

SRX5400 Services Gateway Hardware Guide

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SRX5400 Services Gateway Hardware Guide
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About the Documentation

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Use this guide to install hardware and perform initial software configuration, routine maintenance, and troubleshooting for the SRX5400 Services Gateway.

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

Documentation and Release Notes

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at <https://www.juniper.net/documentation/>.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

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Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

```
system {
  scripts {
    commit {
      file ex-script.xsl;
    }
  }
}
interfaces {
  fxp0 {
    disable;
    unit 0 {
      family inet {
        address 10.0.0.1/24;
      }
    }
  }
}
```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

```
[edit]
user@host# load merge /var/tmp/ex-script.conf
load complete
```


Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

```
commit {  
    file ex-script-snippet.xml; }
```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]  
user@host# edit system scripts  
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]  
user@host# load merge relative /var/tmp/ex-script-snippet.conf  
load complete
```

For more information about the **load** command, see [CLI Explorer](#).

Documentation Conventions

[Table 1 on page xviii](#) defines notice icons used in this guide.

Table 1: Notice Icons






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

Table 2 on page xviii defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: user@host> configure
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> show chassis alarms No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies guide names. Identifies RFC and Internet draft titles. 	<ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS CLI User Guide</i> RFC 1997, <i>BGP Communities Attribute</i>

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

Convention	Description	Examples
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. The console port is labeled CONSOLE.
< > (angle brackets)	Encloses optional keywords or variables.	stub <default-metric <i>metric</i>>;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	broadcast multicast <i>(string1 string2 string3)</i>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	rsvp { # Required for dynamic MPLS only
[] (square brackets)	Encloses a variable for which you can substitute one or more values.	community name members [<i>community-ids</i>]
Indentation and braces ({ })	Identifies a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	

GUI Conventions

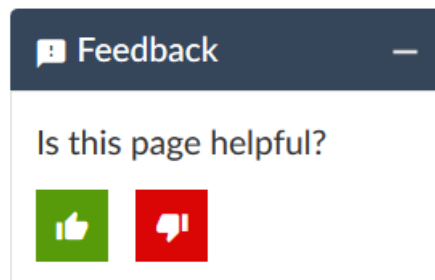
Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
Bold text like this	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel.
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select Protocols>Ospf .

Documentation Feedback

We encourage you to provide feedback so that we can improve our documentation. You can use either of the following methods:

- Online feedback system—Click TechLibrary Feedback, on the lower right of any page on the [Juniper Networks TechLibrary](#) site, and do one of the following:



- Click the thumbs-up icon if the information on the page was helpful to you.
- Click the thumbs-down icon if the information on the page was not helpful to you or if you have suggestions for improvement, and use the pop-up form to provide feedback.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active Juniper Care or Partner Support Services support contract, or are

covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <https://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <https://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <https://www.juniper.net/customers/support/>
- Search for known bugs: <https://prsearch.juniper.net/>
- Find product documentation: <https://www.juniper.net/documentation/>
- Find solutions and answer questions using our Knowledge Base: <https://kb.juniper.net/>
- Download the latest versions of software and review release notes: <https://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum: <https://www.juniper.net/company/communities/>
- Create a service request online: <https://myjuniper.juniper.net>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://entitlementsearch.juniper.net/entitlementsearch/>

Creating a Service Request with JTAC

You can create a service request with JTAC on the Web or by telephone.

- Visit <https://myjuniper.juniper.net>.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

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

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SRX5400 Services Gateway System Overview

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- [Benefits of the SRX5400 Services Gateway | 24](#)
- [SRX5400 Services Gateway FRUs | 25](#)
- [SRX5400 Services Gateway Component Redundancy | 26](#)

SRX5400 Services Gateway Description

The SRX5400 Services Gateway is a high-performance, highly scalable, carrier-class security device with multiprocessor architecture.

The SRX5400 Services Gateway is 5 rack units (U) tall. You can stack eight services gateways in a rack that is at least 48 U (89.3 in. or 2.24 m) in height if it has a 1 in. cap between for increased port density per unit of floor space.

The services gateway provides four slots that you can populate with one Switch Control Board (SCB) and up to three additional cards of the following types:

- Services Processing Cards (SPCs) provide the processing capacity to run integrated services such as firewall, IPsec, and IDP.

NOTE: The SRX5400 Services Gateway supports only the SRX5K-SPC-4-15-320 (SPC2) and does not support the SRX5K-SPC-2-10-40 (SPC1).

- Modular Port Concentrators (MPCs) provide Ethernet interfaces that connect the services gateway to your network.

NOTE: The SRX5400 Services Gateway only supports the SRX5K-MPC (MPC2), and does not support older SRX5000 Series I/O cards (IOCs) or Flex IOCs cards such as:

- SRX5K-40GE-SFP
- SRX5K-4XGE-XFP
- SRX5K-FPC-IOC

Devices configured with SRX5K-SCBE (SCB2) and SRX5K-RE-1800X4 (RE2) only support SPC2.

Devices configured with SRX5K-SCB3 (SCB3) and RE2, or SRX5K-SCBE (SCB2) and RE2 also support IOC3s (SRX5K-MPC3-100G10G and SRX5K-MPC3-40G10G).

NOTE: The SRX5400 Services Gateways configured with SRX5K-SCB (SCB1) and SRX5K-RE-13-20 (RE1) only support Junos OS Release 12.1X46-D10 and later. Devices configured with SCB2 and RE2 only support Junos OS Release 12.1X47-D15 and later, and devices configured with SCB3 and RE2 only support Junos OS Release 15.1X49-D10 and later.

For detailed information about the cards supported by the services gateway, see the [SRX5400](#), [SRX5600](#), and [SRX5800 Services Gateway Card Reference](#) at www.juniper.net/documentation/.

Benefits of the SRX5400 Services Gateway

- The SRX5400 Services Gateway is a small footprint but high-performance gateway which supports 285 Gbps IMIX firewall throughput, 90 million concurrent sessions, and 230 Gbps IPS. The ability to support unique security policies per zone with a compelling performance, makes the SRX5400 an optimal solution for the edge or data center services in large enterprise, service provider, or mobile operator environments.
- IPS Capabilities - Juniper Networks IPS capabilities offer several unique features such as Protocol decodes, Zero-day protection, Active/active traffic monitoring, and packet capture logging per rule assure the highest level of network security.
- Content Security UTM Capabilities - The UTM services offered on the SRX5000 line of Services Gateways include industry-leading antivirus, antispam, content filtering, and additional content security services. The UTM services provide sophisticated protection from:
 - Antivirus experts against malware attacks that can lead to data breaches and lost productivity.

- Advanced persistent threats perpetrated through social networking attacks and the latest phishing scams with sophisticated e-mail filtering and content blockers.
- Lost productivity and the impact of malicious URLs and extraneous or malicious content on the network to help maintain bandwidth.
- Advanced Threat Prevention (ATP) - Juniper Sky ATP, a SaaS-based service, and the Juniper ATP Appliance, an on-premises solution:
 - Protects enterprise users from a spectrum of advanced malware that exploits “zero-day” vulnerabilities.
 - Proactively blocks malware communication channels.
 - The Juniper ATP Appliance includes support for cloud-based e-mail services such as Office 365 and Google Mail, and detects threats in SMB traffic.
 - Single pane-of-glass management with Security Director and JSA Series integration.

SRX5400 Services Gateway FRUs

Field-replaceable units (FRUs) are services gateway components that can be replaced at the customer site. The services gateway uses the following types of FRUs:

[Table 3 on page 25](#) lists the FRUs of the services gateway and the action to perform to install, remove, or replace an FRU.

Table 3: Field-Replaceable Units

Field-Replaceable Units (FRUs)	Action
Air filter	You need not power off the services gateway to install, remove, or replace any of these FRUs.
Fan tray	
Craft interface	
AC and DC power supplies (if redundant)	
Interface transceivers	

Table 3: Field-Replaceable Units (continued)

Field-Replaceable Units (FRUs)	Action
Routing Engine	Power off the services gateway to install, remove, or replace any of these FRUs.
SCBs	
SPCs	
MPCs	
MICs	

SRX5400 Services Gateway Component Redundancy

The following major hardware components are redundant:

- Power supplies—The services gateway is configurable with two or three AC power supplies at the rear of the chassis in slots **PEM0** through **PEM3** (left to right) or two DC power supplies in slots **PEM0** and **PEM2**.
 - In the low-line (110VAC input) or the high-line (220VAC input) configurations, two power supplies are required to support the services gateway electrical requirements. By default, the AC powered services gateways are configured with three AC (2+1) power supplies, you can add a fourth power supply for fault tolerance. The fourth power supply is used when one of the power supplies in the 2+1 configuration fails.
 - In the DC powered services gateways two DC (1+1) power supplies are required to support the services gateway electrical requirements. The minimum power supplies requirement is one and the second power supply provides redundancy. If one power supply fails the second power supply instantly assume the entire electrical load without interruption. Two power supplies provide the maximum configuration with full power for as long as the device is operational.

Redundant power supplies are hot-removable and hot-insertable. When you remove a power supply from a services gateway that uses a nonredundant power supply configuration, the services gateway might shut down depending on your configuration.

- Cooling system—The cooling system has redundant components, which are controlled by the host subsystem. If one of the fans fails, the host subsystem increases the speed of the remaining fans to provide sufficient cooling for the services gateway indefinitely.

SRX5400 Chassis

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- [SRX5400 Services Gateway Chassis | 27](#)
- [SRX5400 Services Gateway Physical Specifications | 29](#)
- [SRX5400 Services Gateway Midplane Description | 30](#)
- [SRX5400 Services Gateway Craft Interface Overview | 31](#)
- [SRX5400 Services Gateway Craft Interface Alarm LEDs and Alarm Cutoff/Lamp Test Button | 32](#)
- [SRX5400 Services Gateway Craft Interface Host Subsystem LEDs | 33](#)
- [SRX5400 Services Gateway Craft Interface Power Supply LEDs | 33](#)
- [SRX5400 Services Gateway Craft Interface Card OK/Fail LEDs | 34](#)
- [SRX5400 Services Gateway Craft Interface Fan LEDs | 34](#)
- [SRX5400 Services Gateway Craft Interface Online/Offline Buttons | 35](#)
- [SRX5400 Services Gateway Craft Interface Alarm Relay Contacts | 37](#)

SRX5400 Services Gateway Chassis

The services gateway chassis is a rigid sheet metal structure that houses all the other components (see [Figure 1 on page 28](#), [Figure 2 on page 28](#), and [Figure 3 on page 29](#)). The chassis measures 8.71 in. (22.1 cm) high, 17.45 in. (44.3 cm) wide, and 24.5 in. (62.2 cm) deep (from the front to the rear of the chassis). The chassis installs in standard 800-mm (or larger) enclosed cabinets, 19-in. equipment racks, or telco open-frame racks. Up to five services gateways can be installed in one standard (48 U) rack if the rack can handle their combined weight, which can be greater than 1100 lb (500 kg). See “[SRX5400 Services Gateway Physical Specifications](#)” on [page 29](#) for physical specifications for the SRX5400 Services Gateway.



CAUTION: Before removing or installing components of a services gateway, 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 can result in damage to the services gateway.


 **WARNING:** The services gateway must be connected to earth ground during normal operation.

Figure 1: Front View of a Fully Configured Services Gateway Chassis

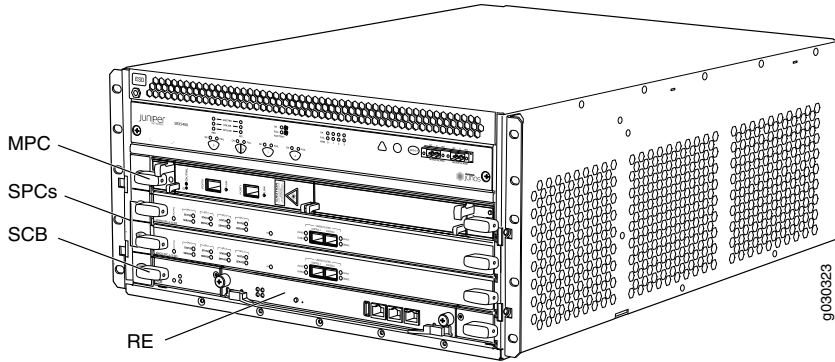


Figure 2: Rear View of an AC-Powered Services Gateway Chassis

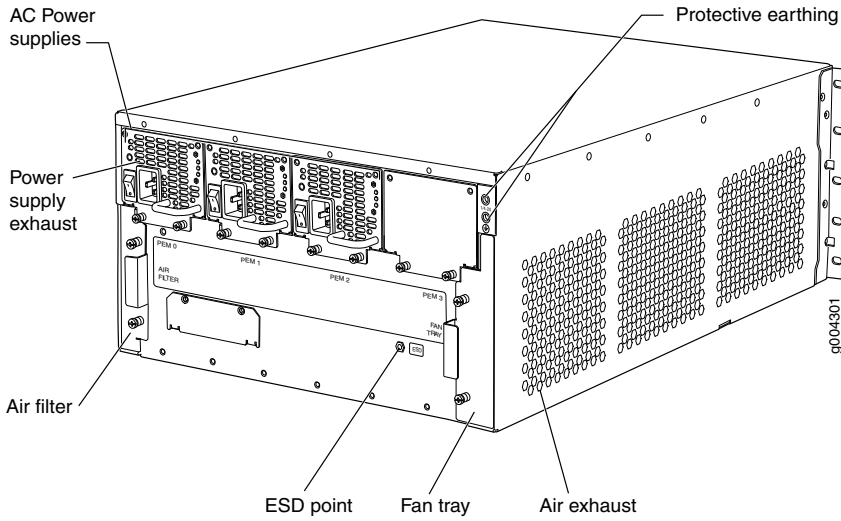
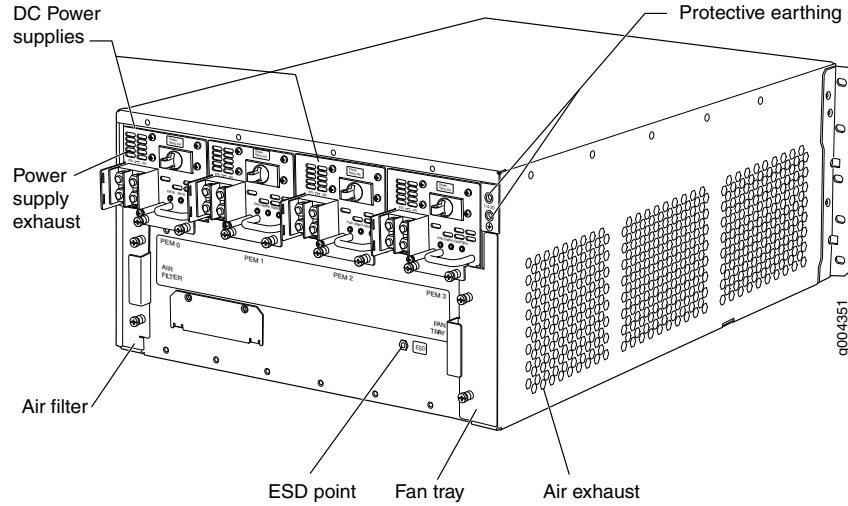


Figure 3: Rear View of a Fully Configured DC-Powered Services Gateway Chassis



SRX5400 Services Gateway Physical Specifications

Table 4 on page 29 summarizes the physical specifications for the services gateway chassis.

Table 4: Physical Specifications

Description	Value
Chassis dimensions	8.7 in. (22.1 cm) high 17.45 in. (44.3 cm) wide 24.5 in. (62.2 cm) deep (from front-mounting bracket to chassis rear) Total depth (including cable management system): 27.75 in. (70.5 cm)
Services gateway weight	Chassis with midplane, fan tray, air filter, and cable management system: 52 lb (23.6 kg) Maximum configuration: 128 lb (58.1 kg)
Routing Engine weight	SRX5K-RE-13-20: 2.4 lb (1.1 kg) SRX5K-RE-1800X4: 2.4 lb (1.1 kg)

Table 4: Physical Specifications (continued)

Description	Value
SCB weight	SRX5K-SCB: 9.6 lb (4.4 kg)
	SRX5K-SCBE: 9.6 lb (4.4 kg)
	SRX5K-SCB3: 10.14 lb (4.6 kg)
MPC weight (with two MICs)	13.1 lb (5.9 kg)
Craft interface weight	1.1 lb (0.5 kg)
Fan tray weight	4.2 lb (1.9 kg)
Air filter weight	1.0 lb (0.5 kg)
Cable management weight	0.3 lb (0.14 kg)
High-capacity DC power supply weight	6.2 lb (2.8 kg)
High-capacity AC power supply weight	6.6 lb (3.0 kg)

SRX5400 Services Gateway Midplane Description

The midplane is located toward the rear of the chassis and forms the rear of the card cage. MPCs, SPCs, and SCB install into the midplane from the front of the chassis, and the power supplies install into the midplane from the rear of the chassis. The cooling system components also connect to the midplane.

The midplane performs the following major functions:

- **Data path**—Data packets are transferred across the midplane between the MPCs and SPCs through the fabric ASICs on the SCB.
- **Power distribution**—The power supplies are connected to the midplane, which distributes power to all the services gateway components.
- **Signal path**—The midplane provides the signal path to the MPCs, SCB, SPCs, Routing Engine, and other system components for monitoring and control of the system.

The enhanced midplane supports Junos OS Release 15.1X49-D10. It provides greater per-slot fabric performance and signal integrity, along with error-free high speed data transfer, and it reduces cross-talk. The midplane supports link speeds up to 10 Gbps and is not field replaceable.

SRX5400 Services Gateway Craft Interface Overview

The craft interface shows you status and troubleshooting information at a glance and lets you perform many system control functions. It is hot-insertable and hot-removable. The craft interface is located on the front of the services gateway above the upper fan tray.

Figure 4 on page 31 shows the front panel of the craft interface and Table 5 on page 31 describes the components on the front panel.

Figure 4: Front Panel of the Craft Interface

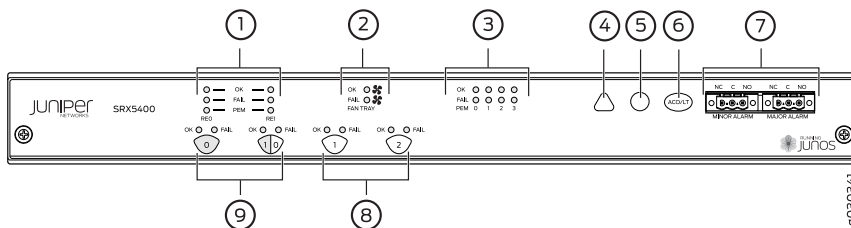


Table 5: Front Panel of the Craft Interface

Component	Description	Reference
1	Routing Engine LEDs	See “SRX5400 Services Gateway Craft Interface Host Subsystem LEDs” on page 33
2	Fan LEDs	See “SRX5400 Services Gateway Craft Interface Fan LEDs” on page 34
3	PEM LEDs	See “SRX5400 Services Gateway Craft Interface Power Supply LEDs” on page 33
4	Minor alarm LED	See “SRX5400 Services Gateway Craft Interface Alarm LEDs and Alarm Cutoff/Lamp Test Button” on page 32
5	Major alarm LED	
6	Alarm cutoff button	
7	Alarm relay contacts	See “SRX5400 Services Gateway Craft Interface Alarm Relay Contacts” on page 37

Table 5: Front Panel of the Craft Interface (continued)

Component	Description	Reference
8/9	<p>SCB and MPC LEDs, and MPC online/offline buttons</p> <p>The card LEDs are located along the bottom edge of the craft interface and are labeled 0 for the bottom slot reserved for the SCB and 0/1, 1, and 2 for the remaining slots.</p>	<p>See “SRX5400 Services Gateway Craft Interface Card OK/Fail LEDs” on page 34</p> <p>See “SRX5400 Services Gateway Craft Interface Online/Offline Buttons” on page 35</p>

NOTE: The SCB must be installed in the services gateway for the craft interface to obtain power.




SRX5400 Services Gateway Craft Interface Alarm LEDs and Alarm Cutoff/Lamp Test Button

Two large alarm LEDs are located at the upper right of the craft interface. The circular red LED lights to indicate a major alarm condition that can result in a system shutdown. The triangular yellow LED lights to indicate a less severe minor alarm condition that requires monitoring or maintenance. Both LEDs can be lit simultaneously. A condition that causes an LED to light also activates the corresponding alarm relay contact on the craft interface.

To deactivate the major and minor alarms, press the button labeled **ACO/LT** (for “alarm cutoff/lamp test”), which is located to the right of the alarm LEDs. Deactivating an alarm turns off both LEDs and deactivates the device attached to the corresponding alarm relay contact on the craft interface.

[Table 6 on page 33](#) describes the alarm LEDs and alarm cutoff button in more detail.

Table 6: Alarm LEDs and Alarm Cutoff/Lamp Test Button

Shape	Label	Color	State	Description
	Major Alarm	Red	On steadily	Critical alarm LED—Indicates a critical condition that can cause the device to stop functioning. Possible causes include component removal, failure, or overheating.
	Minor Alarm	Yellow	On steadily	Warning alarm LED—Indicates a serious but nonfatal error condition, such as a maintenance alert or a significant increase in component temperature.
	ACO/LT	-	-	Alarm cutoff/lamp test button—Deactivates major and minor alarms. Causes all LEDs on the craft interface to light (for testing) when pressed and held.

SRX5400 Services Gateway Craft Interface Host Subsystem LEDs

The host subsystem has three LEDs, located on the upper left of the craft interface, that indicate its status. The LEDs labeled **RE0** show the status of the Routing Engine and SCB in slot **0**. The LEDs labeled **RE1** are disabled and have no function. [Table 7 on page 33](#) describes the functions of the host subsystem LEDs.

Table 7: Host Subsystem LEDs

Label	Color	State	Description
MASTER	Green	On steadily	Host is functioning as the primary.
ONLINE	Green	On steadily	Host is online and is functioning normally.
OFFLINE	Red	On steadily	Host is installed but the Routing Engine is offline.
		Off	Host is not installed.

SRX5400 Services Gateway Craft Interface Power Supply LEDs

Each power supply has two LEDs on the craft interface that indicate its status. The LEDs, labeled **0** through **3**, are located near the middle of the craft interface next to the **PEM** label. [Table 8 on page 34](#) describes the functions of the power supply LEDs on the craft interface.

Table 8: Power Supply LEDs on the Craft Interface

Label	Color	State	Description
PEM	Green	On steadily	Power supply is functioning normally.
	Red	On steadily	Power supply has failed or power input has failed.

SRX5400 Services Gateway Craft Interface Card OK/Fail LEDs

Each slot in the card cage has a pair of LEDs on the craft interface that indicates the status of the card installed in it. The card LEDs are located along the bottom edge of the craft interface and are labeled **0** for the bottom slot reserved for the SCB and **0/1, 1, and 2** for the remaining slots. [Table 9 on page 34](#) describes the functions of the **OK** and **Fail** LEDs.

Table 9: Card OK/Fail LEDs

Label	Color	State	Description
OK	Green	On steadily	The card is functioning normally.
		Blinking	The card is transitioning online or offline.
		Off	The card is not online.
FAIL	Red	On steadily	The card has failed.

SRX5400 Services Gateway Craft Interface Fan LEDs

The fan tray LED are located near the middle of the craft interface. [Table 10 on page 34](#) describes the functions of the fan tray LEDs.

Table 10: Fan LEDs

Label	Color	State	Description
OK	Green	On steadily	Fan tray is functioning normally.
FAIL	Red	On steadily	Fan tray has failed.

SRX5400 Services Gateway Craft Interface Online/Offline Buttons

The craft interface has a row of Online/Offline buttons along its lower edge. Each button corresponds to one slot in the card cage. The Online/Offline buttons are only supported for slots containing MPC interface cards. You can install MPCs into slots:

- SRX5400—Any slot except bottom slot **0**
- SRX5600—Any slot except bottom slots **0** or **1**
- SRX5800—Any slot except center slots **0** or **1**

NOTE: The Online/Offline buttons are not supported for removal and replacement of SPCs or SCB.



CAUTION: While traffic is passing through the Services Gateway, particularly if the device is configured as part of a high availability (HA) cluster, we strongly recommend that you do not push any of the Online/Offline buttons.

To take an MPC offline using the Online/Offline buttons:

1. Press and hold the corresponding card's Online/Offline button on slot **1** on the craft interface. The green **OK/FAIL** LED next to the button begins to blink. Hold until both the button's LED and the MPC's LED are off.
2. Issue the CLI **show chassis fpc** command to check the status of installed MPCs. As shown in the sample output, the value *Offline* in the column labeled *State* indicates that the MPC in slot **1** is now offline:

```
user@host> show chassis fpc
```

Slot	State	(C)	Total	Interrupt	DRAM (MB)	Heap	Buffer
0	Online	35	4	0	1024	13	25
1	Offline	47	3	0	1024	13	25
2	Online	37	8	0	2048	18	14

An MPC can also be taken offline via CLI command:

```
user@host> request chassis fpc slot 2 offline
```

```
node0:
-----
Offline initiated, use "show chassis fpc" to verify

{primary:node0}
```

user@host> **show chassis fpc**

```
node0:
-----
Temp  CPU Utilization (%)  Memory  Utilization (%)
Slot State  (C)  Total  Interrupt  DRAM (MB)  Heap  Buffer
0  Online    35    7    0    1024    13    25
1  Online    46    4    0    1024    13    25
2  Offline    ---Offlined by cli command---
```

After pushing MPC online button:

user@host> **show chassis fpc**

```
Temp  CPU Utilization (%)  Memory  Utilization (%)
Slot State  (C)  Total  Interrupt  DRAM (MB)  Heap  Buffer
0  Online    34    5    0    1024    13    25
1  Online    46    3    0    1024    13    25
2  Offline    ---Offlined by button press---
```

To bring an MPC back online using the Online/Offline buttons:

1. Press and hold the corresponding card's Online/Offline button on slot **1** on the craft interface. The green **OK/FAIL** LED next to the button and the MPC's LED begins to blink. Hold until both the button's LED and the MPC's LED are green and steady.
2. Issue the CLI **show chassis fpc** command to check the status of installed MPCs. As shown in the sample output, the value *Online* in the column labeled *State* indicates that the MPC in slot **1** is functioning normally:

Verify if the MPC is offline:

user@host> **show chassis fpc**

```
node0:
-----
Temp  CPU Utilization (%)  Memory  Utilization (%)
```

```

Slot State          (C)  Total  Interrupt      DRAM (MB) Heap      Buffer
0  Online           37    23      0             2048    19       14
1  Offline          ---Offlined by cli command---
2  Online           49    37      0             1024    14       25

```

The command output indicates the MPC is offline.

Bring the MPC online for the first time by using the following CLI command:

```
user@host> request chassis fpc slot 1 online
```

```

node0:
-----
Online initiated, use "show chassis fpc" to verify

```

Verify that the MPC is online:

```
user@host> request chassis fpc slot 1 online node 0
```

```

node0:
-----
FPC 1 already online

```

The command output indicates the MPC is online.

Confirm that the MPC in the chassis is online:

```
user@host> show chassis fpc
```

```

node0:
-----
Temp  CPU Utilization (%)  Memory  Utilization (%)
Slot State  (C)  Total  Interrupt      DRAM (MB) Heap      Buffer
0  Online    37     6      0             2048    19       14
1  Online    44    11      0             1024    23       29
2  Online    49    22      0             1024    14       25

