servicing the device in the rack.

**Waarschuwing** Om lichamelijk letsel te voorkomen wanneer u dit toestel in een rek monteert of het daar een servicebeurt geeft, moet u speciale voorzorgsmaatregelen nemen om ervoor te zorgen dat het toestel stabiel blijft. De onderstaande richtlijnen worden verstrekt om uw veiligheid te verzekeren:

- De Juniper Networks switch moet in een stellage worden geïnstalleerd die aan een bouwsel is verankerd.
- Dit toestel dient onderaan in het rek gemonteerd te worden als het toestel het enige in het rek is.
- Wanneer u dit toestel in een gedeeltelijk gevuld rek monteert, dient u het rek van onderen naar boven te laden met het zwaarste onderdeel onderaan in het rek.
- Als het rek voorzien is van stabiliseringshulpmiddelen, dient u de stabilisatoren te monteren voordat u het toestel in het rek monteert of het daar een servicebeurt geeft.

**Varoitus** Kun laite asetetaan telineeseen tai huolletaan sen ollessa telineessä, on noudatettava erityisiä varotoimia järjestelmän vakavuuden säilyttämiseksi, jotta vältetään loukkaantumiselta. Noudata seuraavia turvallisuusohjeita:

- Juniper Networks switch on asennettava telineeseen, joka on kiinnitetty rakennukseen.
- Jos telineessä ei ole muita laitteita, aseta laite telineen alaosaan.
- Jos laite asetetaan osaksi täytettyyn telineeseen, aloita kuormittaminen sen alaosasta kaikkein raskaimmalla esineellä ja siirry sitten sen yläosaan.

- Jos telinettä varten on vakaimet, asenna ne ennen laitteen asettamista telineeseen tai sen huoltamista siinä.

**Avertissement** Pour éviter toute blessure corporelle pendant les opérations de montage ou de réparation de cette unité en casier, il convient de prendre des précautions spéciales afin de maintenir la stabilité du système. Les directives ci-dessous sont destinées à assurer la protection du personnel:

- Le rack sur lequel est monté le Juniper Networks switch doit être fixé à la structure du bâtiment.
- Si cette unité constitue la seule unité montée en casier, elle doit être placée dans le bas.
- Si cette unité est montée dans un casier partiellement rempli, charger le casier de bas en haut en plaçant l'élément le plus lourd dans le bas.
- Si le casier est équipé de dispositifs stabilisateurs, installer les stabilisateurs avant de monter ou de réparer l'unité en casier.

**Warnung** Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt. Die folgenden Richtlinien sollen zur Gewährleistung Ihrer Sicherheit dienen:

- Der Juniper Networks switch muß in einem Gestell installiert werden, das in der Gebäudestruktur verankert ist.
- Wenn diese Einheit die einzige im Gestell ist, sollte sie unten im Gestell angebracht werden.
- Bei Anbringung dieser Einheit in einem zum Teil gefüllten Gestell ist das Gestell von unten nach oben zu laden, wobei das schwerste Bauteil unten im Gestell anzubringen ist.
- Wird das Gestell mit Stabilisierungszubehör geliefert, sind zuerst die Stabilisatoren zu installieren, bevor Sie die Einheit im Gestell anbringen oder sie warten.

**Avvertenza** Per evitare infortuni fisici durante il montaggio o la manutenzione di questa unità in un supporto, occorre osservare speciali precauzioni per garantire che il sistema rimanga stabile. Le seguenti direttive vengono fornite per garantire la sicurezza personale:

- Il Juniper Networks switch deve essere installato in un telaio, il quale deve essere fissato alla struttura dell'edificio.
- Questa unità deve venire montata sul fondo del supporto, se si tratta dell'unica unità da montare nel supporto.
- Quando questa unità viene montata in un supporto parzialmente pieno, caricare il supporto dal basso all'alto, con il componente più pesante sistemato sul fondo del supporto.
- Se il supporto è dotato di dispositivi stabilizzanti, installare tali dispositivi prima di montare o di procedere alla manutenzione dell'unità nel supporto.

**Advarsel** Unngå fysiske skader under montering eller reparasjonsarbeid på denne enheten når den befinner seg i et kabinett. Vær nøye med at systemet er stabilt. Følgende retningslinjer er gitt for å verne om sikkerheten:

- Juniper Networks switch må installeres i et stativ som er forankret til bygningsstrukturen.
- Denne enheten bør monteres nederst i kabinettet hvis dette er den eneste enheten i kabinettet.
- Ved montering av denne enheten i et kabinett som er delvis fylt, skal kabinettet lastes fra bunnen og opp med den tyngste komponenten nederst i kabinettet.
- Hvis kabinettet er utstyrt med stabiliseringsutstyr, skal stabilisatorene installeres før montering eller utføring av reparasjonsarbeid på enheten i kabinettet.

**Aviso** Para se prevenir contra danos corporais ao montar ou reparar esta unidade numa estante, deverá tomar precauções especiais para se certificar de que o sistema possui um suporte estável. As seguintes directrizes ajudá-lo-ão a efectuar o seu trabalho com segurança:

- O Juniper Networks switch deverá ser instalado numa prateleira fixa à estrutura do edifício.
- Esta unidade deverá ser montada na parte inferior da estante, caso seja esta a única unidade a ser montada.
- Ao montar esta unidade numa estante parcialmente ocupada, coloque os itens mais pesados na parte inferior da estante, arrumando-os de baixo para cima.

- Se a estante possuir um dispositivo de estabilização, instale-o antes de montar ou reparar a unidade.

**¡Atención!** Para evitar lesiones durante el montaje de este equipo sobre un bastidor, anteriormente durante su mantenimiento, se debe poner mucho cuidado en que el sistema quede bien estable. Para garantizar su seguridad, proceda según las siguientes instrucciones:

- El Juniper Networks switch debe instalarse en un bastidor fijado a la estructura del edificio.
- Colocar el equipo en la parte inferior del bastidor, cuando sea la única unidad en el mismo.
- Cuando este equipo se vaya a instalar en un bastidor parcialmente ocupado, comenzar la instalación desde la parte inferior hacia la superior colocando el equipo más pesado en la parte inferior.
- Si el bastidor dispone de dispositivos estabilizadores, instalar éstos antes de montar o proceder al mantenimiento del equipo instalado en el bastidor.

**Varning!** För att undvika kroppsskada när du installerar eller utför underhållsarbete på denna enhet på en ställning måste du vidta särskilda försiktighetsåtgärder för att försäkra dig om att systemet står stadigt. Följande riktlinjer ges för att trygga din säkerhet:

- Juniper Networks switch måste installeras i en ställning som är förankrad i byggnadens struktur.
- Om denna enhet är den enda enheten på ställningen skall den installeras längst ned på ställningen.
- Om denna enhet installeras på en delvis fylld ställning skall ställningen fyllas nedifrån och upp, med de tyngsta enheterna längst ned på ställningen.
- Om ställningen är försedd med stabiliseringsdon skall dessa monteras fast innan enheten installeras eller underhålls på ställningen.

# Laser and LED Safety Guidelines and Warnings

## IN THIS SECTION

- [General Laser Safety Guidelines | 148](#)
- [Class 1 Laser Product Warning | 149](#)
- [Class 1 LED Product Warning | 149](#)
- [Laser Beam Warning | 150](#)

Juniper Networks devices are equipped with laser transmitters, which are considered a Class 1 Laser Product by the U.S. Food and Drug Administration and are evaluated as a Class 1 Laser Product per IEC/EN 60825-1 requirements.

Observe the following guidelines and warnings:

## General Laser Safety Guidelines

When working around ports that support optical transceivers, observe the following safety guidelines to prevent eye injury:

- Do not look into unterminated ports or at fibers that connect to unknown sources.
- Do not examine unterminated optical ports with optical instruments.
- Avoid direct exposure to the beam.



**LASER WARNING:** Unterminated optical connectors can emit invisible laser radiation. The lens in the human eye focuses all the laser power on the retina, so focusing the eye directly on a laser source—even a low-power laser—could permanently damage the eye.

**Avertissement** Les connecteurs à fibre optique sans terminaison peuvent émettre un rayonnement laser invisible. Le cristallin de l'œil humain faisant converger toute la puissance du laser sur la rétine, toute focalisation directe de l'œil sur une source laser, —même de faible puissance—, peut entraîner des lésions oculaires irréversibles.

## Class 1 Laser Product Warning



**LASER WARNING:** Class 1 laser product.

**Waarschuwing** Klasse-1 laser produkt.

**Varoitus** Luokan 1 lasertuote.

**Avertissement** Produit laser de classe I.

**Warnung** Laserprodukt der Klasse 1.

**Avvertenza** Prodotto laser di Classe 1.

**Advarsel** Laserprodukt av klasse 1.

**Aviso** Produto laser de classe 1.

**¡Atención!** Producto láser Clase I.

**Varning!** Laserprodukt av klass 1.

## Class 1 LED Product Warning



**LASER WARNING:** Class 1 LED product.

**Waarschuwing** Klasse 1 LED-product.

**Varoitus** Luokan 1 valodiodituote.

**Avertissement** Alarme de produit LED Class I.

**Warnung** Class 1 LED-Produktwarnung.

**Avvertenza** Avvertenza prodotto LED di Classe 1.

**Advarsel** LED-produkt i klasse 1.

**Aviso** Produto de classe 1 com LED.

**¡Atención!** Aviso sobre producto LED de Clase 1.

**Varning!** Lysdiodprodukt av klass 1.

## Laser Beam Warning



**LASER WARNING:** Do not stare into the laser beam or view it directly with optical instruments.

**Waarschuwing** Niet in de straal staren of hem rechtstreeks bekijken met optische instrumenten.

**Varoitus** Älä katso säteeseen äläkä tarkastele sitä suoraan optisen laitteen avulla.

**Avertissement** Ne pas fixer le faisceau des yeux, ni l'observer directement à l'aide d'instruments optiques.

**Warnung** Nicht direkt in den Strahl blicken und ihn nicht direkt mit optischen Geräten prüfen.

**Avvertenza** Non fissare il raggio con gli occhi né usare strumenti ottici per osservarlo direttamente.

**Advarsel** Stirr eller se ikke direkte p strlen med optiske instrumenter.

**Aviso** Não olhe fixamente para o raio, nem olhe para ele directamente com instrumentos ópticos.

**¡Atención!** No mirar fijamente el haz ni observarlo directamente con instrumentos ópticos.

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

## Radiation from Open Port Apertures Warning



**LASER WARNING:** Because invisible radiation might be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures.

**Waarschuwing** Aangezien onzichtbare straling vanuit de opening van de poort kan komen als er geen fiberkabel aangesloten is, dient blootstelling aan straling en het kijken in open openingen vermeden te worden.

**Varoitus** Koska portin aukosta voi emittoitua näkymätöntä säteilyä, kun kuitukaapelia ei ole kytkettynä, vältä säteilylle altistumista äläkä katso avoimiin aukkoihin.

**Avertissement** Des radiations invisibles à l'il nu pouvant traverser l'ouverture du port lorsqu'aucun câble en fibre optique n'y est connecté, il est recommandé de ne pas regarder fixement l'intérieur de ces ouvertures.

**Warnung** Aus der Port-Öffnung können unsichtbare Strahlen emittieren, wenn kein Glasfaserkabel angeschlossen ist. Vermeiden Sie es, sich den Strahlungen auszusetzen, und starren Sie nicht in die Öffnungen!

**Avvertenza** Quando i cavi in fibra non sono inseriti, radiazioni invisibili possono essere emesse attraverso l'apertura della porta. Evitate di esporvi alle radiazioni e non guardate direttamente nelle aperture.

**Advarsel** Unngå utsettelse for stråling, og stirr ikke inn i åpninger som er åpne, fordi usynlig stråling kan emitteres fra portens åpning når det ikke er tilkoblet en fiberkabel.

**Aviso** Dada a possibilidade de emissão de radiação invisível através do orifício da via de acesso, quando esta não tiver nenhum cabo de fibra conectado, deverá evitar a EXposição à radiação e não deverá olhar fixamente para orifícios que se encontrarem a descoberto.

**¡Atención!** Debido a que la apertura del puerto puede emitir radiación invisible cuando no existe un cable de fibra conectado, evite mirar directamente a las aperturas para no exponerse a la radiación.

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

## Maintenance and Operational Safety Guidelines and Warnings

### IN THIS SECTION

- [Battery Handling Warning | 152](#)
- [Jewelry Removal Warning | 153](#)



- Lightning Activity Warning | 154
- Operating Temperature Warning | 155
- Product Disposal Warning | 156

While performing the maintenance activities for devices, observe the following guidelines and warnings:

## Battery Handling Warning



**WARNING:** Replacing a battery incorrectly might result in an explosion. Replace a battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

**Waarschuwing** Er is ontploffingsgevaar als de batterij verkeerd vervangen wordt. Vervang de batterij slechts met hetzelfde of een equivalent type dat door de fabrikant aanbevolen is. Gebruikte batterijen dienen overeenkomstig fabrieksvoorschriften weggeworpen te worden.

**Varoitus** Räjähdyksen vaara, jos akku on vaihdettu väärään akkuun. Käytä vaihtamiseen ainoastaan saman- tai vastaavantyyppistä akkua, joka on valmistajan suosittama. Hävitä käytetyt akut valmistajan ohjeiden mukaan.

**Avertissement** Danger d'explosion si la pile n'est pas remplacée correctement. Ne la remplacer que par une pile de type semblable ou équivalent, recommandée par le fabricant. Jeter les piles usagées conformément aux instructions du fabricant.

**Warnung** Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr. Ersetzen Sie die Batterie nur durch den gleichen oder vom Hersteller empfohlenen Batterietyp. Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers.

**Advarsel** Det kan være fare for eksplosjon hvis batteriet skiftes på feil måte. Skift kun med samme eller tilsvarende type som er anbefalt av produsenten. Kasser brukte batterier i henhold til produsentens instruksjoner.

**Avvertenza** Pericolo di esplosione se la batteria non è installata correttamente. Sostituire solo con una di tipo uguale o equivalente, consigliata dal produttore. Eliminare le batterie usate secondo le istruzioni del produttore.

**Aviso** Existe perigo de explosão se a bateria for substituída incorrectamente. Substitua a bateria por uma bateria igual ou de um tipo equivalente recomendado pelo fabricante. Destrua as baterias usadas conforme as instruções do fabricante.