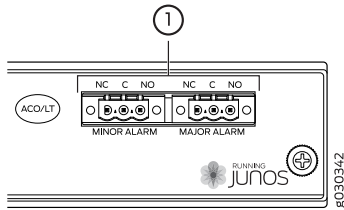
```

SRX5400 Services Gateway Craft Interface Alarm Relay Contacts

The craft interface has two alarm relay contacts for connecting the device to external alarm devices (see [Figure 5 on page 38](#)). Whenever a system condition triggers either the major or minor alarm on the craft

interface, the alarm relay contacts are also activated. The alarm relay contacts are located on the upper right of the craft interface.

Figure 5: Alarm Relay Contacts



The alarm relay contacts consist of two sets of connectors, one set for each of the two alarms (major and minor). For each alarm color there are three connectors. [Table 11 on page 38](#) describes the functions of the connectors.

Table 11: Alarm Relay Contact Functions

Contact Label	Contact Name	Function
NC	Normally Closed	Connects the alarm relay to an external alarm-reporting device that activates when the circuit between C and NC is closed.
C	Current In	Connects the alarm relay to the current source for the external alarm-reporting device.
NO	Normally Open	Connects the alarm relay to an external alarm-reporting device that activates when the circuit between C and NC is open.

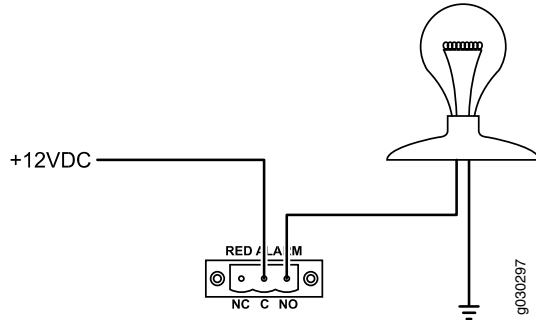
[Table 12 on page 38](#) shows the electrical specifications for the alarm relay contacts.

Table 12: Alarm Relay Contact Electrical Specifications

	Current Type	
	AC	DC
Maximum Voltage	250	30
Maximum Current	8 A	

[Figure 6 on page 39](#) shows an example wiring diagram for a simple alarm reporting device. In this case the device is a 12-volt light bulb that illuminates when the device encounters a condition that activates the major alarm LED and relay contacts. The alarm relay contacts can also be used to activate other devices such as bells or buzzers.

Figure 6: Example Alarm Reporting Device



RELATED DOCUMENTATION

General Electrical Safety Guidelines and Warnings

Preventing Electrostatic Discharge Damage to the SRX5400 Services Gateway

SRX5400 Cooling System

The cooling system consists of the following components:

- Fan tray
- Air filter

The cooling system components work together to keep all services gateway components within the acceptable temperature range (see [Figure 7 on page 40](#), [Figure 8 on page 40](#), and [Figure 9 on page 41](#)). The device has one fan tray and one air filter that install vertically in the rear of the device.

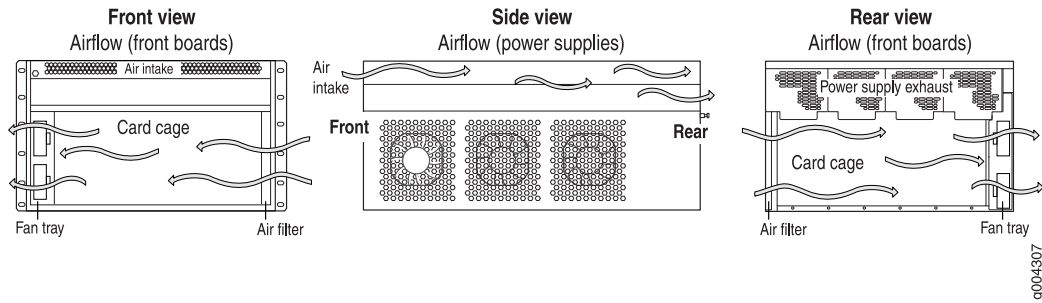
Two types of fan trays are available:

- The standard capacity fan tray has three fans that operate at 216 cubic feet per minute (CFM) at full speed and is adequate for services gateways in which standard-capacity power supplies are installed.
- The high-capacity fan tray has three fans that operate at 289 cubic feet per minute (CFM) at full speed and is required when high-capacity power supplies are installed.

The air intake to cool the chassis is located on the side of the chassis next to the air filter. Air is pulled through the chassis toward the fan tray, where it is exhausted out the side of the system. The air intake to cool the power supplies is located in the front of the device above the craft interface. The exhaust for the power supplies is located on the rear bulkhead power supplies.

Each fan has an LED that displays its status. The fan LEDs are located on the top left of the craft interface.

Figure 7: Airflow Through the Chassis



The host subsystem monitors the temperature of the services gateway components. When the device 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.

Figure 8: Fan Tray

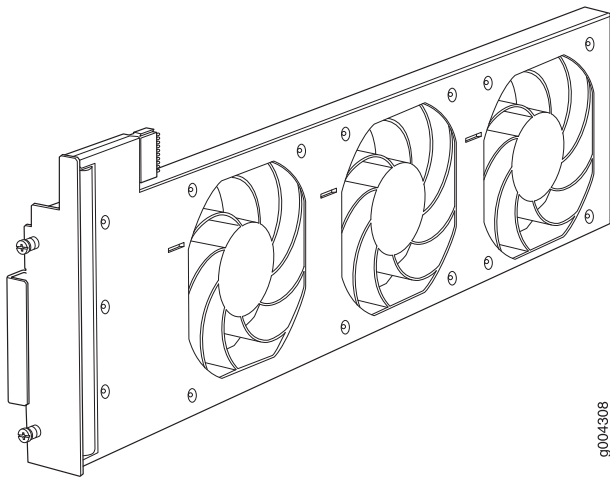
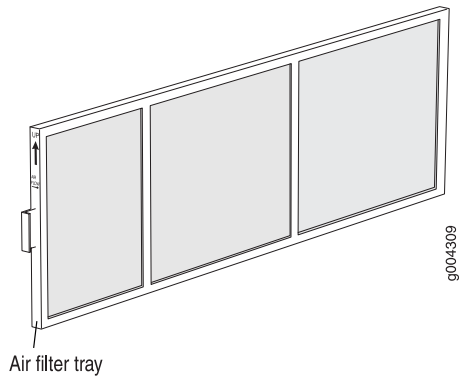


Figure 9: Air Filter

RELATED DOCUMENTATION

[Maintaining the Fan Tray on the SRX5400 Services Gateway | 221](#)

[Maintaining the Air Filter on the SRX5400 Services Gateway | 223](#)

[Troubleshooting the SRX5400 Services Gateway Cooling System | 350](#)

[Replacing the SRX5400 Services Gateway Fan Tray | 221](#)

[Replacing the SRX5400 Services Gateway Air Filter | 224](#)

SRX5400 Power System

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- [AC Power Cord Specifications for the SRX5400 Services Gateway | 46](#)
- [AC Power Circuit Breaker Requirements for the SRX5400 Services Gateway | 49](#)
- [SRX5400 Services Gateway DC Power Supply | 49](#)
- [SRX5400 Services Gateway DC Power Supply Specifications | 50](#)
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SRX5400 Services Gateway Power System Overview

The services gateway uses either AC or DC power supplies.

NOTE: The SRX5400 Services Gateway and SRX5600 Services Gateway use the same power supply model.

The services gateway is configurable with two or three AC power supplies by default (optionally, a fourth power supply can be added) or two DC power supplies. The AC power supplies are located horizontally at the rear of the chassis in slots **PEM0** through **PEM3** (left to right) and the DC power supplies are located in slots **PEM0** and **PEM2**. The power supplies connect to the midplane, which distributes the different output voltages produced by the power supplies to the services gateway components, depending on their voltage requirements. Each power supply is cooled by its own internal cooling system.



CAUTION: The services gateway cannot be powered from AC and DC power supplies simultaneously. The first type of power supply detected by the services gateway when initially powered on determines the type of power supply allowed by the services gateway. All installed power supplies of the other type are disabled by the services gateway. If you install a power supply of the other type while the services gateway is operating, the services gateway disables the power supply and generates an alarm.

Redundant power supplies are hot-removable and hot-insertable. When you remove a power supply from a services gateway that uses a nonredundant power supply configuration, the services gateway might shut down depending on your configuration.

[Table 13 on page 43](#) summarizes the available power supply types, their output capacities, and their redundancy and power distribution schemes. For detailed power supply specifications, see [“SRX5400](#)

Services Gateway AC Power Supply Specifications” on page 44 or “SRX5400 Services Gateway DC Power Supply Specifications” on page 50.

Table 13: Power Supply Type Summary

Power Supply Type	Input Condition (If Any)	Maximum Output	Redundancy
AC	Low-line (110 V Input)	1167 W	2+1
	High-line (220 V Input)	2050 W	2+1
DC	DIP=0 (60 A Input)	2240 W	1+1
	DIP=1 (80 A Input)	2440 W	1+1

In all power supply configurations, the power distribution and total power is shared by all of the components in the services gateway chassis. The power supplies are guaranteed to provide adequate power to the system. In the low-line (110VAC input) and high-line (220VAC input) configurations, two power supplies are required to support the services gateway electrical requirements. Although the services gateway is configurable with three AC (2+1) power supplies, you can add a fourth power supply for fault tolerance. The fourth power supply is used when one of the power supplies in the 2+1 configuration fails.

NOTE: There are no slot restrictions for AC power supplies. If you are using DC power supplies, then use the slots as shown in [Table 14 on page 43](#).

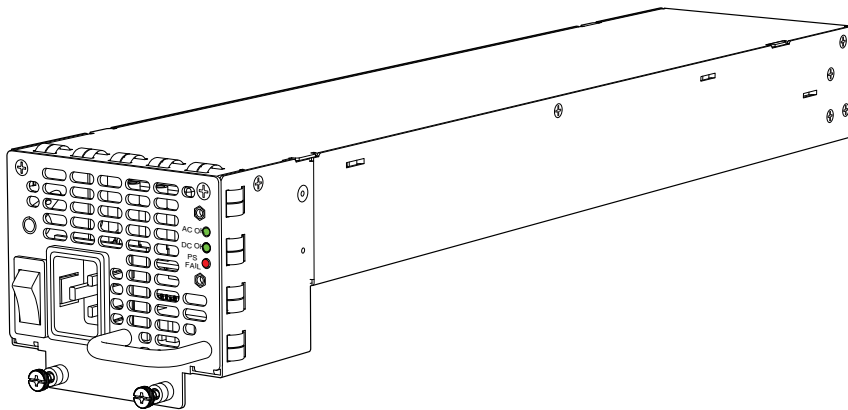
Table 14: PSU Slot Restrictions

PSU	Minimum PSU Requirement	PEM Slot	PSU Redundancy Requirements	PEM Slot
110V AC PSU	2	Any	3	Any
220V AC PSU	2	Any	3	Any
DC PSU	1	PEM0 & PEM2	2	PEM2

SRX5400 Services Gateway AC Power Supply

Each AC power supply consists of one AC appliance inlet, an AC switch, a fan, and LEDs to monitor the status of the power supply. [Figure 10 on page 44](#) shows the power supply. Each inlet requires a dedicated AC power feed and a dedicated 16 A @ 100 VAC or 16 A @ 200 VAC circuit breaker, or as required by local code.

Figure 10: AC Power Supply



WARNING: The services gateway is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal (sized for UNC 1/4-20 ground lugs) 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.

NOTE: The SRX5400 Services Gateway and SRX5600 Services Gateway use the same power supply model.

SRX5400 Services Gateway AC Power Supply Specifications

[Table 15 on page 45](#) lists the AC power supply electrical specifications.

[Table 16 on page 45](#) lists the AC power system electrical specifications.

Table 15: AC Power Supply Electrical Specifications

Item	Specification
Maximum output power	1167 W (low line) 2050 W (high line)
AC input current rating	16 A @ 110 VAC maximum 15.1 A @ 200 VAC maximum
AC input voltage	Operating range: 100 - 240 VAC (nominal)
AC input line frequency	50 to 60 Hz (nominal)

Table 16: AC Power System Specifications

Item	Low-Line (110V)	High-Line (220V)
Redundancy	2+1	2+1
Output power (maximum) per power supply	1167 W	2050 W
Output power (maximum) per system	3501 W	4100 W

SRX5400 Services Gateway AC Power Supply LEDs

Each AC power supply faceplate contains three LEDs that indicate the status of the power supply (see [Table 17 on page 46](#)). The power supply status is also reflected in two LEDs on the craft interface. In addition, a power supply failure triggers the major alarm LED on the craft interface.

Table 17: AC Power Supply LEDs

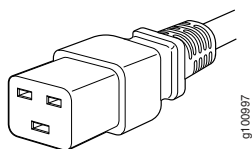
Label	Color	State	Description
AC OK	Amber	Off	AC power input voltage is below 78 VAC.
	Green	On	AC power input voltage is within 78–264 VAC.
DC OK	Green	Off	DC power outputs generated by the power supply are not within the normal operating ranges.
		On	DC power outputs generated by the power supply are within the normal operating ranges.
PS FAIL	Red	Off	Power supply is functioning normally.
		On	Power supply is not functioning normally and its output voltage is out of regulation limits. Check AC OK and DC OK LEDs for more information.

AC Power Cord Specifications for the SRX5400 Services Gateway

Each AC power supply has a single AC appliance inlet located on the power supply that requires a dedicated AC power feed. Most sites distribute power through a main conduit that leads to frame-mounted power distribution panels, one of which can be located at the top of the rack that houses the services gateway. An AC power cord connects each power supply to the power distribution panel.

The services gateway is not shipped with AC power cords. You must order power cords separately using the model number shown in [Table 18 on page 47](#). The C19 appliance coupler end of the cord see [Figure 11 on page 46](#), inserts into the AC appliance inlet coupler, type C20 (right angle) as described by International Electrotechnical Commission (IEC) standard 60320. The plug end of the power cord fits into the power source receptacle that is standard for your geographical location.

Figure 11: C19 Appliance Coupler



[Table 18 on page 47](#) provides specifications and depicts the plug on the AC power cord provided for each country or region.

Table 18: AC Power Cord Specifications

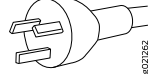
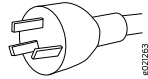
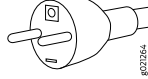

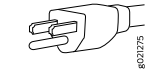
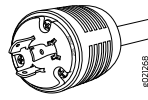

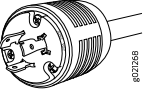
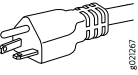
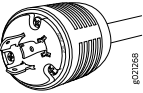


Country	Model Number	Electrical Specification	Plug Type	Graphic
Australia	CBL-M-PWR-RA-AU	240 VAC, 50 Hz AC	SAA/3/15	 #07262
China	CBL-M-PWR-RA-CH	220 VAC, 50 Hz AC	CH2-16P	 #07263
Europe (except Denmark, Italy, Switzerland, and United Kingdom)	CBL-M-PWR-RA-EU	220 or 230 VAC, 50 Hz AC	CEE 7/7	 #07264
Italy	CBL-M-PWR-RA-IT	230 VAC, 50 Hz AC	CEI 23-16/VII	 #07266
Japan	CBL-PWR-RA-JP15	125 VAC, 50 or 60 Hz AC	JIS 8303	 #07275
	CBL-M-PWR-RA-JP	220 VAC, 50 or 60 Hz AC	NEMA L6-20P	 #07268

Table 18: AC Power Cord Specifications (continued)

Country	Model Number	Electrical Specification	Plug Type	Graphic
North America	CBL-PWR-RA-US15	125 VAC, 60 Hz AC	NEMA 5-15P	
	CBL-PWR-RA-TWLK-US15	125 VAC, 60 Hz AC	NEMA L5-15P	
	CBL-M-PWR-RA-US	250 VAC, 60 Hz AC	NEMA 6-20	
	CBL-M-PWR-RA-TWLK-US	250 VAC, 60 Hz AC	NEMA L6-20P	
United Kingdom	CBL-M-PWR-RA-UK	240 VAC, 50 Hz AC	BS89/13	
Worldwide (except Japan)	CBL-EX-PWR-C19-C20	240 VAC, 50 Hz AC	EN 60320-2-2/1	



WARNING: The AC power cord for the services gateway is intended for use with the services gateway only and not for any other use.



WARNING: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must properly ground the services gateway chassis before connecting power. See [“Grounding the SRX5400 Services Gateway”](#) on page 195 for instructions.



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

NOTE: In North America, AC power cords must not exceed 4.5 m (approximately 14.75 ft) 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 listed in [Table 18 on page 47](#) are in compliance.

AC Power Circuit Breaker Requirements for the SRX5400 Services Gateway

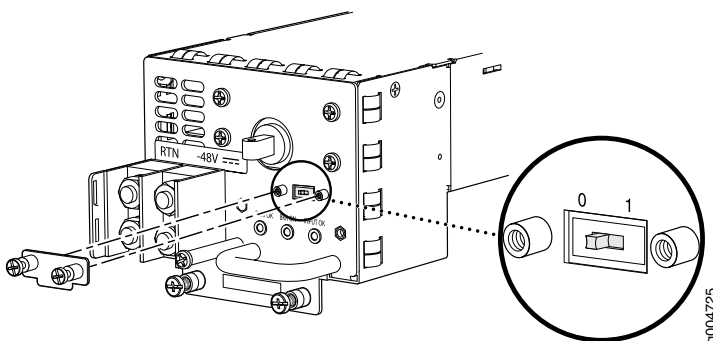
Each AC power supply has a single AC appliance inlet located on the power supply that requires a dedicated AC power feed. We recommend that you use a customer site circuit breaker rated for 15 A (250 VAC) minimum for each AC power supply, or as required by local code. Doing so enables you to operate the services gateway in any configuration without upgrading the power infrastructure.

SRX5400 Services Gateway DC Power Supply

Each DC power supply consists of one DC input (-48 VDC and return), one 40 A (-48 VDC) circuit breaker, a fan, and LEDs to monitor the status of the power supply. [Figure 12 on page 49](#) shows the power supply. Each DC power supply has a single DC input (-48 VDC and return) that requires a dedicated facility circuit breaker.

We recommend that you provision 60 A or 70 A per feed, depending on the selected DIP switch setting.

Figure 12: DC Power Supply Faceplate



NOTE: The SRX5400 Services Gateway and SRX5600 Services Gateway use the same power supply model.

SRX5400 Services Gateway DC Power Supply Specifications

Table 19 on page 50 lists the DC power supply electrical specifications. Table 20 on page 50 lists the DC power system specifications.

Table 19: DC Power Supply Electrical Specifications

Item	Specification	
	DIP=0 (60 A Input)	DIP=1 (80 A Input)
Maximum output power	2400 W	2600 W
DC input voltage	Minimum: -40.5 VDC Nominal: -48 VDC Operating range: -40.5 to -72 VDC	
DC input current rating	50 A @ -48 V nominal operating voltage	54.2 A @ -48 V nominal operating voltage
Internal Supplementary Protector	None	None

Table 20: DC Power System Specifications

Item	Specification	
	DIP=0 (60 A Input)	DIP=1 (80 A Input)
Redundancy	1+1	1+1
Output power (maximum) per power supply	2400 W	2600 W
Output power (maximum) per system	2400 W	2600 W

SRX5400 Services Gateway DC Power Supply LEDs

Each DC power supply faceplate contains three LEDs that indicate the status of the power supply (see Table 21 on page 51). In addition, a power supply failure triggers the major alarm LED on the craft interface.

NOTE: The SCB must be present for the **PWR OK** LED to go on.

Table 21: DC Power Supply LEDs

Label	Color	State	Description
PWR OK	Green	Off	Power supply is not functioning normally. Check the INPUT OK LED for more information.
		On	Power supply is functioning normally.
	Amber	On	The main output voltage is out of range (lower limit: 37.5 V to 39.5 V; upper limit: 72.5 V to 76 V).
BRKR ON	Green	Off	DC power supply circuit breaker is turned off.
	Green	On	DC power input is present and the DC power supply circuit breaker is turned on.
INPUT OK	Green	Off	DC input to the PEM is not present.
		On	DC input is present and is connected in correct polarity.
	Amber	On	DC input is present, but not in valid operating range or connected in reverse polarity.

DC Power Cable Specifications for the SRX5400 Services Gateway

[Table 22 on page 51](#) summarizes the specifications for the power cables, which you must supply.

Table 22: DC Power Cable Specifications

Cable Type	Quantity	Specification
Power	Four 6-AWG (13.3 mm ²) cables for each power supply	Minimum 60°C wire, or as required by the local code

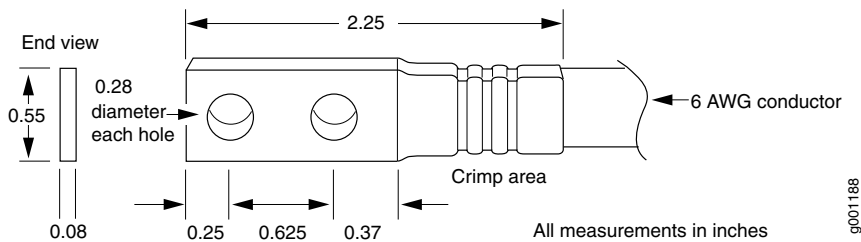


CAUTION: You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (-) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color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

DC Power Cable Lug Specifications for the SRX5400 Services Gateway

The accessory box shipped with the services gateway includes the cable lugs that attach to the terminal studs of each power supply (see [Figure 13 on page 52](#)).

Figure 13: DC Power Cable Lug



CAUTION: Before services gateway installation begins, 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 services gateway.



WARNING: The services gateway is a pluggable type A equipment installed in restricted access location. It has a separate protective earthing terminal [Metric -M6 and English - 1/4-20 screw) ground lugs] provided on the chassis. This separate protective earth terminal must be permanently connected to earth.

DC Power Circuit Breaker Requirements for the SRX5400 Services Gateway

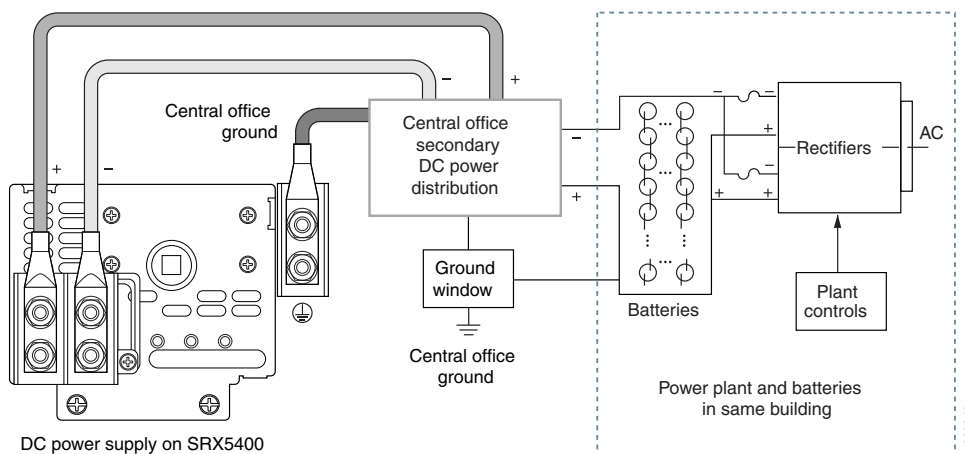
Each DC power supply has a single DC input (-48 VDC and return) that requires a dedicated facility circuit breaker. We recommend that you use a customer site circuit breaker rated for 40 A (-48 VDC) minimum for each DC power supply, or as required by local code. Doing so enables you to operate the services gateway in any configuration without upgrading the power infrastructure.

If you plan to operate a DC-powered services gateway at less than the maximum configuration and do not provision a 40 A (-48 VDC) circuit breaker, we recommend that you provision a circuit breaker for each DC power supply rated for at least 125% of the continuous current that the system draws at -48 VDC, or as required by local code.

DC Power Source Cabling for the SRX5400 Services Gateway

Figure 14 on page 53 shows a typical DC source cabling arrangement.

Figure 14: Typical DC Source Cabling to the Services Gateway



The DC power supplies must be powered by dedicated power feeds.



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.

SRX5400 Services Gateway Chassis Grounding Point Specifications



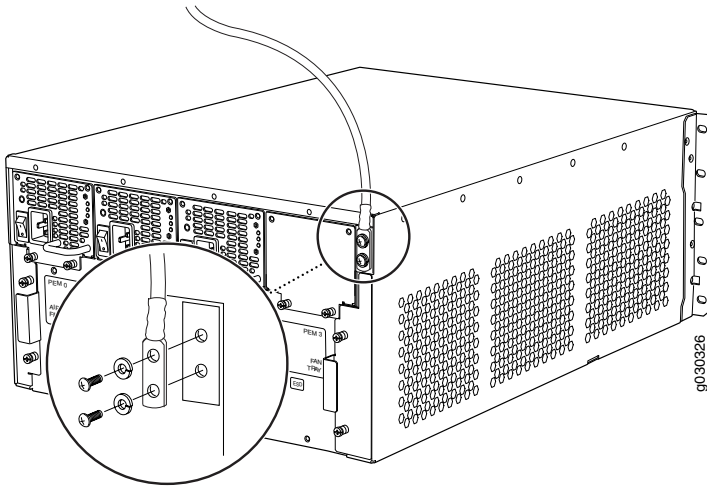
WARNING: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must properly ground the services gateway chassis before connecting power. See [“Grounding the SRX5400 Services Gateway” on page 195](#) for instructions.



CAUTION: Before services gateway installation begins, a licensed electrician must attach cable lugs to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the services gateway.

The services gateway chassis has one grounding point at the upper right corner of the back panel. The grounding point consists of two threaded holes spaced 0.625-in. (15.86-mm) apart ([Figure 15 on page 55](#)). The grounding point holes fit UNC 1/4–20 screws. The accessory box shipped with the services gateway includes the cable lug that attaches to the grounding cable and two UNC 1/4–20 screws used to secure the grounding cable to the services gateway grounding point.

Figure 15: SRX5400 Services Gateway Grounding Point



To ground the services gateway, you must connect a grounding cable to earth ground and then attach it to the chassis grounding point using the two screws provided.

NOTE: Additional grounding is provided to an AC-powered services gateway when you plug its power supplies into grounded AC power receptacles.

SRX5400 Services Gateway Grounding-Cable Specification

The grounding cable that you provide must meet the specifications in [Table 23 on page 55](#).

Table 23: Grounding Cable Specifications

Cable Type	Quantity and Specification
Grounding	One 6-AWG (13.3 mm ²), minimum 60°C wire, or as required by the local code

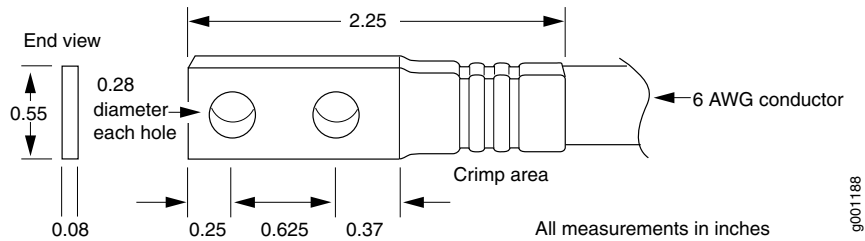


WARNING: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must properly ground the services gateway chassis before connecting power. See ["Grounding the SRX5400 Services Gateway" on page 195](#) for instructions.

SRX5400 Services Gateway Grounding-Cable Lug Specification

The accessory box shipped with the services gateway includes the cable lug that attaches to the grounding cable (see [Figure 16 on page 56](#)) and two UNC 1/4-20 screws used to secure the grounding cable to the grounding points.

Figure 16: Grounding Cable Lug



CAUTION: Before services gateway installation begins, 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 services gateway.

NOTE: The same cable lug is used for the DC power cables.

RELATED DOCUMENTATION

[Calculating Power Requirements for the SRX5400 Services Gateway | 152](#)

[Removing an SRX5400 Services Gateway DC Power Supply | 231](#)

[Replacing an SRX5400 Services Gateway AC Power Supply | 228](#)

[Troubleshooting the SRX5400 Services Gateway Power System | 354](#)

SRX5400 Host Subsystem

IN THIS SECTION

- [SRX5400 Services Gateway Host Subsystem Overview | 57](#)
- [Switch Control Board SRX5K-SCB Overview | 58](#)
- [Switch Control Board SRX5K-SCB Specifications | 59](#)
- [Switch Control Board SRX5K-SCBE Overview | 62](#)
- [Switch Control Board SRX5K-SCBE Specifications | 63](#)
- [Switch Control Board SRX5K-SCB3 Overview | 66](#)
- [Switch Control Board SRX5K-SCB3 Specifications | 67](#)
- [Routing Engine SRX5K-RE-13-20 Overview | 68](#)
- [Routing Engine SRX5K-RE-13-20 Specifications | 69](#)
- [Routing Engine SRX5K-RE-1800X4 Overview | 72](#)
- [Routing Engine SRX5K-RE-1800X4 Specifications | 73](#)
- [Routing Engine SRX5K-RE3-128G Specifications | 76](#)

SRX5400 Services Gateway Host Subsystem Overview

The host subsystem is composed of a Routing Engine installed in a Switch Control Board (SCB). The host subsystem provides the routing and system management functions of the services gateway. You must install one host subsystem on the device. The host subsystem components are as follows:

- Switch Control Board
 - SRX5K-SCB—from Junos OS Release 9.2 to 12.3X48
 - SRX5K-SCBE—from Junos OS Release 12.1X47-D15 and later
 - SRX5K-SCB3—from Junos OS Release 15.1X49-D10 and later
 - SRX5K-SCB4—from Junos OS Release 19.3R1 and later

NOTE: SRX5K-SCB4 is not supported on SRX5400 Services Gateways.

- Routing Engine

- SRX5K-RE-13-20—from Junos OS Release 9.2 to 12.3X48
- SRX5K-RE-1800X4—from Junos OS Release 12.1X47-D15 and later
- SRX5K-RE3-128G—from Junos OS Release 19.3R1 and later

NOTE: You can only configure the following combination of Routing Engine and SCB within a host subsystem:

- SRX5K-RE-13-20 and SRX5K-SCB
- SRX5K-RE-1800X4 and SRX5K-SCBE
- SRX5K-RE-1800X4 and SRX5K-SCB3
- SRX5K-RE-1800X4 and SRX5K-SCB4
- SRX5K-RE3-128G and SRX5K-SCB3 or SRX5K-SCB4

The host subsystem has three LEDs that display its status. The host subsystem LEDs are located in the middle of the craft interface.

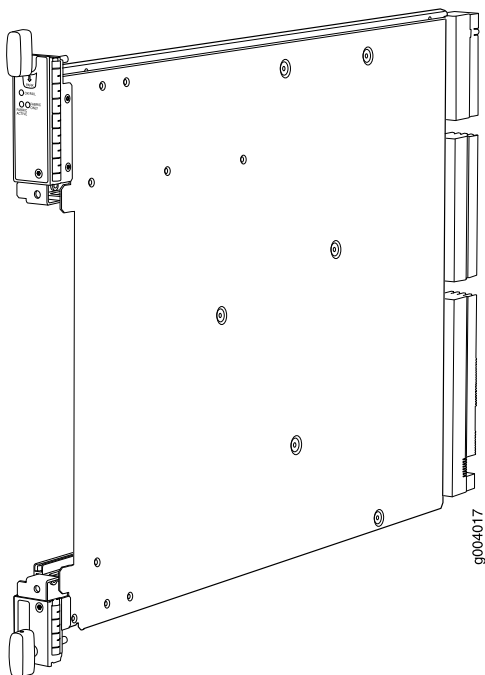
Switch Control Board SRX5K-SCB Overview

The Switch Control Board (SCB) provides the following functions:

- Powers on and powers off MPCs and SPC
- Controls clocking, system resets, and booting
- Monitors and controls system functions, including fan speed, board power status, PDM status and control, and the system front panel
- Provides interconnections to all the MPCs within the chassis through the switch fabrics integrated into the SCB

When the SCB is part of a host subsystem, the Routing Engine installs directly into a slot on the SCB (see [Figure 17 on page 59](#)).

Figure 17: SRX5K-SCB



You must install one SCB in the services gateway as part of a host subsystem.

The SCB installs horizontally into the slot at the bottom of the card cage labeled **0**. If any slots are empty, you must install a blank panel.

For detailed information about SCBs supported by the services gateway, see the [SRX5400, SRX5600, and SRX5800 Services Gateway Card Reference](#) at www.juniper.net/documentation/.

Switch Control Board SRX5K-SCB Specifications

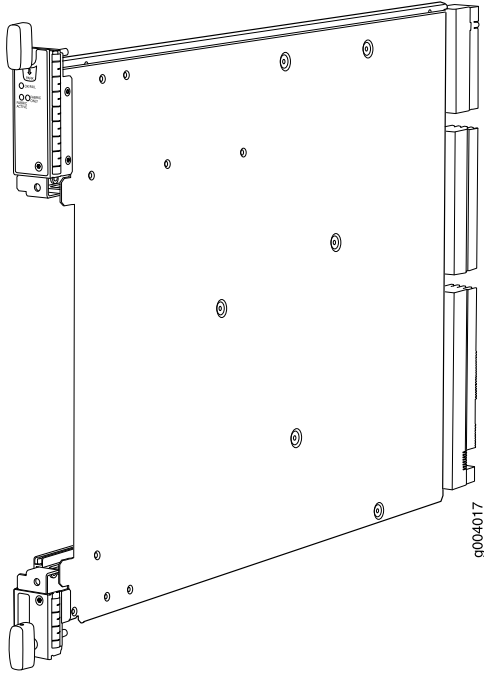
The SRX5K-SCB Switch Control Board (SCB) ([Figure 18 on page 60](#)) performs the following functions:

- Powers on and powers off I/O cards (IOCs) and Services Processing Cards (SPCs)
- Controls clocking, system resets, and booting
- Monitors and controls system functions, including fan speed, board power status, PDM status and control, and the system front panel
- Provides interconnections to all the IOCs within the chassis through the switch fabrics integrated into the SCB

SRX5400 and SRX5600 Services Gateways have one SCB each installed and you can install a second SCB for redundancy. The SRX5800 Services Gateway has two SCBs installed and you can install a third SCB for switch fabric redundancy.

The host subsystem is composed of a Routing Engine installed directly into a slot on the faceplate of the SCB. When there is no Routing Engine in a SCB, its slot must be covered with a blank panel.

Figure 18: Switch Control Board SRX5K-SCB



Each SCB consists of the following components:

- Chassis management Ethernet switch.
- I2C bus logic, used for low-level communication with each component.
- Component redundancy circuitry.
- Gigabit Ethernet switch that is connected to the embedded CPU complex on all components.
- Switch fabric—Provides the switching functions for the IOCs.
- Control FPGA—Provides the Peripheral Component Interconnect (PCI) interface to the Routing Engine.
- 1000Base-T Ethernet controller—Provides a 1-Gbps Ethernet link between the Routing Engines.
- Ethernet switch—Provides 1-Gbps link speeds between the Routing Engine and the IOCs.
- Circuits for chassis management and control.
- Power circuits for the Routing Engine and SCB.

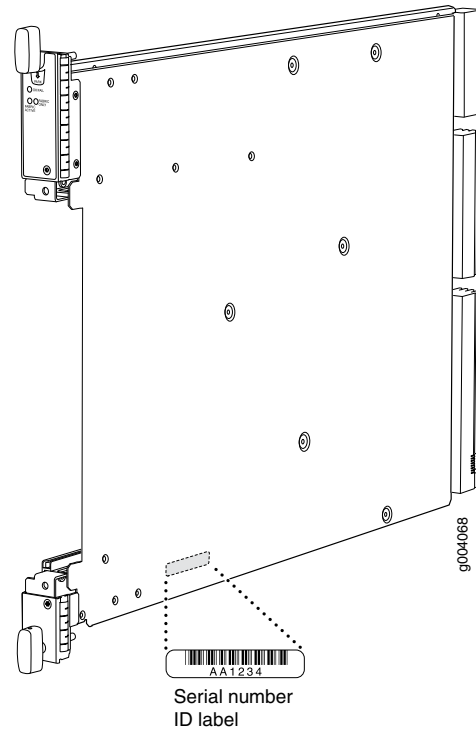
Description	<ul style="list-style-type: none"> • SCB with slot for Routing Engine • Maximum throughput: 75 Gbps per slot
Software release	<ul style="list-style-type: none"> • Junos OS Release 9.2 and later

Cables and connectors	Slot for Routing Engine
Controls	None
Supported Slots	<ul style="list-style-type: none"> ● SRX5400–Only bottom slots 0 and 1/0 ● SRX5600–Only bottom slots 0 and 1 ● SRX5800–Only center slots 0, 1, and 2/6
Power Requirement	150 W
Weight	Approximately 10 lb (4.5 kg)
LEDs	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> ● Green–The SCB is operating normally. ● Red–The SCB has failed and is not operating normally. ● Off–The SCB is powered down. <p>FABRIC ONLY LED:</p> <ul style="list-style-type: none"> ● Green–The SCB is operating in fabric-only mode. ● Off–The SCB is operating in fabric/control board mode. <p>FABRIC ACTIVE LED:</p> <ul style="list-style-type: none"> ● Green–The fabric is in active mode.

Serial Number Location

The serial number label is located as shown in [Figure 19 on page 62](#).

Figure 19: SCB Serial Number Label



Switch Control Board SRX5K-SCBE Overview

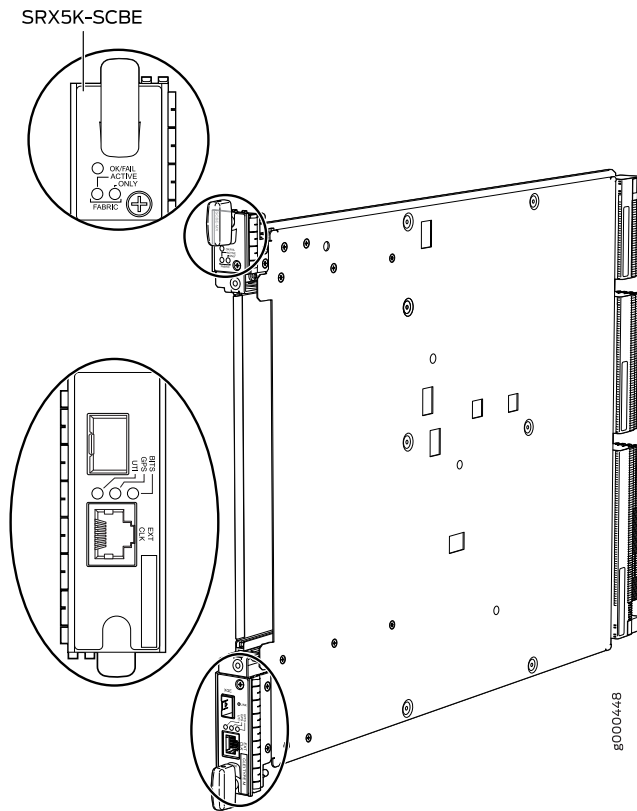
The SRX5000 line enhanced Switch Control Board (SRX5K-SCBE) caters to high-end security markets requiring support for higher capacity traffic. The SRX5K-SCBE provides greater interface density (slot and capacity scale) and improved services.

Some key attributes of the SRX5K-SCBE are:

- A bandwidth of 120 Gbps per slot with redundant fabric support and improved fabric performance by using the next-generation fabric (XF) chip.
- A centralized clocking architecture that supports clock cleanup and distribution. The Stratum 3 clock module performs clock monitoring, filtering, and holdover in a centralized chassis location.
- Full performance with fabric redundancy for higher capacity line cards such as the SRX5K-MPC.

The Routing Engine installs directly into a slot on the SRX5K-SCBE as shown in [Figure 20 on page 63](#).

Figure 20: SRX5K-SCBE



Switch Control Board SRX5K-SCBE Specifications

Each SRX5K-SCBE consists of the following components:

- I2C bus logic for low-level communication with each component
- Component redundancy circuitry
- Control Board/Routing Engine primary-role mechanism
- Gigabit Ethernet switch that is connected to the embedded CPU complex on all components
- Switch fabric to provide the switching functions for the MPCs
- 1000BASE-T Ethernet controller to provide a 1-Gbps Ethernet link between the Routing Engines

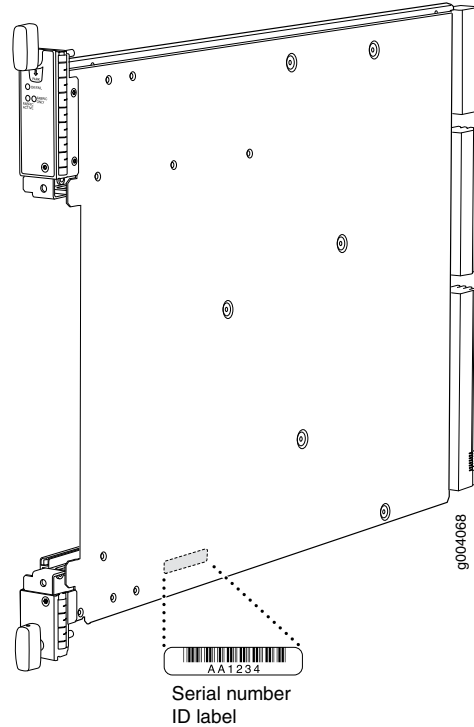
- Power circuits for the Routing Engine and the SRX5K-SCBE
- LEDs—Provides status of the SRX5K-SCBE and clocking interface

Description	<ul style="list-style-type: none"> • SRX5K-SCBE with slot for Routing Engine • Maximum throughput: 120 Gbps per slot
Software release	Junos OS Release 12.1X47-D15 and later
Cables and connectors	Slot for Routing Engine
Controls	None
Supported slots	<ul style="list-style-type: none"> • SRX5400—Only bottom slots 0 and 1/0 • SRX5600—Only bottom slots 0 and 1 • SRX5800—Only center slots 0, 1, and 2/6
Power requirement	<ul style="list-style-type: none"> • 160 W at 131° F (55° C) • 130 W at 104° F (40° C) • 120 W at 77° F (25° C)
Weight	9.6 lb (4.4 kg) with Routing Engine

Serial number location

The serial number label is located as shown in [Figure 21 on page 65](#).

Figure 21: SRX5K-SCBE Serial Number Label

**SRX5K-SCBE LEDs**

[Table 24 on page 65](#) describes the SRX5K-SCBE LEDs and their states.

Table 24: SRX5K-SCBE LEDs

Label	Color	State	Description
FABRIC ACTIVE	Green	On steadily	Fabric is in active mode.
FABRIC ONLY	Green	On steadily	SRX5K-SCBE operates in fabric-only mode.
	None	Off	SRX5K-SCBE operates in fabric/control board mode.

Table 24: SRX5K-SCBE LEDs (continued)

Label	Color	State	Description
OK/FAIL	Green	On steadily	SRX5K-SCBE is online.
	Red	On steadily	SRX5K-SCBE has failed.
	None	Off	SRX5K-SCBE is offline.

Switch Control Board SRX5K-SCB3 Overview

The SRX5K-SCB3 (SCB3) caters to high-end security markets requiring support for higher capacity traffic, greater interface density (slot and capacity scale), and improved services. The SCB3 is supported on SRX5400, SRX5600, and SRX5800 Services Gateways.

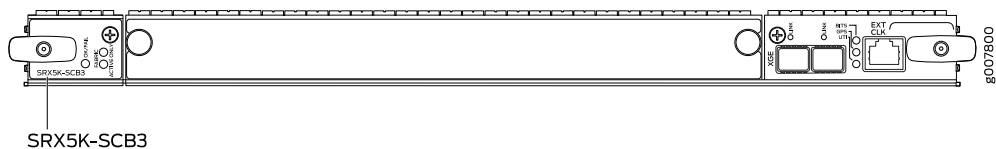
The SCB3 supports the standard midplane and the enhanced midplane.

Some key attributes of the SCB3 are:

- With the existing midplane and fabric link speed of 8.36 Gbps, supports a bandwidth of 205 Gbps per slot with redundant fabric support and 308 Gbps per slot without redundancy.
- With the enhanced midplane and fabric link speed of 10.2 Gbps, supports a bandwidth of 249 Gbps per slot with redundant fabric support and 374 Gbps per slot without redundancy with the enhanced midplane
- Improved fabric performance with the next-generation fabric (XF2) chip.
- Full performance with fabric redundancy for higher-capacity line cards.
- Support for MPC line cards such as SRX5K-MPC (IOC2) and IOC3 (SRX5K-MPC3-40G10G or SRX5K-MPC3-100G10G) only.
- Two 10-Gigabit Ethernet SFP+ ports (These ports are disabled and reserved for future use).

The Routing Engine installs directly into a slot on the SCB3, as shown in [Figure 22 on page 66](#).

Figure 22: SRX5K-SCB3



Switch Control Board SRX5K-SCB3 Specifications

Each SRX5K-SCB3 (SCB3) consists of the following components:

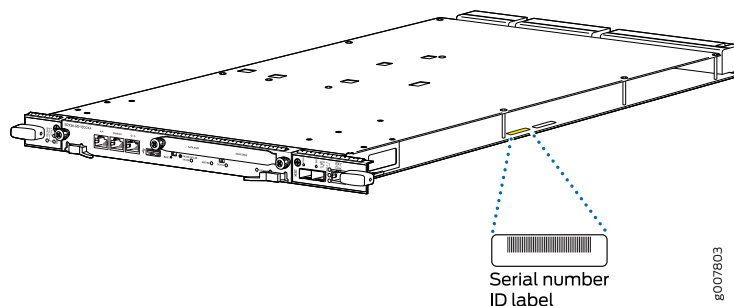
- I2C bus logic for low-level communication with each component
- Component redundancy circuitry
- Control Board/Routing Engine primary-role mechanism
- Gigabit Ethernet switch that is connected to the embedded CPU complex on all components
- Switch fabric to provide the switching functions for the MPCs
- Control field-programmable gate array (FPGA) to provide the Peripheral Component Interconnect (PCI) interface to the Routing Engine
- Circuits for chassis management and control
- Power circuits for the Routing Engine and SCB3
- LEDs to provides status of the SCB3

Description	SCB3 with slot for Routing Engine
Software release	Junos OS Release 15.1X49-D10 and later
Cables and connectors	Slot for Routing Engine
Controls	None
Supported slots	<ul style="list-style-type: none"> • SRX5400—Only bottom slots 0 and 1/0 • SRX5600—Only bottom slots 0 and 1 • SRX5800—Only center slots 0, 1, and 2/6
Power requirement	300 W
Weight	9.6 lb (4.4 kg) with Routing Engine

Serial number location

The serial number label is located as shown in [Figure 23 on page 68](#).

Figure 23: SRX5K-SCB3 Serial Number Label

**SRX5K-SCB3 LEDs**

[Table 25 on page 68](#) describes the SCB3 LEDs and their states.

Table 25: SRX5K-SCB3 LEDs

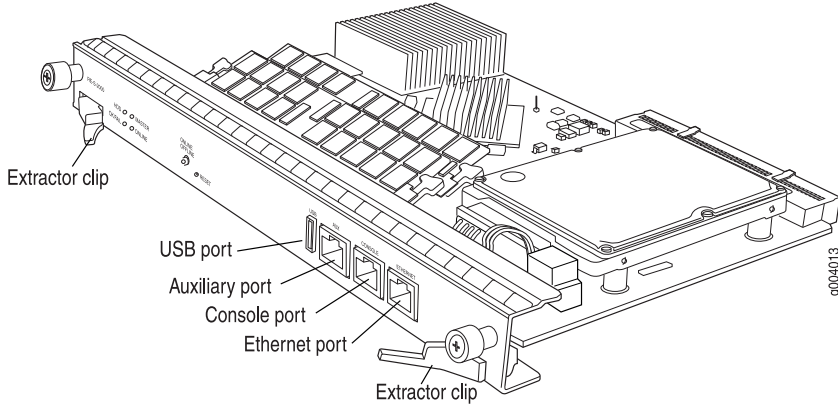
Label	Color	State	Description
FABRIC ACTIVE	Green	On steadily	Fabric is in active mode.
OK/FAIL	Green	On steadily	SCB3 is online.
	Red	On steadily	SCB3 has failed.
	-	Off	SCB3 is offline.
LINK	Green	On steadily	Port is enabled and link is established.
	-	Off	Port is disabled or no link is established.

Routing Engine SRX5K-RE-13-20 Overview

The Routing Engine is an Intel-based PC platform that runs Junos OS. Software processes that run on the Routing Engine maintain the routing tables, manage the routing protocols used on the device, control the device interfaces, control some chassis components, and provide the interface for system management and user access to the device (see [Figure 24 on page 69](#)).

A USB port on the Routing Engine accepts a USB memory card that allows you to load Junos OS.

Figure 24: SRX5K-RE-13-20 Routing Engine

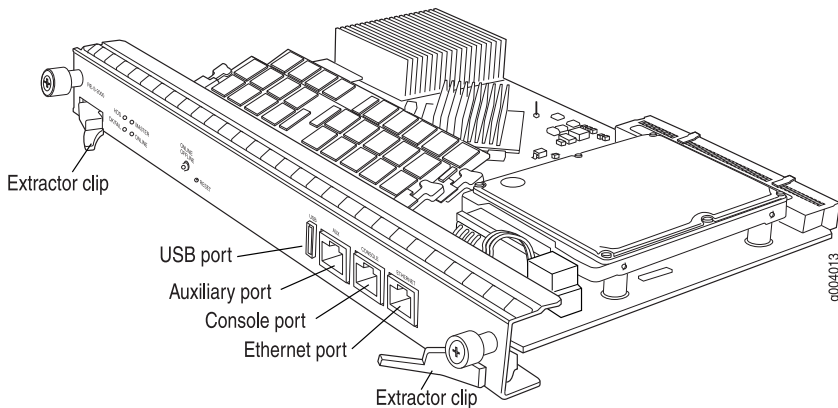


For detailed information about the Routing Engines supported by the services gateway, see the [SRX5400](#), [SRX5600](#), and [SRX5800 Services Gateway Card Reference](#) at www.juniper.net/documentation/.

Routing Engine SRX5K-RE-13-20 Specifications

The SRX5K-RE-13-20 Routing Engine ([Figure 25 on page 69](#)) is an Intel-based PC platform that runs the Junos operating system (Junos OS). Software processes that run on the Routing Engine maintain the routing tables, manage the routing protocols used on the device, control the device interfaces, control some chassis components, and provide the interface for system management and user access to the device.

Figure 25: Routing Engine



You must install at least one Routing Engine in the services gateway. You can install a second Routing Engine if both Routing Engines are running Junos OS Release 10.0 or later. A second Routing Engine is required if you are using the dual chassis cluster control link feature available in Junos OS Release 10.0 and later. The second Routing Engine does not perform all the functions of a Routing Engine and does not improve resiliency or redundancy. The second Routing Engine and the Switch Control Board (SCB) in which

it is installed do not constitute a host subsystem. The only function of the second Routing Engine is to enable the hardware infrastructure that enables the chassis cluster control 1 port on the Services Processing Card (SPC) used for chassis cluster control links. If you install only one Routing Engine in the services gateway, you must install it in the slot in the front panel of SCB0. If you install a second Routing Engine to use the dual chassis cluster control link feature, you install it in the slot in the front panel of SCB1.

The Routing Engine consists of the following components:

- CPU—Runs Junos OS to maintain the services gateway's routing tables and routing protocols. It has a Pentium-class processor.
- DRAM—Provides storage for the routing and forwarding tables and for other Routing Engine processes.
- USB port—Provides a removable media interface through which you can install Junos OS manually. Junos supports USB version 1.0.
- Internal flash disk—Provides primary storage for software images, configuration files, and microcode. The disk is a fixed compact flash and is inaccessible from outside the services gateway.
- Hard disk—Provides secondary storage for log files, memory dumps, and rebooting the system if the internal compact flash disk fails.
- HDD LED—Indicates disk activity for the hard disk drive.
- Management ports—Each Routing Engine has one 10/100-Mbps Ethernet port for connecting to a management network, and two asynchronous serial ports—one for connecting to a console and one for connecting to a modem or other auxiliary device. The interface ports are labeled **AUX**, **CONSOLE**, and **ETHERNET**.
- EEPROM—Stores the serial number of the Routing Engine.
- Extractor clips—Used for inserting and extracting the Routing Engine.
- Captive screws—Secures the Routing Engine in place.

The Routing Engine boots from the storage media in this order: the USB device (if present), then the internal flash disk, then the hard disk, then the LAN.

NOTE: For specific information about Routing Engine components (for example, the amount of DRAM), issue the **show chassis routing-engine** command.

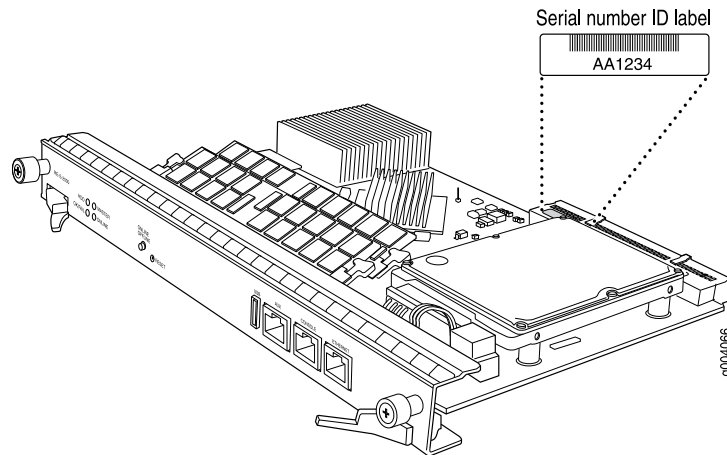
Description	Routing Engine for SRX5400, SRX5600, and SRX5800 Services Gateways
Software release	<ul style="list-style-type: none"> • Junos OS Release 9.2 and later • Junos OS Release 10.0 and later required to install a second Routing Engine

Cables and connectors	<p>AUX—Connects the Routing Engine to a laptop, a modem, or another auxiliary device through a cable with an RJ-45 connector.</p> <p>CONSOLE—Connects the Routing Engine to a system console through a cable with an RJ-45 connector.</p> <p>ETHERNET—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.</p>
Controls	<ul style="list-style-type: none"> ● RESET button—Reboots the Routing Engine when pressed ● ONLINE/OFFLINE Button—Not supported in the current release
Supported Slots	<p>Front panel slot in an SCB installed in:</p> <ul style="list-style-type: none"> ● SRX5400: Bottom slot 0 ● SRX5600: Bottom slots 0 or 1 ● SRX5800: Center slots 0 or 1 <p>NOTE: The services gateway host subsystem Routing Engine must be installed in the SCB in slot 0. A Routing Engine installed in an SCB in slot 1 only enables dual control links in chassis cluster configurations.</p>
Power Requirement	90 W
Weight	Approximately 2.4 lb (1.1 kg)
LEDs	<p>HDD LED:</p> <ul style="list-style-type: none"> ● Blinking green—The Routing Engine hard disk is functioning normally. <p>MASTER LED:</p> <ul style="list-style-type: none"> ● Blue—The Routing Engine is Primary. <p>NOTE: The SRX5400, SRX5600, and SRX5800 Services Gateways do not support a secondary or backup Routing Engine, so the MASTER LED should always be lit.</p> <p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> ● Off—The Routing Engine is operating normally. ● Red—The Routing Engine has failed and is not operating normally. <p>ONLINE LED:</p> <ul style="list-style-type: none"> ● Blinking green—The Routing Engine is coming online. ● Steady green—The Routing Engine is functioning normally.

Serial Number Location

The serial number label is located on the right side of the top of the Routing Engine as shown in [Figure 26 on page 72](#)

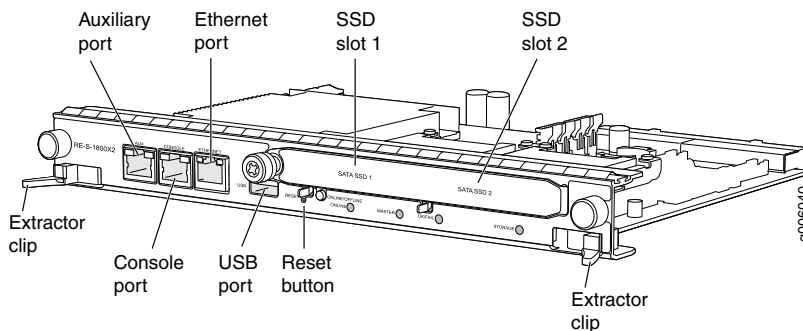
Figure 26: SRX5K-RE-13-20 Serial Number Label



Routing Engine SRX5K-RE-1800X4 Overview

The enhanced Routing Engine is an Intel-based PC platform that runs Junos OS. Software processes that run on the Routing Engine maintain the routing tables, manage the routing protocols used on the device, control the device interfaces, control some chassis components, and provide the interface for system management and user access to the device. The Routing Engine must be installed directly into the SRX5K-SCBE. A USB port on the Routing Engine accepts a USB memory device that allows you to load Junos OS. [Figure 27 on page 72](#) shows the Routing Engine.

Figure 27: SRX5K-RE-1800X4 Routing Engine



Three ports located on the Routing Engine connect to one or more external devices on which system administrators can issue Junos OS CLI commands to manage the services gateway.

The ports function as follows:

- **AUX**—Connects the Routing Engine to a laptop, modem, or other auxiliary device through a serial cable with an RJ-45 connector.