**¡Atención!** Existe peligro de explosión si la batería se reemplaza de manera incorrecta. Reemplazar la batería EXclusivamente con el mismo tipo o el equivalente recomendado por el fabricante. Desechar las baterías gastadas según las instrucciones del fabricante.

**Warning!** Explosionsfara vid felaktigt batteribyte. Ersätt endast batteriet med samma batterityp som rekommenderas av tillverkaren eller motsvarande. Följ tillverkarens anvisningar vid kassering av använda batterier.

## Jewelry Removal Warning



**WARNING:** Before working on equipment that is connected to power lines, remove jewelry, including rings, necklaces, and watches. Metal objects heat up when connected to power and ground and can cause serious burns or can be welded to the terminals.

**Waarschuwing** Alvorens aan apparatuur te werken die met elektrische leidingen is verbonden, sieraden (inclusief ringen, kettingen en horloges) verwijderen. Metalen voorwerpen worden warm wanneer ze met stroom en aarde zijn verbonden, en kunnen ernstige brandwonden veroorzaken of het metalen voorwerp aan de aansluitklemmen lassen.

**Varoitus** Ennen kuin työskentelet voimavirtajohtoihin kytkettyjen laitteiden parissa, ota pois kaikki korut (sormukset, kaulakorut ja kellot mukaan lukien). Metalliesineet kuumenevat, kun ne ovat yhteydessä sähkövirran ja maan kanssa, ja ne voivat aiheuttaa vakavia palovammoja tai hitsata metalliesineet kiinni liitännänapoihin.

**Avertissement** Avant d'accéder à cet équipement connecté aux lignes électriques, ôter tout bijou (anneaux, colliers et montres compris). Lorsqu'ils sont branchés à l'alimentation et reliés à la terre, les objets métalliques chauffent, ce qui peut provoquer des blessures graves ou souder l'objet métallique aux bornes.

**Warnung** Vor der Arbeit an Geräten, die an das Netz angeschlossen sind, jeglichen Schmuck (einschließlich Ringe, Ketten und Uhren) abnehmen. Metallgegenstände erhitzen sich, wenn sie an das Netz und die Erde angeschlossen werden, und können schwere Verbrennungen verursachen oder an die Anschlußklemmen angeschweißt werden.

**Avvertenza** Prima di intervenire su apparecchiature collegate alle linee di alimentazione, togliersi qualsiasi monile (inclusi anelli, collane, braccialetti ed orologi). Gli oggetti metallici si riscaldano quando sono collegati tra punti di alimentazione e massa: possono causare ustioni gravi oppure il metallo può saldarsi ai terminali.

**Advarsel** Fjern alle smykker (inkludert ringe, halskjeder og klokker) før du skal arbeide på utstyr som er koblet til kraftledninger. Metallgjenstander som er koblet til kraftledninger og jord blir svært varme og kan forårsake alvorlige brannskader eller smelte fast til polene.

**Aviso** Antes de trabalhar em equipamento que esteja ligado a linhas de corrente, retire todas as jóias que estiver a usar (incluindo anéis, fios e relógios). Os objectos metálicos aquecerão em contacto com a corrente e em contacto com a ligação à terra, podendo causar queimaduras graves ou ficarem soldados aos terminais.

**¡Atención!** Antes de operar sobre equipos conectados a líneas de alimentación, quitarse las joyas (incluidos anillos, collares y relojes). Los objetos de metal se calientan cuando se conectan a la alimentación y a tierra, lo que puede ocasionar quemaduras graves o que los objetos metálicos queden soldados a los bornes.

**Varning!** Tag av alla smycken (inklusive ringar, halsband och armbandsur) innan du arbetar på utrustning som är kopplad till kraftledningar. Metallobjekt hettas upp när de kopplas ihop med ström och jord och kan förorsaka allvarliga brännskador; metallobjekt kan också sammansvetsas med kontakterna.

## Lightning Activity Warning



**WARNING:** Do not work on the system or connect or disconnect cables during periods of lightning activity.

**Waarschuwing** Tijdens onweer dat gepaard gaat met bliksem, dient u niet aan het systeem te werken of kabels aan te sluiten of te ontkoppelen.

**Varoitus** Älä työskentele järjestelmän parissa äläkä yhdistä tai irrota kaapeleita ukkosilmalla.

**Avertissement** Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage.

**Warnung** Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert.

**Avvertenza** Non lavorare sul sistema o collegare oppure scollegare i cavi durante un temporale con fulmini.

**Advarsel** Utfør aldri arbeid på systemet, eller koble kabler til eller fra systemet når det tordner eller lyner.

**Aviso** Não trabalhe no sistema ou ligue e desligue cabos durante períodos de mau tempo (trovoada).

**¡Atención!** No operar el sistema ni conectar o desconectar cables durante el transcurso de descargas eléctricas en la atmósfera.

**Warning!** Vid åska skall du aldrig utföra arbete på systemet eller ansluta eller koppla loss kablar.

## Operating Temperature Warning



**WARNING:** To prevent the device from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature. To prevent airflow restriction, allow at least 6 in. (15.2 cm) of clearance around the ventilation openings.

**Waarschuwing** Om te voorkomen dat welke switch van de Juniper Networks router dan ook oververhit raakt, dient u deze niet te bedienen op een plaats waar de maximale aanbevolen omgevingstemperatuur van 40° C wordt overschreden. Om te voorkomen dat de luchtstroom wordt beperkt, dient er minstens 15,2 cm speling rond de ventilatie-openingen te zijn.

**Varoitus** Ettei Juniper Networks switch-sarjan reititin ylikuumentuisi, sitä ei saa käyttää tilassa, jonka lämpötila ylittää korkeimman suositellun ympäristölämpötilan 40° C. Ettei ilmanvaihto estyisi, tuuletusaukkojen ympärille on jätettävä ainakin 15,2 cm tilaa.

**Avertissement** Pour éviter toute surchauffe des routeurs de la gamme Juniper Networks switch, ne l'utilisez pas dans une zone où la température ambiante est supérieure à 40° C. Pour permettre un flot d'air constant, dégagez un espace d'au moins 15,2 cm autour des ouvertures de ventilations.

**Warnung** Um einen Router der switch vor Überhitzung zu schützen, darf dieser nicht in einer Gegend betrieben werden, in der die Umgebungstemperatur das empfohlene

Maximum von 40° C überschreitet. Um Lüftungsverschluß zu verhindern, achten Sie darauf, daß mindestens 15,2 cm lichter Raum um die Lüftungsöffnungen herum frei bleibt.

**Avvertenza** Per evitare il surriscaldamento dei switch, non adoperateli in un locale che ecceda la temperatura ambientale massima di 40° C. Per evitare che la circolazione dell'aria sia impedita, lasciate uno spazio di almeno 15.2 cm di fronte alle aperture delle ventole.

**Advarsel** Unngå overoppheting av eventuelle rutere i Juniper Networks switch Disse skal ikke brukes på steder der den anbefalte maksimale omgivelsestemperaturen overstiger 40° C (104° F). Sørg for at klaringen rundt lufteåpningene er minst 15,2 cm (6 tommer) for å forhindre nedsatt luftsirkulasjon.

**Aviso** Para evitar o sobreaquecimento do encaminhador Juniper Networks switch, não utilize este equipamento numa área que exceda a temperatura máxima recomendada de 40° C. Para evitar a restrição à circulação de ar, deixe pelo menos um espaço de 15,2 cm à volta das aberturas de ventilação.

**¡Atención!** Para impedir que un encaminador de la serie Juniper Networks switch se recaliente, no lo haga funcionar en un área en la que se supere la temperatura ambiente máxima recomendada de 40° C. Para impedir la restricción de la entrada de aire, deje un espacio mínimo de 15,2 cm alrededor de las aperturas para ventilación.

**Warning!** Förhindra att en Juniper Networks switch överhettas genom att inte använda den i ett område där den maximalt rekommenderade omgivningstemperaturen på 40° C överskrids. Förhindra att luftcirkulationen inskränks genom att se till att det finns fritt utrymme på minst 15,2 cm omkring ventilationsöppningarna.

## Product Disposal Warning



**WARNING:** Disposal of this device must be handled according to all national laws and regulations.

**Waarschuwing** Dit produkt dient volgens alle landelijke wetten en voorschriften te worden afgedankt.

**Varoitus** Tämän tuotteen lopullisesta hävittämisestä tulee huolehtia kaikkia valtakunnallisia lakeja ja säännöksiä noudattaen.

**Avertissement** La mise au rebut définitive de ce produit doit être effectuée conformément à toutes les lois et réglementations en vigueur.

**Warnung** Dieses Produkt muß den geltenden Gesetzen und Vorschriften entsprechend entsorgt werden.

**Avvertenza** L'eliminazione finale di questo prodotto deve essere eseguita osservando le normative italiane vigenti in materia

**Advarsel** Endelig disponering av dette produktet må skje i henhold til nasjonale lover og forskrifter.

**Aviso** A descartagem final deste produto deverá ser efectuada de acordo com os regulamentos e a legislação nacional.

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

**Warning!** Slutlig kassering av denna produkt bör skötas i enlighet med landets alla lagar och föreskrifter.

## General Electrical Safety Guidelines and Warnings



**WARNING:** Certain ports on the device are designed for use as intrabuilding (within-the-building) interfaces only (Type 2 or Type 4 ports as described in *GR-1089-CORE*) and require isolation from the exposed outside plant (OSP) cabling. To comply with NEBS (Network Equipment-Building System) requirements and protect against lightning surges and commercial power disturbances, the intrabuilding ports *must not* be metallically connected to interfaces that connect to the OSP or its wiring. The intrabuilding ports on the device are suitable for connection to intrabuilding or unexposed wiring or cabling only. The addition of primary protectors is not sufficient protection for connecting these interfaces metallically to OSP wiring.

**Avertissement** Certains ports de l'appareil sont destinés à un usage en intérieur uniquement (ports Type 2 ou Type 4 tels que décrits dans le document *GR-1089-CORE*) et doivent être isolés du câblage de l'installation extérieure exposée. Pour respecter les exigences NEBS et assurer une protection contre la foudre et les perturbations de tension secteur, les ports pour intérieur *ne doivent pas* être raccordés physiquement aux interfaces prévues pour la connexion à l'installation extérieure ou à son câblage. Les

ports pour intérieur de l'appareil sont réservés au raccordement de câbles pour intérieur ou non exposés uniquement. L'ajout de protections ne constitue pas une précaution suffisante pour raccorder physiquement ces interfaces au câblage de l'installation extérieure.



**CAUTION:** Before removing or installing components of a device, connect an electrostatic discharge (ESD) grounding strap to an ESD point and wrap and fasten the other end of the strap around your bare wrist. Failure to use an ESD grounding strap could result in damage to the device.

**Attention** Avant de retirer ou d'installer des composants d'un appareil, raccordez un bracelet antistatique à un point de décharge électrostatique et fixez le bracelet à votre poignet nu. L'absence de port d'un bracelet antistatique pourrait provoquer des dégâts sur l'appareil.

- Install the device in compliance with the following local, national, and international electrical codes:
  - United States—National Fire Protection Association (NFPA 70), United States National Electrical Code.
  - Other countries—International Electromechanical Commission (IEC) 60364, Part 1 through Part 7.
  - Evaluated to the TN power system.
  - Canada—Canadian Electrical Code, Part 1, CSA C22.1.
  - Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.

Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.
- Locate the emergency power-off switch for the room in which you are working so that if an electrical accident occurs, you can quickly turn off the power.
- Make sure that you clean grounding surface and give them a bright finish before making grounding connections.
- Do not work alone if potentially hazardous conditions exist anywhere in your workspace.
- Never assume that power is disconnected from a circuit. Always check the circuit before starting to work.
- Carefully look for possible hazards in your work area, such as moist floors, ungrounded power extension cords, and missing safety grounds.

- Operate the device within marked electrical ratings and product usage instructions.
- To ensure that the device and peripheral equipment function safely and correctly, use the cables and connectors specified for the attached peripheral equipment, and make certain they are in good condition.

You can remove and replace many device components without powering off or disconnecting power to the device, as detailed elsewhere in the hardware documentation for this device. Never install equipment that appears to be damaged.

## Prevention of Electrostatic Discharge Damage

Device components that are shipped in antistatic bags are sensitive to damage from static electricity. Some components can be impaired by voltages as low as 30 V. You can easily generate potentially damaging static voltages whenever you handle plastic or foam packing material or if you move components across plastic or carpets. Observe the following guidelines to minimize the potential for electrostatic discharge (ESD) damage, which can cause intermittent or complete component failures:

- Always use an ESD wrist strap when you are handling components that are subject to ESD damage, and make sure that it is in direct contact with your skin.

If a grounding strap is not available, hold the component in its antistatic bag (see [Figure 64 on page 160](#)) in one hand and touch the exposed, bare metal of the device with the other hand immediately before inserting the component into the device.



**WARNING:** For safety, periodically check the resistance value of the ESD grounding strap. The measurement must be in the range 1 through 10 Mohms.

**Avertissement** Par mesure de sécurité, vérifiez régulièrement la résistance du bracelet antistatique. Cette valeur doit être comprise entre 1 et 10 mégohms (Mohms).

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

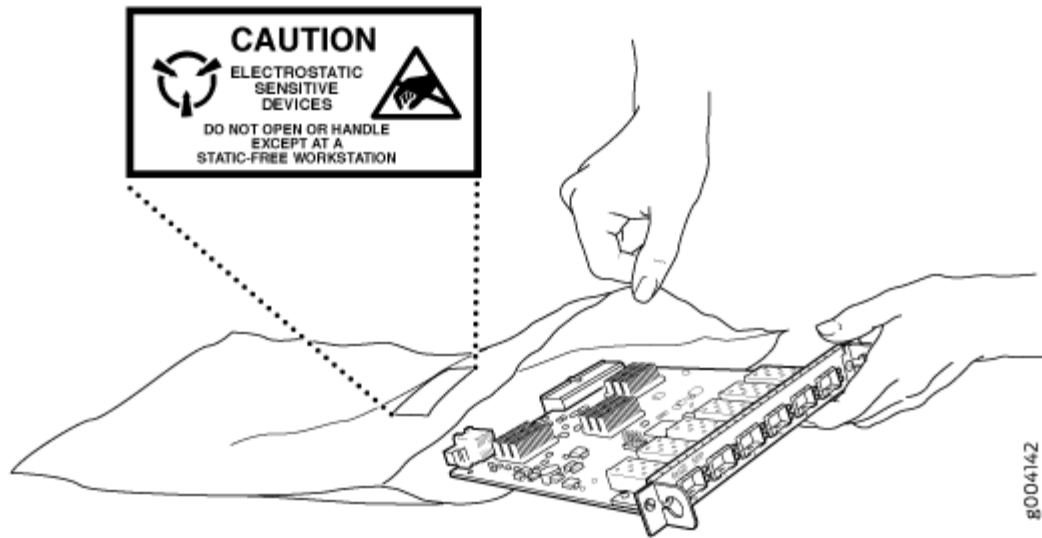
If no grounding strap is available, touch the exposed, bare metal of the device to ground yourself before handling the component.