- **CONSOLE**—Connects the Routing Engine to a system console through a serial cable with an RJ-45 connector.
- **ETHERNET**—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 10/100/1000 Mbps connections. Two small LEDs on the bottom of the port indicate the connection in use: the LED flashes yellow or green for a 10/100/1000 Mbps connection, and the LED is light green when traffic is passing through the port.

The solid-state drive (SSD) slots located on the Routing Engine provide secondary storage for log files, for generating core files, and for rebooting the system if the CompactFlash card fails. Currently, SRX5K-RE-1800X4 only supports one 128-GB SSD.

SRX5K-RE-1800X4 Routing Engine Boot Sequence

The services gateway is shipped with three copies of the Junos OS preinstalled on the Routing Engine in the following locations:

- On the CompactFlash card in the Routing Engine
- On the SSD in the Routing Engine
- On a USB flash drive that can be inserted into the slot on the Routing Engine faceplate

The Routing Engine boots from the storage media in this order: the USB device (if present), the CompactFlash card, the solid-state drive (SSD), and then the LAN. Normally, the services gateway boots from the copy of the software on the CompactFlash card.

Routing Engine SRX5K-RE-1800X4 Specifications

Each Routing Engine consists of the following components:

- **CPU**—Runs Junos OS to maintain the routing tables and routing protocols.
- **DRAM**—Provides storage for the routing and forwarding tables and for other Routing Engine processes.
- **USB port**—Provides a removable media interface through which you can install the Junos OS manually. Junos OS supports USB version 1.0 and 2.0.
- **CompactFlash card**—Provides primary storage for software images, configuration files, and microcode. The CompactFlash card is fixed and is inaccessible from outside the device.

- Solid-state drive (SSD)—Provides secondary storage for log files, for generating core files, and for rebooting the system if the CompactFlash card fails.
- Interface ports—The **AUX**, **CONSOLE**, and **ETHERNET** ports provide access to management devices. Each Routing Engine has one 10/100/1000-Mbps Ethernet port for connecting to a management network, and two asynchronous serial ports—one for connecting to a console and one for connecting to a modem or other auxiliary device.
- EEPROM—Stores the serial number of the Routing Engine.
- Reset button—Reboots the Routing Engine when pressed.
- Online/Offline button—Takes the Routing Engine online or offline when pressed.
- Extractor clips—Inserts and extracts the Routing Engine.
- Captive screws—Secures the Routing Engine in place.

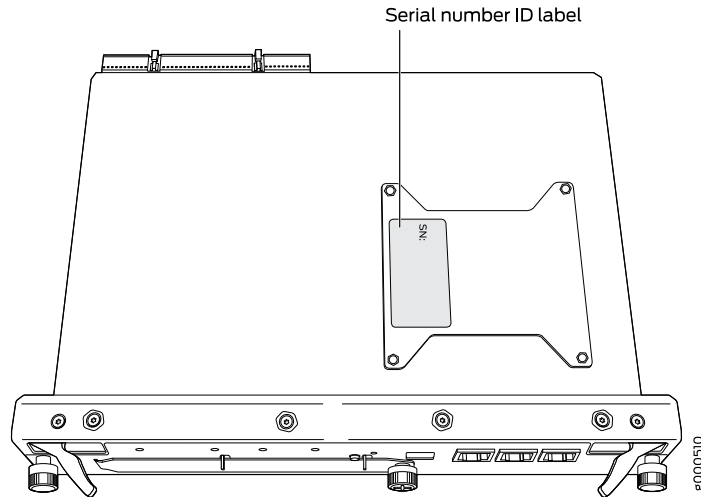
Description	Routing Engine for SRX5400, SRX5600, and SRX5800 Services Gateways
Software release	Junos OS Release 12.1X47-D15 and later
Cables and connectors	<p>Slot for Routing Engine</p> <ul style="list-style-type: none"> • AUX—Connects the Routing Engine to a laptop, a modem, or another auxiliary device through a cable with an RJ-45 connector. • CONSOLE—Connects the Routing Engine to a system console through a cable with an RJ-45 connector. • ETHERNET—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.
Controls	RESET button—Reboots the Routing Engine when pressed.
Supported slots	<p>Front panel slot in an SCB installed in:</p> <ul style="list-style-type: none"> • SRX5400: Bottom slot 0 • SRX5600: Bottom slots 0 or 1 • SRX5800: Center slots 0 or 1 <p>NOTE: The services gateway host subsystem Routing Engine must be installed in the SCB in slot 0. A Routing Engine installed in an SCB in slot 1 only enables dual control links in chassis cluster configurations.</p>
Power requirement	90 W
Weight	2.4 lb (1.1 kg)

Serial number location

The serial number label is located as shown in [Figure 28 on page 75](#).

Figure 28: SRX5K-RE-1800X4 Serial Number Label

Bottom view

**SRX5K-RE-1800X4 LEDs**

Each Routing Engine has four LEDs that indicate its status. The LEDs, labeled **MASTER**, **STORAGE**, **ONLINE**, and **OK/FAIL**, are located directly on the faceplate of the Routing Engine. [Table 26 on page 75](#) describes the Routing Engine LEDs and their states.

Table 26: SRX5K-RE-1800X4 LEDs

Label	Color	State	Description
MASTER	Blue	On steadily	Routing Engine is the primary.
STORAGE	Green	Blinking	Indicates activity on the SSD or CompactFlash card.
ONLINE	Green	Blinking	Routing Engine is transitioning online.
	None	On steadily	Routing Engine is functioning normally.
OK/FAIL	Red	On steadily	Routing Engine has failed.

Routing Engine SRX5K-RE3-128G Specifications

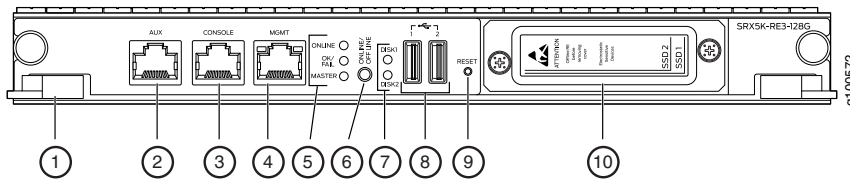
IN THIS SECTION

- [SRX5K-RE3-128G Routing Engine Components | 78](#)
- [SRX5K-RE3-128G Routing Engine LEDs | 79](#)
- [SRX5K-RE3-128G Routing Engine Boot Sequence | 80](#)

The Routing Engine maintains the routing tables, manages the routing protocols used on the device, controls the device interfaces, controls some chassis components, and provides the interfaces for system management and user access to the device.

[Figure 29 on page 76](#) shows the SRX5K-RE3-128G Routing Engine.

Figure 29: SRX5K-RE3-128G Routing Engine Front View



1—Extractor clips	6— ONLINE/OFFLINE button
2—Auxiliary port (AUX)	7—SSD LEDs— DISK1 and DISK2
3—Console port (CONSOLE)	8—USB ports— USB1 and USB2
4—Management port (MGMT)	9— RESET button
5—Routing Engine status LEDs— ONLINE , OK/FAIL , and MASTER	10—SSD card slot cover

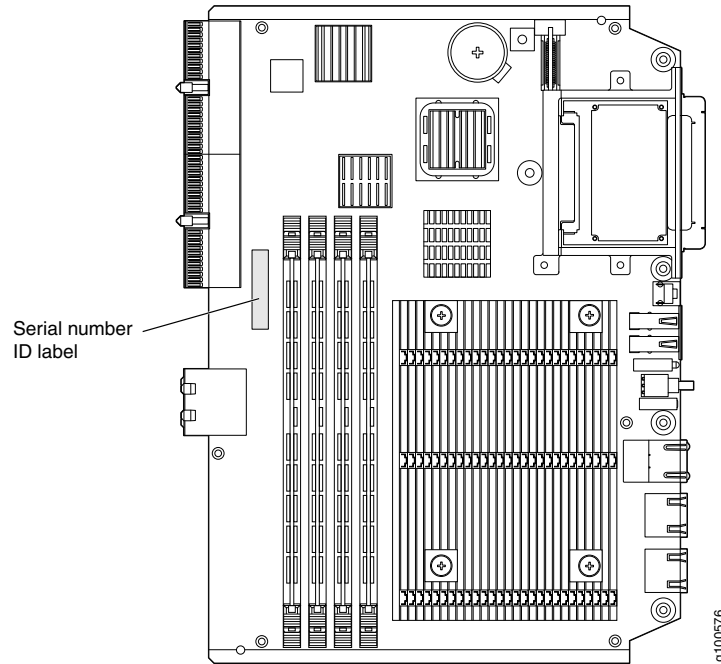
Description	Routing Engine for SRX5400, SRX5600, and SRX5800 Services Gateways, based on Intel's Haswell-EP CPU with 6 cores, and 128GB of DDR4 memory. It provides increased control plane performance and scalability along with virtualization features in the SRX Series 5000 line of chassis.
Software release	Junos OS Release 19.3R1 and later

Cables and connectors	<p>Slot for Routing Engine</p> <ul style="list-style-type: none"> ● AUX—Connects the Routing Engine to a laptop, a modem, or another auxiliary device through a cable with an RJ-45 connector. ● CONSOLE—Connects the Routing Engine to a system console through a 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.
Controls	<p>RESET button—Reboots the Routing Engine when pressed.</p>
Supported slots	<p>Front panel slot in an SCB installed in:</p> <ul style="list-style-type: none"> ● SRX5400: Bottom slot 0 ● SRX5600: Bottom slots 0 or 1 ● SRX5800: Center slots 0 or 1 <p>NOTE: The services gateway host subsystem Routing Engine must be installed in the SCB in slot 0. A Routing Engine installed in an SCB in slot 1 only enables dual control links in chassis cluster configurations.</p> <p>NOTE: In the SRX5600 or SRX5800 Services Gateways chassis cluster configurations, dual control links functionality is not supported if you mix SRX5K-RE-1800X4 and SRX5K-RE3-128G Routing Engines. To support dual control links you have to install two SRX5K-RE3-128Gs.</p>
Power requirement	<p>110 W</p>
Weight	<p>2.69 lb (1.22 kg)</p>

Serial number location

The serial number label is located as shown in [Figure 30 on page 78](#).

Figure 30: SRX5K-RE3-128G Serial Number Label



SRX5K-RE3-128G Routing Engine Components

Each Routing Engine consists of the following components:

- CPU—Runs Junos OS to maintain the routing tables and routing protocols.
- EEPROM—Stores the serial number of the Routing Engine.
- DRAM—Provides storage for the routing and forwarding tables and for other Routing Engine processes.
- One 10-Gigabit Ethernet interface between the Routing Engine and Switch Control Board.
- Extractor clips—Control the locking system that secures the Routing Engine.
- Interface ports—The **AUX**, **CONSOLE**, and **MGMT** ports provide access to management devices. Each Routing Engine has one 10/100/1000-Mbps Ethernet port for connecting to a management network, and two asynchronous serial ports—one for connecting to a console and one for connecting to a modem or other auxiliary device.

NOTE:

The control interface names differ based on the routing engine:

- For RE2, the control interfaces are displayed as **em0** and **em1**.
- For RE3, the control interfaces are displayed as **ixlv0** and **igb0**.

For more information, see *show chassis cluster interfaces*.

- Status LEDs—[Table 27 on page 79](#) describes the functions of the **ONLINE**, **OK/FAIL**, **MASTER**, **DISK1**, and **DISK2** LEDs.
- **ONLINE/OFFLINE** button—Takes the Routing Engine online or offline when pressed.

NOTE: The **ONLINE/OFFLINE** button must be pressed for a minimum of 4 seconds.

- **USB1** and **USB2** ports—Provide a removable media interface through which you can install Junos OS manually. Junos OS supports USB versions 3.0, 2.0, and 1.1.
- **RESET** button—Reboots the Routing Engine when pressed.
- **SSD1** (primary) and **SSD2** (secondary) Solid-state drives (SSD)—Two 200-GB each slim solid-state drives that provide storage for software images, configuration files, microcode, log files, and memory dumps. The Routing Engine reboots from **SSD2** when boot from primary **SSD1** fails.
- Captive screws—Secures the Routing Engine.

SRX5K-RE3-128G Routing Engine LEDs

Each Routing Engine has four LEDs that indicate its status. The LEDs, labeled **ONLINE**, **OK/FAIL**, **MASTER**, **DISK1**, and **DISK2**, are located directly on the faceplate of the Routing Engine. [Table 27 on page 79](#) describes the Routing Engine LEDs and their states.

Table 27: SRX5K-RE3-128G Routing Engine LEDs

Label	Color	State	Description
ONLINE	Green	Blinking slowly	Routing Engine is in the process of booting BIOS and the host OS.
		Blinking rapidly	Routing Engine is in the process of booting Junos OS.
	-	Off	Routing Engine is not online or not functioning normally.

Table 27: SRX5K-RE3-128G Routing Engine LEDs (*continued*)

Label	Color	State	Description
OK/FAIL	Green	On steadily	Routing Engine is powering up.
	Yellow	On steadily	Routing Engine is not powering up, which indicates failure.
MASTER	Blue	On steadily	This Routing Engine is the primary Routing Engine.
DISK1	Green	Blinking	Indicates presence of disk activity.
	-	Off	There is no disk activity.
DISK2	Green	Blinking	Indicates presence of disk activity.
	-	Off	There is no disk activity.

SRX5K-RE3-128G Routing Engine Boot Sequence

Booting in a SRX5K-RE3-128G Routing Engine follows this sequence—the USB device, SSD1, SSD2, and LAN. SSD1 is the primary boot device. The boot sequence is tried twice for SSD1 and SSD2.

RELATED DOCUMENTATION

[Replacing the SRX5400 Services Gateway SCB | 242](#)

[Maintaining the SRX5400 Services Gateway Host Subsystem | 239](#)

[Replacing the SRX5400 Services Gateway Routing Engine | 245](#)

[Replacing a CompactFlash Card in an SRX5K-RE-1800X4 Routing Engine](#)

[Replacing a Solid-State Drive in an SRX5K-RE-1800X4 Routing Engine](#)

SRX5400 Line Cards and Modules

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- [SRX5400 Services Gateway Card Cage and Slots | 86](#)
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- [Flex I/O Card Port Module SRX-IOC-16GE-SFP Specifications | 137](#)
- [Flex I/O Card Port Module SRX-IOC-16GE-TX Specifications | 139](#)
- [Flex I/O Card Port Module SRX-IOC-4XGE-XFP Specifications | 141](#)

SRX5400, SRX5600, and SRX5800 Services Gateway Card Overview

The cards described in this guide let you upgrade and customize your SRX5400, SRX5600, or SRX5800 Services Gateway to suit the needs of your network. The following types of cards are available for the SRX5400, SRX5600, and SRX5800 Services Gateways:

- I/O cards (IOCs) provide additional physical network connections to the services gateway. Their primary function is to deliver data packets arriving on the physical ports to the Services Processing Cards (SPCs) and to forward data packets out the physical ports after services processing.
- Flex IOCs have two slots for port modules that add additional physical network connections to the services gateway. Like IOCs, their primary function is to deliver data packets arriving on the physical ports to the SPCs and to forward data packets out the physical ports after services processing.
- Modular Port Concentrators (MPCs) have slots on the front panel that accept smaller cards called Modular Interface Cards (MICs). Each MIC has one or more physical interfaces on it. An MPC with MICs installed functions in the same way as a regular I/O card (IOC), but allows greater flexibility in adding different types of Ethernet ports to your services gateway. MPCs and MICs are similar in form and function to Flex IOCs and port modules. However, the two use different form-factors, so you cannot install port modules in an MPC, nor can you install MICs in a Flex IOC.
- Services Processing Cards (SPCs) provide the processing power to run integrated services such as firewall, IPsec and IDP. All traffic traversing the services gateway is passed to an SPC to have services processing applied to it.
- Switch Control Boards (SCBs) power on and power off IOCs and SPCs; control clocking and system resets; and control booting, monitor, and system functions. Each SCB has a slot in the front panel for a Routing Engine.

Although the following modules are not cards in the sense of having a form-factor that fits the card cage of the SRX5400, SRX5600, and SRX5800 Services Gateway, this guide also addresses the following modules that fit into certain SRX5400, SRX5600, and SRX5800 Services Gateway cards:

- Routing Engines fit into slots in SCBs and maintain the routing tables, manage the routing protocols used on the device, control the device interfaces and some chassis components, and provide the interface for system management and user access to the device.
- Port modules fit into slots in Flex IOCs and add additional physical network interface ports to the services gateway.
- Modular Interface Cards (MICs) fit into slots in MPCs and add additional physical network interface ports to the services gateway. MPCs and MICs are similar in form and function to Flex IOCs and port modules. However, the two use different form-factors, so you cannot install port modules in an MPC, nor can you install MICs in a Flex IOC.

Cards Supported on SRX5400, SRX5600, and SRX5800 Services Gateways

Table 28 on page 83 describes the cards and other modules supported on the SRX5400, SRX5600, and SRX5800 Services Gateways.

Table 28: Supported Cards for SRX5400, SRX5600, and SRX5800 Services Gateways

Card Name and Model Number	Earliest Supported Junos OS Release		Last Supported Junos OS Release
	SRX5400	SRX5600 and SRX5800	SRX5400, SRX5600, and SRX5800

SPCs

<i>Services Processing Card SRX5K-SPC-2-10-40 Specifications</i>	Not supported	9.2	15.1X49
<i>Services Processing Card SRX5K-SPC-4-15-320 Specifications</i>	12.1X46-D10	12.1X44-D10	
<i>Services Processing Card SRX5K-SPC3 Specifications</i>	18.2R1-S1	18.2R1-S1	

Interface Cards

<i>I/O Card SRX5K-40GE-SFP Specifications</i>	Not supported	9.2	15.1X49
<i>I/O Card SRX5K-4XGE-XFP Specifications</i>	Not supported	9.2	15.1X49
<i>Flex I/O Card (SRX5K-FPC-IOC) Specifications</i>	Not supported	10.2	15.1X49
<i>Modular Port Concentrator (SRX5K-MPC) Specifications</i>	12.1X46-D10	12.1X46-D10	
<i>SRX5K-MPC3-40G10G Specifications</i>	15.1X49-D10	15.1X49-D10	
<i>SRX5K-MPC3-100G10G Specifications</i>	15.1X49-D10	15.1X49-D10	

Table 28: Supported Cards for SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Card Name and Model Number	Earliest Supported Junos OS Release		Last Supported Junos OS Release
	SRX5400	SRX5600 and SRX5800	SRX5400, SRX5600, and SRX5800
<i>SRX5K-IOC4-10G Specifications</i>	19.3R1	19.3R1	
<i>SRX5K-IOC4-MRAT Specifications</i>	19.3R1	19.3R1	
SCBs			
<i>Switch Control Board SRX5K-SCB Specifications</i>	12.1X46-D10	9.2	15.1X49
<i>Switch Control Board SRX5K-SCBE Specifications</i>	12.1X47-D15	12.1X47-D15	
<i>Switch Control Board SRX5K-SCB3 Specifications</i>	15.1X49-D10	15.1X49-D10	
<i>Switch Control Board SRX5K-SCB4 Specifications</i>	Not supported	19.3R1	
Other modules			
<i>Flex I/O Card Port Module SRX-IOC-16GE-SFP Specifications</i>	Not supported	10.2	
<i>Flex I/O Card Port Module SRX-IOC-16GE-TX Specifications</i>	Not supported	10.2	
<i>Flex I/O Card Port Module SRX-IOC-4XGE-XFP Specifications</i>	Not supported	10.2	
<i>MIC with 1x100GE CFP Interface (SRX-MIC-1X100G-CFP)</i>	12.1X46-D10	12.1X46-D10	

Table 28: Supported Cards for SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Card Name and Model Number	Earliest Supported Junos OS Release		Last Supported Junos OS Release
	SRX5400	SRX5600 and SRX5800	SRX5400, SRX5600, and SRX5800
<i>MIC with 2x40GE QSFP+ Interfaces (SRX-MIC-2X40G-QSFP)</i>	12.1X46-D10	12.1X46-D10	
<i>MIC with 10x10GE SFP+ Interfaces (SRX-MIC-10XG-SFPP)</i>	12.1X46-D10	12.1X46-D10	
<i>MIC with 20x1GE SFP Interfaces (SRX-MIC-20GE-SFP)</i>	12.1X47-D10	12.1X47-D10	
<i>Routing Engine SRX5K-RE-13-20 Specifications</i>	12.1X46-D10	9.2	12.3X48
<i>Routing Engine SRX5K-RE-1800X4 Specifications</i>	12.1X47-D15	12.1X47-D15	
<i>Routing Engine SRX5K-RE3-128G Specifications</i>	19.3R1	19.3R1	

Figure 31 on page 86 is an interoperability matrix that describes the compatibility between various interface cards for the SRX5400, SRX5600, and SRX5800 Services Gateways.

Figure 31: Interoperability Matrix for SRX5400, SRX5600, and SRX5800 Services Gateways

Model Numbers	SRX5400 SRX5K-SCB SRX5K-RE-13-20	SRX5600/SRX5800 SRX5K-SCB SRX5K-RE-13-20	SRX5K-SCBE SRX5K-RE-1800X4	SRX5K-SCB3 SRX5K-RE-1800X4	SRX5K-SPC-2-10-40	SRX5K-SPC-4-15-320	SRX5K-SPC3	SRX5K-4XGE-XFP SRX5K-40GE-SFP SRX5K-FPC-IOC	SRX5K-MPC (SRX-MIC-20GE-SFP) (SRX-MIC-10XG-SFP) (SRX-MIC-1X100G-CFP) (SRX-MIC-2X40G-QSFP)	SRX5K-MPC3-40G10G SRX5K-MPC3-100G10G	SRX5K-IOC4-10G SRX5K-IOC4-MRAT	SRX5600/SRX5800 SRX5K-SCB4 SRX5K-RE3-128G	SRX5600/SRX5800 SRX5K-SCB4 SRX5K-RE-1800X4	SRX5K-SCB3 SRX5K-RE3-128G
SRX5400 SRX5K-SCB SRX5K-RE-13-20	✓	✗	✗	✗	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗
SRX5600/SRX5800 SRX5K-SCB SRX5K-RE-13-20	✗	✓	✗	✗	✓	✓	✗	✓	✓	✗	✗	✗	✗	✗
SRX5K-SCBE SRX5K-RE-1800X4	✗	✗	✓	✗	✗	✓	✓	✗	✓	✓	✗	✗	✗	✗
SRX5K-SCB3 SRX5K-RE-1800X4	✗	✗	✗	✓	✗	✓	✓	✗	✓	✓	✓	✗	✗	✗
SRX5K-SPC-2-10-40	✗	✓	✗	✗	✓	✓	✗	✓	✓	✗	✗	✗	✗	✗
SRX5K-SPC-4-15-320	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SRX5K-SPC3	✗	✗	✓	✓	✗	✓	✓	✗	✓	✓	✓	✓	✓	✓
SRX5K-4XGE-XFP SRX5K-40GE-SFP SRX5K-FPC-IOC	✗	✓	✗	✗	✓	✓	✗	✓	✓	✗	✗	✗	✗	✗
SRX5K-MPC (SRX-MIC-20GE-SFP) (SRX-MIC-10XG-SFP) (SRX-MIC-1X100G-CFP) (SRX-MIC-2X40G-QSFP)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SRX5K-MPC3-40G10G SRX5K-MPC3-100G10G	✗	✗	✓	✓	✗	✓	✓	✗	✓	✓	✓	✓	✓	✓
SRX5K-IOC4-10G SRX5K-IOC4-MRAT	✗	✗	✗	✓	✗	✓	✓	✗	✓	✓	✓	✓	✓	✓
SRX5600/SRX5800 SRX5K-SCB4 SRX5K-RE3-128G	✗	✗	✗	✗	✗	✓	✓	✗	✓	✓	✓	✓	✗	✗
SRX5600/SRX5800 SRX5K-SCB4 SRX5K-RE-1800X4	✗	✗	✗	✗	✗	✓	✓	✗	✓	✓	✓	✗	✓	✗
SRX5K-SCB3 SRX5K-RE3-128G	✗	✗	✗	✗	✗	✓	✓	✗	✓	✓	✓	✗	✗	✓

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SRX5400 Services Gateway Card Cage and Slots

The card cage is the set of four horizontal slots in the front of the chassis where you install cards. The slots are numbered from bottom to top. [Table 29 on page 86](#) describes the types of cards that you can install into each slot.

Table 29: SRX5400 Services Gateway Card Cage Slots

Card Cage Slot	Eligible Cards		
	SPC	MPC & IOC	SCB
2	X	X	

Table 29: SRX5400 Services Gateway Card Cage Slots (continued)

Card Cage Slot	Eligible Cards		
	SPC	MPC & IOC	SCB
1	X	X	
1/0	X	X	X
0			X

SEE ALSO

[SRX5400 Services Gateway Midplane Description | 30](#)

[SRX5400 Services Gateway Chassis | 27](#)

SRX5400 Services Gateway Services Processing Card Overview

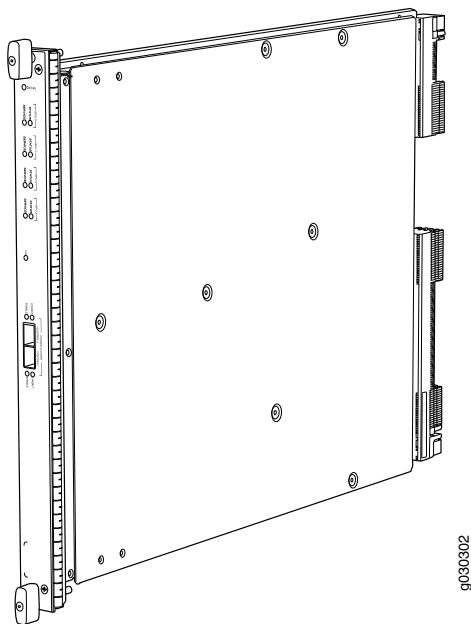
The Services Processing Card (SPC) has Services Processing Units (SPUs), which provide the processing power to run integrated services such as firewall, IPsec, and IDP (see [Figure 32 on page 88](#)). All traffic traversing the services gateway is passed to an SPU to have services processing applied to it. Traffic is intelligently distributed by interface cards to SPUs for services processing.

The services gateway must have one SPC installed.

You can install an SPC in any of the slots that are not reserved for Switch Control Board (SCB). If a slot is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the device.

[Figure 32 on page 88](#) shows a typical SPC supported on the services gateway.

Figure 32: Typical SPC



For detailed information about SPCs supported by the services gateway, see the [SRX5400, SRX5600, and SRX5800 Services Gateway Card Reference](#) at www.juniper.net/documentation/.

Services Processing Card SRX5K-SPC-2-10-40 Specifications

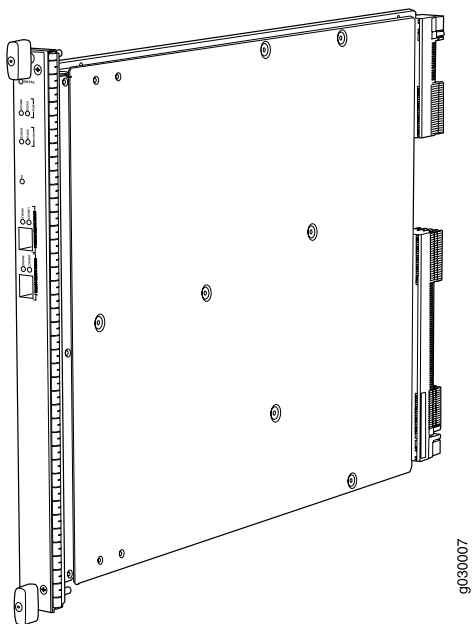
The SRX5K-SPC-2-10-40 Services Processing Card (SPC) contains two Services Processing Units (SPUs), which provide the processing power to run integrated services such as firewall, IPsec, and IDP (see [Figure 33 on page 89](#)). All traffic traversing the services gateway is passed to an SPU to have services processing applied to it. Traffic is intelligently distributed by I/O cards (IOCs) to SPUs for services processing.

The services gateway must have at least one SPC installed. You can install additional SPCs to increase services processing capacity.

You can install SPCs in any of the slots that are not reserved for Switch Control Boards (SCBs). If a slot is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the device.

[Figure 33 on page 89](#) shows a typical SPC supported on the services gateway.

Figure 33: Services Processing Card SRX5K-SPC-2-10-40



Each SPC consists of the following components:

- SPC cover, which functions as a ground plane and a stiffener.
- Two small form-factor pluggable (SFP) chassis cluster control ports for connecting multiple devices into a redundant chassis cluster. See [Chassis Cluster User Guide for SRX Series Devices](#) for more information about connecting and configuring redundant chassis clusters.



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

- Fabric interfaces.
- Two Gigabit Ethernet interfaces that allow control information, route information, and statistics to be sent between the Routing Engine and the CPU on the SPCs.
- Two interfaces from the SCBs that enable the boards to be powered on and controlled.
- Physical SPC connectors.
- Midplane connectors and power circuitry.

- Processor subsystem, which includes a 1.2-GHz CPU, system controller, and 1 GB of SDRAM.
- LEDs on the faceplate that indicate the SPC and SPU status.

Description	SPC with two SPUs
Software release	<ul style="list-style-type: none"> • Junos OS Release 9.2 and later
Cables and connectors	<p>CHASSIS CLUSTER CONTROL 0 and CHASSIS CLUSTER CONTROL 1—SFP ports for control links in chassis cluster configurations.</p> <p>Supported SFP transceivers:</p> <p>1000BASE-LH (model numbers SRX-SFP-1GE-LH, SRX-SFP-1GE-LH-ET)</p> <p>1000BASE-LX (model numbers SRX-SFP-1GE-LX, SRX-SFP-1GE-LX-ET)</p> <p>1000BASE-SX (model numbers SRX-SFP-1GE-SX, SRX-SFP-1GE-SX-ET)</p>
Controls	None
Supported Slots	<ul style="list-style-type: none"> • SRX5600—Any slot, except the bottom slots 0 or 1 which are reserved for SCB/RE. • SRX5800—Any slot, except the slots 0 or 1 which are reserved for SCB/RE.
Power Requirement	Maximum 351 W
Weight	Approximately 13 lb (5.9 kg)

LEDs



OK/FAIL LED, one bicolor:

- Steady green–The SPC is operating normally.
- Red–The SPC has failed and is not operating normally.
- Off–The SPC is powered down.

STATUS LED, one tricolor for each of the two SPUs **SPU 0** and **SPU 1**:

- Green–The SPU is operating normally.
- Amber–The SPU is initializing.
- Red–The SPU has encountered an error or a failure.
- Off–The SPU is offline. If all four SPUs are offline, it is safe to remove the SPC from the chassis.

SERVICE LED, one bicolor for each of the two SPUs, **SPU 0** and **SPU 1**:

- Green–Service is running on the SPU under acceptable load.
- Amber–Service on the SPU is overloaded.
- Off–Service is not running on the SPU.

HA LED, one tricolor:

NOTE: The **HA LED** is lit only if the SPC has a control link, otherwise it is off.

Sometimes even after the control link is removed from the SPC, the **HA LED** would lit. Power cycle both the nodes to turn off the LED,

- Green (bold)–Clustering is operating normally. All cluster members and monitored links are available, and no error conditions are detected.
- Green (blinking)–Data transfer between the nodes.
- Red–A critical alarm is present on clustering. A cluster member is missing or unreachable, or the other node is no longer part of a cluster because it has been disabled by the dual membership and detection recovery process in reaction to a control link or fabric link failure.
- Amber–All cluster members are present, but an error condition has compromised the performance and resiliency of the cluster. The reduced bandwidth could cause packets to be dropped or could result in reduced resiliency because a single point of failure might exist. The error condition might be caused by:
 - The loss of chassis cluster links which causes an interface monitoring failure.
 - An error in an SPU or NPU.
 - Failure of the spu-monitoring or cold-sync-monitoring processes.
 - A chassis cluster IP monitoring failure.

LINK/ACT LED, one for each of the two ports **CHASSIS CLUSTER CONTROL 0** and **CHASSIS CLUSTER CONTROL 1**:

- Green (flickering)–Chassis cluster control port link is active.
- Off–No link.

ENABLE LED, one for each of the two ports **CHASSIS CLUSTER CONTROL 0** and **CHASSIS**

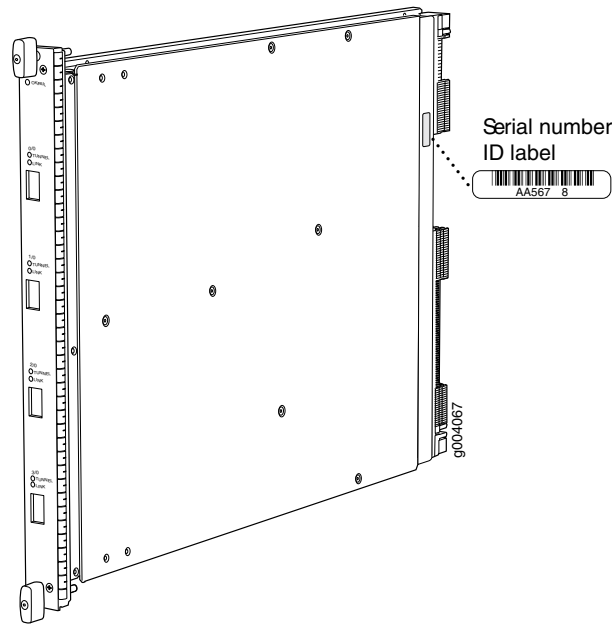
CLUSTER CONTROL 1:

- Green—The chassis cluster control port is enabled.
- Off—The chassis cluster control port is disabled.

Serial Number Location

The serial number label is located as shown in [Figure 34 on page 93](#).

Figure 34: Serial Number Label (IOC Shown, Other Cards Similar)



Services Processing Card SRX5K-SPC-4-15-320 Specifications

The SRX5K-SPC-4-15-320 Services Processing Card (SPC) contains four Services Processing Units (SPUs), which provide the processing power to run integrated services such as firewall, IPsec, and IDP (see [Figure 35 on page 94](#)). All traffic traversing the services gateway is passed to an SPU to have services processing applied to it. Traffic is intelligently distributed by I/O cards (IOCs) to SPUs for services processing.

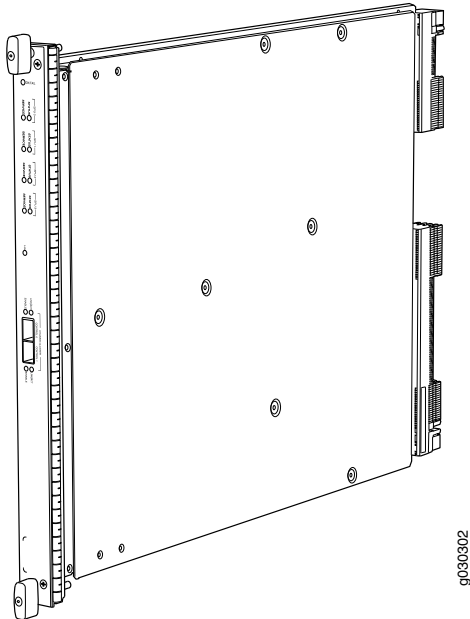
The services gateway must have at least one SPC installed. You can install additional SPCs to increase services processing capacity.

You can install SPCs in any of the slots that are not reserved for Switch Control Boards (SCBs). If a slot is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the device.

If your services gateway contains a mix of SRX5K-SPC-4-15-320 SPCs and earlier SRX5K-SPC-2-10-40 SPCs, an SRX5K-SPC-4-15-320 SPC must occupy the lowest-numbered slot of any SPC in the chassis.

This configuration ensures that the center point (CP) function is performed by the faster and higher-performance SPC type.

Figure 35: Services Processing Card SRX5K-SPC-4-15-320



Each SPC consists of the following components:

- SPC cover, which functions as a ground plane and a stiffener.
- Two small form-factor pluggable (SFP) chassis cluster control ports for connecting multiple devices into a redundant chassis cluster. See [Chassis Cluster User Guide for SRX Series Devices](#) for more information about connecting and configuring redundant chassis clusters.



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

- Fabric interfaces.
- Two Gigabit Ethernet interfaces that allow control information, route information, and statistics to be sent between the Routing Engine and the CPU on the SPCs.
- Two interfaces from the SCBs that enable the boards to be powered on and controlled.
- Physical SPC connectors.

- Midplane connectors and power circuitry.
- Processor subsystem, which includes a 1.2-GHz CPU, system controller, and 1 GB of SDRAM.
- LEDs on the faceplate that indicate the SPC and SPU status.

Description	SPC with four SPUs
Software release	<ul style="list-style-type: none"> • Junos OS Release 12.1X44-D10 and later
Cables and connectors	<p>CHASSIS CLUSTER CONTROL 0 and CHASSIS CLUSTER CONTROL 1—SFP ports for control links in chassis cluster configurations.</p> <p>Supported SFP transceivers:</p> <p>1000BASE-LH (model numbers SRX-SFP-1GE-LH, SRX-SFP-1GE-LH-ET)</p> <p>1000BASE-LX (model numbers SRX-SFP-1GE-LX, SRX-SFP-1GE-LX-ET)</p> <p>1000BASE-SX (model numbers SRX-SFP-1GE-SX, SRX-SFP-1GE-SX-ET)</p>
Controls	None
Supported Slots	<ul style="list-style-type: none"> • SRX5400—Any slot, except the bottom slot 0 which is reserved for SCB/RE. • SRX5600—Any slot, except the bottom slots 0 or 1 which are reserved for SCB/RE. • SRX5800—Any slot, except the slots 0 or 1 which are reserved for SCB/RE.
Power Requirement	<p>475 W typical, 585 W maximum</p> <p>NOTE:</p> <ul style="list-style-type: none"> • In the SRX5600 and SRX5800 Services Gateways, you must have high-capacity power supplies (either AC or DC) and high-capacity fan trays installed in the services gateway in order to install and use SRX5K-SPC-4-15-320 SPCs. If you do not have high-capacity power supplies and fan trays installed, the services gateway will log an alarm condition when it recognizes the SRX5K-SPC-4-15-320 SPCs. • On SRX5600 Services Gateways with AC power supplies, we recommend that you use high-line (220v) input power to ensure the device has adequate power to support SRX5K-SPC-4-15-320 SPCs.
Weight	Approximately 18 lb (8.3 kg)

LEDs



OK/FAIL LED, one bicolor:

- Steady green—The SPC is operating normally.
- Red—The SPC has failed and is not operating normally.
- Off—The SPC is powered down.

STATUS LED, one tricolor for each of the four SPUs **SPU 0** through **SPU 3**:

- Green—The SPU is operating normally.
- Amber—The SPU is initializing.
- Red—The SPU has encountered an error or a failure.
- Off—The SPU is offline. If all four SPUs are offline, it is safe to remove the SPC from the chassis.

SERVICE LED, one bicolor for each of the four SPUs **SPU 0** through **SPU 3**:

- Green—Service is running on the SPU under acceptable load.
- Amber—Service on the SPU is overloaded.
- Off—Service is not running on the SPU.

HA LED, one tricolor:

- Green—Clustering is operating normally. All cluster members and monitored links are available, and no error conditions are detected.
- Red—A critical alarm is present on clustering. A cluster member is missing or unreachable, or the other node is no longer part of a cluster because it has been disabled by the dual membership and detection recovery process in reaction to a control-link or fabric-link failure.
- Amber—All cluster members are present, but an error condition has compromised the performance and resiliency of the cluster. The reduced bandwidth could cause packets to be dropped or could result in reduced resiliency because a single point of failure might exist. The error condition might be caused by:
 - The loss of chassis cluster links which causes an interface monitoring failure.
 - An error in an SPU or NPU.
 - Failure of the spu-monitoring or cold-sync-monitoring processes.
 - A chassis cluster IP monitoring failure.
- Off—The node is not configured for clustering or it has been disabled by the dual membership and detection recovery process in reaction to a control link or fabric link failure.

LINK/ACT LED, one for each of the two ports **CHASSIS CLUSTER CONTROL 0** and **CHASSIS CLUSTER CONTROL 1**:

- Green—Chassis cluster control port link is active.
- Off—No link.

ENABLE LED, one for each of the two ports **CHASSIS CLUSTER CONTROL 0** and **CHASSIS CLUSTER CONTROL 1**:

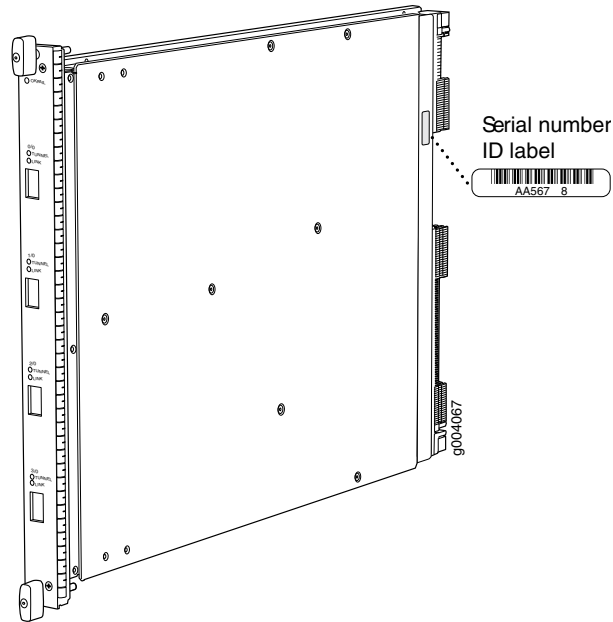
- Green—The chassis cluster control port is enabled.

- Off—The chassis cluster control port is disabled.

Serial Number Location

The serial number label is located as shown in [Figure 36 on page 98](#).

Figure 36: Serial Number Label (IOC Shown, Other Cards Similar)



Services Processing Card SRX5K-SPC3 Specifications

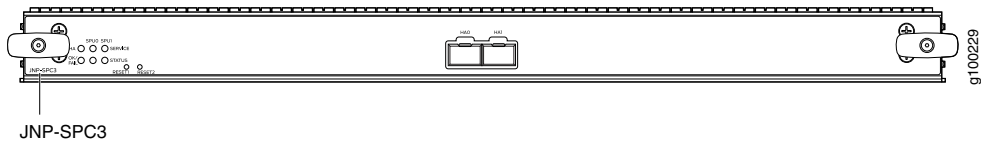
The SRX5K-SPC3 Services Processing Card (SPC) contains two Services Processing Units (SPUs) with 128GB of memory per SPU, that provide the processing power to run integrated services such as firewall, IPsec, and IDP (see [Figure 37 on page 99](#)). All traffic traversing the services gateway is passed to an SPU to have services processing applied to it. Traffic is intelligently distributed by I/O cards (IOCs) to SPUs for services processing.

The services gateway must have at least one SPC installed. You can install additional SPCs to increase services processing capacity.

SPCs cannot be installed in slots that are reserved for Switch Control Boards (SCBs) or in slot **11** on the SRX5800. If a slot is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the device.

NOTE: Your services gateway cannot have a mix of SRX5K-SPC-2-10-40 SPCs and SRX5K-SPC3 SPCs. Starting with Junos OS release 18.2R2 and then 18.4R1 but not 18.3R1, you can have a mix of SRX5K-SPC-4-15-320 SPCs and SRX5K-SPC3 SPCs.

Figure 37: Services Processing Card SRX5K-SPC3



Each SPC consists of the following components:

- SPC cover, which functions as a ground plane and a stiffener.
- Two 10-Gigabit Ethernet small form-factor pluggable plus (SFP+) chassis cluster control ports for connecting multiple devices into a redundant chassis cluster. See the [Chassis Cluster User Guide for SRX Series Devices](#) for more information about connecting and configuring redundant chassis clusters.



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

- Fabric interfaces
- One Gigabit Ethernet switch that provides control connectivity to the Routing Engine.
- Two interfaces from the SCBs that enable the boards to be powered on and controlled.
- Physical SPC connectors
- Midplane connectors and power circuitry.
- Processor subsystem, which includes a 2.3-GHz CPU, system controller, and two 128 GB solid state-drives (SSDs).
- LEDs on the faceplate that indicate the SPC and SPU status.

Description	SPC with two SPUs of 256 GB memory.
-------------	-------------------------------------

Software release	<ul style="list-style-type: none"> • Junos OS Release 18.2R1-S1
Cables and connectors	<p>HA0 and HA1 SFP+ ports for control links in chassis cluster configurations.</p> <p>Supported transceivers:</p> <ul style="list-style-type: none"> • 10GBASE-LR: transceiver model number SRX-SFP-10GE-LR • 10GBASE-SR: transceiver model number SRX-SFP-10GE-SR
Controls	None
Supported Slots	<ul style="list-style-type: none"> • SRX5400—Any slot, except the bottom slot 0 which is reserved for SCB/RE. • SRX5600—Any slot, except the bottom slots 0 or 1 which are reserved for SCB/RE. • SRX5800—Any slot, except slot 11, and the slots 0 or 1 which are reserved for SCB/RE.
Power Requirement	<p>650 W maximum</p> <p>NOTE:</p> <ul style="list-style-type: none"> • In the SRX5600 and SRX5800 Services Gateways, you must have high-capacity power supplies (either AC or DC) and high-capacity fan trays installed in the services gateway in order to install and use SRX5K-SPC3 SPCs. If you do not have high-capacity power supplies and fan trays installed, the services gateway will log an alarm condition when it recognizes the SRX5K-SPC3 SPCs. • On SRX5600 Services Gateways with AC power supplies, we recommend that you use high-line (220v) input power to ensure the device has adequate power to support SRX5K-SPC3 SPCs.
Weight	Approximately 18 lb (8.3 kg)

LEDs

OK/FAIL LED, one bicolor:

- Steady green–The SPC is operating normally.
- Red–The SPC has failed and is not operating normally.
- Off–The SPC is powered down.

STATUS LED, one tricolor for each SPU **SPU 0** and **SPU 1**:

- Off–The SPU is offline.
- Blinking Amber–The SPU is initializing.
- Green–The SPU initialization is done and it is operating normally.
- Red–The SPU has encountered an error or a failure.

SERVICE LED, one tricolor for each SPU **SPU 0** and **SPU 1**:

- Off–The SPU is offline.
- Blinking Red–The SPU initialization is done.
- Blinking Amber–Service is initializing on the SPU.
- Green–Service is running on the SPU under acceptable load.
- Solid Red–Service encountered an error or a failure.

HA LED, one tricolor:

- Green–Clustering is operating normally. All cluster members and monitored links are available, and no error conditions are detected.
- Red–A critical alarm is present on clustering. A cluster member is missing or unreachable, or the other node is no longer part of a cluster because it has been disabled by the dual membership and detection recovery process in reaction to a control-link or fabric-link failure.
- Amber–All cluster members are present, but an error condition has compromised the performance and resiliency of the cluster. The reduced bandwidth could cause packets to be dropped or could result in reduced resiliency because a single point of failure might exist. The error condition might be caused by:
 - The loss of chassis cluster links which causes an interface monitoring failure.
 - An error in an SPU or NPU.
 - Failure of the spu-monitoring or cold-sync-monitoring processes.
 - A chassis cluster IP monitoring failure.
- Off–The node is not configured for clustering or it has been disabled by the dual membership and detection recovery process in reaction to a control link or fabric link failure.

LINK/ACT LED, one for each of the two ports **CHASSIS CLUSTER CONTROL 0** and **CHASSIS CLUSTER CONTROL 1**:

- Green–Chassis cluster control port link is active.
- Off–No link.

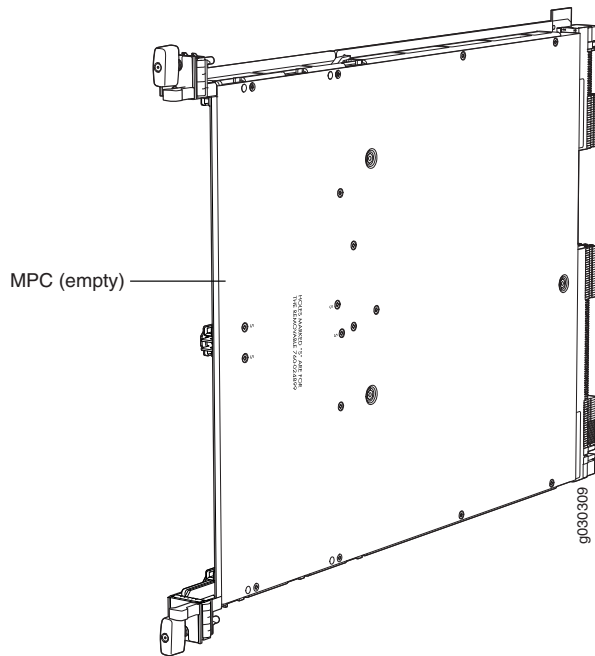
SRX5400 Services Gateway MPC and MIC Overview

Modular Port Concentrators (MPCs; see [Figure 38 on page 102](#)) are interface cards with two slots that accept Modular Interface Cards (MICs). These MICs add Ethernet ports to your services gateway. You must install at least one MPC in the services gateway. You can install MPCs into any of the slots **0/1**, **1**, and **2** at the bottom of the card cage. You cannot install the MPC into the SCB slot (**0**).

NOTE: The SRX5400 Services Gateway does not support the I/O cards (IOCs) or Flex IOCs supported by the SRX5600 and SRX5800 Services Gateways. MPCs are the only supported interface cards for the SRX5400 Services Gateway.

If a slot in the card cage is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the services gateway. If a slot in an MPC is not occupied by a MIC, you must install a blank panel in the empty MIC slot to shield it and to allow cooling air to circulate properly through the MPC.

Figure 38: SRX5K-MPC



Modular Port Concentrator (SRX5K-MPC) Specifications

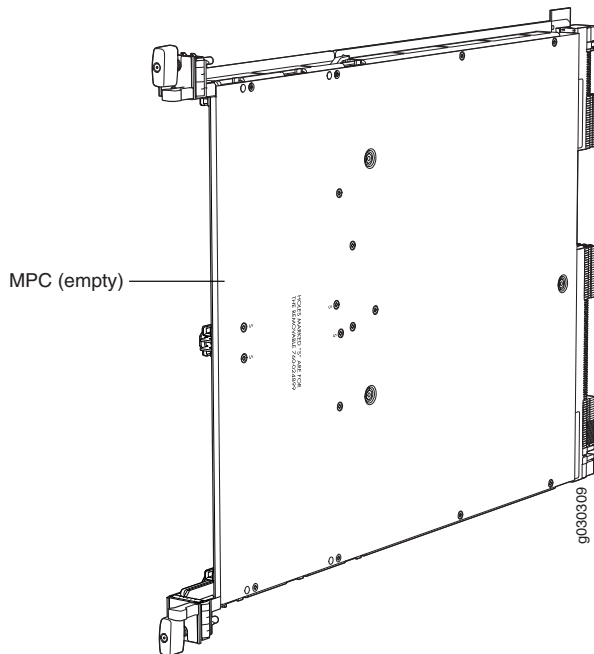
The SRX5K-MPC (see [Figure 39 on page 103](#)) is an interface card with two slots that accept MICs. These MICs add Ethernet ports to your services gateway. An MPC with MICs installed functions in the same way as a regular IOC but allows you to add different types of Ethernet ports to your services gateway. MPCs and MICs are similar in form and function to Flex IOCs and port modules. However, the two use different form-factors, so you cannot install port modules in an MPC, nor can you install MICs in a Flex IOC.

You must install at least one interface card in the services gateway. The interface card can be of any of the available IOC, Flex IOC, or MPC types. You can add just one MIC; or you can add two MICs of the same or different types.

You can install MPCs in any of the slots that are not reserved for Switch Control Boards (SCBs).

If a slot in the SRX5400, SRX5600, or SRX5800 Services Gateway card cage is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the services gateway. If a slot in an MPC is not occupied by a MIC, you must install a blank panel in the empty MIC slot to shield it and to allow cooling air to circulate properly through the MPC.

Figure 39: SRX5K-MPC



NOTE: When installing an SRX5K-MPC in an SRX5600 or SRX5800 Services Gateway:

- If the **session-distribution-mode** has not been explicitly configured using the CLI command:

```
user@host set security forwarding-process application-services session-distribution-mode
```

The SRX5K-MPC defaults to hash-based mode automatically even if existing SRX5K-MPC or non-MPCs are installed. You cannot set the **session-distribution-mode** to **normal**.

- If the **session-distribution-mode** has been explicitly configured to **normal**, and the MIC is installed in the device, then the SRX5K-MPC will remain offline, and the services gateway generates a major alarm and logs the event for troubleshooting. You must explicitly configure the **session-distribution-mode** using the CLI command:

```
user@host set security forwarding-process application-services session-distribution-mode hash-based
```

When installing an SRX5K-MPC in an SRX5400 Services Gateway, the **session-distribution-mode** will only function when **hash-based** mode is configured or set as the default. The normal mode is not supported.

A 9% drop is observed for PPS (throughput) when moving from session mode to hash mode (for SRX5K-MPC or non-MPCs), whereas no drop in performance is observed on CPS (connection per second) and session capacity numbers.

For more information about the CLI command, see the Junos OS documentation at www.juniper.net/documentation/.

Description	<ul style="list-style-type: none"> • MPC with slots for two MICs • Maximum throughput: 75 Gbps per slot from Junos OS Release 12.1X46-D10 and later 120 Gbps per slot from Junos OS Release 12.1x47-D15 and later
Software release	Junos OS Release 12.1x46-D10
Cables and connectors	Slots for two MICs
Controls	One ejector knob each for MIC slots 0 and 1 . Pull the ejector knob to unseat and partially eject the adjacent MIC.
Supported slots	<ul style="list-style-type: none"> • SRX5400—Any slot except bottom slot 0 • SRX5600—Any slot except bottom slots 0 or 1 • SRX5800—Any slot except center slots 0 or 1

Power requirement	<p>Maximum of 570 W for the MPC with two MICs, including applicable transceivers.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • To install and use SRX5K-MPCs in the SRX5600 and SRX5800 Services Gateways, you must have high-capacity power supplies (either AC or DC) and high-capacity fan trays installed in the services gateways. All models of SRX5400 Services Gateways already include high-capacity supplies. If you do not have high-capacity power supplies and fan trays installed, the services gateway will log an alarm condition when it recognizes the SRX5K-MPCs. • On SRX5400 and SRX5600 Services Gateways with AC power supplies, we recommend that you use high-line (220 V) input power to ensure that the devices have adequate power to support SRX5K-MPCs.
Weight	Approximately 10 lb (4.5 kg) without MICs
LEDs	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> • Green—The MPC is operating normally. • Blinking green—The MPC is transitioning to online or offline. • Red—The MPC has failed and is not operating normally. • Off—The MPC is powered down.
Serial number location	The serial number label is yellow and is located on the opposite side of the card.

SRX5K-MPC3-40G10G Specifications

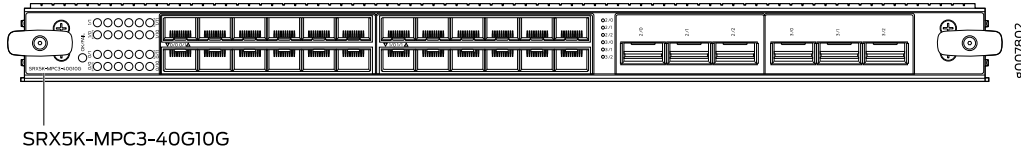
The SRX5K-MPC3-40G10G (IOC3) is an interface card that provides 10 Gigabit Ethernet and 40 Gigabit Ethernet interfaces, with a Packet Forwarding Engine that provides a 240 Gbps line rate. This interface card is supported on SRX5400, SRX5600, and SRX5800 Services Gateways. See [Figure 40 on page 106](#).

NOTE: These cards do not support plug-in Modular Interface Cards (MICs).

All ports on the interface card have dual-color LEDs for reporting link status.

The interface card also supports hot-pluggable optical modules.

Figure 40: SRX5K-MPC3-40G10G



If a slot in the SRX5400, SRX5600, or SRX5800 Services Gateway card cage is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the services gateway.

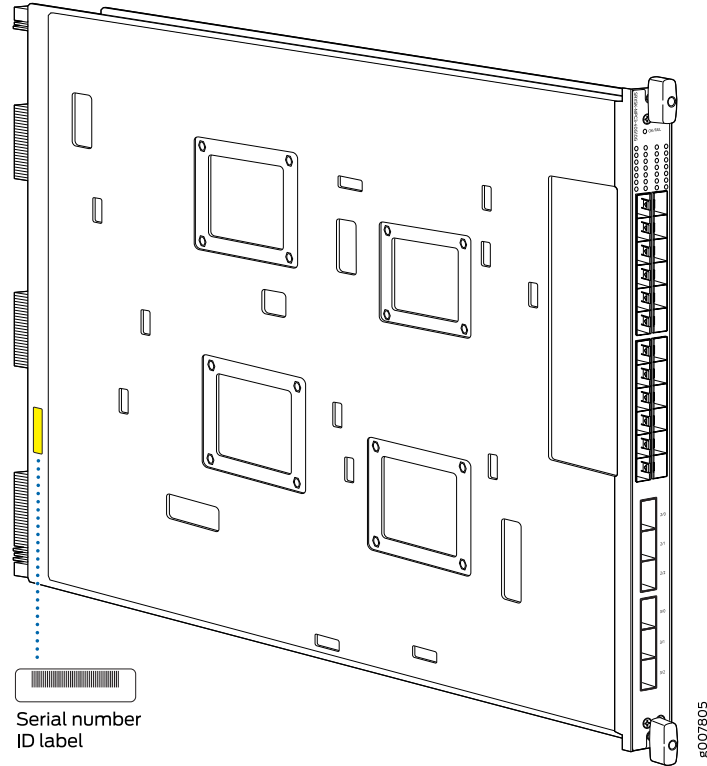
Description	<ul style="list-style-type: none"> • Fixed-configuration MPC with six 40-Gigabit Ethernet ports and twenty-four 10-Gigabit Ethernet ports • Maximum throughput: 240 Gbps • Maximum configurable MTU: 9192 bytes
Software release	Junos OS Release 15.1X49-D10 and later
Supported Slots	<ul style="list-style-type: none"> • SRX5400 – Any slot, except the bottom slot 0 which is reserved for SCB/RE. • SRX5600 – Any slot, except the bottom slots 0 or 1 which are reserved for SCB/RE. • SRX5800 – Any slot, except the middle slots 0, 1, and 2/6 which are reserved for SCB/RE and slots 0 (left most) and 11 (right most). <p>NOTE: You can use the 2/6 slot to install an interface card if an SCB is not already installed in it.</p>
Cables and connectors	<p>Sockets for 40-Gbps and 10-Gbps SFP+ transceivers</p> <p>See Hardware Compatibility Tool for the transceivers supported.</p>
Power requirements	<p>Typical: 9.68 A @ 48 V (460 W)</p> <p>At different temperatures:</p> <ul style="list-style-type: none"> • 55° C: 607 W • 40° C: 541 W • 25° C: 511 W
Weight	21 lb (9.52 kg)

Hardware features	<ul style="list-style-type: none"> ● Line-rate throughput of up to 240 Gbps ● Supports up to 32,000 queues per-slot ● LAN-PHY mode at 10.3125 Gbps on a per-port basis ● The ports are labeled as: <ul style="list-style-type: none"> ● 10-Gigabit Ethernet ports: 0/0 through 0/11 and 1/0 through 1/11 ● 40-Gigabit Ethernet ports: 2/0 through 2/2 and 3/0 through 3/2
Software features	<ul style="list-style-type: none"> ● Optical diagnostics and related alarms ● Two packet-forwarding engines, PFE0 and PFE1. PFE0 hosts PICO and PIC2. PFE1 hosts PIC1 and PIC3. ● Configurable LAN-PHY mode options per 10-Gigabit Ethernet port ● Intelligent oversubscription services <p>NOTE: At any one time you can have only one of the following PIC combinations powered on:</p> <ul style="list-style-type: none"> ● PICO & PIC1 ● PICO & PIC3 ● PIC2 & PIC1 ● PIC2 & PIC3 <p>If you configure any of the following invalid PIC combinations, the chassis will set PICO & PIC1 combination online.</p> <ul style="list-style-type: none"> ● PICO & PIC2 ● PIC1 & PIC3
LEDs	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> ● Solid green—MPC is functioning normally. ● Blinking green—MPC is transitioning online or offline. ● Red—MPC has failed. <p>10-Gigabit Ethernet LINK LED, one green per port:</p> <ul style="list-style-type: none"> ● Green—Link is up. ● Off—Link is down or disabled. <p>40-Gigabit Ethernet LINK LED, one bicolor per port:</p> <ul style="list-style-type: none"> ● Green—Link is up. ● Amber—Link is disabled. ● Off—Link is down.

Serial Number
Location

The serial number label is located as shown in [Figure 41 on page 108](#).

Figure 41: SRX5K-MPC3-40G10G Serial Number Label



SRX5K-MPC3-100G10G Specifications

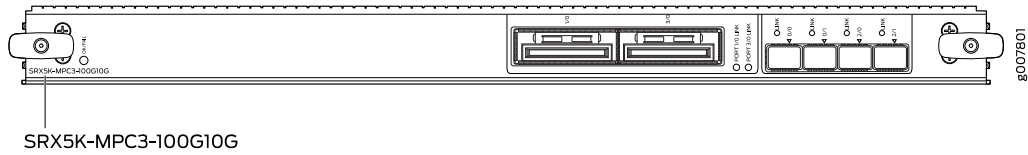
The SRX5K-MPC3-100G10G (IOC3) is an interface card that provides 100 Gigabit Ethernet and 10 Gigabit Ethernet interfaces, with a Packet Forwarding Engine that provides a 240 Gbps line rate. This interface card is supported on SRX5400, SRX5600, and SRX5800 Services Gateways. See [Figure 42 on page 109](#).

NOTE: These cards do not support plug-in Modular Interface Cards (MICs).

All ports on the interface card have dual-color LEDs for reporting link status.

The interface card also supports hot-pluggable optical modules.

Figure 42: SRX5K-MPC3-100G10G



If a slot in the SRX5400, SRX5600, or SRX5800 Services Gateway card cage is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the services gateway.

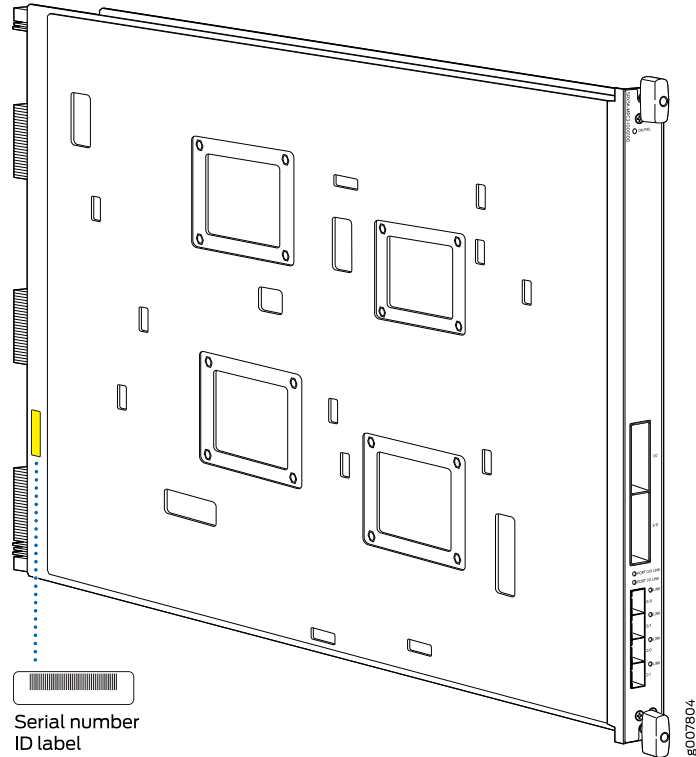
Description	<ul style="list-style-type: none"> ● Fixed-configuration MPC with two 100-Gigabit Ethernet ports and four 10-Gigabit Ethernet ports ● Maximum throughput: 240 Gbps ● Maximum configurable MTU: 9192 bytes
Software release	Junos OS Release 15.1X49-D10 and later
Supported Slots	<ul style="list-style-type: none"> ● SRX5400 – Any slot, except the bottom slot 0 which is reserved for SCB/RE. ● SRX5600 – Any slot, except the bottom slots 0 or 1 which are reserved for SCB/RE. ● SRX5800 – Any slot, except the middle slots 0, 1, and 2/6 which are reserved for SCB/RE and slots 0 (left most) and 11 (right most). <p>NOTE: You can use the 2/6 slot to install an interface card if an SCB is not already installed in it.</p>
Cables and connectors	Sockets for 100-Gbps and 10-Gbps SFP+ transceivers See Hardware Compatibility Tool for the transceivers supported.
Power requirements	<ul style="list-style-type: none"> ● Typical: 10.52 A @ 48 V (505 W) At different temperatures: <ul style="list-style-type: none"> ● 55° C: 607 W ● 40° C: 541 W ● 25° C: 511 W
Weight	21 lb (9.52 kg)

Hardware features	<ul style="list-style-type: none">● Line-rate throughput of up to 240 Gbps● Supports up to 32,000 queues per-slot● LAN-PHY mode at 10.3125 Gbps on a per-port basis The ports are labeled as: <ul style="list-style-type: none">● 10-Gigabit Ethernet ports: 0/0, 0/1, 2/0, and 2/1● 100-Gigabit Ethernet ports: 1/0 and 3/0
Software features	<ul style="list-style-type: none">● Configurable LAN-PHY mode options per 10-Gigabit Ethernet port● Optical diagnostics and related alarms● Intelligent oversubscription services
LEDs	OK/FAIL LED, one bicolor: <ul style="list-style-type: none">● Solid green—MPC is functioning normally.● Blinking green—MPC is transitioning online or offline.● Red—MPC has failed. 10-Gigabit Ethernet LINK LED, one bicolor per port: <ul style="list-style-type: none">● Green—Link is up.● Amber—Link is disabled.● Off—Link is down or disabled. 100-Gigabit Ethernet LINK LED, one bicolor per port: <ul style="list-style-type: none">● Green—Link is up.● Amber—Link is disabled.● Off—Link is down.

Serial Number Location

The serial number label is located as shown in [Figure 43 on page 111](#).

Figure 43: SRX5K-MPC3-100G10G Serial Number Label

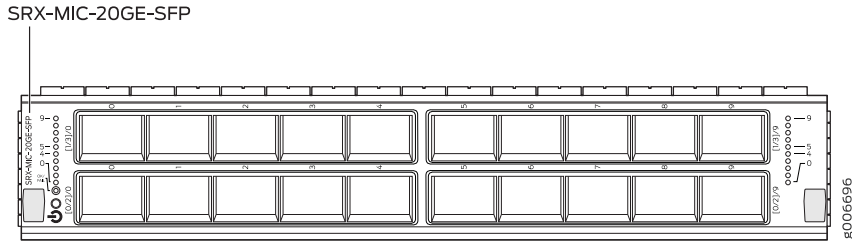


MIC with 20x1GE SFP Interfaces (SRX-MIC-20GE-SFP)

You use Modular Interface Cards (MICs) and Modular Port Concentrators (MPCs) to add different combinations of Ethernet interfaces to your services gateway to suit the specific needs of your network.

The SRX-MIC-20GE-SFP MIC (see [Figure 44 on page 112](#)) can be installed in the SRX-5K MPC to add twenty 1-Gigabit Ethernet small form-factor pluggable (SFP) Ethernet ports.

Figure 44: SRX-MIC-20GE-SFP



<p>Description</p>	<ul style="list-style-type: none"> • MIC with twenty 1-Gigabit Ethernet SFP Ethernet ports • Fits into either of the two slots of SRX-5K-MPC • Supports up to 20 Gbps of full-duplex traffic • Maximum configurable MTU: 9192 bytes • Maximum throughput: 20 Gbps
<p>Software release</p>	<p>Junos OS Release 12.1X47-D10</p>
<p>Cables and connectors</p>	<p>Sockets for 20 SFP Gigabit Ethernet transceivers.</p> <p>Supported SFP transceivers:</p> <p>1000BASE-LX (model numbers SRX-SFP-1GE-LX, SRX-SFP-1GE-LX-ET)</p> <p>1000BASE-SX (model numbers SRX-SFP-1GE-SX, SRX-SFP-1GE-SX-ET)</p> <p>1000BASE-T (model numbers SRX-SFP-1GE-T, SRX-SFP-1GE-T-ET)</p>
<p>Weight</p>	<p>Approximately 1.2 lb (0.54 kg)</p>
<p>LEDs</p>	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> • Green–MIC is operating normally. • Red–MIC has failed. • Off–MIC is powered down. <p>LINK LED, single color, one per SFP port:</p> <ul style="list-style-type: none"> • Green–Link is active. • Off–Link is inactive.

Port and Interface Numbering



Each MPC accepts up to two MICs. SRX-MIC-20GE-SFP is a 20-port Gigabit Ethernet MIC with SFP.

Each port on a MIC corresponds to a unique interface name in the CLI.

In the syntax of an interface name, a hyphen (-) separates the media type from the MPC number (represented as an **FPC** in the CLI). The MPC slot number corresponds to the first number in the interface. The second number in the interface corresponds to the logical PIC number. The last number in the interface matches the port number on the MIC. Slashes (/) separate the MPC number from the logical PIC number and port number:

type-fpc/pic/port

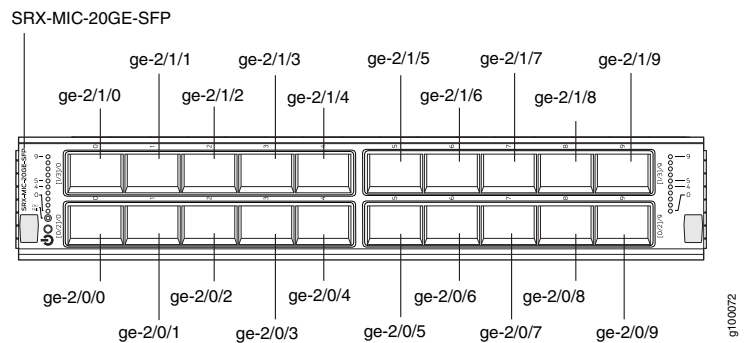
- *type*—Media type, which identifies the network device. For example:
 - *ge*—Gigabit Ethernet interface
 - *so*—SONET/SDH interface
 - *xe*—10-Gigabit Ethernet interface

For a complete list of media types, see *Interface Naming Overview*.

- *fpc*—Slot in which the MPC is installed in an SRX5400, SRX5600, or SRX5800 Services Gateway.
- *pic*—Two Logical PICs on the MIC, numbered 0 or 1 when installed in the first slot, and 2 or 3 when installed in the second slot.
- *port*—Port number.

Figure 45 on page 114 shows the SRX-MIC-20GE-SFP MIC installed in slot 0 of an MPC in slot 2 of an SRX5400, SRX5600, or SRX5800 Services Gateway.

Figure 45: SRX-MIC-20GE-SFP Interface Port Mapping



The SRX-MIC-20GE-SFP MIC contains two logical PICs, numbered **PIC 0** through **PIC 1** in the CLI. Each logical PIC contains 10 ports numbered **0** through **9**.

The sample output of the **show chassis fpc pic-status** command output displays two 20-port Gigabit Ethernet MICs with SFP – inserted into the slots of an MPC in slot 2.

The logical PICs of the two MICs— **10x 1GE(LAN) SFP** – are shown as **PIC 0, PIC 1, PIC 2, and PIC 3**.

```
user@host> show chassis hardware
```

```
node1:
```

```
-----
Slot 1  Online      SRX5k SPC II
  PIC 0  Online      SPU Cp
  PIC 1  Online      SPU Flow
  PIC 2  Online      SPU Flow
  PIC 3  Online      SPU Flow
Slot 2  Online      SRX5k IOC II
  PIC 0  Online      10x 1GE(LAN) SFP
  PIC 1  Online      10x 1GE(LAN) SFP
  PIC 2  Online      10x 1GE(LAN) SFP
  PIC 3  Online      10x 1GE(LAN) SFP
```

```
{primary:node1}
```

The **show interfaces terse** command output displays the Gigabit Ethernet interfaces that correspond to all the ports located on the two MICs.

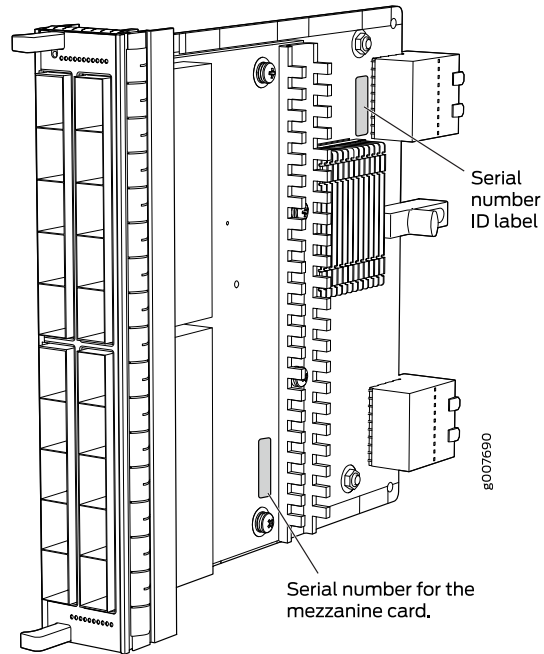
```
user@host> show interfaces terse
```

Interface	Admin	Link	Proto	Local
	Remote			
gr-0/0/0	up	up		
ip-0/0/0	up	up		
lt-0/0/0	up	up		
ge-2/0/0	up	up		
ge-2/0/1	up	down		
ge-2/0/2	up	down		
ge-2/0/3	up	down		
ge-2/0/4	up	down		
ge-2/0/5	up	up		
ge-2/0/6	up	down		
ge-2/0/7	up	down		
ge-2/0/8	up	up		
ge-2/0/9	up	up		
ge-2/1/0	up	down		
ge-2/1/1	up	up		
ge-2/1/2	up	down		
ge-2/1/3	up	down		
ge-2/1/4	up	up		
ge-2/1/5	up	down		
ge-2/1/6	up	down		
ge-2/1/7	up	down		
ge-2/1/8	up	up		
ge-2/1/9	up	up		
ge-2/2/0	up	down		
ge-2/2/1	up	down		
ge-2/2/2	up	down		
ge-2/2/3	up	down		
ge-2/2/4	up	down		
ge-2/2/5	up	down		
ge-2/2/6	up	down		
ge-2/2/7	up	down		
ge-2/2/8	up	down		
ge-2/2/9	up	down		
ge-2/3/0	up	down		
ge-2/3/1	up	down		
ge-2/3/2	up	down		
ge-2/3/3	up	down		
ge-2/3/4	up	down		
ge-2/3/5	up	down		
ge-2/3/6	up	down		
ge-2/3/7	up	down		
ge-2/3/8	up	down		

Serial number location

The serial number label is yellow and is located as shown in [Figure 46 on page 117](#).

Figure 46: SRX-MIC-20GE-SFP Serial Number Label

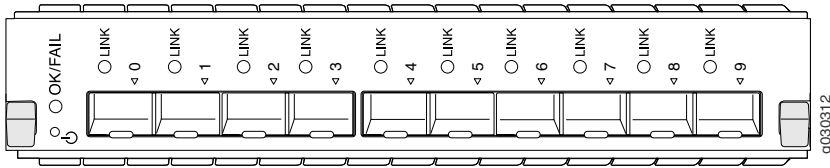


NOTE: The serial number for the mezzanine card is shown only for reference and is never used for any purpose.

MIC with 10x10GE SFP+ Interfaces (SRX-MIC-10XG-SFPP)

You use MICs and MPCs to add different combinations of Ethernet interfaces to your services gateway to suit the specific needs of your network. The SRX-MIC-10XG-SFPP (see [Figure 47 on page 118](#)) can be installed in an MPC to add ten 10-Gigabit Ethernet SFP+ ports.

Figure 47: SRX-MIC-10XG SFPP



Description	<ul style="list-style-type: none"> • MIC with ten SFP+ 10-Gigabit Ethernet ports • Fits into MPC • Supports up to 100 Gbps of full-duplex traffic • Maximum configurable MTU: 9192 bytes • Maximum throughput: 100 Gbps
Software release	Junos OS Release 12.1X46-D10
Cables and connectors	Sockets for ten 10-Gbps SFP+ transceivers See Hardware Compatibility Tool for the transceivers supported.
Supported slots	Either slot in SRX5K-MPC
Weight	Approximately 1.6 lb (0.7 kg)
LEDs	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> • Green–The MIC is operating normally. • Red–The MIC has failed and is not operating normally. • Off–The MIC is powered down. <p>LINK LED, single color:</p> <ul style="list-style-type: none"> • Green–The link is active. • Off–No link.

Port and
Interface
Numbering

Each port on a MIC corresponds to a unique interface name in the CLI.

In the syntax of an interface name, a hyphen (-) separates the media type from the MPC number (represented as an **FPC** in the CLI). The MPC slot number corresponds to the first number in the interface. The second number in the interface corresponds to the logical PIC number. The last number in the interface matches the port number on the MIC. Slashes (/) separate the MPC number from the logical PIC number and port number:

type-fpc/pic/port

- **type**—Media type, which identifies the network device. For example:

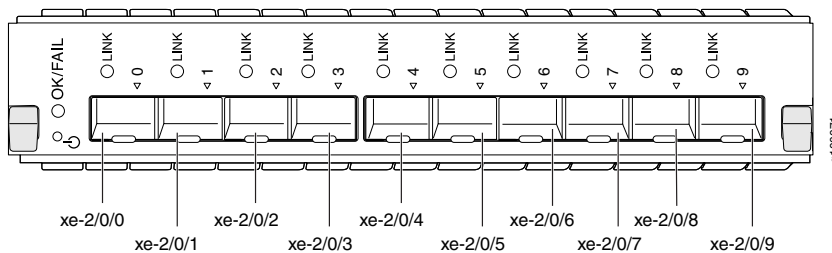
- **ge**—Gigabit Ethernet interface
- **so**—SONET/SDH interface
- **xe**—10-Gigabit Ethernet interface

For a complete list of media types, see *Interface Naming Overview*.

- **fpc**—Slot in which the MPC is installed in an SRX5400, SRX5600, or SRX5800 Services Gateway.
- **pic**—Logical PIC on the MIC, numbered 0 when installed in the first slot or 2 when installed in the second slot.
- **port**—Port number.

Figure 48 on page 120 shows the port and interface numbering of an SRX-MIC-10XG-SFPP MIC when it is installed in slot 0 of an MPC in slot 2 of an SRX5400, SRX5600, or SRX5800 Services Gateway.

Figure 48: SRX-MIC-10XG-SFPP Port and Interface Numbering



The SRX-MIC-10XG-SFPP MIC contains one logical PIC, numbered **PIC 0** in the CLI when inserted in the first slot of the MPC or **PIC 2** when inserted in the second slot of the MPC. Each logical PIC contains 10 ports numbered 0 through 9.

The sample output of the **show chassis fpc pic-status** command displays two 10-port 10-Gigabit Ethernet MICs with SFP+ — inserted into the slots of an MPC in slot 2.

The logical PICs of the two MICs— **10x 10GE SFP+** — are shown as **PIC 0** and **PIC 2**.

```
user@host> show chassis fpc pic-status
Slot 1   Online      SRX5k SPC II
PIC 0   Online      SPU Cp
```



```

PIC 1 Online      SPU Flow
PIC 2 Online      SPU Flow
PIC 3 Online      SPU Flow
Slot 2 Online     SRX5k IOC II
PIC 0 Online      10x 10GE SFP+
PIC 2 Online      10x 10GE SFP+

```

The **show interfaces terse** command output displays the 10-Gigabit Ethernet interfaces that correspond to the 10 ports located on each MIC.