- Avoid contact between the component that is subject to ESD damage and your clothing. ESD voltages emitted from clothing can damage components.



- When removing or installing a component that is subject to ESD damage, always place it component-side up on an antistatic surface, in an antistatic card rack, or in an antistatic bag (see [Figure 64 on page 160](#)). If you are returning a component, place it in an antistatic bag before packing it.

Figure 64: Placing a Component into an Antistatic Bag



**CAUTION:** ANSI/TIA/EIA-568 cables such as Category 5e and Category 6 can get electrostatically charged. To dissipate this charge, always ground the cables to a suitable and safe earth ground before connecting them to the system.

**Attention** Les câbles ANSI/TIA/EIA-568, par exemple Cat 5e et Cat 6, peuvent emmagasiner des charges électrostatiques. Pour évacuer ces charges, reliez toujours les câbles à une prise de terre adaptée avant de les raccorder au système.

## Site Electrical Wiring Guidelines

[Table 38 on page 161](#) 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 38: Site Electrical Wiring Guidelines**

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

# AC Power Electrical Safety Guidelines

The following electrical safety guidelines apply to AC-powered devices:

- Note the following warnings printed on the device:

**“CAUTION: THIS UNIT HAS MORE THAN ONE POWER SUPPLY CORD. DISCONNECT ALL POWER SUPPLY CORDS BEFORE SERVICING TO AVOID ELECTRIC SHOCK.”**

**“ATTENTION: CET APPAREIL COMPORTE PLUS D'UN CORDON D'ALIMENTATION. AFIN DE PRÉVENIR LES CHOCS ÉLECTRIQUES, DÉBRANCHER TOUT CORDON D'ALIMENTATION AVANT DE FAIRE LE DÉPANNAGE.”**

- AC-powered devices are shipped with a three-wire electrical cord with a grounding-type plug that fits only a grounding-type power outlet. Do not circumvent this safety feature. Equipment grounding must comply with local and national electrical codes.
- You must provide an external certified circuit breaker (2-pole circuit breaker or 4-pole circuit breaker based on your device) rated minimum 20 A in the building installation.
- The power cord serves as the main disconnecting device for the AC-powered device. The socket outlet must be near the AC-powered device and be easily accessible.
- For devices that have more than one power supply connection, you must ensure that all power connections are fully disconnected so that power to the device is completely removed to prevent electric shock. To disconnect power, unplug all power cords (one for each power supply).

## Power Cable Warning (Japanese)

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

**注意**

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

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## AC Power Disconnection Warning



**WARNING:** Before working on the device or near power supplies, unplug all the power cords from an AC-powered device.

**Waarschuwing** Voordat u aan een frame of in de nabijheid van voedingen werkt, dient u bij wisselstroom toestellen de stekker van het netsnoer uit het stopcontact te halen.

**Varoitus** Kytke irti vaihtovirtalaitteiden virtajohto, ennen kuin teet mitään asennuspohjalle tai työskentelet virtalähteiden läheisyydessä.

**Avertissement** Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif.

**Warnung** Bevor Sie an einem Chassis oder in der Nähe von Netzgeräten arbeiten, ziehen Sie bei Wechselstromeinheiten das Netzkabel ab bzw.

**Avvertenza** Prima di lavorare su un telaio o intorno ad alimentatori, scollegare il cavo di alimentazione sulle unità CA.

**Advarsel** Før det utføres arbeid på kabinettet eller det arbeides i nærheten av strømforsyningsenheter, skal strømledningen trekkes ut på vekselstrømsenheter.

**Aviso** Antes de trabalhar num chassis, ou antes de trabalhar perto de unidades de fornecimento de energia, desligue o cabo de alimentação nas unidades de corrente alternada.

**¡Atención!** Antes de manipular el chasis de un equipo o trabajar cerca de una fuente de alimentación, desenchufar el cable de alimentación en los equipos de corriente alterna (CA).

**Warning!** Innan du arbetar med ett chassi eller nära strömförsörjningsenheter skall du för växelströmsenheter dra ur nätsladden.

## DC Power Disconnection Warning



**WARNING:** Before performing any of the DC power procedures, ensure that power is removed from the DC circuit. To ensure that all power is off, locate the circuit breaker

on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the device handle of the circuit breaker in the OFF position.

**Waarschuwing** Voordat u een van de onderstaande procedures uitvoert, dient u te controleren of de stroom naar het gelijkstroom circuit uitgeschakeld is. Om u ervan te verzekeren dat alle stroom UIT is geschakeld, kiest u op het schakelbord de stroomverbreker die het gelijkstroom circuit bedient, draait de stroomverbreker naar de UIT positie en plakt de schakelaarhendel van de stroomverbreker met plakband in de UIT positie vast.

**Varoitus** Varmista, että tasavirtapiirissä ei ole virtaa ennen seuraavien toimenpiteiden suorittamista. Varmistaaksesi, että virta on KATKAISTU täysin, paikanna tasavirrasta huolehtivassa kojetaulussa sijaitseva suojakytkin, käännä suojakytkin KATKAISTU-asentoon ja teippaa suojakytkimen varsi niin, että se pysyy KATKAISTU-asennossa.

**Avertissement** Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifier que le circuit en courant continu n'est plus sous tension. Pour en être sûr, localiser le disjoncteur situé sur le panneau de service du circuit en courant continu, placer le disjoncteur en position fermée (OFF) et, à l'aide d'un ruban adhésif, bloquer la poignée du disjoncteur en position OFF.

**Warnung** Vor Ausführung der folgenden Vorgänge ist sicherzustellen, daß die Gleichstromschaltung keinen Strom erhält. Um sicherzustellen, daß sämtlicher Strom abgestellt ist, machen Sie auf der Schalttafel den Unterbrecher für die Gleichstromschaltung ausfindig, stellen Sie den Unterbrecher auf AUS, und kleben Sie den Schaltergriff des Unterbrechers mit Klebeband in der AUS-Stellung fest.

**Avvertenza** Prima di svolgere una qualsiasi delle procedure seguenti, verificare che il circuito CC non sia alimentato. Per verificare che tutta l'alimentazione sia scollegata (OFF), individuare l'interruttore automatico sul quadro strumenti che alimenta il circuito CC, mettere l'interruttore in posizione OFF e fissarlo con nastro adesivo in tale posizione.

**Advarsel** Før noen av disse prosedyrene utføres, kontroller at strømmen er frakoblet likestrømkretsen. Sørg for at all strøm er slått AV. Dette gjøres ved å lokalisere strømbryteren på brytertavlen som betjener likestrømkretsen, slå strømbryteren AV og teipe bryterhåndtaket på strømbryteren i AV-stilling.

**Aviso** Antes de executar um dos seguintes procedimentos, certifique-se que desligou a fonte de alimentação de energia do circuito de corrente contínua. Para se assegurar que toda a corrente foi DESLIGADA, localize o disjuntor no painel que serve o circuito de corrente contínua e coloque-o na posição OFF (Desligado), segurando nessa posição a manivela do interruptor do disjuntor com fita isoladora.

**¡Atención!** Antes de proceder con los siguientes pasos, comprobar que la alimentación del circuito de corriente continua (CC) esté cortada (OFF). Para asegurarse de que toda la alimentación esté cortada (OFF), localizar el interruptor automático en el panel que alimenta al circuito de corriente continua, cambiar el interruptor automático a la posición de Apagado (OFF), y sujetar con cinta la palanca del interruptor automático en posición de Apagado (OFF).

**Varning!** Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten. Kontrollera att all strömförsörjning är BRUTEN genom att slå AV det överspänningskydd som skyddar likströmskretsen och tejpa fast överspänningskyddets omkopplare i FRÅN-läget.

## DC Power Grounding Requirements and Warning

An insulated grounding conductor that is identical in size to the grounded and ungrounded branch circuit supply conductors but is identifiable by green and yellow stripes is installed as part of the branch circuit that supplies the device. The grounding conductor is a separately derived system at the supply transformer or motor generator set.



**WARNING:** When you install the device, the ground connection must always be made first and disconnected last.

**Waarschuwing** Bij de installatie van het toestel moet de aardverbinding altijd het eerste worden gemaakt en het laatste worden losgemaakt.

**Varoitus** Laitetta asennettaessa on maahan yhdistäminen aina tehtävä ensiksi ja maadoituksen irti kytkeminen viimeiseksi.

**Avertissement** Lors de l'installation de l'appareil, la mise à la terre doit toujours être connectée en premier et déconnectée en dernier.

**Warnung** Der Erdanschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden.

**Avvertenza** In fase di installazione dell'unità, eseguire sempre per primo il collegamento a massa e disconnetterlo per ultimo.

**Advarsel** Når enheten installeres, må jordledningen alltid tilkobles først og frakobles sist.

**Aviso** Ao instalar a unidade, a ligação à terra deverá ser sempre a primeira a ser ligada, e a última a ser desligada.

**¡Atención!** Al instalar el equipo, conectar la tierra la primera y desconectarla la última.

**Warning!** Vid installation av enheten måste jordledningen alltid anslutas först och kopplas bort sist.

## DC Power Wiring Sequence Warning



**WARNING:** Wire the DC power supply using the appropriate lugs. When connecting power, the proper wiring sequence is ground to ground, +RTN to +RTN, then -48 V to -48 V. When disconnecting power, the proper wiring sequence is -48 V to -48 V, +RTN to +RTN, then ground to ground. Note that the ground wire must always be connected first and disconnected last.

**Waarschuwing** De juiste bedradingsvolgorde verbonden is aarde naar aarde, +RTN naar +RTN, en -48 V naar -48 V. De juiste bedradingsvolgorde losgemaakt is en -48 naar -48 V, +RTN naar +RTN, aarde naar aarde.

**Varoitus** Oikea yhdistettava kytkentäjärjestys on maajohto maajohtoon, +RTN varten +RTN, -48 V varten -48 V. Oikea irrotettava kytkentäjärjestys on -48 V varten -48 V, +RTN varten +RTN, maajohto maajohtoon.

**Avertissement** Câblez l'alimentation CC En utilisant les crochets appropriés à l'extrémité de câblage. En reliant la puissance, l'ordre approprié de câblage est rectifié pour rectifier, +RTN à +RTN, puis -48 V à -48 V. En débranchant la puissance, l'ordre approprié de câblage est -48 V à -48 V, +RTN à +RTN, a alors rectifié pour rectifier. Notez que le fil de masse devrait toujours être relié d'abord et débranché pour la dernière fois. Notez que le fil de masse devrait toujours être relié d'abord et débranché pour la dernière fois.

**Warnung** Die Stromzufuhr ist nur mit geeigneten Ringösen an das DC Netzteil anzuschliessen. Die richtige Anschlusssequenz ist: Erdanschluss zu Erdanschluss, +RTN zu +RTN und dann -48V zu -48V. Die richtige Sequenz zum Abtrennen der Stromversorgung ist -48V zu -48V, +RTN zu +RTN und dann Erdanschluss zu Erdanschluss. Es ist zu beachten dass der Erdanschluss immer zuerst angeschlossen und als letztes abgetrennt wird.

**Avvertenza** Mostra la morsettiera dell'alimentatore CC. Cablare l'alimentatore CC usando i connettori adatti all'estremità del cablaggio, come illustrato. La corretta sequenza di cablaggio è da massa a massa, da positivo a positivo (da linea ad L) e da negativo a negativo (da neutro a N). Tenere presente che il filo di massa deve sempre venire collegato per primo e scollegato per ultimo.

**Advarsel** Riktig tilkoples tilkoplingssekvens er jord til jord, +RTN til +RTN, -48 V til -48 V. Riktig frakoples tilkoplingssekvens er -48 V til -48 V, +RTN til +RTN, jord til jord.

**Aviso** Ate con alambre la fuente de potencia cc Usando los terminales apropiados en el extremo del cableado. Al conectar potencia, la secuencia apropiada del cableado se muele para moler, +RTN a +RTN, entonces -48 V a -48 V. Al desconectar potencia, la secuencia apropiada del cableado es -48 V a -48 V, +RTN a +RTN, entonces molió para moler. Observe que el alambre de tierra se debe conectar siempre primero y desconectar por último. Observe que el alambre de tierra se debe conectar siempre primero y desconectar por último.

**¡Atención!** Wire a fonte de alimentação de DC Usando os talões apropriados nan Extremidade da fiação. Ao conectar a potência, a seqüência apropriada da fiação é moída para moer, +RTN a +RTN, então -48 V a -48 V. Ao desconectar a potência, a seqüência apropriada da fiação é -48 V a -48 V, +RTN a +RTN, moeu então para moer. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último.

**Warning!** Korrekt kopplingssekvens ar jord till jord, +RTN till +RTN, -48 V till -48 V. Korrekt kopplas kopplingssekvens ar -48 V till -48 V, +RTN till +RTN, jord till jord.

## DC Power Wiring Terminations Warning



**WARNING:** When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations must be the appropriate size for the wires and must clamp both the insulation and conductor.

**Waarschuwing** Wanneer geslagen bedrading vereist is, dient u bedrading te gebruiken die voorzien is van goedgekeurde aansluitingspunten, zoals het gesloten-lus type of het grijperschop type waarbij de aansluitpunten omhoog wijzen. Deze aansluitpunten



dienen de juiste maat voor de draden te hebben en dienen zowel de isolatie als de geleider vast te klemmen.

**Varoitus** Jos säikeellinen johdin on tarpeen, käytä hyväksytyä johdinliitintää, esimerkiksi suljettua silmukkaa tai kourumaista liitintää, jossa on ylöspäin käännetyt kiinnityskorvat. Tällaisten liitintöjen tulee olla kooltaan johtimiin sopivia ja niiden tulee puristaa yhteen sekä eristeen että johdinosan.