```

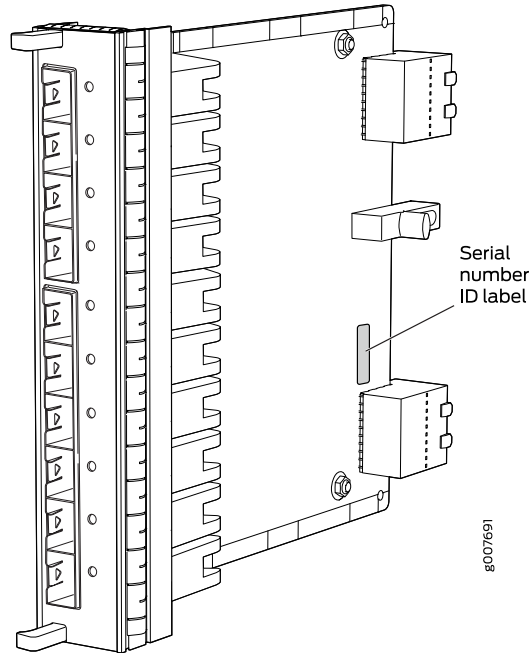
user@host> show interfaces terse
Interface           Admin Link Proto  Local           Remote
gr-0/0/0            up    up
ip-0/0/0            up    up
lt-0/0/0            up    up
xe-2/0/0            up    up
xe-2/0/1            up    up
xe-2/0/2            up    up
xe-2/0/2.0          up    up    inet    131.131.131.2/24
                   inet6   1300::2/64
                   fe80::224:dcff:fe20:b94c/64
                   multiservice
xe-2/0/3            up    up
xe-2/0/4            up    up
xe-2/0/5            up    up
xe-2/0/6            up    up
xe-2/0/6.0          up    up    inet    141.141.141.1/24
                   inet6   1400::1/64
                   fe80::224:dcff:fe20:b950/64
                   multiservice
xe-2/0/7            up    down
xe-2/0/8            up    down
xe-2/0/9            up    down
xe-2/2/0            up    down
xe-2/2/1            up    down
xe-2/2/2            up    down
xe-2/2/3            up    down
xe-2/2/4            up    down
xe-2/2/5            up    down
xe-2/2/6            up    down
xe-2/2/7            up    down
xe-2/2/8            up    down
xe-2/2/9            up    down

```

Serial number location

The serial number label is yellow and located as shown in [Figure 49 on page 122](#).

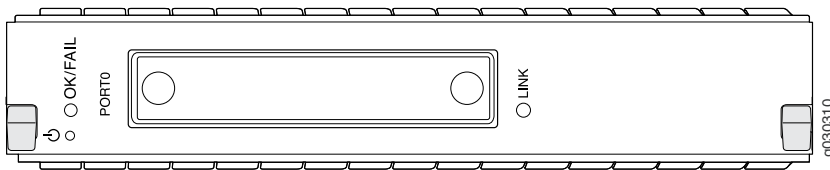
Figure 49: SRX-MIC-10XG-SFPP Serial Number Label



MIC with 1x100GE CFP Interface (SRX-MIC-1X100G-CFP)

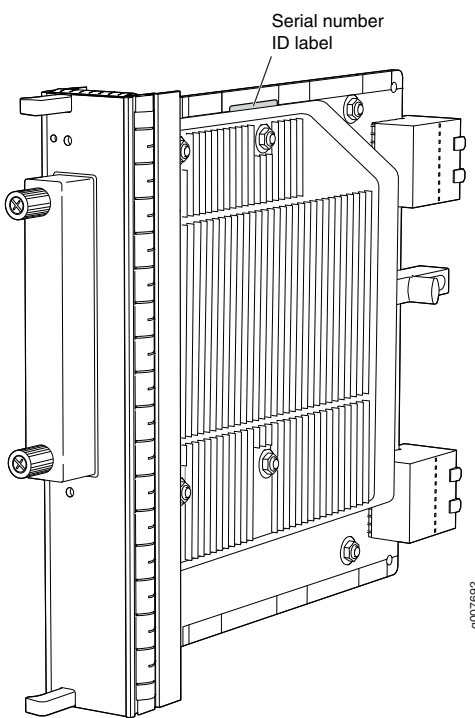
You use MICs and MPCs to add different combinations of Ethernet interfaces to your services gateway to suit the specific needs of your network. The SRX-MIC-1X100G-CFP (see [Figure 50 on page 122](#)) can be installed in an MPC to add one 100-Gigabit Ethernet CFP port.

Figure 50: SRX-MIC-1X100G-CFP



Description

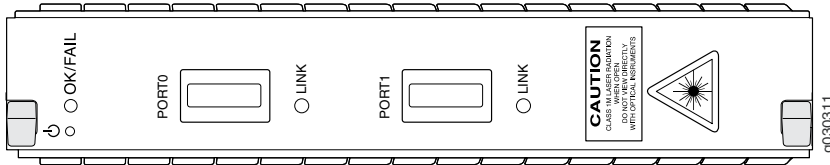
- MIC with one CFP 100-Gigabit Ethernet port
- Fits into MPC
- Supports up to 100 Gbps of full-duplex traffic
- Maximum configurable MTU: 9192 bytes
- Maximum throughput: 100 Gbps

Software release	Junos OS Release 12.1X46-D10
Cables and connectors	<p>One socket for a 100-Gigabit CFP transceiver.</p> <p>Supported CFP transceivers:</p> <ul style="list-style-type: none"> • 100GBASE-LR4 (model number: SRX-CFP-100G-LR4) • 100GBASE-SR10 (model number: SRX-CFP-100G-SR10)
Supported slots	Either slot in SRX5K-MPC
Weight	Approximately 1.6 lb (0.7 kg)
LEDs	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> • Green—The MIC is operating normally. • Red—The MIC has failed and is not operating normally. • Off—The MIC is powered down. <p>LINK LED, single color:</p> <ul style="list-style-type: none"> • Green—The link is active. • Off—No link.
Serial number location	<p>The serial number label is yellow and located as shown in Figure 51 on page 123.</p> <p>Figure 51: SRX-MIC-1X100G-CFP Serial Number Label</p>  <p style="text-align: right; font-size: small;">9007692</p>

MIC with 2x40GE QSFP+ Interfaces (SRX-MIC-2X40G-QSFP)

You use MICs and MPCs to add different combinations of Ethernet interfaces to your services gateway to suit the specific needs of your network. The SRX-MIC-2X40G-QSFP (see [Figure 52 on page 124](#)) can be installed in an MPC to add two 40-Gigabit quad small form-factor pluggable (QSFP+) Ethernet ports.

Figure 52: SRX-MIC-2X40G QSFP

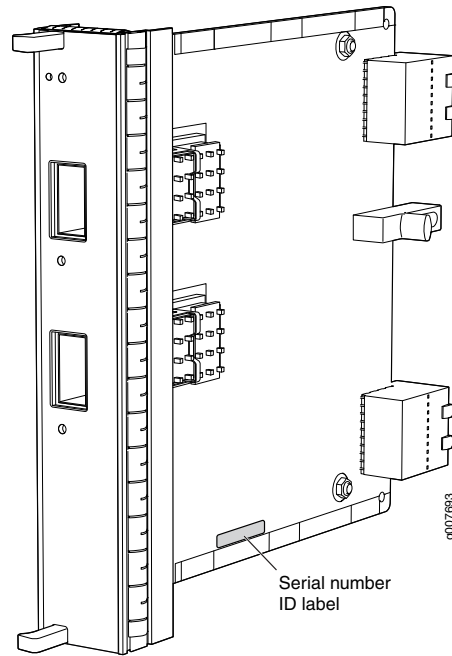


Description	<ul style="list-style-type: none"> • MIC with two QSFP+ Ethernet ports • Fits into MPC • Supports up to 80 Gbps of full-duplex traffic • Maximum configurable MTU: 9192 bytes • Maximum throughput: 80 Gbps
Software release	Junos OS Release 12.1X46-D10
Cables and connectors	Sockets for two QSFP+ 40-Gigabit Ethernet fiber-optic transceivers. Supported QSFP+ transceiver: 40GBASE-SR4 (model number SRX-QSFP-40G-SR4) 40GBASE-LR4 (model number SRX-QSFP-40G-LR4)
Supported slots	Either slot in SRX5K-MPC
Weight	Approximately 1.6 lb (0.7 kg)
LEDs	OK/FAIL LED , one bicolor: <ul style="list-style-type: none"> • Green–The MIC is operating normally. • Red–The MIC has failed and is not operating normally. • Off–The MIC is powered down. LINK LED , single color, one per QSFP+ port: <ul style="list-style-type: none"> • Green–The link is active. • Off–No link.

Serial number location

The serial number label is yellow and typically located as shown in [Figure 53 on page 125](#).

Figure 53: SRX-MIC-2X40G-QSFP Serial Number Label



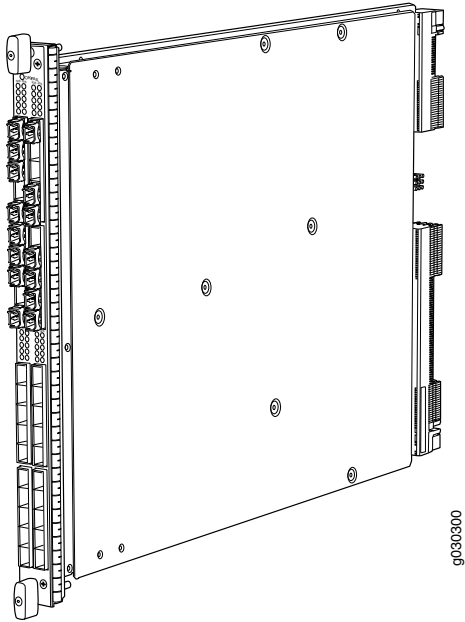
I/O Card SRX5K-40GE-SFP Specifications

The SRX5K-40GE-SFP I/O card (IOC) is optimized for Ethernet density and supports 40 Gigabit Ethernet ports (see [Figure 54 on page 126](#)). The IOC assembly combines packet forwarding and Ethernet interfaces on a single board, with four 10-Gbps Packet Forwarding Engines. Each Packet Forwarding Engine consists of one I-chip for Layer 3 processing and one Layer 2 network processor. The IOCs interface with the power supplies and Switch Control Boards (SCBs).

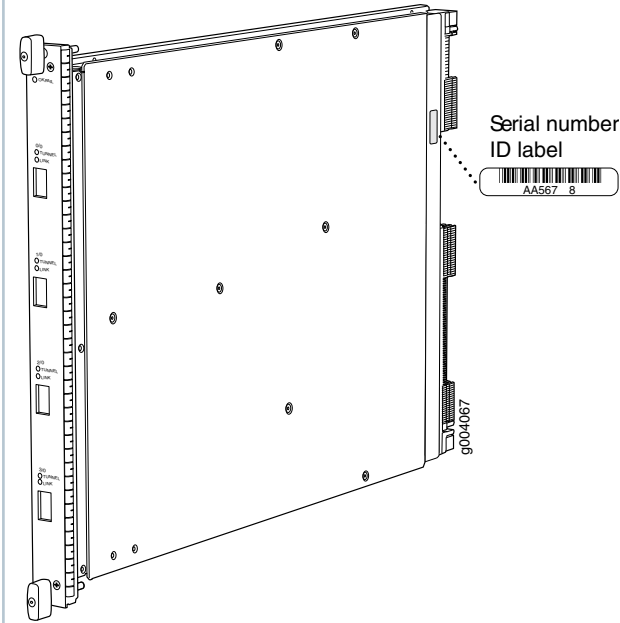
You must install at least one IOC in the services gateway. The IOC can be of any of the available IOC or Flex IOC types.

You can install IOCs in any of the slots that are not reserved for Switch Control Boards (SCBs). If a slot is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the services gateway.

Figure 54: IOC SRX5K-40GE-SFP



Description	<ul style="list-style-type: none"> • I/O card with 40 Gigabit Ethernet SFP ports • Maximum configurable MTU: 9192 bytes • Maximum throughput: 40 Gbps
Software release	<ul style="list-style-type: none"> • Junos OS Release 9.2 and later
Cables and connectors	<p>40 Gigabit Ethernet SFP ports</p> <p>Supported SFP transceivers:</p> <p>1000BASE-LH (model numbers SRX-SFP-1GE-LH, SRX-SFP-1GE-LH-ET)</p> <p>1000BASE-LX (model numbers SRX-SFP-1GE-LX, SRX-SFP-1GE-LX-ET)</p> <p>1000BASE-SX (model numbers SRX-SFP-1GE-SX, SRX-SFP-1GE-SX-ET)</p> <p>1000BASE-T (model numbers SRX-SFP-1GE-T, SRX-SFP-1GE-T-ET)</p>
Controls	None
Supported Slots	<ul style="list-style-type: none"> • SRX5600—Any slot except bottom slots 0 or 1 • SRX5800—Any slot except center slots 0, 1, or 2/6
Power Requirement	312 W typical, 365 W maximum
Weight	Approximately 13 lb (5.9 kg)

<p>LEDs</p>	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> • Steady green–The IOC is operating normally. • Red–The IOC has failed and is not operating normally. • Off–The IOC is powered down.
<p>Serial Number Location</p>	<p>The serial number label is located as shown in Figure 55 on page 127.</p> <p>Figure 55: Serial Number Label (IOC Shown, Other Cards Similar)</p> 

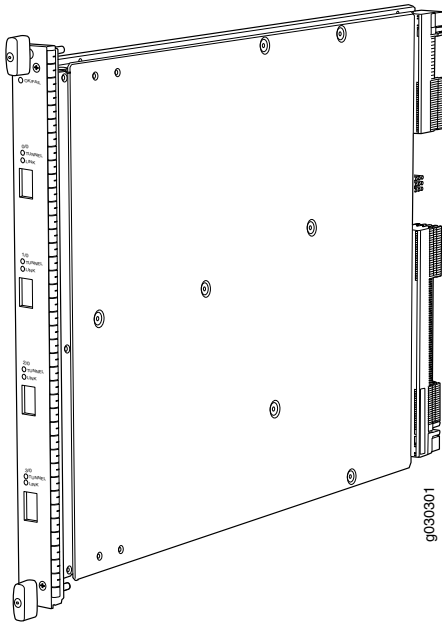
I/O Card SRX5K-4XGE-XFP Specifications

The SRX5K-4XGE-XFP I/O card (IOC) supports four 10-Gigabit Ethernet ports (see [Figure 56 on page 128](#)). The IOC assembly combines packet forwarding and Ethernet interfaces on a single board, with four 10-Gbps Packet Forwarding Engines. Each Packet Forwarding Engine consists of one I-chip for Layer 3 processing and one Layer 2 network processor. The IOCs interface with the power supplies and Switch Control Boards (SCBs).

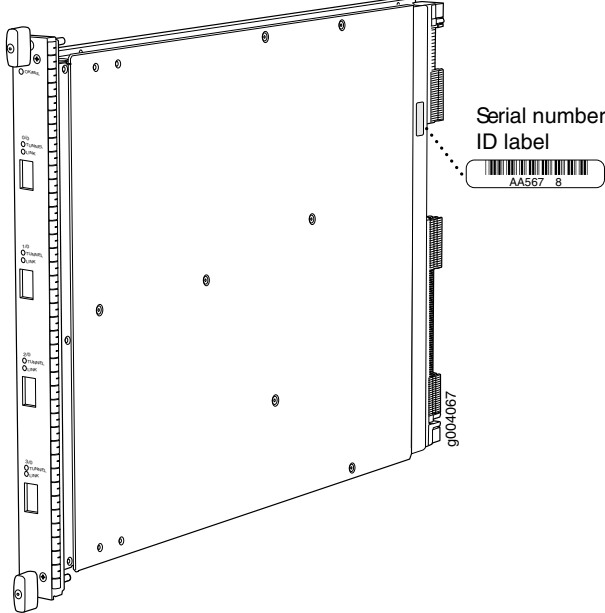
You must install at least one IOC in the services gateway. The IOC can be of any of the available IOC or Flex IOC types.

You can install IOCs in any of the slots that are not reserved for Switch Control Boards (SCBs). If a slot is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the services gateway.

Figure 56: IOC SRX5K-4XGE-XFP



Description	<ul style="list-style-type: none"> • I/O card with four 10-Gigabit Ethernet XFP ports • Maximum configurable MTU: 9192 bytes • Maximum throughput: 40 Gbps
Software release	<ul style="list-style-type: none"> • Junos OS Release 9.2 and later
Cables and connectors	<p>Four 10-Gbps XFP ports</p> <p>Supported XFP transceivers:</p> <p>10GBASE-ER (model numbers SRX-XFP-10GE-ER and SRX-XFP-10GE-ER-ET)</p> <p>10GBASE-LR (model numbers SRX-XFP-10GE-LR and SRX-XFP-10GE-LR-ET)</p> <p>10GBASE-SR (model numbers SRX-XFP-10GE-SR and SRX-XFP-10GE-SR-ET)</p>
Controls	None
Supported Slots	<ul style="list-style-type: none"> • SRX5600—Any slot except bottom slots 0 or 1 • SRX5800—Any slot except center slots 0, 1, or 2
Power Requirement	312 W typical, 365 W maximum
Weight	Approximately 13 lb (5.9 kg)

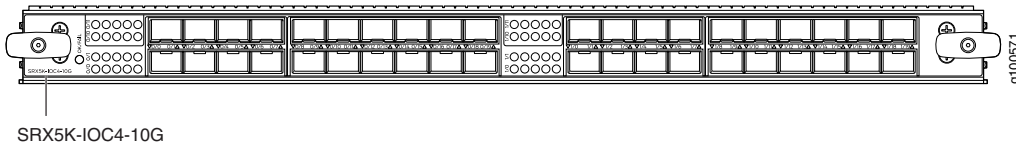
<p>LEDs</p>	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> • Steady green–The IOC is operating normally. • Red–The IOC has failed and is not operating normally. • Off–The IOC is powered down.
<p>Serial Number Location</p>	<p>The serial number label is located as shown in Figure 57 on page 129.</p> <p>Figure 57: SRX5K-4XGE-XFP Serial Number Label</p> 

SRX5K-IOC4-10G Specifications

SRX5K-IOC4-10G is a fixed-configuration interface card with a Packet Forwarding Engine that provides 400-Gbps line rate. This interface card provides scalability in bandwidth and services to the SRX5400, SRX5600 and SRX5800 Services Gateways. See [Figure 58 on page 130](#).

NOTE: SRX5K-IOC4-10G cards do not support plug-in Modular Interface Cards (MICs).

Figure 58: SRX5K-IOC4-10G



If a slot in the SRX5400, SRX5600, or SRX5800 Services Gateway card cage is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the services gateway.

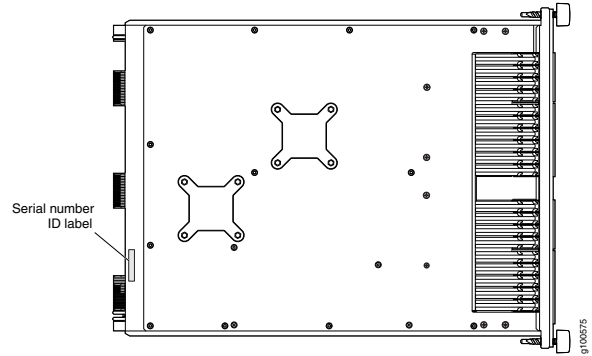
Description	<ul style="list-style-type: none"> ● Fixed-configuration IOC with forty 10-Gbps port speeds ● Maximum throughput: 400-Gbps ● Maximum configurable MTU: 9192 bytes
Software release	Junos OS Release 19.3R1 and later
Supported slots	<ul style="list-style-type: none"> ● SRX5400—Any slot, except the bottom slots 0 and 1/0, which are reserved for SCB/RE. NOTE: Slot 1/0 is a dual purpose slot. You can install SRX5K-IOC4-10G in slot 2/6 if an SCB is not already installed in it. ● SRX5600—Any slot, except the bottom slots 0 and 1, which are reserved for SCB/RE. ● SRX5800—Any slot, except the middle slots 0, 1, and 2/6, which are reserved for SCB/RE, and slots 0 (most left) and 11 (most right). NOTE: Slot 2/6 is a dual purpose slot. You can install SRX5K-IOC4-10G in slot 2/6 if an SCB is not already installed in it.
Cables and connectors	See Hardware Compatibility Tool for the transceivers supported.
Power requirements	<ul style="list-style-type: none"> ● Typical: 405 W <p>At different temperatures:</p> <ul style="list-style-type: none"> ● 131° F (55° C): 500 W ● 104° F (40° C): 465 W ● 75° F (25° C): 430 W
Weight	17 lb (7.7 kg)

Hardware features	<ul style="list-style-type: none"> ● Junos Trio chipsets for increased scaling for bandwidth, subscribers, and services ● Forty 10-Gigabit Ethernet ports. The ports support SFP+ transceivers. ● Requires high-capacity power supplies and high-capacity fan trays. ● The ports are labeled as (see Figure 58 on page 130): <ul style="list-style-type: none"> ● 0/0 through 0/9 ● 0/10 through 0/19 ● 1/0 through 1/9 ● 1/10 through 1/19
Software features	<ul style="list-style-type: none"> ● Application security ● Application Layer Gateway (ALG) ● Attack detection and prevention ● Class of service (CoS) ● Equal-cost multipath (ECMP) load balancing ● GPRS Tunneling Protocol (GTP) ● High availability (chassis cluster) ● Intrusion detection and prevention (IDP) ● IPsec VPN ● Layer 2 transparent mode ● Logical systems ● Network Address Translation (NAT) ● Routing protocols (BFD, BGP, IGMP, IS-IS, MLD, Multicast, OSPF, PIM, RIP, and SCTP) ● SSL proxy ● Tenant systems ● Unified threat management (UTM)
LEDs	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> ● Steady green—IOC is functioning normally. ● Yellow—IOC has failed. <p>LINK LED, one green per port:</p> <ul style="list-style-type: none"> ● Steady green—Link is up. ● Off—Link is down or disabled.

Serial Number Location

The serial number label is located as shown in [Figure 59 on page 132](#).

Figure 59: SRX5K-IOC4-10G Serial Number Label

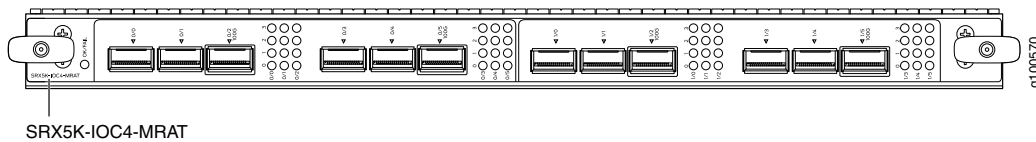


SRX5K-IOC4-MRAT Specifications

SRX5K-IOC4-MRAT is a fixed-configuration interface card with a Packet Forwarding Engine that provides up to 480-Gbps (240-Gbps per PIC slot) line rate. This interface card provides scalability in bandwidth and services to the SRX5400, SRX5600, and SRX5800 Services Gateways. See [Figure 60 on page 132](#).

NOTE: SRX5K-IOC4-MRAT cards do not support plug-in Modular Interface Cards (MICs).

Figure 60: SRX5K-IOC4-MRAT



If a slot in the SRX5400, SRX5600, or SRX5800 Services Gateway card cage is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the services gateway.

Description	<ul style="list-style-type: none"> • Fixed-configuration IOC with 10-Gbps, 40-Gbps, and 100-Gbps port speeds • Maximum throughput: up to 480 Gbps (240 Gbps per PIC slot) • Maximum configurable MTU: 9192 bytes
Software release	Junos OS Release 19.3R1 and later
Supported Slots	<ul style="list-style-type: none"> • SRX5400—Any slot, except the bottom slots 0 and 1/0, which are reserved for SCB/RE. NOTE: Slot 1/0 is a dual purpose slot. You can install SRX5K-IOC4-10G in slot 2/6 if an SCB is not already installed in it. • SRX5600—Any slot, except the bottom slots 0 and 1, which are reserved for SCB/RE. • SRX5800—Any slot, except the middle slots 0, 1, and 2/6, which are reserved for SCB/RE, and slots 0 (most left) and 11 (most right). NOTE: Slot 2/6 is a dual purpose slot. You can install SRX5K-IOC4-10G in slot 2/6 if an SCB is not already installed in it.
Cables and connectors	See Hardware Compatibility Tool for the transceivers supported.
Power requirements	At different temperatures: <ul style="list-style-type: none"> • 131° F (55° C): 500 W • 104° F (40° C): 465 W • 75° F (25° C): 430 W
Weight	15.7 lb (7.12 kg)

Hardware features

- Junos Trio chipsets for increased scaling for bandwidth, subscribers, and services
- Twelve Gigabit Ethernet ports that can be configured as 40-Gigabit Ethernet port or as 4X10-Gigabit Ethernet port using a breakout cable. The ports support quad small-form factor pluggable plus (QSFP+) transceivers.
- Four out of the twelve ports can be configured as 100-Gigabit Ethernet ports. Port numbers **0/2**, **0/5**, **1/2** and **1/5** are the four 100-Gigabit Ethernet ports.
- You can configure different combination of port speeds as long as the aggregate capacity per group of six ports labeled **0/0** through **0/5** does not exceed 240 Gbps. Similarly, aggregate capacity per group of the other six ports labeled **1/0** through **1/5** should not exceed 240 Gbps.
- Requires high-capacity power supplies and high-capacity fan trays.
- The ports are labeled as (see [Figure 60 on page 132](#)):
 - 10-Gigabit Ethernet or 40-Gigabit Ethernet ports:
0/0, 0/1, 0/2 100G, 0/3, 0/4, 0/5 100G, 1/0, 1/1, 1/2 100G, 1/3, 1/4, and 1/5 100G
 - 100-Gigabit Ethernet ports:
0/2 100G, 0/5 100G, 1/2 100G and 1/5 100G

NOTE: Only ports marked **100G** support 100-Gigabit Ethernet speed using QSFP28 transceivers.

Software features

- Application security
- Application Layer Gateway (ALG)
- Attack detection and prevention
- Class of service (CoS)
- Equal-cost multipath (ECMP) load balancing
- GPRS Tunneling Protocol (GTP)
- High availability (chassis cluster)
- Intrusion detection and prevention (IDP)
- IPsec VPN
- Layer 2 transparent mode
- Logical systems
- Network Address Translation (NAT)
- Routing protocols (BFD, BGP, IGMP, IS-IS, MLD, Multicast, OSPF, PIM, RIP, and SCTP)
- SSL proxy
- Tenant systems
- Unified threat management (UTM)

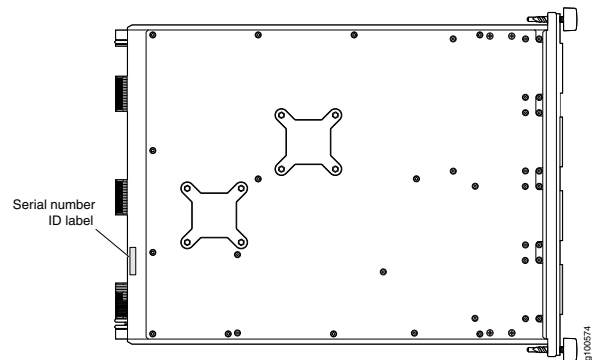
LEDs

- OK/FAIL LED**, one bicolor:
- Steady green—IOC is functioning normally.
 - Yellow—IOC has failed.
- LINK LED**, one green per port (4 per QSFP+ cage):
- Steady green—Link is up.
 - Off—Link is down or disabled.

Serial Number Location

The serial number label is located as shown in [Figure 61 on page 135](#).

Figure 61: SRX5K-IOC4-MRAT Serial Number Label



Flex I/O Card (SRX5K-FPC-IOC) Specifications

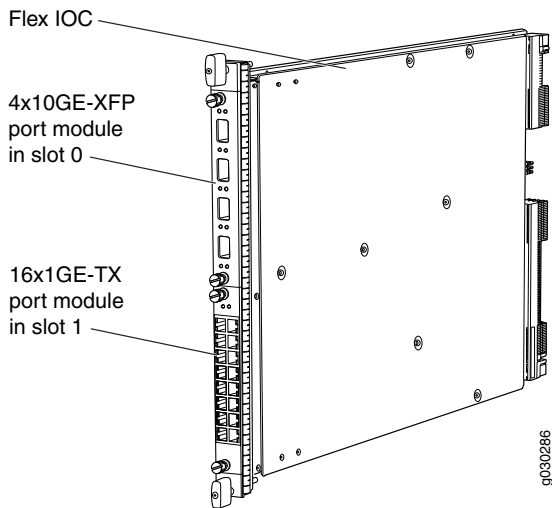
The SRX5K-FPC-IOC Flex I/O card (Flex IOC) (Figure 62 on page 136) is an IOC with two slots that accept port modules that add Ethernet ports to your services gateway. A Flex IOC with installed port modules functions in the same way as a regular IOC, but allows greater flexibility in adding different types of Ethernet ports to your services gateway.

Each Flex IOC has a processor subsystem, which includes a 1.2-GHz CPU, a system controller, 1 GB SDRAM, and two Packet Forwarding Engines with a maximum throughput of 10 Gbps each.

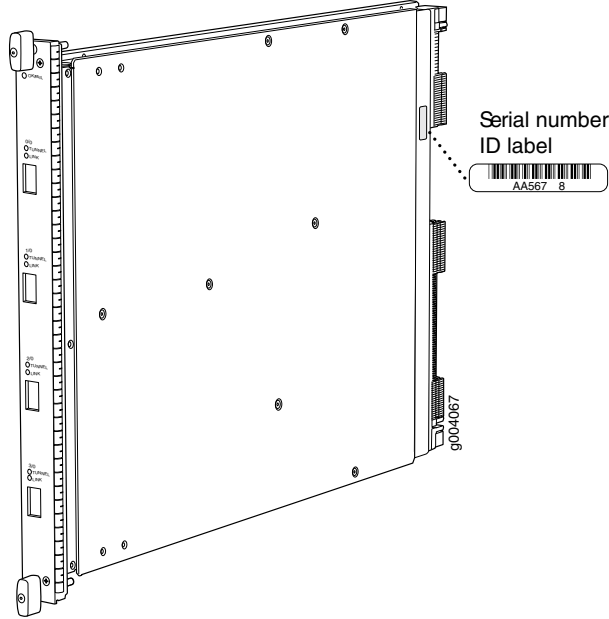
You must install at least one IOC in the services gateway. The IOC can be of any of the available IOC or Flex IOC types.

You can install Flex IOCs in any of the slots that are not reserved for Switch Control Boards (SCBs). If a slot is not occupied by a card, you must install a blank panel to shield the empty slot and to allow cooling air to circulate properly through the services gateway.

Figure 62: Flex IOC with Typical Port Modules



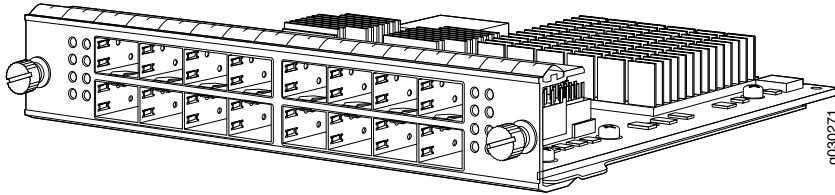
Description	<ul style="list-style-type: none"> • Flex IOC with slots for two port modules • Maximum throughput: 10 Gbps (per PFE)
Software release	<ul style="list-style-type: none"> • Junos OS Release 9.5R1 and later
Cables and connectors	Slots for two port modules
Controls	None
Supported Slots	<ul style="list-style-type: none"> • SRX5600—Any slot except bottom slots 0 or 1 • SRX5800—Any slot except center slots 0, 1, or 2/6

Power Requirement	312 W typical, 365 W maximum (includes port modules)
Weight	Approximately 10 lb (4.5 kg)
LEDs	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> • Steady green—The Flex IOC is operating normally. • Red—The Flex IOC has failed and is not operating normally. • Off—The Flex IOC is powered down.
Serial Number Location	<p>The serial number label is located as shown in Figure 63 on page 137.</p> <p>Figure 63: Serial Number Label (IOC Shown, Other Cards Similar)</p> 

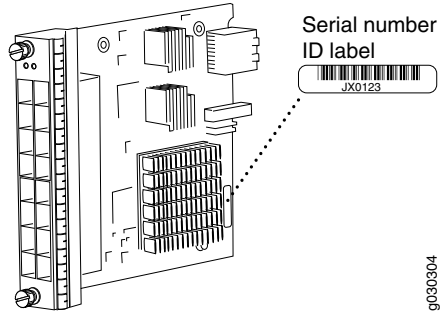
Flex I/O Card Port Module SRX-IOC-16GE-SFP Specifications

You use port modules and Flex I/O Cards (Flex IOCs) to add different combinations of small form-factor pluggable transceiver (SFP), 10-gigabit SFP transceiver (XFP), and copper ports to your services gateway to suit the specific needs of your network. The SRX-IOC-16GE-SFP port module ([Figure 64 on page 138](#)) installs into a Flex IOC to add sixteen 10/100/1000 Ethernet SFP ports.

Figure 64: Flex IOC Port Module SRX-IOC-16GE-SFP



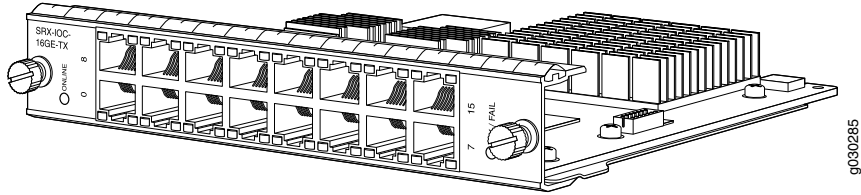
Description	<ul style="list-style-type: none"> • Port module with 16 Gigabit Ethernet SFP ports • Maximum throughput: 10 Gbps • Oversubscription ratio: 1.6:1 • Maximum configurable MTU: 9192 bytes
Software release	<ul style="list-style-type: none"> • Junos OS Release 9.5R1 and later
Cables and connectors	<p>16 Gigabit Ethernet SFP ports</p> <p>Supported SFP transceivers:</p> <p>1000BASE-LH (model numbers SRX-SFP-1GE-LH, SRX-SFP-1GE-LH-ET)</p> <p>1000BASE-LX (model numbers SRX-SFP-1GE-LX, SRX-SFP-1GE-LX-ET)</p> <p>1000BASE-SX (model numbers SRX-SFP-1GE-SX, SRX-SFP-1GE-SX-ET)</p> <p>1000BASE-T (model numbers SRX-SFP-1GE-T, SRX-SFP-1GE-T-ET)</p>
Controls	<p>ONLINE Button–The ONLINE button on the port module front panel toggles the port module online and offline</p>
Supported Slots	<p>Either slot in SRX5K-FPC-IOC Flex IOC</p>
Weight	<p>Approximately 1.6 lb (0.7 kg)</p>

<p>LEDs</p>	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> • Steady green–The port module is operating normally. • Red–The port module has failed and is not operating normally. • Off–The port module is powered down. <p>LINK LED, single color, one per port:</p> <ul style="list-style-type: none"> • Steady green–The link is active. • Off–No link. <p>TX/RX LED, single color, one per port:</p> <ul style="list-style-type: none"> • Blinking Green–The port is receiving or transmitting data. • Off–No activity.
<p>Serial Number Location</p>	<p>The serial number label is located as shown in Figure 65 on page 139.</p> <p>Figure 65: Port Module SRX-IOC-16GE-SFP Serial Number Label</p> 

Flex I/O Card Port Module SRX-IOC-16GE-TX Specifications

You use port modules and Flex I/O Cards (Flex IOCs) to add different combinations of small form-factor pluggable transceiver (SFP), 10-gigabit SFP transceiver (XFP), and copper ports to your services gateway to suit the specific needs of your network. The SRX-IOC-16GE-TX port module ([Figure 66 on page 140](#)) installs into a Flex IOC to add sixteen 10/100/1000 Ethernet RJ-45 copper ports.

Figure 66: Flex IOC Port Module SRX-IOC-16GE-TX

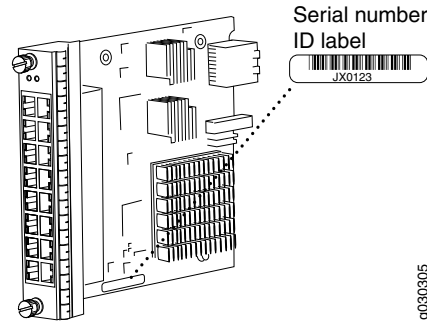


Description	<ul style="list-style-type: none"> • Port module with sixteen 10/100/1000 Ethernet RJ45 ports • Maximum throughput: 10 Gbps • Oversubscription ratio: 1.6:1 • Maximum configurable MTU: 9192 bytes
Software release	<ul style="list-style-type: none"> • Junos OS Release 9.5R1 and later
Cables and connectors	Sixteen RJ-45 1-Gbps ports
Controls	ONLINE Button—The ONLINE button on the port module front panel toggles the port module online and offline.
Supported Slots	Either slot in SRX5K-FPC-IOC Flex IOC
Weight	Approximately 1.6 lb (0.7 kg)
LEDs	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> • Steady green—The port module is operating normally. • Red—The port module has failed and is not operating normally. • Off—The port module is powered down. <p>LINK LED, single color, one per port:</p> <ul style="list-style-type: none"> • Steady green—The link is active. • Off—No link. <p>TX/RX LED, single color, one per port:</p> <ul style="list-style-type: none"> • Blinking green—The port is receiving or transmitting data. • Off—No activity.

Serial Number Location

The serial number label is located as shown in [Figure 67 on page 141](#).

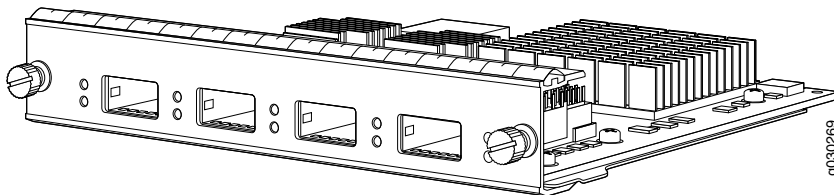
Figure 67: Port Module SRX-IOC-16GE-TX Serial Number Label



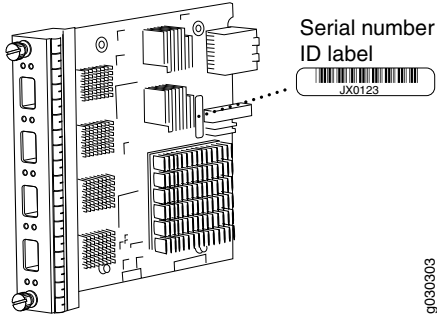
Flex I/O Card Port Module SRX-IOC-4XGE-XFP Specifications

You use port modules and Flex I/O Cards (Flex IOCs) to add different combinations of small form-factor pluggable transceiver (SFP), 10-gigabit SFP transceiver (XFP), and copper ports to your services gateway to suit the specific needs of your network. The SRX-IOC-4XGE-XFP port module ([Figure 68 on page 141](#)) installs into a Flex IOC to add four 10-Gigabit Ethernet XFP ports.

Figure 68: Flex IOC Port Module SRX-IOC-4XGE-XFP



<p>Description</p>	<ul style="list-style-type: none"> • Port module with four 10-Gigabit Ethernet XFP ports • Maximum throughput: 10 Gbps • Oversubscription ratio: 4:1 • Maximum configurable MTU: 9192 bytes
<p>Software release</p>	<ul style="list-style-type: none"> • Junos OS Release 9.5R1 and later

Cables and connectors	<p>4 XFP Ethernet ports</p> <p>Supported XFP transceivers:</p> <p>10GBASE-ER (model numbers SRX-XFP-10GE-ER and SRX-XFP-10GE-ER-ET)</p> <p>10GBASE-LR (model numbers SRX-XFP-10GE-LR and SRX-XFP-10GE-LR-ET)</p> <p>10GBASE-SR (model numbers SRX-XFP-10GE-SR and SRX-XFP-10GE-SR-ET)</p>
Controls	<p>ONLINE Button–The ONLINE button on the port module front panel toggles the port module online and offline</p>
Supported Slots	<p>Either slot in SRX5K-FPC-IOC Flex IOC</p>
Weight	<p>Approximately 1.6 lb (0.7 kg)</p>
LEDs	<p>OK/FAIL LED, one bicolor:</p> <ul style="list-style-type: none"> ● Steady green–The port module is operating normally. ● Red–The port module has failed and is not operating normally. ● Off–The port module is powered down. <p>LINK LED, single color, one per port:</p> <ul style="list-style-type: none"> ● Steady green–The link is active. ● Off–No link.
Serial Number Location	<p>The serial number label is located as shown in Figure 69 on page 142.</p> <p>Figure 69: Port Module SRX-IOC-4XGE-XFP Serial Number Label</p>  <p style="text-align: right;">9030303</p>

RELATED DOCUMENTATION

[SRX5400 Services Gateway Chassis | 27](#)

[SRX5400 Services Gateway FRUs | 25](#)

[SRX5400 Services Gateway Midplane Description | 30](#)

[Installing an SRX5400 Services Gateway SPC | 291](#)

[Maintaining SPCs on the SRX5400 Services Gateway | 287](#)

[Troubleshooting SRX5400 Services Gateway SPCs | 353](#)

[Installing an SRX5400 Services Gateway MPC | 277](#)

[Installing an SRX5400 Services Gateway MIC | 282](#)

[Troubleshooting SRX5400 Services Gateway MPCs | 350](#)

2

CHAPTER

Site Planning, Preparation, and Specifications

Site Preparation Checklist for the SRX5400 Services Gateway | **145**

SRX5400 Site Guidelines and Requirements | **146**

SRX5400 Rack and Cabinet Requirements | **150**

Calculating Power Requirements for the SRX5400 Services Gateway | **152**

SRX5400 Network Cable and Transceiver Planning | **158**

SRX5400 Alarm and Management Cable Specifications and Pinouts | **163**

Site Preparation Checklist for the SRX5400 Services Gateway

The checklist in [Table 30 on page 145](#) summarizes the tasks you need to perform when preparing a site for services gateway installation.

Table 30: Site Preparation Checklist

Item or Task	For More Information ...	Performed By	Date
Verify that environmental factors such as temperature and humidity do not exceed services gateway tolerances.	“SRX5400 Services Gateway Environmental Specifications” on page 146		
Select the type of rack or cabinet.	“SRX5400 Services Gateway Cabinet Size and Clearance Requirements” on page 151, “SRX5400 Services Gateway Rack Size and Strength Requirements” on page 150		
Plan rack or cabinet location, including required space clearances.	“Clearance Requirements for SRX5400 Services Gateway Airflow and Hardware Maintenance” on page 149		
Plan electrical power provisions.	“Calculating Power Requirements for the SRX5400 Services Gateway” on page 152		
If a rack is used, secure rack to floor and building structure.	“Connection to Building Structure for the SRX5400 Services Gateway Rack” on page 151		
Acquire cables and connectors.			
Locate sites for connection of system grounding.	<i>DC Power Electrical Safety Guidelines and Warnings</i>		
Measure distance between external power sources and services gateway installation site.			

Table 30: Site Preparation Checklist (continued)

Item or Task	For More Information ...	Performed By	Date
Calculate the optical power budget and optical power margin.	“Calculating Power Budget for Fiber-Optic Cable for the SRX5400 Services Gateway” on page 160 , “Calculating Power Margin for Fiber-Optic Cable for the SRX5400 Services Gateway” on page 161		

SRX5400 Site Guidelines and Requirements

IN THIS SECTION

- [SRX5400 Services Gateway Environmental Specifications | 146](#)
- [General Site Guidelines | 147](#)
- [Site Electrical Wiring Guidelines | 148](#)
- [Clearance Requirements for SRX5400 Services Gateway Airflow and Hardware Maintenance | 149](#)

SRX5400 Services Gateway Environmental Specifications

[Table 31 on page 146](#) specifies the environmental specifications required for normal services gateway operation. In addition, the site should be as dust-free as possible.

Table 31: Services Gateway Environmental Specifications

Description	Value
Altitude	No performance degradation to 10,000 ft (3048 m)
Relative humidity	Normal operation ensured in relative humidity range of 5% to 90%, noncondensing

Table 31: Services Gateway Environmental Specifications (continued)

Description	Value
Temperature	Normal operation ensured in temperature range of 32°F (0°C) to 104°F (40°C) Nonoperating storage temperature in shipping container: -40°F (-40°C) to 158°F (70°C)
Seismic	Designed to meet Telcordia Technologies Zone 4 earthquake requirements
Maximum thermal output	AC power: 8065 BTU/hour (2365 W) DC power: 7325 BTU/hour (2148 W)

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

General Site Guidelines

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

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

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

Site Electrical Wiring Guidelines

Table 32 on page 148 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.

Table 32: Site Electrical Wiring Guidelines

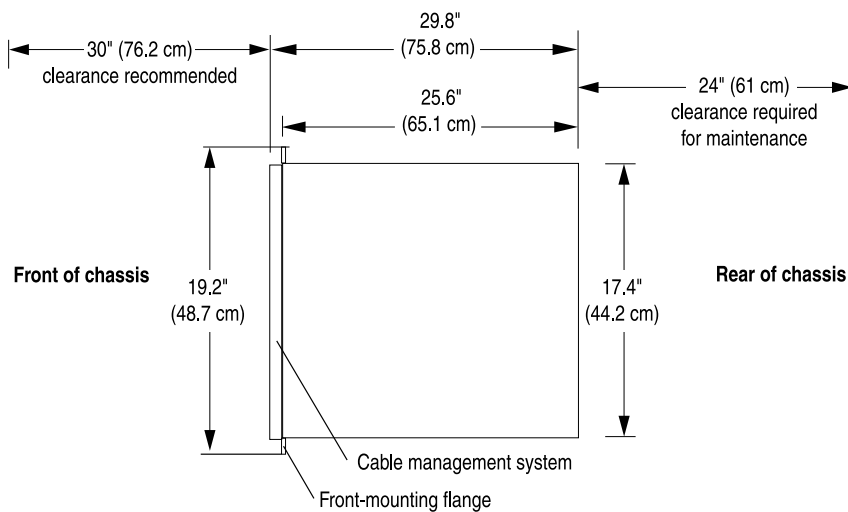
Site Wiring Factor	Guidelines
Signaling limitations	<p>If your site experiences any of the following problems, consult experts in electrical surge suppression and shielding:</p> <ul style="list-style-type: none"> • Improperly installed wires cause radio frequency interference (RFI). • Damage from lightning strikes occurs when wires exceed recommended distances or pass between buildings. • Electromagnetic pulses (EMPs) caused by lightning damage unshielded conductors and electronic devices.
Radio frequency interference	<p>To reduce or eliminate RFI from your site wiring, do the following:</p> <ul style="list-style-type: none"> • Use a twisted-pair cable with a good distribution of grounding conductors. • If you must exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal when applicable.
Electromagnetic compatibility	<p>If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, seek expert advice.</p> <p>Some of the problems caused by strong sources of electromagnetic interference (EMI) are:</p> <ul style="list-style-type: none"> • Destruction of the signal drivers and receivers in the device • Electrical hazards as a result of power surges conducted over the lines into the equipment

Clearance Requirements for SRX5400 Services Gateway Airflow and Hardware Maintenance

When planning the installation site, you need to allow sufficient clearance around the rack (see [Figure 70 on page 149](#)):

- For the cooling system to function properly, the airflow around the chassis must be unrestricted. Allow at least 8 in. (20.32 cm) of side clearance between side-cooled devices. Allow 5.5 in. (13.97 cm) between the side of the chassis and any non-heat-producing surface such as a wall.
- A minimum of 3 inches clearance must be provided behind the power supplies for airflow.
- For service personnel to remove and install hardware components, there must be adequate space at the front and back of the services gateway. At least 24 in. (61 cm) is required both in front of and behind the device. NEBS GR-63 recommends that you allow at least 30 in. (76.2 cm) in front of the services gateway.

Figure 70: Chassis Dimensions and Clearance Requirements



RELATED DOCUMENTATION

[SRX5400 Services Gateway Agency Approvals | 429](#)

[SRX5400 Services Gateway Compliance Statements for EMC Requirements | 430](#)

SRX5400 Rack and Cabinet Requirements

IN THIS SECTION

- SRX5400 Services Gateway Rack Size and Strength Requirements | 150
- Spacing of Rack Mounting Bracket Holes for the SRX5400 Services Gateway | 151
- Connection to Building Structure for the SRX5400 Services Gateway Rack | 151
- SRX5400 Services Gateway Cabinet Size and Clearance Requirements | 151
- SRX5400 Services Gateway Cabinet Airflow Requirements | 152

SRX5400 Services Gateway Rack Size and Strength Requirements

The size, strength, and location of the rack must accommodate the services gateway's weight and external dimensions. The location of the rack must allow for the clearance requirements specified in .

The chassis is 17.37 in. (44.11 cm) wide. The services gateway is designed for installation in a standard 19-in. rack, as defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310-D) published by the Electronics Industry Association (<http://www.eia.org>). The spacing of the holes between the left and right front-mounting flanges and center-mounting brackets is 18.31 in (465 mm) apart. However, the inside spacing between the rack rails must allow sufficient space for the width of the chassis.

With the use of adapters or approved wing devices to narrow the opening between the rails, the services gateway can fit into a 600-mm-wide rack, as defined in the four-part *Equipment Engineering (EE); European telecommunications standard for equipment practice* (document numbers ETS 300 119-1 through 119-4) published by the European Telecommunications Standards Institute (<http://www.etsi.org>).

Observe these guidelines:

- The rack must have sufficient vertical usable space to accommodate the height of the services gateway: 8.75 in. (22.23 cm) high (approximately 5 U). You can stack eight services gateways in a rack that is at least 48 U (89.3 in. or 2.24 m) in height if it has a 1 in cap between.

NOTE: A **U** is the standard rack unit defined in *Cabinets, Racks, Panels, and Associated Equipment*.

- The location of the rack must provide sufficient space to accommodate the depth of the services gateway. The chassis is 24.5 in. (62.2 cm) deep.

- The rack must be strong enough to support the weight of the fully configured device, up to 220 lb (100 kg). If you stack five fully configured devices in one rack, it must be capable of supporting up to 1100 lb (500 kg).

Spacing of Rack Mounting Bracket Holes for the SRX5400 Services Gateway

The services gateway can be mounted in any rack that provides holes or hole patterns spaced at 1 U (1.75 in.) increments. The mounting brackets used to attach the chassis to a rack are designed (as per EIA-310-D specifications) to fasten to holes spaced at those distances.

Connection to Building Structure for the SRX5400 Services Gateway Rack

Always secure the rack to the structure of the building. If your geographical area is subject to earthquakes, bolt the rack to the floor. For maximum stability, also secure the rack to ceiling brackets.

SRX5400 Services Gateway Cabinet Size and Clearance Requirements

The minimum size cabinet that can accommodate the device is 482 mm wide and 800 mm deep. A cabinet larger than the minimum requirement provides better airflow and reduces the chance of overheating. To accommodate a single device, the cabinet must be at least 13 U high. If you provide adequate cooling air and airflow clearance, you can stack five devices in a cabinet that has at least 48 U (84 in. or 2.13 m) of usable vertical space.

The minimum front and rear clearance requirements depend on the mounting configuration you choose. The minimum total clearance inside the cabinet is 30.7 in. between the inside of the front door and the inside of the rear door.

SRX5400 Services Gateway Cabinet Airflow Requirements

When you mount the device in a cabinet, you must ensure that ventilation through the cabinet is sufficient to prevent overheating. Following is a list of requirements to consider when planning for chassis cooling:

- Ensure that the cool air supply you provide through the cabinet can adequately dissipate the thermal output of the device.
- Ensure that the cabinet allows the chassis hot exhaust air to exit from the cabinet without recirculating into the device. 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.
- Install the device as close as possible to the front of the cabinet so that the cable management system just clears the inside of the front door. This maximizes the clearance in the rear of the cabinet for critical airflow.
- Route and dress all cables to minimize the blockage of airflow to and from the chassis.

Calculating Power Requirements for the SRX5400 Services Gateway

The information in this topic helps you determine which power supply configurations are suitable for various services gateway configurations, as well as which configurations are not suitable because output power is exceeded. You determine suitability by subtracting the total power draw from the maximum output of the power supplies. Afterward, the required input current is calculated. Finally, you calculate the thermal output.

We recommend that you provision power according to the maximum input current listed in the power supply electrical specifications (see [“SRX5400 Services Gateway AC Power Supply Specifications” on page 44](#) and [“SRX5400 Services Gateway DC Power Supply Specifications” on page 50](#)).

Use the following procedures to calculate the power requirement:

1. Calculate the power requirement.
2. Evaluate the power budget.
3. Calculate input power.
4. Calculate thermal output (BTUs) for cooling requirements.

The following sample configuration shows an SRX5400 Services Gateway chassis with various power supplies and:

- Two SRX5K-SPC-4-15-320 (SPC2) Services Processing Card (SPC) (slots 1 and 2)
- One SRX5K-MPC (IOC2) with two MICs installed in it (slot 1/0)
- One switch control board SRX5K-SCB (SCB1) or SRX5K-SCBE (SCB2) and one Routing Engine SRX5K-RE-13-20 (RE1) or SRX5KRE-1800X4 (RE2) installed in it (SCB slot 0)

1. Calculate the power requirements (usage) as shown in [Table 33 on page 153](#).

Table 33: Sample Power Requirements for an SRX5400 Services Gateway

Chassis Component	Part Number	Power Requirement
Base system	SRX5400-CHAS	40 W
Fan tray	SRX5400-FAN	75 W
MPC - slot 1/0	IOC2 SRX-MIC-2X40-QSFP SRX-QSFP-40G-SR4	570 W
SPC - slots 1 and 2	SCP2	585 W * 2 = 1170 W
SCB 0	SCB1 with	150 W
	RE1	90 W
	Or	
	SCB2 with	>150 W
	RE2	90 W
Total power requirement		2095 W
Total power requirement excluding cooling system		2020 W

2. Evaluate the power budget. In this step, we check the required power against the maximum output power of available power supply options.

NOTE: The power for the cooling system comes from a different tap on the power supply, reserved for the cooling system only. The cooling system power requirement does not need to be deducted from the output power budget of the power supply.

Table 34 on page 154 lists the power supplies, their maximum output power, and unused power (or a power deficit) for an AC-powered services gateway. Table 35 on page 154 lists the power supplies, their maximum output power, and unused power (or a power deficit) for a DC-powered services gateway.

Table 34: Calculating Power Budget, AC-Powered Chassis

Maximum Output Power of Power Supply	Maximum Output Power for System	Unused Power
1167 W (low-line)	1167W x 2 = 2334 W (2+1 Redundancy)	2334 - 2095 = 239W
2050 W (high-line)	2050 x 2 = 4100 W (2+1 Redundancy)	4100 - 2095 = 2005W

Table 35: Calculating Power Budget, DC Powered Chassis

Maximum Output Power of Power Supply	Maximum Output Power for System	Unused Power
2400 W (DIP=0)	2400 W (1+1 Redundancy)	2400 - 2095 = 305 W
2600 W (DIP=1)	2600W (1+1 Redundancy)	2600 - 2095 = 505 W

- Calculate input power. In this step, the input power requirements for the example configuration are calculated. To do this, divide the total output requirement by the efficiency of the power supply as shown in Table 36 on page 154. Here we include the power drawn by the cooling system.

Table 36: Calculating System Input Power

Power Supply	Power Supply Efficiency ¹	Input Power Requirement
SRX5400 AC	89 %	2095/0.89 = 2354 W

Table 36: Calculating System Input Power (continued)

Power Supply	Power Supply Efficiency ¹	Input Power Requirement
SRX5400 DC	~98 %	2095/0.98 = 2138 W

¹ These values are at full load and nominal voltage.

4. Calculate thermal output (BTUs) for the system. To calculate this value, multiply the total input power requirement (in watts) by 3.41 as shown in [Table 37 on page 155](#).

Table 37: Calculating System Thermal Output

Power Supply	Thermal Output (BTUs per hour)
SRX5400 AC	2354 * 3.41 = 8027 BTU/hr
SRX5400 DC	2138 * 3.41 = 7291 BTU/hr

The following sample configuration shows an SRX5400 Services Gateway chassis with various power supplies and:

- Two SRX5K-SPC-4-15-320 (SPC2) Services Processing Card (SPC) (slots 1 and 2)
- One IOC3 (SRX5K-MPC3-40G10G or SRX5K-MPC3-100G10G) (slot 1/0)
- One switch control board SRX5K-SCB3 (SCB3) and one Routing Engine RE2 installed in SCB slot 0

1. Calculate the power requirements (usage) as shown in [Table 38 on page 156](#).

Table 38: Sample Power Requirements for an SRX5400 Services Gateway with SCB3, IOC3, and RE2

Chassis Component	Part Number	Power Requirement
Base system	SRX5400-CHAS	40 W
Fan tray	SRX5400-FAN	75 W
MPC - slot 1/0	IOC3	607 W
SPC - slots 1 and 2	SCP2	585 W * 2 = 1170 W
SCB 0	SCB3	300 W
	RE2	90 W
Total power requirement		2282 W
Total power requirement excluding cooling system		2207 W

2. Evaluate the power budget. In this step, we check the required power against the maximum output power of available power supply options.

NOTE: The power for the cooling system comes from a different tap on the power supply, reserved for the cooling system only. The cooling system power requirement does not need to be deducted from the output power budget of the power supply.

[Table 39 on page 157](#) lists the power supplies, their maximum output power, and unused power (or a power deficit) for an AC-powered services gateway. [Table 40 on page 157](#) lists the power supplies, their maximum output power, and unused power (or a power deficit) for an AC-powered services gateway.

Table 39: Calculating Power Budget, AC-Powered Chassis

Maximum Output Power of Power Supply	Maximum Output Power for System	Unused Power
1167 W (low-line)	1167 x 2 = 2334 W (2+1 Redundancy)	2334 - 2282 = 52W
2050 W (high-line)	2050 x 2 = 4100 W (2+1 Redundancy)	4100 - 2282 = 1818 W

Table 40: Calculating Power Budget, DC Powered Chassis

Maximum Output Power of Power Supply	Maximum Output Power for System	Unused Power
2400 W (DIP=0)	2400W (1+1 Redundancy)	2400 - 2282 = 118W
2600 W (DIP=1)	2600W (1+1 Redundancy)	2600 - 2282 = 318 W

3. Calculate input power. In this step, the input power requirements for the example configuration are calculated. To do this, divide the total output requirement by the efficiency of the power supply as shown in [Table 41 on page 157](#). Here we include the power drawn by the cooling system.

Table 41: Calculating System Input Power

Power Supply	Power Supply Efficiency ¹	Input Power Requirement
SRX5400 AC	89 %	2282/0.89 = 2564 W
SRX5400 DC	~98 %	2282/0.98 = 2329 W

¹ These values are at full load and nominal voltage.

4. Calculate thermal output (BTUs) for the system. To calculate this value, multiply the total input power requirement (in watts) by 3.41 as shown in [Table 42 on page 158](#).

Table 42: Calculating System Thermal Output

Power Supply	Thermal Output (BTUs per hour)
SRX5400 AC	$2564 * 3.41 = 8743$ BTU/hr
SRX5400 DC	$2329 * 3.41 = 7941$ BTU/hr

RELATED DOCUMENTATION

| [SRX5400 Services Gateway Environmental Specifications](#) | 146

SRX5400 Network Cable and Transceiver Planning

IN THIS SECTION

- [Routing Engine Interface Cable and Wire Specifications for the SRX5400 Services Gateway](#) | 158
- [Signal Loss in Multimode and Single-Mode Fiber-Optic Cable for the SRX5400 Services Gateway](#) | 159
- [Attenuation and Dispersion in Fiber-Optic Cable for the SRX5400 Services Gateway](#) | 159
- [Calculating Power Budget for Fiber-Optic Cable for the SRX5400 Services Gateway](#) | 160
- [Calculating Power Margin for Fiber-Optic Cable for the SRX5400 Services Gateway](#) | 161

Routing Engine Interface Cable and Wire Specifications for the SRX5400 Services Gateway

[Table 43 on page 159](#) lists the specifications for the cables that connect to management ports and the wires that connect to the alarm relay contacts.

Table 43: Cable and Wire Specifications for Routing Engine Management and Alarm Interfaces

Port	Cable Specification	Cable/Wire Supplied	Maximum Length	Routing Engine Receptacle
Routing Engine console or auxiliary interface	RS-232 (EIA-232) serial cable	One 6-ft (1.83-m) length with RJ-45/DB-9 connectors	6 ft (1.83 m)	RJ-45 socket
Routing Engine Ethernet interface	Category 5 cable or equivalent suitable for 100Base-T operation	One 15-ft (4.57-m) length with RJ-45/RJ-45 connectors	328 ft (100 m)	RJ-45 autosensing

Signal Loss in Multimode and Single-Mode Fiber-Optic Cable for the SRX5400 Services Gateway

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. LEDs are not coherent sources, however. 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 (HOL) results. Together these factors limit the transmission distance of multimode fiber compared to 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. It is consequently more expensive.

Attenuation and Dispersion in Fiber-Optic Cable for the SRX5400 Services Gateway

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. While 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 in time. The following two types of dispersion can affect an optical data link:

- Chromatic dispersion—The spreading of the signal in time resulting from the different speeds of light rays.
- Modal dispersion—The spreading of the signal in time resulting from the different propagation modes in the fiber.

For multimode transmission, modal dispersion, rather than chromatic dispersion or attenuation, usually limits the maximum bit rate and link length. For single-mode transmission, modal dispersion is not a factor. However, at higher bit rates and over longer distances, chromatic dispersion rather than modal dispersion limits maximum link length.

An efficient optical data link must have enough light to exceed the minimum power that the receiver requires to operate within its specifications. In addition, the total dispersion must be less than the limits specified for the type of link in Telcordia Technologies document GR-253-CORE (Section 4.3) and International Telecommunications Union (ITU) document G.957.

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

Calculating Power Budget for Fiber-Optic Cable for the SRX5400 Services Gateway

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):

$$P_B = P_T - P_R$$

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

$$P_B = 13 \text{ dB}$$

Calculating Power Margin for Fiber-Optic Cable for the SRX5400 Services Gateway

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 :

$$P_M = P_B - LL$$

A 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 44 on page 161](#) 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, see your vendor documentation.

Table 44: Estimated Values for Factors That Cause 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
Connector	0.5 dB
Splice	0.5 dB
Fiber attenuation	Single-mode—0.5 dB/km Multimode—1 dB/km

The following example uses the estimated values in [Table 44 on page 161](#) to calculate link loss (LL) for a 2 km-long multimode link with a power budget (P_B) of 13 dB:

- Fiber attenuation for 2 km @ 1.0 dB/km= 2 dB
- Loss for five connectors @ 0.5 dB per connector = 5(0.5 dB) = 2.5 dB
- Loss for two splices @ 0.5 dB per splice =2(0.5 dB) = 1 dB

- Higher-order loss = 0.5 dB
- Clock recovery module = 1 dB

The power margin (P_M) is calculated as follows:

$$P_M = P_B - LL$$

$$P_M = 13 \text{ dB} - 2 \text{ km} (1.0 \text{ dB/km}) - 5 (0.5 \text{ dB}) - 2 (0.5 \text{ dB}) - 0.5 \text{ dB [HOL]} - 1 \text{ dB [CRM]}$$

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

$$P_M = 6 \text{ dB}$$

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 44 on page 161](#) to calculate 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:

$$P_M = P_B - LL$$

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

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

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

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.

RELATED DOCUMENTATION

[Connecting the SRX5400 Services Gateway to a Network for Out-of-Band Management | 191](#)

[Connecting the SRX5400 Services Gateway to a Management Console or an Auxiliary Device | 189](#)

SRX5400 Alarm and Management Cable Specifications and Pinouts

IN THIS SECTION

- [Alarm Relay Contact Wire Specifications for the SRX5400 Services Gateway | 163](#)
- [Console Port Cable and Wire Specifications for the SRX5400 Services Gateway | 163](#)
- [RJ-45 Connector Pinouts for the SRX5400 Services Gateway Routing Engine Ethernet Port | 164](#)
- [RJ-45 Connector Pinouts for the SRX5400 Services Gateway Routing Engine Auxiliary and Console Ports | 164](#)

Alarm Relay Contact Wire Specifications for the SRX5400 Services Gateway

[Table 45 on page 163](#) lists the specifications for the wires that connect to the alarm relay contacts.

Table 45: Cable and Wire Specifications for Alarm Interfaces

Port	Cable Specification	Cable/Wire Supplied
Alarm relay contacts	Wire with gauge between 28-AWG and 14-AWG (0.08 and 2.08 mm ²)	No

Console Port Cable and Wire Specifications for the SRX5400 Services Gateway

[Table 46 on page 163](#) lists the specifications for the cable that connects a **CONSOLE** port on the Routing Engine to a management console.

Table 46: Cable and Wire Specifications for Routing Engine Management and Alarm Interfaces

Port	Cable Specification	Cable/Wire Supplied	Maximum Length	Receptacle
Routing Engine console or auxiliary interface	RS-232 (EIA-232) serial cable	One 6-ft (1.83-m) length with RJ-45/DB-9 connectors	6 ft (1.83 m)	RJ-45/DB-9 plug

RJ-45 Connector Pinouts for the SRX5400 Services Gateway Routing Engine Ethernet Port

The port on the Routing Engine labeled **ETHERNET** is an autosensing 10/100-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). [Table 47 on page 164](#) describes the RJ-45 connector pinout.

Table 47: RJ-45 Connector Pinout for the Routing Engine ETHERNET Port

Pin	Signal
1	TX+
2	TX-
3	RX+
4	Termination network
5	Termination network
6	RX-
7	Termination network
8	Termination network

RJ-45 Connector Pinouts for the SRX5400 Services Gateway Routing Engine Auxiliary and Console Ports

The ports on the Routing Engine labeled **AUX** and **CONSOLE** are asynchronous serial interfaces that accept an RJ-45 connector. The ports connect the Routing Engine to an auxiliary or console management device. [Table 48 on page 164](#) describes the RJ-45 connector pinout.

Table 48: RJ-45 Connector Pinout for the AUX and CONSOLE Ports

Pin	Signal	Description
1	RTS	Request to Send

Table 48: RJ-45 Connector Pinout for the AUX and CONSOLE Ports (*continued*)

Pin	Signal	Description
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

RELATED DOCUMENTATION

| [Connecting the SRX5400 to External Devices](#) | 189

3

CHAPTER

Initial Installation and Configuration

SRX5400 Installation Overview | **167**

Unpacking the SRX5400 | **168**

Installing the SRX5400 Mounting Hardware | **172**

Installing the SRX5400 Using a Mechanical Lift | **176**

Installing the SRX5400 Without a Mechanical Lift | **178**

Connecting the SRX5400 to External Devices | **189**

Connecting the SRX5400 to Power | **194**

Performing the Initial Software Configuration for the SRX5400 | **204**

SRX5400 Installation Overview

To install the SRX5400 Services Gateway:

1. Prepare your installation site as described in [“Site Preparation Checklist for the SRX5400 Services Gateway” on page 145](#).
2. Review the safety guidelines explained in *SRX5400 Services Gateway General Safety Guidelines and Warnings*.
3. Unpack the services gateway and verify the parts.
 - a. [Unpacking the SRX5400 Services Gateway on page 168](#)
 - b. [Verifying the SRX5400 Services Gateway Parts Received on page 170](#)
4. Install the mounting hardware as described in [“Installing the SRX5400 Services Gateway Mounting Hardware for a Rack or Cabinet” on page 173](#).
5. Lift the services gateway on to the rack. Because of the weight of the services gateway, we recommend that you use a mechanical lift.
 - [Installing the SRX5400 Services Gateway Using a Mechanical Lift on page 177](#)
 - [Installing the SRX5400 Services Gateway Chassis in the Rack Manually on page 184](#)
6. Connect cables to the network and external devices.
 - [Connecting the SRX5400 Services Gateway to a Management Console or an Auxiliary Device on page 189](#)
 - [Connecting the SRX5400 Services Gateway to a Network for Out-of-Band Management on page 191](#)
 - [Connecting the Alarm Relay Wires to the SRX5400 Services Gateway Craft Interface on page 220](#)
7. Connect the grounding cable as described in [“Grounding the SRX5400 Services Gateway” on page 195](#).



WARNING: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must properly ground the services gateway chassis before connecting power.

8. Connect the AC power cord or DC power cables:
 - [Connecting Power to an AC-Powered SRX5400 Services Gateway on page 196](#)

- [Connecting Power to a DC-Powered SRX5400 Services Gateway on page 199](#)
9. Power on the services gateway:
- [Powering On an AC-Powered SRX5400 Services Gateway on page 198](#)
 - [Powering On a DC-Powered SRX5400 Services Gateway on page 202](#)
10. Perform the initial system configuration as described in “[Initially Configuring the SRX5400 Services Gateway](#)” on page 205.

Unpacking the SRX5400

IN THIS SECTION

- [Tools and Parts Required to Unpack the SRX5400 Services Gateway | 168](#)
- [Unpacking the SRX5400 Services Gateway | 168](#)
- [Verifying the SRX5400 Services Gateway Parts Received | 170](#)

Tools and Parts Required to Unpack the SRX5400 Services Gateway

To unpack the services gateway 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
- Blank panels to cover any slots not occupied by a component

Unpacking the SRX5400 Services Gateway

The services gateway is shipped in a wooden crate. A wooden pallet forms the base of the crate. The device chassis is bolted to this pallet. A Getting Started Guide and a cardboard accessory box are also included in the shipping crate.

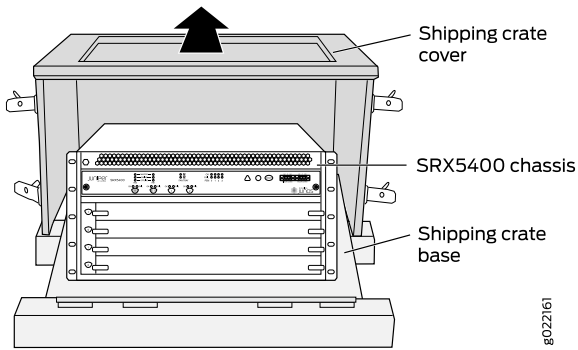
The shipping container measures 33.5 in. (85.1 cm) high, 28 in. (71.1 cm) wide, and 26 in. (66.0 cm) deep. The total weight of the container containing the device and accessories can range from 153 lb (70 kg) to 351 lb (159.2 kg).

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

To unpack the device, follow these steps (see [Figure 71 on page 170](#)):

1. Move the shipping crate to a staging area as close to the installation site as possible, where you have enough room to remove the components from the chassis. While the chassis is bolted to the pallet, you can use a forklift or pallet jack to move it.
2. Position the shipping crate with the arrows pointing up.
3. Open all the latches on the shipping crate.
4. Remove the front door of the shipping crate cover and set it aside.
5. Slide the remainder of the shipping crate cover off the pallet.
6. Remove the foam covering the top of the device.
7. Remove the accessory box and the *SRX5400 Services Gateway Getting Started Guide*.
8. Verify the parts received as described in [“Verifying the SRX5400 Services Gateway Parts Received” on page 170](#).
9. Remove the vapor corrosion inhibitor (VCI) packs attached to the pallet, being careful not to break the VCI packs open.
10. To remove the brackets holding the chassis on the pallet, use a 1/2-in. socket wrench and a number 2 Phillips screwdriver to remove the bolts and screws from the brackets.
11. Store the brackets and bolts inside the accessory box.
12. Save the shipping crate cover, pallet, and packing materials in case you need to move or ship the device at a later time.

Figure 71: Contents of the Shipping Crate



Verifying the SRX5400 Services Gateway 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 services gateway contains the chassis with installed components, listed in [Table 49 on page 170](#), and an accessory box, which contains the parts listed in [Table 50 on page 171](#). The parts shipped with your device can vary depending on the configuration you ordered.

Table 49: Parts List for a Fully Configured Services Gateway

Component	Quantity
Chassis, including midplane, craft interface, and rack-mounting brackets	1
MPCs	1 or 2
SPCs	1 or 2
Routing Engine	1
SCB	1
Power supplies	Up to 4
Fan tray	1
Air filter	1

Table 49: Parts List for a Fully Configured Services Gateway (continued)

Component	Quantity
Air filter tray	1
Getting Started Guide	1
Small mounting shelf	1
Blank panels for slots without components installed	One blank panel for each slot not occupied by a component

Table 50: Accessory Box Parts List

Part	Quantity
Screws to mount chassis and small shelf	22
Screws to connect grounding cable (1/4-20 thread, 1/2 in. length)	2
Split washers for connecting grounding cable	2
DC power terminal Lugs, 6-AWG	8
RJ-45-to-DB-9 cable to connect the device through the serial port	1
Cable manager brackets	2
Terminal block plug, 3-pole, 5.08 mm spacing, 12A, to connect the device alarms	2
Transceiver	2
Label, accessories contents, SRX5400	1
USB flash drive with Junos OS	1
Read me first document	1
Affidavit for T1 connection	1
Juniper Networks Product Warranty	1
End User License Agreement	1

Table 50: Accessory Box Parts List (continued)

Part	Quantity
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
Ethernet cable, RJ-45/RJ-45, 4-pair stranded UTP, Category 5E, 15'	1
ESD wrist strap with cable	1

Installing the SRX5400 Mounting Hardware

IN THIS SECTION

- [Tools and Parts Required to Install the SRX5400 Services Gateway Mounting Hardware for a Rack or Cabinet | 173](#)
- [Installing the SRX5400 Services Gateway Mounting Hardware for a Rack or Cabinet | 173](#)
- [Moving the Mounting Brackets for Center-Mounting the SRX5400 Services Gateway | 175](#)

Tools and Parts Required to Install the SRX5400 Services Gateway Mounting Hardware for a Rack or Cabinet

To install the services gateway in a rack or cabinet, you need the following tools:

- Phillips (+) screwdriver, number 2

Installing the SRX5400 Services Gateway Mounting Hardware for a Rack or Cabinet

The services gateway can be installed in a four-post rack or cabinet or an open-frame rack. Install the mounting hardware on the rack before installing the services gateway.

Install the mounting shelf, which is included in the shipping container, before installing the services gateway. We recommend that you install the mounting shelf because the weight of a fully loaded chassis can be up to 220 lb (100 kg).

[Table 51 on page 173](#) specifies the holes in which you insert cage nuts and screws to install the mounting hardware required. The hole distances are relative to one of the standard U divisions on the rack. The bottom of all mounting shelves is at 0.02 in. above a U division.

Table 51: Four-Post Rack or Cabinet Mounting Hole Locations

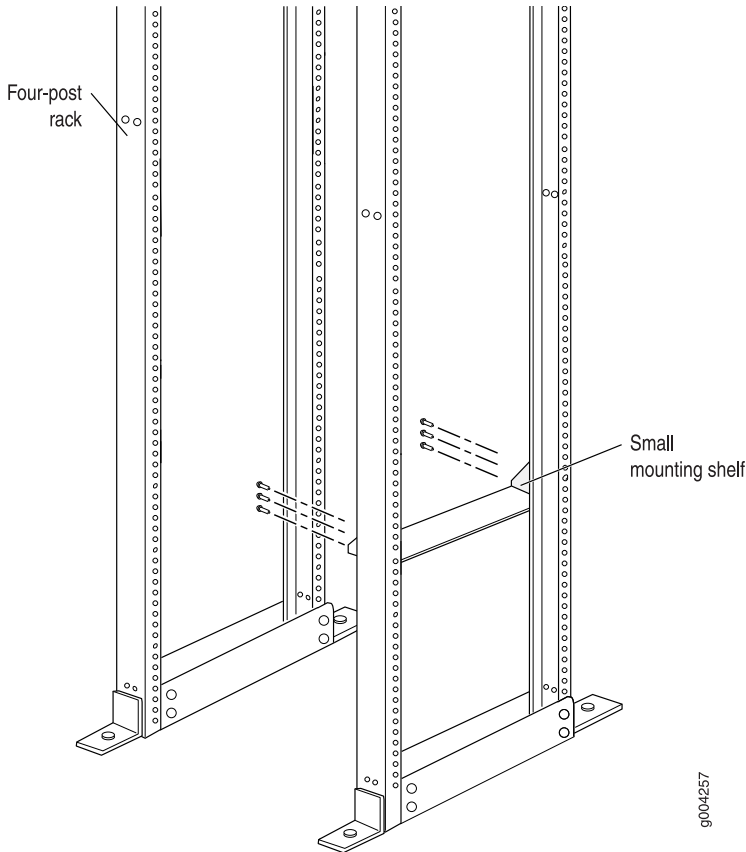
Hole	Distance Above U Division	
3	1.51 in. (3.8 cm)	0.86 U
2	0.88 in. (2.2 cm)	0.50 U
1	0.25 in. (0.6 cm)	0.14 U

To install the mounting shelf on the front rails of a four-post rack or cabinet, or the rails of an open-frame rack (see [Figure 72 on page 174](#) or [Figure 73 on page 175](#)):

1. If needed, install cage nuts in the holes specified in [Table 51 on page 173](#).
2. On the back of each rack rail, partially insert a mounting screw into the lowest hole specified in [Table 51 on page 173](#).
3. Install the mounting shelf on the back of the rack rails. Rest the bottom slot of each flange on a mounting screw.

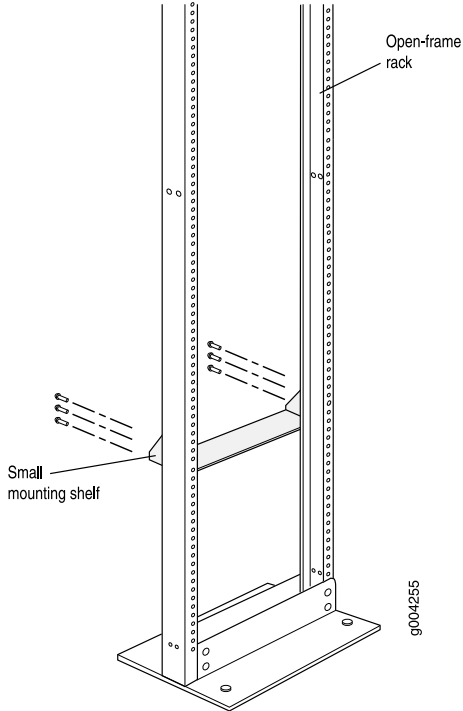
4. Partially insert the remaining screws into the open holes in each flange of the mounting shelf.
5. Tighten all the screws completely.

Figure 72: Installing the Front Mounting Hardware for a Four-Post Rack or Cabinet



g004257

Figure 73: Installing the Mounting Hardware for an Open-Frame Rack



Moving the Mounting Brackets for Center-Mounting the SRX5400 Services Gateway

Two removable mounting brackets are attached to the mounting holes closest to the front of the chassis. You can move the pair of brackets to another position on the side of the chassis for center-mounting the services gateway.

To move the mounting brackets from the front of the chassis toward the center of the chassis:

1. Remove the three screws at the top and center of the bracket.
2. Pull the top of the bracket slightly away from the chassis. The bottom of the bracket contains a tab that inserts into a slot in the chassis.
3. Pull the bracket away from the chassis so that the tab is removed from the chassis slot.
4. Insert the bracket tab into the slot in the bottom center of the chassis.
5. Align the bracket with the two mounting holes located toward the top center of the chassis.

There is no mounting hole in the center of the chassis that corresponds to the hole in the center of the bracket.

6. Insert the two screws at the top of the bracket and tighten each partially.

Two screws are needed for mounting the bracket on the center of the chassis. You do not need the third screw.

7. Tighten the two screws completely.
8. Repeat the procedure for the other bracket.

RELATED DOCUMENTATION

[General Safety Guidelines and Warnings | 369](#)

[Site Preparation Checklist for the SRX5400 Services Gateway | 145](#)

Installing the SRX5400 Using a Mechanical Lift

IN THIS SECTION

- [Tools Required to Install the SRX5400 Services Gateway with a Mechanical Lift | 176](#)
- [Installing the SRX5400 Services Gateway Using a Mechanical Lift | 177](#)

Tools Required to Install the SRX5400 Services Gateway with a Mechanical Lift

To install the services gateway, you need the following tools:

- Mechanical lift
- Phillips (+) screwdrivers, number 2

Installing the SRX5400 Services Gateway Using a Mechanical Lift

Because of the services gateway's size and weight—up to 220 lb (100 kg) depending on the configuration—we strongly recommend that you install the services gateway using a mechanical lift. If you do not use a lift to install the services gateway, see [“Overview of Installing the SRX5400 Services Gateway Without a Mechanical Lift” on page 179](#) for complete instructions to install the services gateway safely.

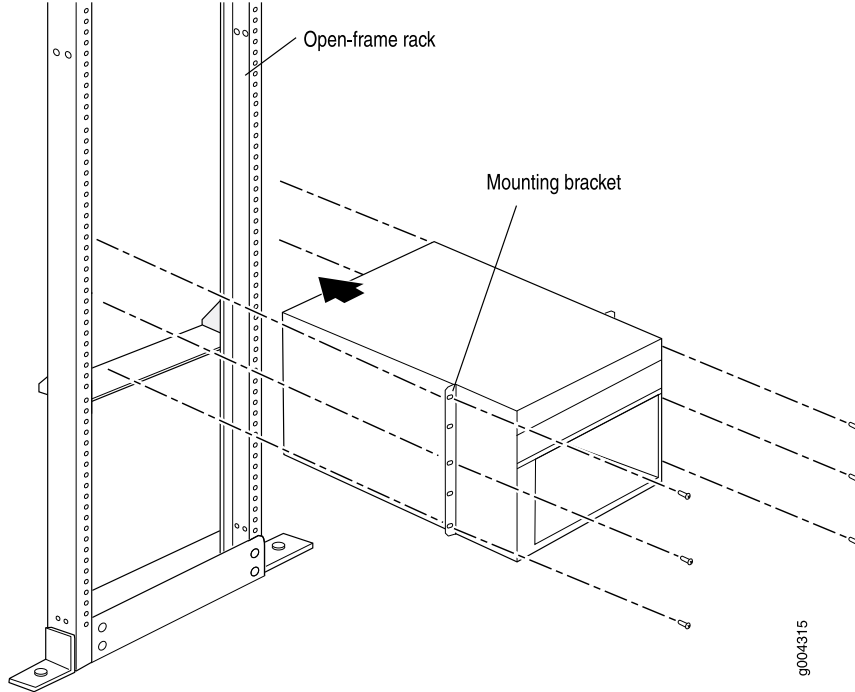


CAUTION: Before front mounting the services gateway in a rack, have a qualified technician verify that the rack is strong enough to support the services gateway's weight and is adequately supported at the installation site.

To install the services gateway using a lift (see [Figure 74 on page 178](#)):

1. Ensure that the rack is in its permanent location and is secured to the building. Ensure that the installation site allows adequate clearance for both airflow and maintenance.
2. Load the services gateway onto the lift, making sure it rests securely on the lift platform.
3. Using the lift, position the services gateway in front of the rack or cabinet, centering it in front of the mounting shelf.
4. Lift the chassis approximately 0.75 in. above the surface of the mounting shelf and position it as close as possible to the shelf.
5. Carefully slide the services gateway onto the mounting shelf so that the bottom of the chassis and the mounting shelf overlap by approximately two inches.
6. Slide the device onto the mounting shelf until the mounting brackets contact the rack rails. The shelf ensures that the holes in the mounting brackets of the chassis align with the holes in the rack rails.
7. Move the lift away from the rack.
8. Install a mounting screw into each of the open mounting holes aligned with the rack, starting from the bottom.
9. Visually inspect the alignment of the services gateway. If the services gateway is installed properly in the rack, all the mounting screws on one side of the rack should be aligned with the mounting screws on the opposite side and the device should be level.

Figure 74: Installing the Services Gateway in the Rack



NOTE: This illustration depicts the services gateway being installed in an open-frame rack.

RELATED DOCUMENTATION

[General Safety Guidelines and Warnings | 369](#)

[Chassis and Component Lifting Guidelines | 379](#)

Installing the SRX5400 Without a Mechanical Lift

IN THIS SECTION

- [Overview of Installing the SRX5400 Services Gateway Without a Mechanical Lift | 179](#)
- [Tools Required to Install the SRX5400 Services Gateway Without a Mechanical Lift | 179](#)
- [Removing Components from the SRX5400 Chassis Before Installing It Without a Lift | 179](#)

- [Installing the SRX5400 Services Gateway Chassis in the Rack Manually | 184](#)
- [Reinstalling Components in the SRX5400 Services Gateway Chassis After Installing It Without a Lift | 186](#)

Overview of Installing the SRX5400 Services Gateway Without a Mechanical Lift

If you cannot use a mechanical lift to install the services gateway (the preferred method), you can install it manually. Before installing the services gateway manually, you must first remove components from the chassis, and you must reinstall the components once the services gateway is installed in the rack. At least two people are needed to safely lift the chassis into the rack or cabinet. With components removed, the chassis weighs approximately 65 lb (29 kg).

Before installing the services gateway in the rack, read the safety information in *Chassis Lifting Guidelines*. Remove the services gateway from the shipping container as described in [“Unpacking the SRX5400 Services Gateway” on page 168](#). Install the mounting hardware as described in [“Installing the SRX5400 Services Gateway Mounting Hardware for a Rack or Cabinet” on page 173](#).

Tools Required to Install the SRX5400 Services Gateway Without a Mechanical Lift

To install the services gateway, you need the following tools and parts:

- Phillips (+) screwdrivers, numbers 1 and 2
- 7/16-in. (11 mm) nut driver
- ESD grounding wrist strap

Removing Components from the SRX5400 Chassis Before Installing It Without a Lift

If you cannot use a mechanical lift to install the services gateway (the preferred method), you can install it manually. Before installing the services gateway manually, you must first remove components from the

chassis, and reinstall the components the chassis is installed in the rack. With components removed, the chassis weighs approximately 65 lb (29 kg).

1. [Removing the Power Supplies Before Installing the SRX5400 Services Gateway Without a Lift | 180](#)
2. [Removing the Fan Tray Before Installing an SRX5400 Services Gateway Without a Lift | 181](#)
3. [Removing Cards Before Installing an SRX5400 Services Gateway Without a Lift | 181](#)

Removing the Power Supplies Before Installing the SRX5400 Services Gateway Without a Lift

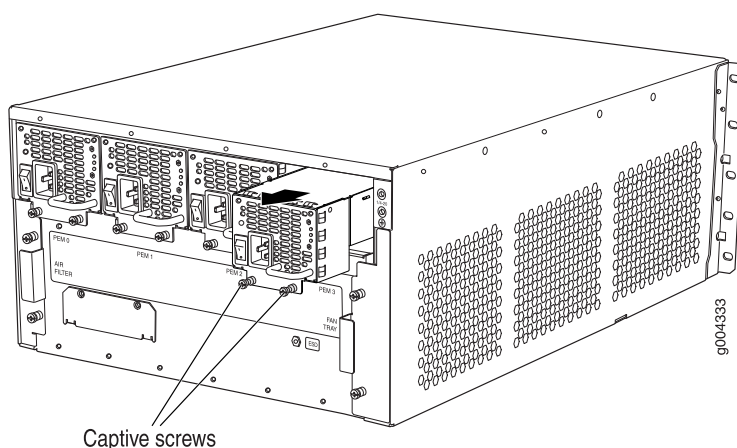
Remove the leftmost power supply first and then work your way to the right. To remove the AC or DC power supplies for each power supply (see [Figure 75 on page 180](#)):

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. On an AC-powered services gateway, switch the AC input switch on each power supply to the off (O) position. On a DC-powered services gateway, Move the DC circuit breaker on each DC power supply to the off (O) position.

We recommend this even though the power supplies are not connected to power sources.

3. Loosen the captive screws on the bottom edge of the power supply faceplate.
4. Pull the power supply straight out of the chassis.

Figure 75: Removing a Power Supply Before Installing the Device

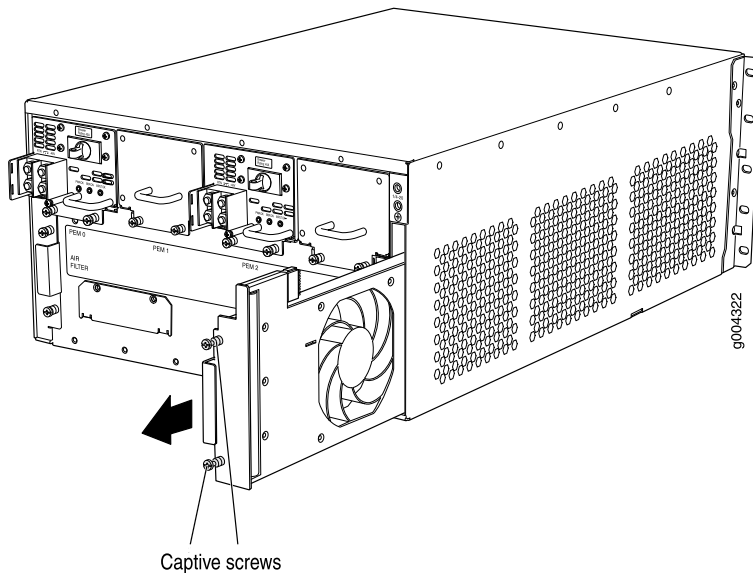


Removing the Fan Tray Before Installing an SRX5400 Services Gateway Without a Lift

To remove the fan tray (see [Figure 76 on page 181](#)):

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. Loosen the captive screws on the fan tray faceplate.
3. Grasp the fan tray handle and pull it out approximately 1 to 3 inches.
4. Press the latch located on the inside of the fan tray to release it from the chassis.
5. Place one hand under the fan tray to support it and pull the fan tray completely out of the chassis.

Figure 76: Removing the Fan Tray



Removing Cards Before Installing an SRX5400 Services Gateway Without a Lift

The services gateway holds up to four cards (MPCs, SCB, and SPCs), which are installed horizontally in the front of the device. Each card weighs up to 18.3 lb (8.3 kg), be prepared to accept its full weight.

To remove a card (see [Figure 77 on page 183](#)):

1. Have ready an antistatic mat for the card. Also have ready rubber safety caps for each port using an optical interface on the card that you are removing.
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 each port on the card so that you can later reconnect the cables to the correct ports.
4. If a card uses fiber-optic cable, immediately cover each transceiver and the end of each cable with a rubber safety cap. Arrange the disconnected cables in the cable management system, to prevent the cables from developing stress points.



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.



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



CAUTION: Avoid bending a 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.

5. For SCB, observe these points regarding the ejector handles:
 - When removing or inserting the SCB, ensure that the SCB or blank panels in adjacent slots are fully inserted to avoid hitting them with the ejector handles. The ejector handles require that all adjacent components be completely inserted so the ejector handles do not hit them, which could result in damage.
 - The ejector handles have a center of rotation and need to be stored toward the center of the board. Ensure the long ends of the ejectors located at both the top and the bottom of the board are vertical and pressed as far as possible toward the center of the board. Once you have installed the SCB, place

the ejector handles in their proper position, vertically and toward the center of the board. To avoid blocking the visibility of the LEDs, position the ejectors over the PARK icon.

- To insert or remove the SCB card, slide the ejector across the SCB horizontally, rotate it, and slide it again another quarter of a turn. Turn the ejector again and repeat as necessary. Use the indexing feature to maximize leverage and to avoid hitting any adjacent components.
6. Simultaneously turn both the ejector handles counterclockwise to unseat the card.
 7. Grasp the handles and slide the card straight out of the card cage halfway.
 8. Place one hand around the front of the card and the other hand under it to support it. Slide the card completely out of the chassis, and place it on the antistatic mat or in the electrostatic bag.

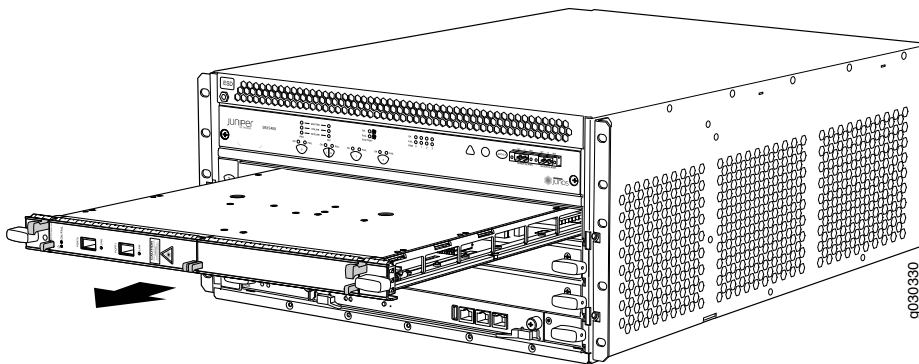


CAUTION: The weight of the card is concentrated in the back end. Be prepared to accept the full weight—up to 18.3 lb (8.3 kg)—as you slide the card out of the chassis.

When the card is out of the chassis, do not hold it by the ejector handles, bus bars, or edge connectors. They cannot support its weight.

Do not stack cards on top of one another after removal. Place each one individually in an electrostatic bag or on its own antistatic mat on a flat, stable surface.

Figure 77: Removing a Card (MPC Shown, Other Card Types Similar)



Installing the SRX5400 Services Gateway Chassis in the Rack Manually

To install the device in the rack (see [Figure 78 on page 185](#)):



CAUTION: If you are installing more than one services gateway in a rack, install the lowest one first. Installing a services gateway in an upper position in a rack or cabinet requires a lift.



CAUTION: Before front mounting the services gateway in a rack, have a qualified technician verify that the rack is strong enough to support the services gateway's weight and is adequately supported at the installation site.



CAUTION: Lifting the chassis and mounting it in a rack requires two people. The empty chassis weighs approximately 65 lb (29 kg).

1. Ensure that the rack is in its permanent location and is secured to the building. Ensure that the installation site allows adequate clearance for both airflow and maintenance.
2. Position the services gateway in front of the rack or cabinet, centering it in front of the mounting shelf. Use a pallet jack if one is available.
3. With one person on each side, hold onto the bottom of the chassis and carefully lift it onto the mounting shelf.

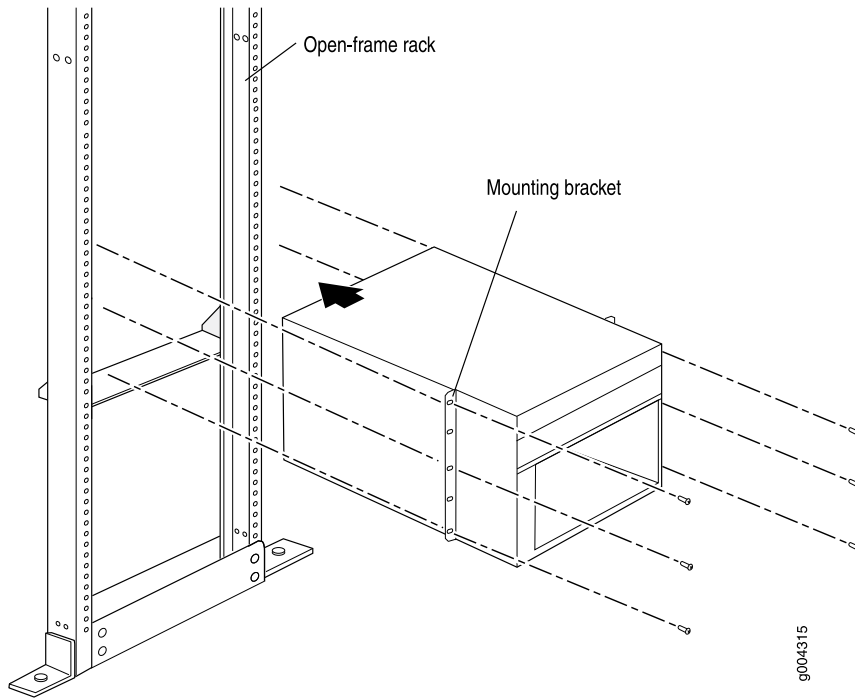


WARNING: To prevent injury, keep your back straight and lift with your legs, not your back. Avoid twisting your body as you lift. Balance the load evenly and be sure that your footing is solid.

4. Slide the services gateway onto the mounting shelf until the mounting brackets contact the rack rails. The shelf ensures that the holes in the mounting brackets of the chassis align with the holes in the rack rails.

5. Install a mounting screw into each of the open mounting holes aligned with the rack, starting from the bottom.
6. Visually inspect the alignment of the services gateway. If the services gateway is installed properly in the rack, all the mounting screws on one side of the rack should be aligned with the mounting screws on the opposite side and the services gateway should be level.

Figure 78: Installing the Services Gateway in the Rack



NOTE: This illustration depicts the services gateway being installed in an open-frame rack.

Reinstalling Components in the SRX5400 Services Gateway Chassis After Installing It Without a Lift

After the services gateway is installed in the rack, reinstall the removed components before booting and configuring the services gateway. You reinstall components first in the rear of the chassis, and then in the front:

1. [Reinstalling Power Supplies After Installing the SRX5400 Services Gateway Without a Lift | 186](#)
2. [Reinstalling the Fan Tray After Installing the SRX5400 Services Gateway Without a Lift | 187](#)
3. [Reinstalling Cards After Installing the SRX5400 Services Gateway Without a Lift | 188](#)

Reinstalling Power Supplies After Installing the SRX5400 Services Gateway Without a Lift

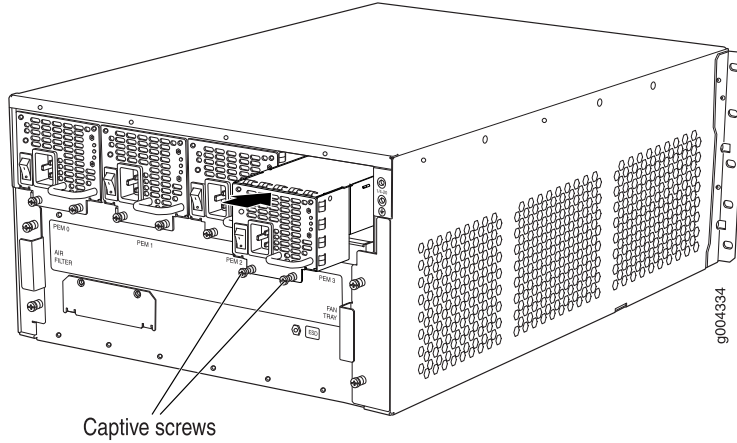
Reinstall the rightmost power supply first and then work your way to the left. To reinstall the AC or DC power supplies, follow this procedure for each power supply (see [Figure 79 on page 187](#), which shows the installation of the DC power supplies):

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. On an AC-powered services gateway, switch the AC input switch on each power supply to the off (O) position. On a DC-powered services gateway, move the DC circuit breaker on each DC power supply to the off (O) position.

We recommend this even though the power supplies are not connected to power sources.

3. Using both hands, slide the power supply straight into the chassis until the power supply is fully seated in the chassis slot. The power supply faceplate should be flush with any adjacent power supply faceplate or blank installed in the power supply slot.
4. Tighten the captive screws.

Figure 79: Reinstalling a Power Supply

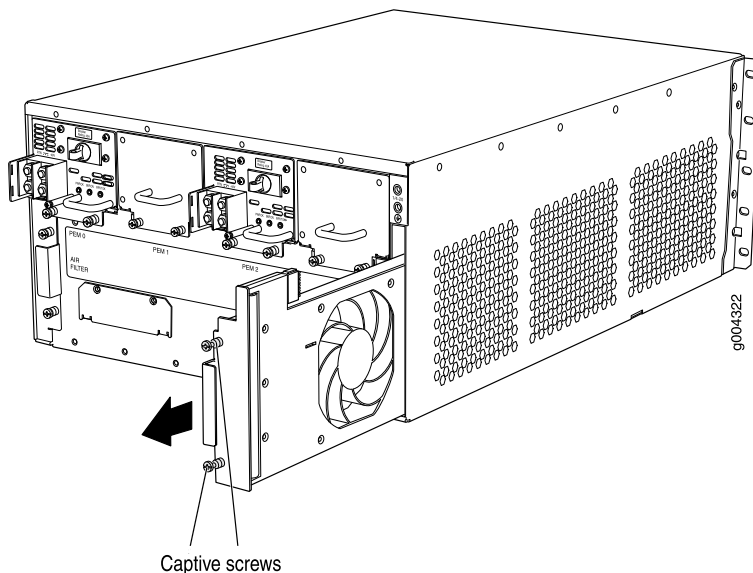


Reinstalling the Fan Tray After Installing the SRX5400 Services Gateway Without a Lift

To reinstall the fan tray (see [Figure 80 on page 187](#)):

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. Grasp the fan tray on each side and insert it straight into the chassis. Note the correct orientation by the "this side up" label on the top surface of the fan tray.
3. Tighten the captive screws on the fan tray faceplate to secure it in the chassis.

Figure 80: Reinstalling the Fan Tray

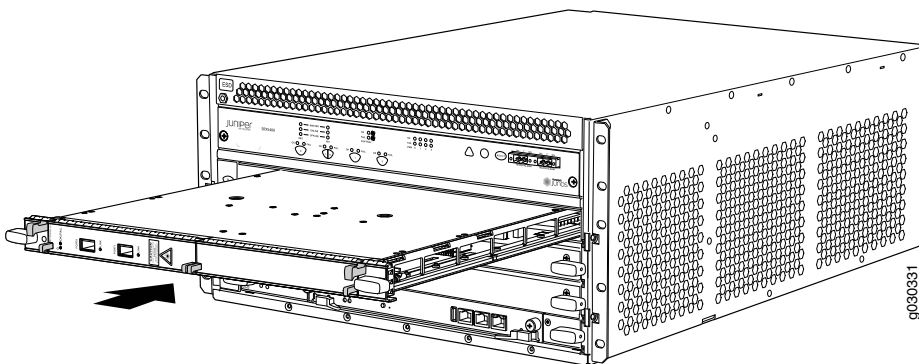


Reinstalling Cards After Installing the SRX5400 Services Gateway Without a Lift

To reinstall MPCs, SPCs, and the SCB, follow this procedure for each card (see [Figure 81 on page 188](#)):

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. Place the card on an antistatic mat or remove it from its electrostatic bag.
3. Identify the slot on the services gateway where it will be installed.
4. Verify that each fiber-optic has a rubber safety cap covering the transceiver. If it does not, cover the transceiver with a safety cap.
5. Orient the card so that the faceplate faces you.
6. Lift the card into place and carefully align the sides of the card with the guides inside the card cage.
7. Slide the card all the way into the card cage until you feel resistance.
8. Grasp both ejector handles and rotate them clockwise simultaneously until the card is fully seated.

Figure 81: Installing an MPC or SPC



RELATED DOCUMENTATION

[General Safety Guidelines and Warnings | 369](#)

[Chassis and Component Lifting Guidelines | 379](#)

Connecting the SRX5400 to External Devices

IN THIS SECTION

- [Tools and Parts Required for SRX5400 Services Gateway Connections | 189](#)
- [Connecting the SRX5400 Services Gateway to a Management Console or an Auxiliary Device | 189](#)
- [Connecting the SRX5400 Services Gateway to a Network for Out-of-Band Management | 191](#)
- [Connecting an SRX5400 Services Gateway to an External Alarm-Reporting Device | 191](#)
- [Connecting Network Cables to SRX5400 Services Gateway MICs | 193](#)

Tools and Parts Required for SRX5400 Services Gateway Connections

To connect the device to management devices and to power on the device, you need the following tools and parts:

- Phillips (+) screwdrivers, numbers 1 and 2
- 2.5-mm flat-blade (-) screwdriver
- 2.5-mm Phillips (+) screwdriver
- Wire cutters
- Pliers
- Electrostatic discharge (ESD) grounding wrist strap

Connecting the SRX5400 Services Gateway to a Management Console or an Auxiliary Device

To use a system console to configure and manage the Routing Engine, connect it to the appropriate **CONSOLE** port on the Routing Engine. To use a laptop, modem, or other auxiliary device, connect it to the **AUX** port on the Routing Engine. Both ports accept a cable with an RJ-45 connector. One serial cable with an RJ-45 connector and a DB-9 connector is provided with the services gateway. To connect a device to the **CONSOLE** port and another device to the **AUX** port, you must supply an additional cable.

To connect a management console or auxiliary device:

1. Plug the RJ-45 end of the serial cable ([Figure 82 on page 190](#) shows the connector) into the **AUX** port or **CONSOLE** port on the Routing Engine. [Figure 83 on page 190](#) shows the ports.

Figure 82: Routing Engine Console and Auxiliary Cable Connector

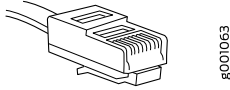
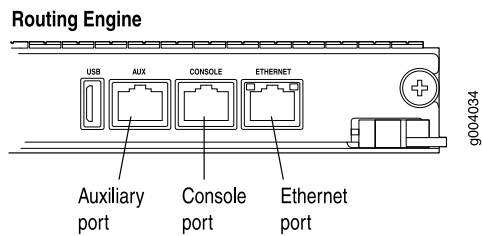


Figure 83: Auxiliary and Console Ports



2. 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

Connecting the SRX5400 Services Gateway to a Network for Out-of-Band Management

To connect the services gateway Routing Engine to a network for out-of-band management, connect an Ethernet cable with RJ-45 connectors to the **ETHERNET** port on the Routing Engine. One Ethernet cable is provided with the services gateway. To connect to the **ETHERNET** port on the Routing Engine:

1. Plug one end of the Ethernet cable ([Figure 84 on page 191](#) shows the connector) into the **ETHERNET** port on the Routing Engine. [Figure 85 on page 191](#) shows the port.
2. Plug the other end of the cable into the network device.

Figure 84: Routing Engine Ethernet Cable Connector

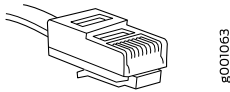
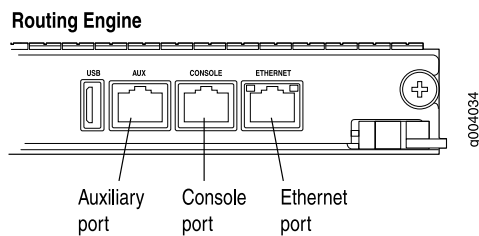


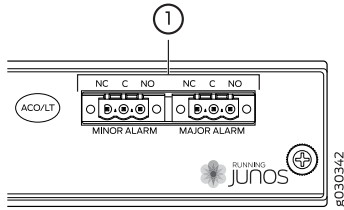
Figure 85: Ethernet Port



Connecting an SRX5400 Services Gateway to an External Alarm-Reporting Device

To connect the services gateway to external alarm-reporting devices, attach wires to the **MAJOR ALARM** and **MINOR ALARM** relay contacts on the craft interface. (See [Figure 86 on page 192](#).) A system condition that triggers the major or minor alarm LED on the craft interface also activates the corresponding alarm relay contact.

Figure 86: Alarm Relay Contacts

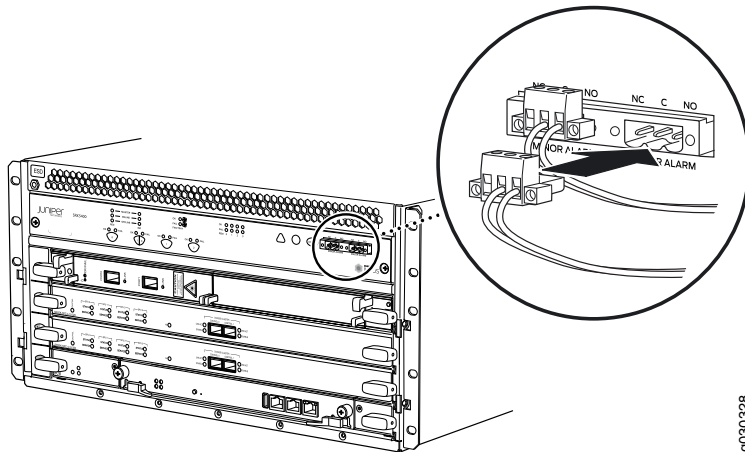


The terminal blocks that plug into the alarm relay contacts are supplied with the services gateway. They accept wire of any gauge between 28-AWG and 14-AWG (0.08 and 2.08 mm²), which is not provided. Use the gauge of wire appropriate for the external device you are connecting.

To connect an external device to an alarm relay contact (see [Figure 86 on page 192](#)):

1. Prepare the required length of wire with gauge between 28-AWG and 14-AWG (0.08 and 2.08 mm²).
2. While the terminal block is not plugged into the relay contact, use a 2.5-mm flat-blade screwdriver to loosen the small screws on its top. With the small screws on its top facing upward, insert wires into the slots in the front of the block based on the wiring for the external device. Tighten each screw to secure the corresponding wire.
3. Plug the terminal block into the relay contact, and use a 2.5-mm flat-blade screwdriver to tighten the screws on the face of the block. See [Figure 87 on page 192](#).

Figure 87: Connecting an External Alarm-Reporting Device



4. Attach the other end of the wires to the external device.

To attach a reporting device for the other kind of alarm, repeat the procedure.

Connecting Network Cables to SRX5400 Services Gateway MICs

To connect the MICs to the network:

1. Have ready a length of the type of cable used by the component.
2. Remove the rubber safety plug from the cable connector port.



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.



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

3. Insert the cable connector into the cable connector port on the faceplate.

NOTE: The transceiver cages and optics on the components are industry standard parts that have limited tactile feedback for insertion of optics and fiber. You need to insert the optics and fiber firmly until the latch is securely in place.

4. Arrange the cable in the standard or extended cable manager to prevent it from dislodging or developing stress points. Secure the cable so that it is not supporting its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on the loop helps to maintain its shape.



CAUTION: Avoid bending a 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.



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

Connecting the SRX5400 to Power

IN THIS SECTION

- [Tools and Parts Required for SRX5400 Services Gateway Grounding and Power Connections | 194](#)
- [Grounding the SRX5400 Services Gateway | 195](#)
- [Connecting Power to an AC-Powered SRX5400 Services Gateway | 196](#)
- [Powering On an AC-Powered SRX5400 Services Gateway | 198](#)
- [Connecting Power to a DC-Powered SRX5400 Services Gateway | 199](#)
- [Powering On a DC-Powered SRX5400 Services Gateway | 202](#)
- [Powering Off the SRX5400 Services Gateway | 203](#)

Tools and Parts Required for SRX5400 Services Gateway Grounding and Power Connections

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

- Phillips (+) screwdrivers, numbers 1 and 2
- 2.5-mm flat-blade (-) screwdriver
- 7/16-in. hexagonal-head external drive socket wrench, or nut driver, with a torque range between 23 lb-in. (2.6 Nm) and 25 lb-in. (2.8 Nm) tightening torque, for tightening nuts to terminal studs on each power supply on a DC-powered services gateway.
- Wire cutters
- Electrostatic discharge (ESD) grounding wrist strap

Grounding the SRX5400 Services Gateway

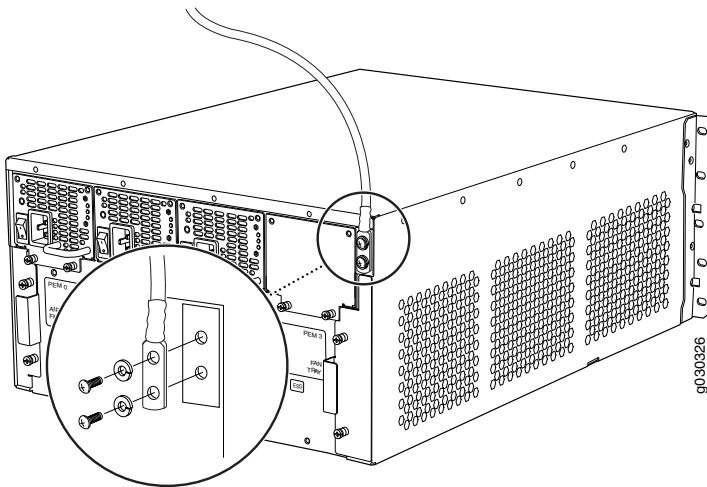


WARNING: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must properly ground the services gateway chassis before connecting power.

You ground the device by connecting a grounding cable to earth ground and then attaching it to the chassis grounding points using UNC 1/4-20 two screws. You must provide the grounding cable (the cable lug is supplied with the device).

1. Verify that a licensed electrician has attached the cable lug provided with the device 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, and connect the strap to one of the ESD points on the chassis.
6. Place the grounding cable lug over the grounding point. The grounding point is sized for UNC 1/4-20 screws and 1/4 in. split washers, which are provided in the accessory box.
7. Secure the grounding cable lug to the grounding point, first with the washers, and then with the screws as shown in [Figure 88 on page 196](#).

Figure 88: Connecting the Grounding Cable



8. Dress the grounding cable and verify that it does not touch or block access to device components, and that it does not drape where people could trip on it.

Connecting Power to an AC-Powered SRX5400 Services Gateway



WARNING: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must properly ground the services gateway chassis before connecting power. See [“Grounding the SRX5400 Services Gateway”](#) on page 195 for instructions.



CAUTION: Do not mix AC and DC power supplies within the same services gateway. Damage to the device might occur.

NOTE: The SRX5400 Services Gateway and SRX5600 Services Gateway use the same power supply model.

You connect AC power to the device by attaching power cords from the AC power sources to the AC appliance inlets located on the power supplies. The power cords are not provided with the services gateway.

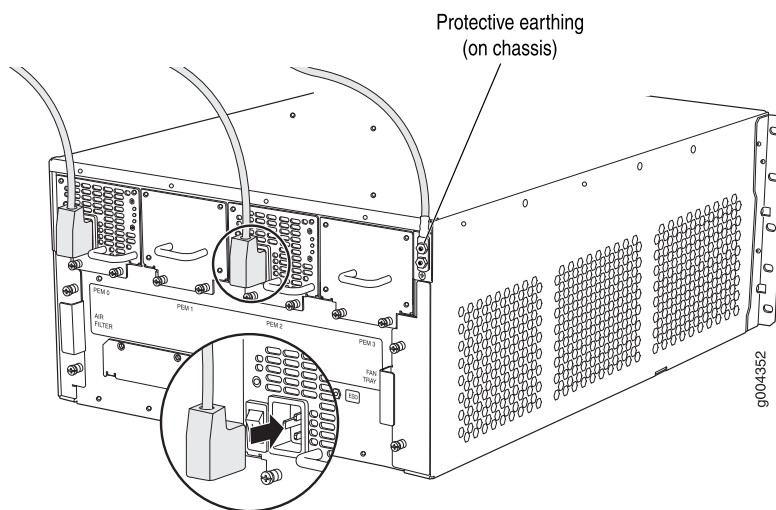
To connect the AC power cords to the device for each power supply (see [Figure 89 on page 197](#)):

1. Locate or obtain the power cords you will use with the services gateway. The power cords must have a plug appropriate for your geographical location.
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. Move the AC switch next to the appliance inlet on the power supply to the off position (O).
4. Insert the appliance coupler end of the power cord into the appliance inlet on the power supply.
5. Insert the power cord plug into an external AC power source receptacle.

NOTE: Each power supply must be connected to a dedicated AC power feed and a dedicated external circuit breaker. We recommend that you use a 15 A (250 VAC) minimum, or as permitted by local code.

6. Dress the power cord appropriately. Verify that the power cord does not block the air exhaust and access to device components, or drape where people could trip on it.
7. Repeat [Step 1](#) through [Step 6](#) for the remaining power supplies.

Figure 89: Connecting AC Power to the Services Gateway



Powering On an AC-Powered SRX5400 Services Gateway

To power on an AC-powered services gateway:

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 the power supplies are fully inserted in the chassis.
3. Verify that each AC power cord is securely inserted into the appliance inlet.
4. Verify that an external management device is connected to one of the Routing Engine ports (**AUX**, **CONSOLE**, or **ETHERNET**).
5. Turn on the power to the external management device.
6. Switch on the dedicated customer site circuit breakers for the power supplies. Follow the ESD and safety instructions for your site.
7. Move the AC input switch on each power supply to the on (I) position and observe the status LEDs on each power supply faceplate. If an AC power supply is correctly installed and functioning normally, the **AC OK** and **DC OK** LEDs light steadily, and the **PS FAIL** LED is not lit.

If any of the status LEDs indicates that the power supply is not functioning normally, repeat the installation and cabling procedures.

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

Connecting Power to a DC-Powered SRX5400 Services Gateway



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



WARNING: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must properly ground the services gateway chassis before connecting power. See [“Grounding the SRX5400 Services Gateway” on page 195](#) for instructions.



CAUTION: Do not mix AC and DC power supplies within the same services gateway. Damage to the services gateway might occur.

NOTE: The SRX5400 Services Gateway and SRX5600 Services Gateway use the same power supply model.

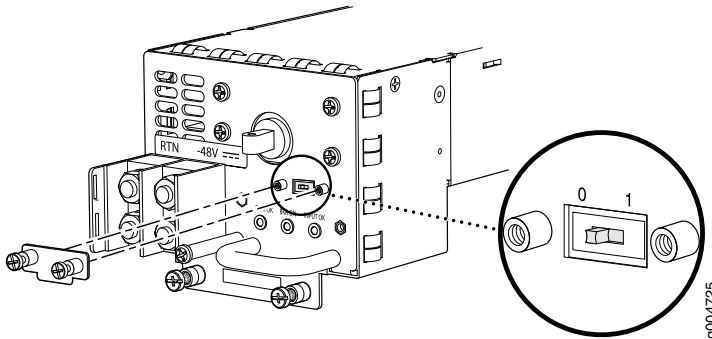
You connect DC power to the services gateway by attaching power cables from the external DC power sources to the terminal studs on the power supply faceplates. You must provide the power cables (the cable lugs are supplied with the device).

To connect the DC source power cables to the services gateway:

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. 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. Move the DC circuit breaker on the power supply faceplate to the off (O) position.
4. Check the setting of the input mode switch. Use a sharp, nonconductive object to slide the switch to the desired position. Set the input mode switch to position 0 for 60-A input and position 1 for 70-A

input. This setting is used by the power management software and must be set on the power supply. See [Figure 90 on page 200](#).

Figure 90: DC Power Supply Input Mode Switch



5. Remove the clear plastic cover protecting the terminal studs on the faceplate.
6. 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**.



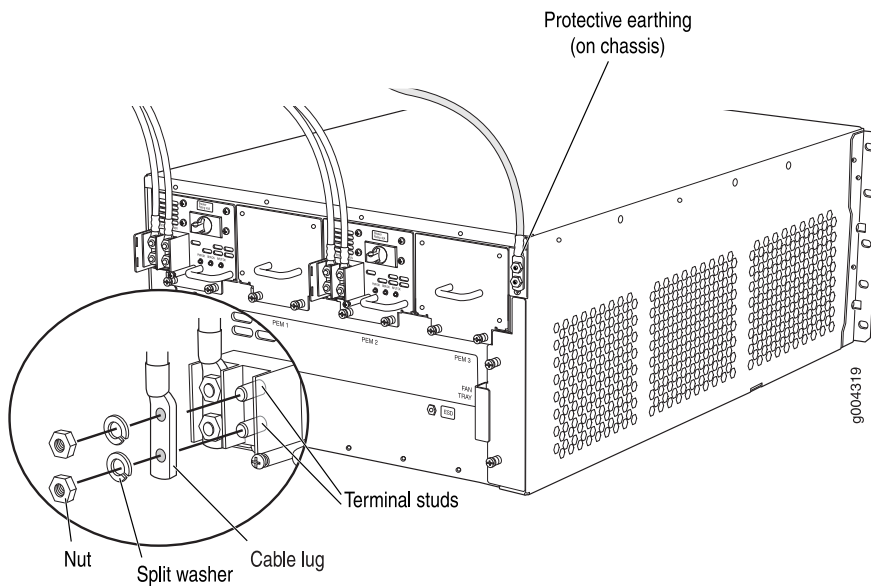
CAUTION: You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (-) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color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

7. Remove the nuts and washers from the terminal studs. (Use a 7/16-in. (11 mm) nut driver or socket wrench.)
8. Secure each power cable lug to the terminal studs, first with the flat washer, then with the nut (see [Figure 91 on page 201](#)). Apply between 23 lb-in. (2.6 Nm) and 25 lb-in. (2.8 Nm) of torque to each nut. (Use a 7/16-in. (11 mm) nut driver or socket wrench.)
 - a. Secure each positive (+) DC source power cable lug to the **RTN** (return) terminal.
 - b. Secure each negative (-) DC source power cable lug to the **-48V** (input) terminal.

The DC power supplies in slots **PEM0** and **PEM1** must be powered by dedicated power feeds derived from feed **A**, and the DC power supplies in slots **PEM2** and **PEM3** must be powered by dedicated power feeds derived from feed **B**. This configuration provides the commonly deployed **A/B** feed redundancy for the system.

9. Route the power cables along the cable restraint toward the left or right corner of the chassis. If needed, thread plastic cable ties, which you must provide, through the openings on the cable restraint to hold the power cables in place.
10. Replace the clear plastic cover over the terminal studs on the faceplate.
11. Verify that the power cables are connected correctly, that they are not touching or blocking access to device components, and that they do not drape where people could trip on them.
12. Repeat Steps 3 through 11 for the remaining power supplies.

Figure 91: Connecting DC Power to the Device



Powering On a DC-Powered SRX5400 Services Gateway

To power on a DC-powered services gateway:

1. Verify that an external management device is connected to one of the Routing Engine ports (**AUX**, **CONSOLE**, or **ETHERNET**).
2. Turn on the power to the external management device.
3. Verify that the power supplies 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 **RETURN**) 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. Follow your site's procedures.
6. Check the **INPUT OK** LED 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. 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.
9. Move the DC circuit breaker on each of the power supplies to the on (—) position.
10. Verify that the **BREAKER ON** LED is lit green steadily.
11. Verify that the **PWR OK** LED is lit green steadily, indicating the power supply is correctly installed and functioning normally.

If the power supply is not functioning normally, repeat the installation and cabling procedures.

NOTE: 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.

If any of the status LEDs indicates that the power supply is not functioning normally, repeat the installation and cabling procedures .

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

NOTE: If the system is completely powered off when you power on the power supply, the Routing Engine boots as the power supply completes its startup sequence. Normally, the services gateway boots from the Junos OS image on the CompactFlash card.

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

Powering Off the SRX5400 Services Gateway

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

To power off the services gateway:

1. On the external management device connected to the Routing Engine, issue the **request system halt** operational mode command. The command shuts down the Routing Engine cleanly, so its state information is preserved.