**Avertissement** Quand des fils torsadés sont nécessaires, utiliser des douilles terminales homologuées telles que celles à circuit fermé ou du type à plage ouverte avec cosses rebroussées. Ces douilles terminales doivent être de la taille qui convient aux fils et doivent être refermées sur la gaine isolante et sur le conducteur.

**Warnung** Wenn Litzenverdrahtung erforderlich ist, sind zugelassene Verdrahtungsabschlüsse, z.B. für einen geschlossenen Regelkreis oder gabelförmig, mit nach oben gerichteten Kabelschuhen zu verwenden. Diese Abschlüsse sollten die angemessene Größe für die Drähte haben und sowohl die Isolierung als auch den Leiter festklemmen.

**Avvertenza** Quando occorre usare trecce, usare connettori omologati, come quelli a occhio o a forcilla con linguette rivolte verso l'alto. I connettori devono avere la misura adatta per il cablaggio e devono serrare sia l'isolante che il conduttore.

**Advarsel** Hvis det er nødvendig med flertrådede ledninger, brukes godkjente ledningsavslutninger, som for eksempel lukket sløyfe eller spadetype med oppoverbøyde kabelsko. Disse avslutningene skal ha riktig størrelse i forhold til ledningene, og skal klemme sammen både isolasjonen og ledaren.

**Aviso** Quando forem requeridas montagens de instalação eléctrica de cabo torcido, use terminações de cabo aprovadas, tais como, terminações de cabo em circuito fechado e planas com terminais de orelha voltados para cima. Estas terminações de cabo deverão ser do tamanho apropriado para os respectivos cabos, e deverão prender simultaneamente o isolamento e o fio condutor.

**¡Atención!** Cuando se necesite hilo trenzado, utilizar terminales para cables homologados, tales como las de tipo "bucle cerrado" o "espada", con las lengüetas de conexión vueltas hacia arriba. Estos terminales deberán ser del tamaño apropiado para los cables que se utilicen, y tendrán que sujetar tanto el aislante como el conductor.

**Varning!** När flertrådiga ledningar krävs måste godkända ledningskontakter användas, t.ex. kabelsko av sluten eller öppen typ med uppåtvänd tapp. Storleken på dessa kontakter måste vara avpassad till ledningarna och måste kunna hålla både isoleringen och ledaren fastklämda.

## Multiple Power Supplies Disconnection Warning



**WARNING:** The network device has more than one power supply connection. All connections must be removed completely to remove power from the unit completely.

**Waarschuwing** Deze eenheid heeft meer dan één stroomtoevoerverbinding; alle verbindingen moeten volledig worden verwijderd om de stroom van deze eenheid volledig te verwijderen.

**Varoitus** Tässä laitteessa on useampia virtalähdekytkentöjä. Kaikki kytkennät on irrotettava kokonaan, jotta virta poistettaisiin täysin laitteesta.

**Avertissement** Cette unité est équipée de plusieurs raccordements d'alimentation. Pour supprimer tout courant électrique de l'unité, tous les cordons d'alimentation doivent être débranchés.

**Warnung** Diese Einheit verfügt über mehr als einen Stromanschluß; um Strom gänzlich von der Einheit fernzuhalten, müssen alle Stromzufuhren abgetrennt sein.

**Avvertenza** Questa unità ha più di una connessione per alimentatore elettrico; tutte le connessioni devono essere completamente rimosse per togliere l'elettricità dall'unità.

**Advarsel** Denne enheten har mer enn én strømtilkobling. Alle tilkoblinger må kobles helt fra for å eliminere strøm fra enheten.

**Aviso** Este dispositivo possui mais do que uma conexão de fonte de alimentação de energia; para poder remover a fonte de alimentação de energia, deverão ser desconectadas todas as conexões existentes.

**¡Atención!** Esta unidad tiene más de una conexión de suministros de alimentación; para eliminar la alimentación por completo, deben desconectarse completamente todas las conexiones.

**Warning!** Denna enhet har mer än en strömförsörjningsanslutning; alla anslutningar måste vara helt avlägsnade innan strömtillförseln till enheten är fullständigt bruten.

## TN Power Warning



**WARNING:** The device is designed to work with a TN power system.

**Waarschuwing** Het apparaat is ontworpen om te functioneren met TN energiesystemen.

**Varoitus** Koje on suunniteltu toimimaan TN-sähkövoimajärjestelmien yhteydessä.

**Avertissement** Ce dispositif a été conçu pour fonctionner avec des systèmes d'alimentation TN.

**Warnung** Das Gerät ist für die Verwendung mit TN-Stromsystemen ausgelegt.

**Avvertenza** Il dispositivo è stato progettato per l'uso con sistemi di alimentazione TN.

**Advarsel** Utstyret er utfomet til bruk med TN-strømsystemer.

**Aviso** O dispositivo foi criado para operar com sistemas de corrente TN.

**¡Atención!** El equipo está diseñado para trabajar con sistemas de alimentación tipo TN.

**Warning!** Enheten är konstruerad för användning tillsammans med elkraftssystem av TN-typ.

## Action to Take After an Electrical Accident

If an electrical accident results in an injury, take the following actions in this order:

1. Use caution. Be aware of potentially hazardous conditions that could cause further injury.
2. Disconnect power from the device.
3. If possible, send another person to get medical aid. Otherwise, assess the condition of the victim, and then call for help.

## Agency Approvals for MX204 Router

### IN THIS SECTION

- [Compliance Statement for Argentina | 172](#)

The router comply with the following standards:

- Safety
  - CAN/CSA-C22.2 No. 60950-1, Safety of Information Technology Equipment
  - UL 60950-1 Information Technology Equipment - Safety - Part 1: General Requirements
  - EN 60950-1 European Norm, Safety of Information Technology Equipment
  - IEC 60950-1 Information Technology Equipment - Safety - Part 1: General Requirements (with country deviations)
  - EN 60825-1 Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide
- EMC
  - EN 300 386 V1.6.1 Telecom Network Equipment - EMC requirements Class A
  - EN 300 386 V2.1.1 Telecom Network Equipment - EMC requirements Class A
  - EN 55032:2012 + EN55032:2012/AC:2013 Electromagnetic compatibility of multimedia equipment - Emission requirements Class A
  - CISPR 32:2012 Electromagnetic compatibility of multimedia equipment – Emission Requirements Class A
  - EN 55022:2010/AC:2011 European Radiated Emissions Class A
  - CISPR 22 edition 6.0 : 2008-09 Class A
  - FCC 47CFR , Part 15 Class A (2012) USA Radiated Emissions Class A
  - ICES-003 Issue 6, Jan 2016 Canada Radiated Emissions Class A
  - VCCI-V-3/2013.04 and V-4/2012.04 Japanese Radiated Emissions Class A
  - VCCI-CISPR 32:2016 Japanese Radiated and Conducted Emissions Class A
  - BSMI CNS 13438 and NCC C6357 Taiwan Radiated Emissions Class A
  - AS/NZS CISPR22:2009/A1:2010 Class A
  - AS/NZS CISPR 32:2015 Electromagnetic compatibility of multimedia equipment - Emission requirements Class A
  - KN32 Korea Radiated Emission (at 10 Meter) Class A
  - TEC/EMI/TEL-001/01/FEB-09,Class A

- EN-61000-3-2 Power Line Harmonics
- EN-61000-3-3 Voltage Fluctuations and Flicker

**NOTE:** The device has immunity against the electromagnetic interference of 1V/m in the frequency range of 690 Mhz to 960 Mhz and 1400 Mhz to 2690 Mhz.

- Immunity
  - EN 55024:2010 Information Technology Equipment Immunity Characteristics
  - CISPR 24:edition 2b: 2010 COREC 2011 IT Equipment Immunity Characteristics
  - EN 300 386 V1.6.1 Telecom Network Equipment - EMC requirements
  - EN 300 386 V2.1.1 Telecom Network Equipment - EMC requirements
  - KN35 Immunity Characteristics
  - TEC/EMI/TEL-001/01/FEB-09,Class A
  - EN-61000-4-2 ESD
  - EN-61000-4-3 Radiated Immunity
  - EN-61000-4-4 EFT
  - EN-61000-4-5 Surge
  - EN-61000-4-6 Low Frequency Common Immunity
  - EN-61000-4-11 Voltage Dips and Sags

The router is designed to comply with the following standards:

- GR-63-Core: NEBS, Physical Protection
- GR-1089-Core: EMC and Electrical Safety for Network Telecommunications Equipment
- SR-3580 NEBS Criteria Levels (Level 3 Compliance)

## Compliance Statement for Argentina

EQUIPO DE USO IDÓNEO.

## RELATED DOCUMENTATION

| [MX204 Router Overview](#) | 2

# Compliance Statements for Data Center

- The equipment is suitable for installation as part of the Common Bonding Network (CBN).
- The equipment is suitable for installation in locations where the National Electrical Code (NEC) applies.
- The battery return connection is to be treated as an isolated DC return (that is, DC-I), as defined in GR-1089-CORE.
- You must provision a readily accessible device outside of the equipment to disconnect power. The device must also be rated based on local electrical code practice.

# Compliance Statements for EMC Requirements

## IN THIS SECTION

- [Canada](#) | 173
- [European Community](#) | 174
- [Israel](#) | 174
- [Japan](#) | 174
- [United States](#) | 174

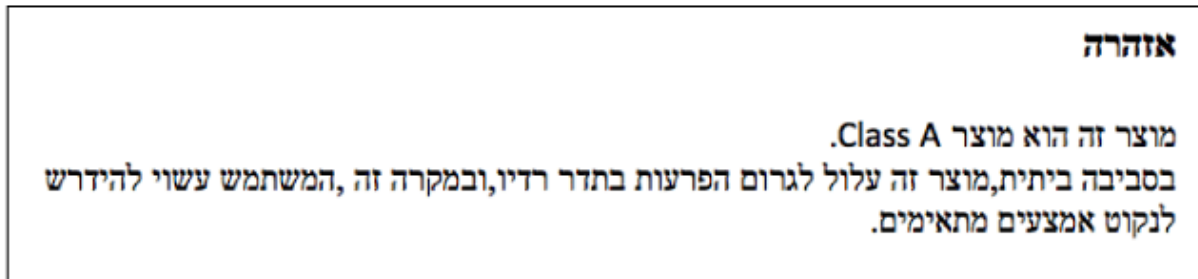
## Canada

CAN ICES-3 (A)/NMB-3(A)

## European Community

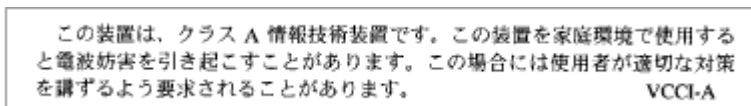
This is a Class A product. In a domestic environment, this product might cause radio interference in which case the user might be required to take adequate measures.

## Israel



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

## Japan



The preceding translates as follows:

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this product is used near a radio or television receiver in a domestic environment, it might cause radio interference. Install and use the equipment according to the instruction manual. VCCI-A.

## United States

The hardware equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection

against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## Compliance Statements for Environmental Requirements

Batteries in this product are not based on mercury, lead, or cadmium substances. The batteries used in this product are in compliance with EU Directives 91/157/EEC, 93/86/EEC, and 98/101/EEC. The product documentation includes instructional information about the proper method of reclamation and recycling.

## Compliance Statements for Acoustic Noise for MX204 Router

The router complies with NEBS Level 3 requirements:

- GR-63-CORE: NEBS, Physical Protection
- GR-1089-CORE: EMC and Electrical Safety for Network Telecommunications Equipment

## Statements of Volatility for Juniper Network Devices

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



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

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

CTP Series:

- [CTP150](#)
- [CTP2000](#)

EX Series:

- [EX2200](#) and [EX2200-C](#)
- [EX2300-24P](#), [EX2300-24T](#), and [EX2300-24T-DC](#)
- [EX2300-48P](#) and [EX2300-48T](#)
- [EX2300-C](#)
- [EX3300](#)
- [EX3400-24P](#), [EX3400-24T](#), [EX3400-24T-DC](#)
- [EX3400-48P](#), [EX3400-48T](#), [EX3400-48T-AFI](#)
- [EX4200](#)
- [EX4300](#)
- [EX4300-48MP](#)
- [EX4400](#)
  1. [EX4400-24T](#)
  2. [EX4400-24P](#)
  3. [EX4400-24MP](#)
  4. [EX4400-24X](#)
  5. [EX4400-48T](#)

6. EX4400-48P
7. EX4400-48MP
8. EX4400-48F

- EX4500
- EX4550
- EX4600
- EX8200
- EX9251
- EX9253
- XRE200 External Routing Engine

LN Series:

- LN1000-CC

MX Series:

- M7i
- M7i Compact Forwarding Engine Board (CFEB)
- M40e and M10i
- M320
- MX5, MX10, MX40, and MX80
- MX104
- MX204
- MX304
- MX240, MX480, and MX960
- MX10003
- RE-A-2000 Route Engine
- RE-S-X6-64G Routing Engine

NFX Series:

- [NFX250](#)

QFX Series:

- [QFX3008-I](#)
- [QFX3100](#)
- [QFX3500](#)
- [QFX3600](#)
- [QFX5100-24Q](#)
- [QFX5100-48S](#)
- [QFX5100-48T](#)
- [QFX5110-32Q](#)
- [QFX5110-48S](#)
- [QFX5120](#)
  1. [QFX5120-32C](#)
  2. [QFX5120-48T](#)
  3. [QFX5120-48Y](#)
  4. [QFX5120-48YM](#)
- [QFX5200](#)
- [QFX5200-32C](#)
- [QFX10008 and QFX10016](#)

SRX Series:

- [SRX100](#)
- [SRX110](#)
- [SRX210B](#)
- [SRX210H-POE](#)
- [SRX210H-P-MGW](#)
- [SRX220](#)

- SRX240H
- SRX240H-POE
- SRX300
- SRX320
- SRX340 and SRX345
- SRX380
- SRX550
- SRX650
- SRX1400
- SRX1500
- SRX3400 and SRX3600
- SRX4200
- SRX4600
- SRX5400, SRX5600, and SRX5800
- SRX-MP-1SERIAL
- SSG-520M

T Series:

- RE-A-2000 Route Engine