```
user@host> request system halt
```

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

For more information about the command, see *Junos OS System Basics and Services Command Reference* at www.juniper.net/documentation/.

3. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end of the strap to an ESD point.
4. On an AC-powered services gateway, switch the AC switch on each power supply to the off position (O). On a DC-powered services gateway, switch the circuit breaker on each power supply to the off position (OFF).

RELATED DOCUMENTATION

| [Preventing Electrostatic Discharge Damage to the SRX5400 Services Gateway](#)

Performing the Initial Software Configuration for the SRX5400

IN THIS SECTION

- [SRX5400 Services Gateway Software Configuration Overview | 204](#)
- [Initially Configuring the SRX5400 Services Gateway | 205](#)
- [Performing Initial Software Configuration Using J-Web | 210](#)

SRX5400 Services Gateway Software Configuration Overview

The services gateway is shipped with the Junos operating system (Junos OS) preinstalled and ready to be configured when the device is powered on. There are three copies of the software: one on a CompactFlash card (if installed) in the Routing Engine, one on the hard disk in the Routing Engine, and one on a USB flash drive that can be inserted into the slot in the Routing Engine faceplate.

When the device boots, it first attempts to start the image on the USB flash drive. If a USB flash drive is not inserted into the Routing Engine or the attempt otherwise fails, the device next tries the CompactFlash card (if installed), and finally the hard disk.

You configure the services gateway by issuing Junos OS command-line interface (CLI) commands, either on a console device attached to the **CONSOLE** port on the Routing Engine, or over a telnet connection to a network connected to the **ETHERNET** port on the Routing Engine.

Gather the following information before configuring the device:

- Name the device will use on the network
- Domain name the device 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

Initially Configuring the SRX5400 Services Gateway

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

To configure the software:

1. Verify that the device is powered on.
2. Log in as the root user. There is no password.
3. Start the CLI.

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

4. Enter configuration mode.

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

5. 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
```

6. Configure an administrator account on the device. When prompted, enter the password for the administrator account.

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

7. Commit the configuration to activate it on the device.

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

8. Log in as the administrative user you configured in step 6.
9. Configure the name of the device. If the name includes spaces, enclose the name in quotation marks (" ").

```
configure
[edit]
admin@# set system host-name host-name
```

10. Configure the IP address and prefix length for the Ethernet management interface on the services gateway's Routing Engine.

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

11. Configure the traffic interface.

```
[edit]
admin@# set interfaces xe-2/0/0 unit 0 family inet address address/prefix-length
admin@# set interfaces xe-2/2/5 unit 0 family inet address address/prefix-length
```

12. Configure the default route.

```
[edit]
admin@# set routing-options static route 0.0.0.0/0 next-hop gateway
```

13. Configure basic security zones and bind them to traffic interfaces.

```
[edit]
admin@# set security zones security-zone trust interfaces xe-2/2/5
admin@# set security zones security-zone untrust interfaces xe-2/0/0
```

14. Configure basic security policies.

```
[edit]
admin@# set security policies from-zone trust to-zone untrust policy policy-name match source-address any
destination-address any application any
root@# set security policies from-zone trust to-zone untrust policy policy-name then permit
```

15. Check the configuration for validity.

```
[edit]
admin@# commit check
configuration check succeeds
```

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

```
[edit]
admin@# commit
commit complete
```

17. Optionally, display the configuration to verify that it is correct.

```
admin@# show

## Last changed: 2008-05-07 22:43:25 UTC
version "9.2I0 [builder]";
system {
    autoinstallation;
    host-name henbert;
    root-authentication {
```

```

        encrypted-password "$1$otVn2KY3$uQe4xzQCxpR2j7sKuV.Pa0"; ## SECRET-DATA
    }
    login {
        user admin {
            uid 928;
            class super-user;
            authentication {
                encrypted-password "$1$cdOPmAcD$QvreBsJkNR1EF0uurTBkE."; ##
SECRET-DATA
            }
        }
    }
    services {
        ssh;
        web-management {
            http {
                interface xe-0/0/0.0;
            }
        }
    }
    syslog {
        user * {
            any emergency;
        }
        file messages {
            any any;
            authorization info;
        }
        file interactive-commands {
            interactive-commands any;
        }
    }
    license {
        autoupdate {
            url https://ae1.juniper.net/junos/key_retrieval;
        }
    }
}
interfaces {
    xe-0/0/0 {
        unit 0;
    }
    xe-2/0/0 {

```



```
    unit 0 {
        family inet {
            address 5.1.1.1/24;
        }
    }
}
xe-2/2/5 {
    unit 0 {
        family inet {
            address 192.1.1.1/24;
        }
    }
}
fxp0 {
    unit 0 {
        family inet {
            address 192.168.10.2/24;
        }
    }
}
}
routing-options {
    static {
        route 0.0.0.0/0 next-hop 5.1.1.2;
    }
}
security {
    zones {
        security-zone trust {
            interfaces {
                xe-2/2/5.0;
            }
        }
        security-zone untrust {
            interfaces {
                xe-2/0/0.0;
            }
        }
    }
}
policies {
    from-zone trust to-zone untrust {
        policy bob {
            match {
                source-address any;
            }
        }
    }
}
```

```
        destination-address any;
        application any;
    }
    then {
        permit;
    }
}
}
```

18. Commit the configuration to activate it on the device.

```
[edit]
admin@# commit
```

19. Optionally, configure additional properties by adding the necessary configuration statements. Then commit the changes to activate them on the device.

```
[edit]
admin@# commit
```

20. When you have finished configuring the device, exit configuration mode.

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

Performing Initial Software Configuration Using J-Web

IN THIS SECTION

- [Configuring Root Authentication and the Management Interface from the CLI | 211](#)
- [Configuring Interfaces, Zones, and Policies with J-Web | 212](#)

Configuring Root Authentication and the Management Interface from the CLI

Before you can use J-Web to configure your device, you must access the CLI to perform the initial configuration.

To configure root authentication and the management interface:

1. Log in as root. There is no password.
2. Start the CLI and enter configuration mode.

```
root@% cli
root@>configure
root@#
```

3. Set the root authentication password by entering 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
```

4. Commit the configuration to activate it on the device.

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

5. Configure the IP address and prefix length for the Ethernet management interface on the device.

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

6. Configure the default route.

```
[edit]
root@# set routing-options static route 0.0.0.0/0 next-hop gateway
```

7. Enable Web access to launch J-Web.

```
[edit]  
root@# set system services web-management http
```

8. Commit the configuration changes.

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

Configuring Interfaces, Zones, and Policies with J-Web

IN THIS SECTION

- [Configuring the Hostname | 213](#)
- [Configuring Interfaces | 213](#)
- [Configuring Zones and Assigning Interfaces | 214](#)
- [Configuring Security Policies | 214](#)

You can configure hostnames, interfaces, zones, and security policies using J-Web.

NOTE: You cannot use J-Web to configure SRX5400, SRX5600, and SRX5800 Services Gateways in Junos OS Release 15.1X49-D10.

Before you begin:

- Ensure you have configured the IP address, root authentication, and default route. See [“Configuring Root Authentication and the Management Interface from the CLI” on page 211](#)
- Enable HTTP on the device to access J-Web. See [“Configuring Root Authentication and the Management Interface from the CLI” on page 211](#)

Configure the device with J-Web using the following procedures.

Configuring the Hostname

To configure the hostname:

1. Launch a Web browser from the management device.
2. Enter the IP address of the device in the URL address field.
3. Specify the default username as root and enter the password. See ["Configuring Root Authentication and the Management Interface from the CLI" on page 211.](#)
4. Click **Log In**. The J-Web Dashboard page appears.
5. Select **Configure>System Properties>System Identity**, and then select **Edit**. The Edit System Identity dialog box appears.
6. Enter the hostname and click **OK**.
7. Select **Commit Options>Commit** to apply the configuration changes.

You have successfully configured the hostname for the system.

Configuring Interfaces

To configure two physical interfaces:

1. From the J-Web Dashboard page, select **Configure>Interfaces** and select a physical interface you want to configure.
2. Select **Add>Logical Interface**. The Add interface dialog box appears.
3. Set **Unit = 0**.
4. Select the check box for **IPv4 Address** to enable IPv4 addressing.
5. Click **Add** and enter the IPv4 address.
6. Click **OK**.
A message appears after your configuration changes are validated successfully.
7. Click **OK**.
8. Select **Commit Options>Commit** to apply the configuration changes.

A message appears after your configuration changes are applied successfully.

9. Click **OK**.

You have successfully configured the physical interface. Repeat these steps to configure the second physical interface for the device.

Configuring Zones and Assigning Interfaces

To assign interfaces within a trust zone and an untrust zone:

1. From the J-Web Dashboard page, select **Configure>Security>Zones/Screens** and click **Add**. The Add Zone dialog box appears.
2. In the Main tab, enter **trust** for zone name and enter the description.
3. Set the zone type to **Security**.
4. Select the interfaces listed under Available and move them under Selected.
5. Click **OK**.

A message appears after your configuration changes are validated successfully.

6. Click **OK**.

7. Select **Commit Options>Commit** to apply the configuration changes.

A message appears after your configuration changes are applied successfully.

8. Click **OK**.

9. Repeat Step 1 through Step 8 and assign another interface to an untrust zone.

You have successfully configured interfaces in a trust zone and in an untrust zone.

Configuring Security Policies

To configure security policies:

1. From the J-Web Dashboard page, select **Configure>Security>Security Policy** and click **Add**. The Add Policy dialog box appears.
2. In the Policy tab, enter the policy name and set the policy action to **permit**. Then select **Zone** and set the From Zone to **trust** and the To Zone to **untrust**.

3. Configure the source IP address by selecting **any** listed under Available and moving it under Selected.
4. Configure the destination IP address by selecting **any** listed under Available and moving it under Selected.
5. Configure the application by selecting **any** listed under Available and moving it under Selected.
6. Click **OK**.
A message appears after your configuration changes are validated successfully.
7. Click **OK**.
8. Select **Commit Options>Commit** to apply the configuration changes.
A message appears after your configuration changes are applied successfully.
9. Click **OK**.

You have successfully configured the security policy.

4

CHAPTER

Maintaining Components

Maintaining the SRX5400 Chassis | **217**

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Maintaining the SRX5400 Chassis

IN THIS SECTION

- [Routine Maintenance Procedures for the SRX5400 Services Gateway | 217](#)
- [Replacing the SRX5400 Services Gateway Craft Interface | 217](#)

Routine Maintenance Procedures for the SRX5400 Services Gateway

Purpose

For optimum services gateway performance, perform preventive maintenance procedures regularly.

Action

- Inspect the installation site for moisture, loose wires or cables, and excessive dust. Make sure that airflow is unobstructed around the device and into the air intake vents.
- Check the status-reporting devices on the craft interface—System alarms and LEDs.
- Inspect the air filter at the bottom front of the services gateway, replacing it every six months for optimum cooling system performance. Do not run the device for more than a few minutes without the air filter in place.

Replacing the SRX5400 Services Gateway Craft Interface

To replace the craft interface, perform the following procedures in sequence:

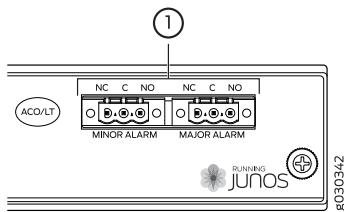
1. [Disconnecting the Alarm Relay Wires from the SRX5400 Services Gateway Craft Interface | 218](#)
2. [Removing the SRX5400 Services Gateway Craft Interface | 218](#)
3. [Installing the SRX5400 Services Gateway Craft Interface | 219](#)
4. [Connecting the Alarm Relay Wires to the SRX5400 Services Gateway Craft Interface | 220](#)

Disconnecting the Alarm Relay Wires from the SRX5400 Services Gateway Craft Interface

To disconnect the alarm relay wires from the services gateway and an alarm-reporting device (see [Figure 92 on page 218](#)):

1. Disconnect the existing wire at the external device.
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. Using a 2.5-mm flat-blade screwdriver, loosen the small screws on the face of the terminal block and remove the block from the relay contact.
4. Using the 2.5-mm flat-blade screwdriver, loosen the small screws on the side of the terminal block. Remove existing wires from the slots in the front of the block.

Figure 92: Alarm Relay Contacts

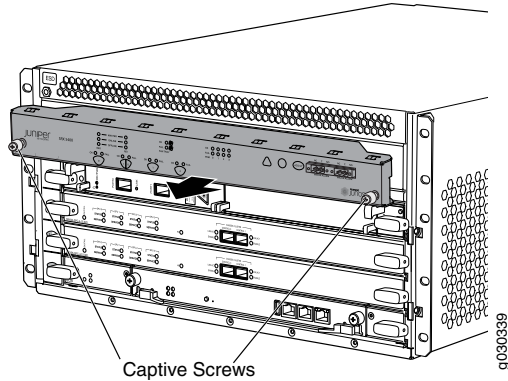


Removing the SRX5400 Services Gateway Craft Interface

To remove the craft interface (see [Figure 93 on page 219](#)):

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. Detach any external devices connected to the craft interface.
3. Loosen the captive screws at the top left and right corners of the craft interface faceplate.
4. Grasp the craft interface faceplate and carefully tilt it toward you until it is horizontal.
5. Disconnect the ribbon cable from the back of the faceplate by gently pressing on both sides of the latch with your thumb and forefinger. Remove the craft interface from the chassis.

Figure 93: Removing the Craft Interface

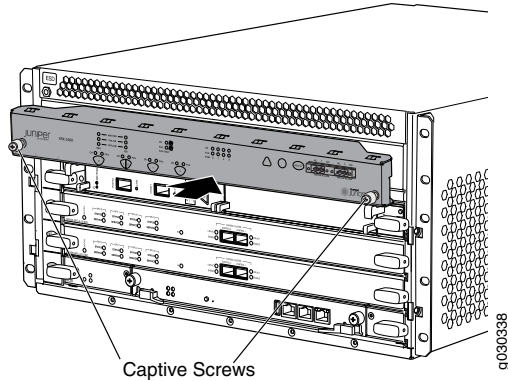


Installing the SRX5400 Services Gateway Craft Interface

To install the craft interface (see [Figure 94 on page 220](#)):

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. Grasp the craft interface with one hand and hold the bottom edge of the craft interface with the other hand to support its weight.
3. Orient the ribbon cable so that it plugs into the connector socket. The connector is keyed and can be inserted only one way.
4. Align the bottom of the craft interface with the sheet metal above the card cage and press it into place.
5. Tighten the screws on the left and right corners of the craft interface faceplate.
6. Reattach any external devices connected to the craft interface.

Figure 94: Installing a Craft Interface

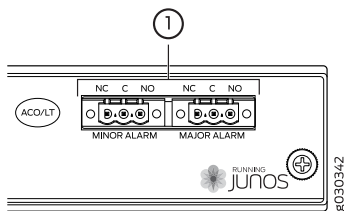


Connecting the Alarm Relay Wires to the SRX5400 Services Gateway Craft Interface

To connect the alarm relay wires between a services gateway and an alarm-reporting device (see [Figure 95 on page 220](#)):

1. Prepare the required length of replacement wire with gauge between 28-AWG and 14-AWG (0.08 and 2.08 mm²).
2. Insert the replacement wires into the slots in the front of the block. Use a 2.5-mm flat-blade screwdriver to tighten the screws and secure the wire.
3. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end of the strap to an ESD point.
4. Plug the terminal block into the relay contact, and use a 2.5-mm flat-blade screwdriver to tighten the screws on the face of the block.
5. Attach the other end of the wires to the external device.

Figure 95: Alarm Relay Contacts



Maintaining the SRX5400 Cooling System

IN THIS SECTION

- [Maintaining the Fan Tray on the SRX5400 Services Gateway | 221](#)
- [Replacing the SRX5400 Services Gateway Fan Tray | 221](#)
- [Maintaining the Air Filter on the SRX5400 Services Gateway | 223](#)
- [Replacing the SRX5400 Services Gateway Air Filter | 224](#)

Maintaining the Fan Tray on the SRX5400 Services Gateway

Purpose

For optimum cooling, verify the condition of the fans.

Action

- Monitor the status of the fans. A fan tray contains multiple fans that work in unison to cool the services gateway components. If one fan fails, the host subsystem adjusts the speed of the remaining fans to maintain proper cooling. A major alarm is triggered when a fan fails, and a minor alarm and major alarm is triggered when a fan tray is removed.
- To display the status of the cooling system, issue the **show chassis environment** command.

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

NOTE: The fan numbers are stamped into the fan tray sheet metal next to each fan.

Replacing the SRX5400 Services Gateway Fan Tray

To replace a fan tray, perform the following procedures in sequence:

1. [Removing the SRX5400 Services Gateway Fan Tray | 222](#)
2. [Installing the SRX5400 Services Gateway Fan Tray | 223](#)

Removing the SRX5400 Services Gateway Fan Tray

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

To remove the fan tray (see [Figure 96 on page 222](#)):

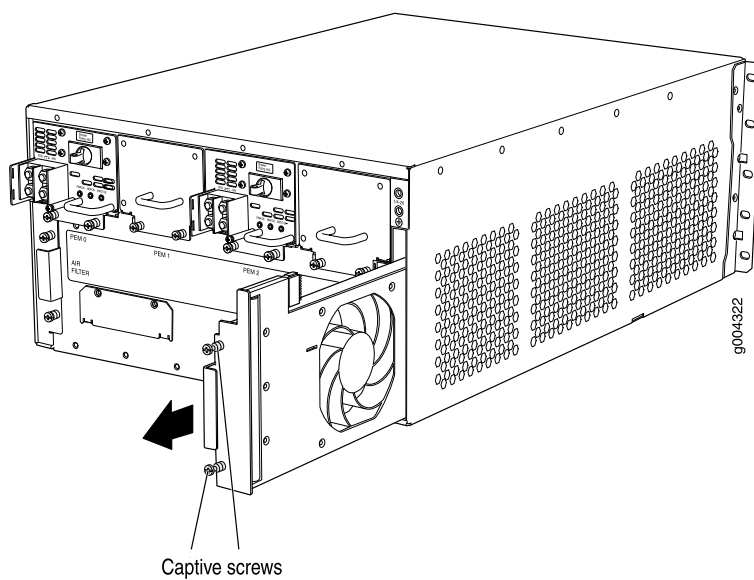
1. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end of the strap to an ESD point.
2. Loosen the captive screws on the fan tray faceplate.
3. Grasp the fan tray handle and pull it out approximately 1 to 3 inches.



WARNING: To avoid injury, keep tools and your fingers away from the fans as you slide the fan tray out of the chassis. The fans might still be spinning.

4. Press the latch located on the inside of the fan tray to release it from the chassis.
5. Place one hand under the fan tray to support it and pull the fan tray completely out of the chassis.

Figure 96: Removing the Fan Tray

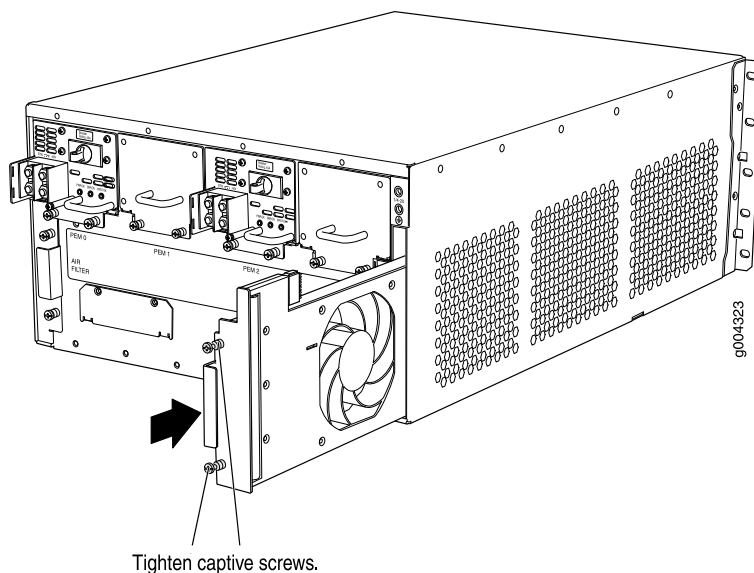


Installing the SRX5400 Services Gateway Fan Tray

To install the fan tray (see [Figure 97 on page 223](#)):

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. Grasp the fan tray handle and insert it straight into the chassis. Note the correct orientation by the **this side up** label on the top surface of the fan tray.
3. Tighten the captive screws on the fan tray faceplate to secure it in the chassis.

Figure 97: Installing the Fan Tray



Maintaining the Air Filter on the SRX5400 Services Gateway

Purpose

For optimum cooling, verify the condition of the air filters.

Action

- Regularly inspect the air filter. A dirty air filter restricts airflow in the unit, impeding the ventilation of the chassis. The filter degrades over time. Periodically replace the filter in use, as well as spares. We recommend that you replace the filter every six months. Discard used filters, do not attempt to clean and reuse them.

NOTE: Air filters will not be replaced by Juniper Networks under the Juniper Networks Hardware Replacement Support Plan, you need to purchase them for replacement.



CAUTION: Always keep the air filter in place while the services gateway is operating. Because the fans are very powerful, they could pull small bits of wire or other materials into the services gateway through the unfiltered air intake. This could damage the services gateway components.

- The shelf life of polyurethane filter varies from two years to five years depending on the storage conditions. Store in a cool, dry, and dark environment. Wrap the media in plastic and store in an environment with relative humidity between 40%- 80% and temperature between 40°F (4° C) to 90°F (32° C). Note that if the material flakes, or becomes brittle when rubbed or deformed, it is no longer usable.

Replacing the SRX5400 Services Gateway Air Filter

To replace the air filter, perform the following procedures in sequence:

1. [Removing the SRX5400 Services Gateway Air Filter | 224](#)
2. [Installing the SRX5400 Services Gateway Air Filter | 225](#)

Removing the SRX5400 Services Gateway Air Filter



CAUTION: Do not run the services gateway for more than a few minutes without the air filter in place.

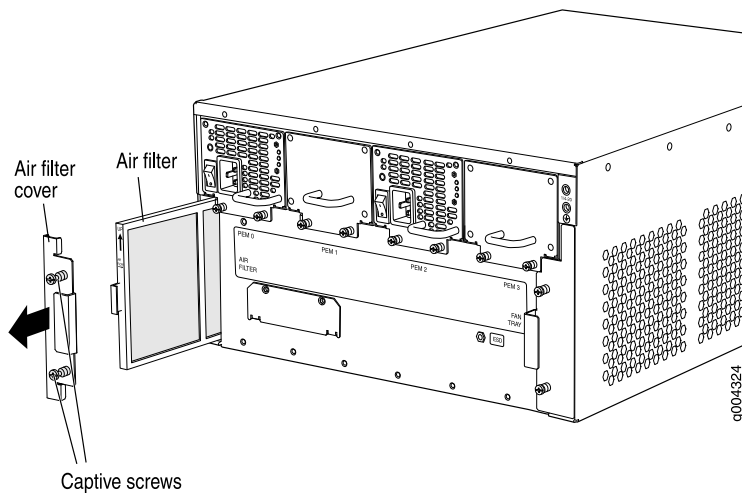


CAUTION: Always keep the air filter in place while the device is operating, except during replacement. Because the fans are very powerful, they could pull small bits of wire or other materials into the device through the unfiltered air intake. This could damage the services gateway components.

To remove the air filter (see [Figure 98 on page 225](#)):

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. Loosen the captive screws on the air filter cover.
3. Remove the air filter cover.
4. Slide the air filter out of the chassis.

Figure 98: Removing the Air Filter

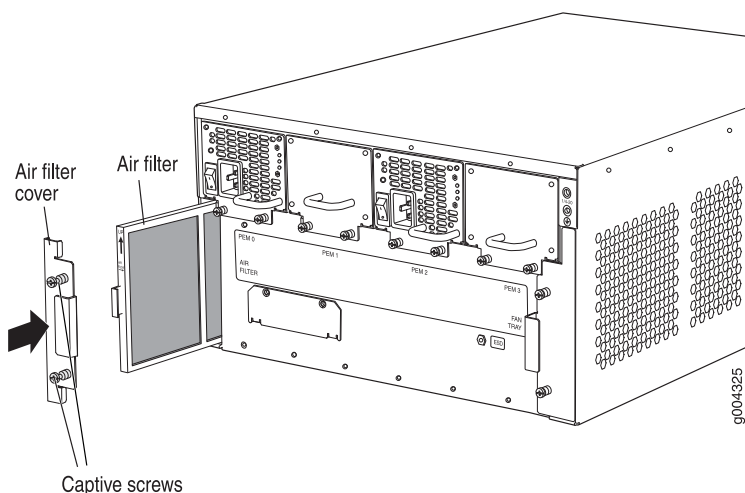


Installing the SRX5400 Services Gateway Air Filter

To install the air filter (see [Figure 99 on page 226](#)):

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. Locate the up arrow and ensure that the air filter is right side up.
3. Slide the air filter straight into the chassis until it stops.
4. Align the captive screws of the air filter cover with the mounting holes on the chassis.
5. Tighten the captive screws on the air filter cover.

Figure 99: Installing the Air Filter



Maintaining the SRX5400 Power System

IN THIS SECTION

- [Maintaining SRX5400 Services Gateway Power Supplies | 226](#)
- [Replacing an SRX5400 Services Gateway AC Power Supply | 228](#)
- [Replacing an SRX5400 Services Gateway AC Power Supply Cord | 230](#)
- [Replacing an SRX5400 Services Gateway DC Power Supply | 231](#)
- [Replacing an SRX5400 Services Gateway DC Power Supply Cable | 236](#)

Maintaining SRX5400 Services Gateway Power Supplies

Purpose

For optimum services gateway performance, verify the condition of the power supplies.

Action

On a regular basis:

- To check the status of the power supplies, issue the **show chassis environment pem** command. The sample output below is of a chassis with DC power supplies:

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

```

PEM 0 status:
  State           Online
  Temperature     OK
  DC Input:       OK
  DC Output       Voltage(V) Current(A) Power(W) Load(%)
                  52         8         416     17
  Voltage:
    48.0 V input      52000 mV

PEM 1 status:
  State           Empty

PEM 2 status:
  State           Online
  Temperature     OK
  DC Input:       OK
  DC Output       Voltage(V) Current(A) Power(W) Load(%)
                  53         10        530     21
  Voltage:
    48.0 V input      53000 mV

PEM 3 status:
  State           Empty

```

- Make sure that the power and grounding cables are arranged so that they do not obstruct access to other services gateway 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 device are securely in place and that there is no moisture accumulating near the device.

Replacing an SRX5400 Services Gateway AC Power Supply

To replace an AC power supply, perform the following procedures:

NOTE: The SRX5400 Services Gateway and SRX5600 Services Gateway use the same power supply model.

1. [Removing an SRX5400 Services Gateway AC Power Supply | 228](#)
2. [Installing an SRX5400 Services Gateway AC Power Supply | 229](#)

Removing an SRX5400 Services Gateway AC Power Supply

The power supplies are located at the rear of the chassis. Each AC power supply weighs approximately 6.6 lb (3.0 kg).



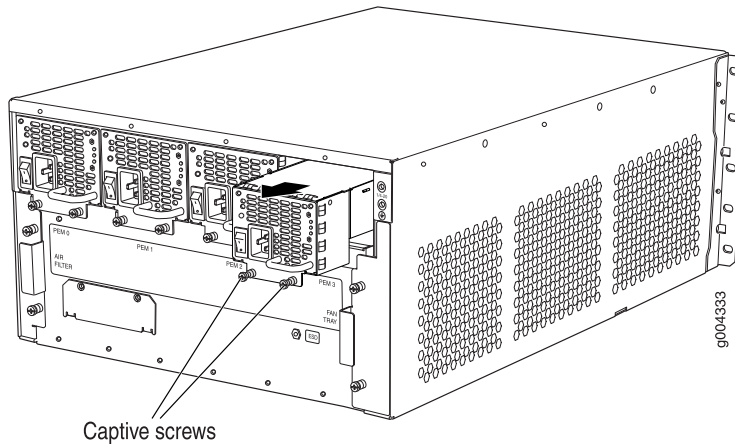
CAUTION: Do not leave a power supply slot empty for more than 30 minutes while the services gateway is operational. For proper airflow, the power supply must remain in the chassis, or a blank panel must be used in an empty slot.

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

To remove an AC power supply (see [Figure 100 on page 229](#)):

1. Switch off the dedicated facility circuit breaker for the power supply, and remove the power cord from the AC power source. Follow the ESD and disconnection instructions for your site.
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. Move the AC switch next to the appliance inlet on the power supply to the off position (O).
4. Unscrew the captive screws on the bottom edge of the power supply.
5. Remove the power cord from the power supply.
6. Pull the power supply straight out of the chassis.

Figure 100: Removing an AC Power Supply

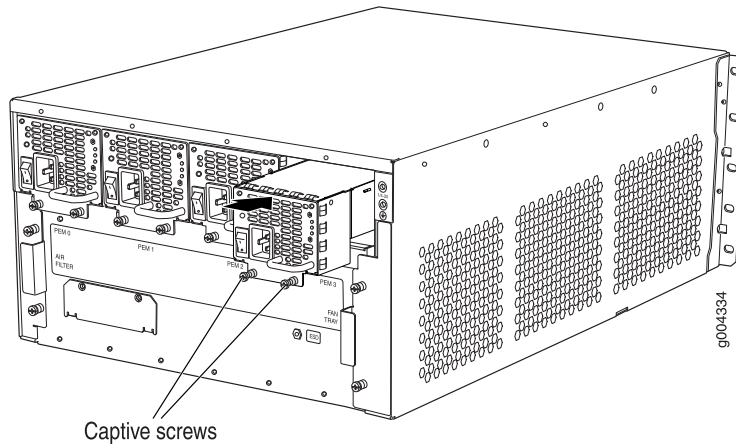


Installing an SRX5400 Services Gateway AC Power Supply

To install an AC power supply (see [Figure 101 on page 230](#)):

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. Move the AC switch next to the appliance inlet on the power supply to the off position (O).
3. Using both hands, slide the power supply straight into the chassis until the power supply is fully seated in the chassis slot. The power supply faceplate should be flush with any adjacent power supply faceplate (see [Figure 101 on page 230](#)).
4. Tighten both captive screws at the bottom of the power supply.
5. Attach the power cord to the power supply.
6. Route the power cord along the cable restraint toward the left or right corner of the chassis. If needed to hold the power cord in place, thread plastic cable ties, which you must provide, through the openings on the cable restraint.
7. Attach the power cord to the AC power source, and switch on the dedicated facility circuit breaker for the power supply. Follow the ESD and connection instructions for your site.
8. Move the AC switch next to the appliance inlet on the power supply to the on position (I) and observe the status LEDs on the power supply faceplate. If the power supply is correctly installed and functioning normally, the **AC OK** and **DC OK** LEDs light steadily, and the **PS FAIL** LED is not lit.

Figure 101: Installing an AC Power Supply



Replacing an SRX5400 Services Gateway AC Power Supply Cord

To replace an SRX5400 Services Gateway AC power supply cord, perform the following procedures:

1. [Disconnecting an SRX5400 Services Gateway AC Power Supply Cord | 230](#)
2. [Connecting an SRX5400 Services Gateway AC Power Supply Cord | 231](#)

Disconnecting an SRX5400 Services Gateway AC Power Supply Cord



WARNING: Before working on an AC-powered device or near power supplies, unplug the power cord.

To disconnect the AC power cord:

1. Unplug the power cord from the power source receptacle.
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. Move the AC switch next to the appliance inlet on the power supply to the off position (O).
4. Unplug the power cord from the appliance inlet on the power supply.

Connecting an SRX5400 Services Gateway AC Power Supply Cord

To connect the AC power cord:

1. Locate a replacement power cord with the type of plug appropriate for your geographical location.
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. Insert the power cord plug into an external AC power source receptacle.
4. Connect the power cord to the power supply.
5. Route the power cord along the cable restraint toward the left or right corner of the chassis. If needed to hold the power cord in place, thread plastic cable ties, which you must provide, through the openings on the cable restraint.
6. Verify that the power cord does not block the air exhaust and access to services gateway components, or drape where people could trip on it.
7. Switch the AC switch on the each power supply to the on position (—) and observe the status LEDs on the power supply faceplate. If the power supply is correctly installed and functioning normally, the **AC OK** and **DC OK** LEDs light steadily, and the **PS FAIL** LED is not lit.

Replacing an SRX5400 Services Gateway DC Power Supply

IN THIS SECTION

- [Removing an SRX5400 Services Gateway DC Power Supply | 231](#)
- [Installing an SRX5400 Services Gateway DC Power Supply | 233](#)

Removing an SRX5400 Services Gateway DC Power Supply

The power supplies are located at the rear of the chassis. Each DC power supply weighs approximately 6.2 lb (2.8 kg).



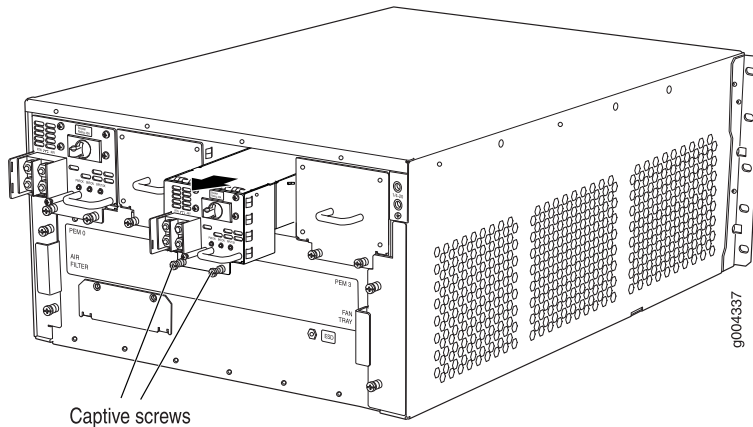
CAUTION: Do not leave a power supply slot empty for more than 30 minutes while the services gateway is operational. For proper airflow, the power supply must remain in the chassis, or a blank panel must be used in an empty slot.

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

To remove a DC power supply (see [Figure 102 on page 233](#)):

1. Switch off the dedicated facility 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. 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.
4. Switch the circuit breaker on the power supply faceplate to the off position **O**.
5. Remove the clear plastic cover protecting the terminal studs on the faceplate.
6. Remove the nuts and washers from the terminal studs. (Use a 3/8-in. nut driver or socket wrench.)
7. Remove the cable lugs from the terminal studs.
8. Loosen the captive screws on the bottom edge of the power supply faceplate.
9. Carefully move the power cables out of the way.
10. Pull the power supply straight out of the chassis.

Figure 102: Removing a DC Power Supply



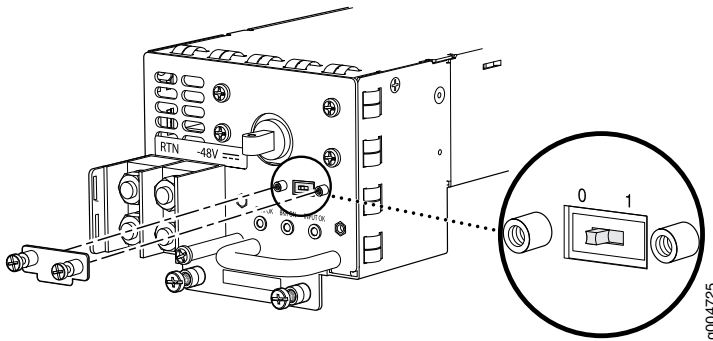
Installing an SRX5400 Services Gateway DC Power Supply

NOTE: The SRX5400 Services Gateway and SRX5600 Services Gateway use the same power supply model.

To install a DC power supply:

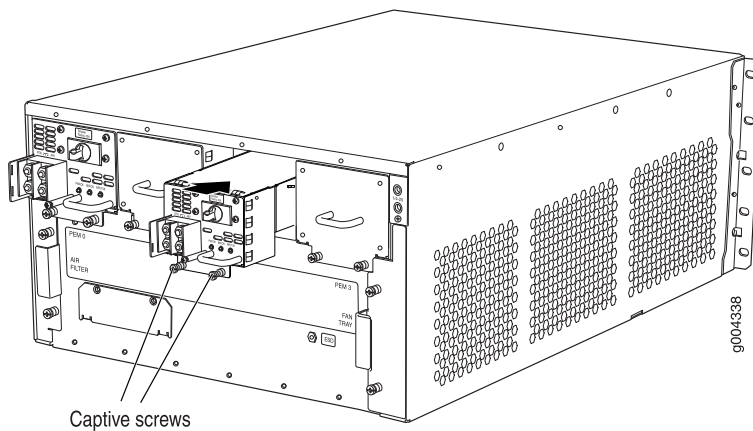
1. Ensure that the voltage across the DC power source cable leads is 0 V and that there is no chance that the cable leads might become active during installation.
2. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end of the strap to an ESD point.
3. Switch the circuit breaker on the power supply faceplate to the off position **O**.
4. For a DC power supply, check the setting of the input mode switch. Use a sharp, nonconductive object to slide the switch to the desired position. Set the input mode switch to position **0** for 60-A input or position **1** for 80-A input. This setting is used by the power management software and must be set on the power supply. See [Figure 103 on page 234](#).

Figure 103: DC Power Supply Input Mode Switch



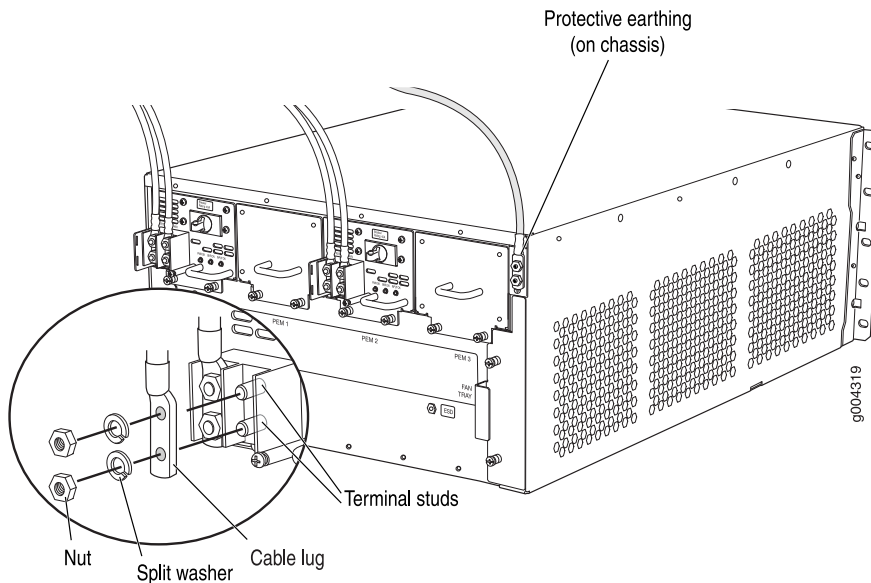
5. Using both hands, slide the power supply straight into the chassis until the power supply is fully seated in the chassis slot. The power supply faceplate should be flush with any adjacent power supply faceplate (see [Figure 104 on page 234](#)).

Figure 104: Installing a DC Power Supply



6. Tighten the captive screws on the lower edge of the power supply faceplate.
7. Remove the clear plastic cover protecting the terminal studs on the faceplate.
8. Remove the nuts and washers from the terminal studs.
9. Secure each power cable lug to the terminal studs, first with the washer, then with the nut. Apply between 23 lb-in. (2.6 Nm) and 25 lb-in. (2.8 Nm) of torque to each nut. (see [Figure 105 on page 235](#)).
 - a. Attach the positive (+) DC source power cable lug to the **RTN** (return) terminal.
 - b. Attach the negative (-) DC source power cable lug to the **-48V** (input) terminal.

Figure 105: Connecting DC Power



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: The DC power supplies must be powered by dedicated power feeds.

10. Replace the clear plastic cover over the terminal studs on the faceplate.
11. Route the power cables along the cable restraint toward the left or right corner of the chassis. If needed to hold the power cables in place, thread plastic cable ties, which you must provide, through the openings on the cable restraint.
12. Verify that the power cabling is correct, that the cables are not touching or blocking access to services gateway components, and that they do not drape where people could trip on them.

13. Verify that the **INPUT OK** LED on the power supply is lit green.
14. Switch the circuit breaker on the power supply to the **ON** position — and observe the status LEDs on the power supply faceplate. If the power supply is correctly installed and functioning normally, the **PWR OK**, **BRKR ON**, and **INPUT OK** LEDs will glow green steadily.

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

NOTE: The SCB must be present for the **PWR OK** LED to go on.

Replacing an SRX5400 Services Gateway DC Power Supply Cable

To replace an SRX5400 Services Gateway DC power supply cable, perform the following procedures:

1. [Disconnecting an SRX5400 Services Gateway DC Power Supply Cable | 236](#)
2. [Connecting an SRX5400 Services Gateway DC Power Supply Cable | 237](#)

Disconnecting an SRX5400 Services Gateway DC Power Supply Cable

To remove a power cable from a DC power supply:

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to an approved site ESD grounding point.
2. Switch off the external circuit breakers for all the cables attached to the power supply. 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. Remove the power cable from the DC power source.
4. Detach the ESD grounding strap from the site ESD grounding point, and connect the strap to one of the ESD points on the chassis.
5. Switch the circuit breaker on the power supply faceplate to the **OFF** position **O**.

6. Remove the clear plastic cover protecting the terminal studs on the faceplate.
7. Remove the nut and washer from the terminal studs. (Use a 7/16-in. nut driver or pliers.)
8. Remove the cable lug from the terminal studs.
9. Loosen the captive screws on the power supply faceplate.
10. Carefully move the power cable out of the way.

Connecting an SRX5400 Services Gateway DC Power Supply Cable

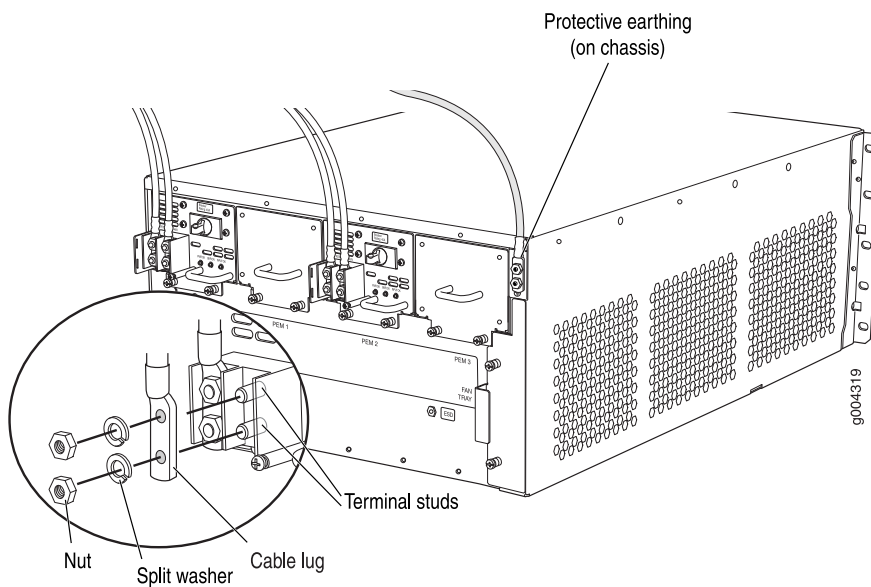
To install a replacement power cable for a DC power supply (see [Figure 106 on page 238](#)):

1. Locate a replacement power cable that meets the specifications defined in [“DC Power Cable Specifications for the SRX5400 Services Gateway” on page 51](#).
2. Verify that a licensed electrician has attached a cable lug to the replacement power cable.
3. Verify that the **INPUT OK** LED is off.
4. Secure the power cable lug to the terminal studs, first with the flat washer, then with the nut. Apply between 23 lb-in. (2.6 Nm) and 25 lb-in. (2.8 Nm) of torque to each nut, (see [Figure 106 on page 238](#)).
5. Route the power cable along the cable restraint toward the left or right corner of the chassis. If needed, thread plastic cable ties, which you must provide, through the openings on the cable restraint to hold the power cables in place.
6. Make sure the cable is not touching or in the way of any device components, and that it does not drape where people could trip on it.
7. Replace the clear plastic cover over the terminal studs on the faceplate.
8. Attach the power cable to the DC power source.
9. Verify that the **INPUT OK** LED on the power supply is lit green.
10. Switch the circuit breaker on the power supply to the **ON** position (I)

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

11. Verify that the DC source power cabling is correct. Observe the status of the LEDs on the power supply faceplate. If the power cable is correctly installed and the power supply is functioning normally, the **PWR OK**, **BRKR ON**, and **INPUT OK** LEDs light green steadily.

Figure 106: Connecting Power Cables to the DC Power Supply



Maintaining the SRX5400 Host Subsystem

IN THIS SECTION

- [Maintaining the SRX5400 Services Gateway Host Subsystem | 239](#)
- [Taking the SRX5400 Services Gateway Host Subsystem Offline | 241](#)
- [Operating and Positioning the SRX5400 Services Gateway SCB Ejectors | 241](#)
- [Replacing the SRX5400 Services Gateway SCB | 242](#)
- [Replacing the SRX5400 Services Gateway Routing Engine | 245](#)

- Low Impact Hardware Upgrade for SCB3 and IOC3 | 249
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Maintaining the SRX5400 Services Gateway Host Subsystem

Purpose

For optimum services gateway performance, verify the condition of the host subsystem. The host subsystem is composed of an SCB and a Routing Engine installed into the slot in the SCB.

Action

On a regular basis:

- Check the LEDs on the craft interface to view information about the status of the Routing Engines.
- Check the LEDs on the SCB faceplate.
- Check the LEDs on the Routing Engine faceplate.
- To check the status of the Routing Engine, issue the **show chassis routing-engine** command. The output is similar to the following:

```
user@host> show chassis routing-engine
```

```
Routing Engine status:
Slot 0:
  Current state           Master
  Election priority       Master (default)
  Temperature             36 degrees C / 96 degrees F
  CPU temperature         33 degrees C / 91 degrees F
  DRAM                   2048 MB
  Memory utilization      12 percent
  CPU utilization:
    User                  1 percent
    Background            0 percent
    Kernel                4 percent
    Interrupt             0 percent
    Idle                  94 percent
  Model                   RE-S-1300
  Serial ID               1000697084
  Start time              2008-07-11 08:31:44 PDT
```

```

Uptime                3 hours, 27 minutes, 27 seconds
Load averages:        1 minute    5 minute    15 minute
                       0.44         0.16         0.06

```

- To check the status of the SCB, issue the **show chassis environment cb** command. The output is similar to the following:

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

```

CB 0 status:
State                Online Master
Temperature          40 degrees C / 104 degrees F
Power 1
  1.2 V              1208 mV
  1.5 V              1521 mV
  1.8 V              1807 mV
  2.5 V              2507 mV
  3.3 V              3319 mV
  5.0 V              5033 mV
  12.0 V             12142 mV
  1.25 V             1243 mV
  3.3 V SM3         3312 mV
  5 V RE            5059 mV
  12 V RE           11968 mV
Power 2
  11.3 V bias PEM   11253 mV
  4.6 V bias MidPlane 4814 mV
  11.3 V bias FPD   11234 mV
  11.3 V bias POE 0 11176 mV
  11.3 V bias POE 1 11292 mV
Bus Revision        42
FPGA Revision       1

```

To check the status of a specific SCB, issue the **show chassis environment cb node slot** command, for example, **show chassis environment cb node 0**.

For more information about using the CLI, see the [CLI Explorer](#).

Taking the SRX5400 Services Gateway Host Subsystem Offline

The host subsystem is composed of an SCB with a Routing Engine installed in it. You take the host subsystem offline and bring it online as a unit. Before you replace an SCB or a Routing Engine, you must take the host subsystem offline. Taking the host subsystem offline causes the device to shut down.

To take the host subsystem offline:

1. On the console or other management device connected to the Routing Engine that is paired with the SCB you are removing, enter CLI operational mode and issue the following command. The command shuts down the Routing Engine cleanly, so its state information is preserved:

```
user@host> request system halt
```

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

For more information about the command, see *Junos OS System Basics and Services Command Reference* at www.juniper.net/documentation/.

NOTE: The SCB might continue forwarding traffic for approximately 5 minutes after the **request system halt** command has been issued.

Operating and Positioning the SRX5400 Services Gateway SCB Ejectors

- When removing or inserting the SCB, ensure that the cards or blank panels in adjacent slots are fully inserted to avoid hitting them with the ejector handles. The ejector handles require that all adjacent components be completely inserted so the ejector handles do not hit them, which could result in damage.
- The ejector handles must be stored toward the center of the board. Ensure the long ends of the ejectors located at both the right and left ends of the board are horizontal and pressed as far as possible toward the center of the board.
- To insert or remove the SCB, slide the ejector across the SCB horizontally, rotate it, and slide it again another quarter of a turn. Turn the ejector again and repeat as necessary. Utilize the indexing feature to maximize leverage and to avoid hitting any adjacent components.
- Operate both ejector handles simultaneously. The insertion force on the SCB is too great for one ejector.

Replacing the SRX5400 Services Gateway SCB

Before replacing the SCB, read the guidelines in “[Operating and Positioning the SRX5400 Services Gateway SCB Ejectors](#)” on [page 241](#). To replace the SCB, perform the following procedures:

NOTE: The procedure to replace an SCB applies to the SRX5K-SCB, SRX5K-SCBE, and SRX5K-SCB3.

1. [Removing the SRX5400 Services Gateway SCB | 242](#)
2. [Installing an SRX5400 Services Gateway SCB | 243](#)

Removing the SRX5400 Services Gateway SCB

To remove the SCB (see [Figure 107 on page 243](#)):

NOTE: The SCB and Routing Engine are removed as a unit. You can also remove the Routing Engine separately.



CAUTION: Before removing the SCB, ensure that you know how to operate the ejector handles properly to avoid damage to the equipment.

1. If you are removing an SCB from a chassis cluster, deactivate the fabric interfaces from any of the nodes.

NOTE: The fabric interfaces should be deactivated to avoid failures in the chassis cluster.

```
user@host# deactivate interfaces fab0
user@host# deactivate interfaces fab1
user@host# commit
```

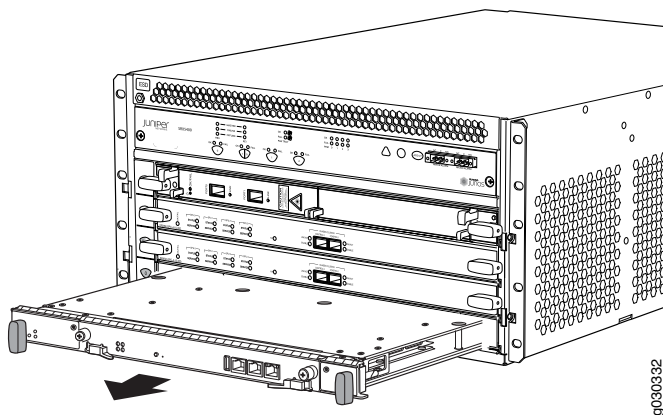
2. Power off the services gateway using the command **request system power-off**.

```
user@host# request system power-off
```

NOTE: Wait until a message appears on the console confirming that the services stopped.

3. Physically turn off the power and remove the power cables from the chassis.
4. Place an electrostatic bag or antistatic mat on a flat, stable surface.
5. 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.
6. Rotate the ejector handles simultaneously counterclockwise to unseat the SCB.
7. Grasp the ejector handles and slide the SCB about halfway out of the chassis.
8. Place one hand underneath the SCB to support it and slide it completely out of the chassis.
9. Place the SCB on the antistatic mat.
10. If you are not replacing the SCB now, install a blank panel over the empty slot.

Figure 107: Removing the SCB



Installing an SRX5400 Services Gateway SCB

To install the SCB (see [Figure 108 on page 244](#)):

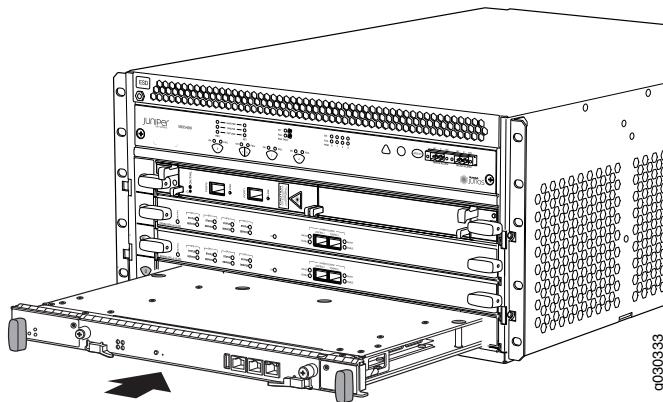
1. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end of the strap to an ESD point.
2. Power off the services gateway using the command **request system power-off**.

```
user@host# request system power-off
```

NOTE: Wait until a message appears on the console confirming that the services stopped.

3. Physically turn off the power and remove the power cables from the chassis.
4. Carefully align the sides of the SCB with the guides inside the chassis.
5. Slide the SCB into the chassis until you feel resistance, carefully ensuring that it is correctly aligned.

Figure 108: Installing the SCB



6. Grasp both ejector handles and rotate them simultaneously clockwise until the SCB is fully seated.
7. Place the ejector handles in the proper position, horizontally and toward the center of the board.
8. Connect the power cables to the chassis and power on the services gateway. The **OK** LED on the power supply faceplate should blink, then light steadily.
9. To verify that the SCB is functioning normally, check the LEDs on its faceplate. The green **OK/FAIL** LED should light steadily a few minutes after the SCB is installed. If the **OK/FAIL** LED is red, remove

and install the SCB again. If the **OK/FAIL** LED still lights steadily, the SCB is not functioning properly. Contact your customer support representative.

To check the status of the SCB:

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

10. If you installed an SCB into a chassis cluster, through the console of the newly installed SCB put the node back into cluster and reboot.

```
user@host> set chassis cluster cluster-id X node Y reboot
```

where *x* is the cluster ID and *Y* is the node ID

11. Activate the disabled fabric interfaces.

```
user@host# activate interfaces fab0
```

```
user@host# activate interfaces fab1
```

```
user@host# commit
```

Replacing the SRX5400 Services Gateway Routing Engine

To replace the Routing Engine, perform the following procedures:

NOTE: The procedure to replace a Routing Engine applies to both SRX5K-RE-13-20, SRX5K-RE-1800X4, and SRX5K-RE-128G.

1. [Removing the SRX5400 Services Gateway Routing Engine | 246](#)
2. [Installing the SRX5400 Services Gateway Routing Engine | 247](#)

Removing the SRX5400 Services Gateway Routing Engine

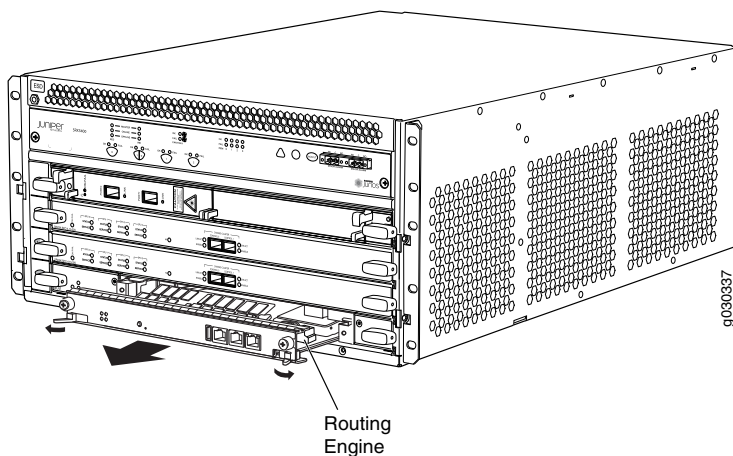


CAUTION: Before you replace the Routing Engine, you must take the host subsystem offline.

To remove the Routing Engine (see [Figure 109 on page 246](#)):

1. Take the host subsystem offline as described in [“Taking the SRX5400 Services Gateway Host Subsystem Offline” on page 241](#).
2. Place an electrostatic bag or antistatic mat on a flat, stable surface.
3. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end of the strap to an ESD point.
4. Flip the ejector handles outward to unseat the Routing Engine.
5. Grasp the Routing Engine by the ejector handles and slide it about halfway out of the chassis.
6. Place one hand underneath the Routing Engine to support it and slide it completely out of the chassis.

Figure 109: Removing the Routing Engine



7. Place the Routing Engine on the antistatic mat.

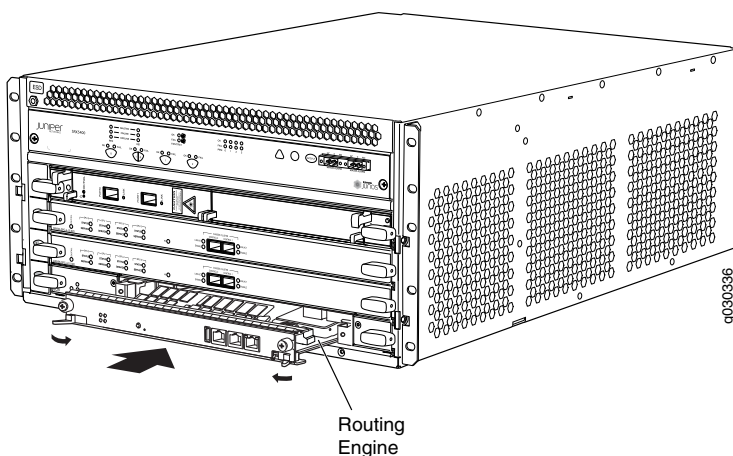
Installing the SRX5400 Services Gateway Routing Engine

To install the Routing Engine into the SCB (see [Figure 110 on page 247](#)):

NOTE: If you install only one Routing Engine in the service gateway, you must install it in SCB slot 0 of service gateway chassis.

1. If you have not already done so, take the host subsystem offline. See [“Taking the SRX5400 Services Gateway Host Subsystem Offline” on page 241](#).
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. Ensure that the ejector handles are not in the locked position. If necessary, flip the ejector handles outward.
4. Place one hand underneath the Routing Engine to support it.
5. Carefully align the sides of the Routing Engine with the guides inside the opening on the SCB.
6. Slide the Routing Engine into the SCB until you feel resistance, and then press the Routing Engine's faceplate until it engages the connectors.

Figure 110: Installing the Routing Engine



7. Press both of the ejector handles inward to seat the Routing Engine.

8. Tighten the captive screws on the right and left ends of the Routing Engine faceplate.
9. Power on the services gateway. The **OK** LED on the power supply faceplate should blink, then light steadily.

The Routing Engine might require several minutes to boot.

After the Routing Engine boots, verify that it is installed correctly by checking the **RE0** and **RE1** LEDs on the craft interface. If the services gateway is operational and the Routing Engine is functioning properly, the green **ONLINE** LED lights steadily. If the red **FAIL** LED lights steadily instead, remove and install the Routing Engine again. If the red **FAIL** LED still lights steadily, the Routing Engine is not functioning properly. Contact your customer support representative.

To check the status of the Routing Engine, use the CLI command:

```
user@host> show chassis routing-engine
```

```
Routing Engine status:
  Slot 0:
    Current state           Master ...
```

For more information about using the CLI, see the [CLI Explorer](#).

10. If the Routing Engine was replaced on one of the nodes in a chassis cluster, then you need to copy certificates and key pairs from the other node in the cluster:
 - a. Start the shell interface as a root user on both nodes of the cluster.
 - b. Verify files in the `/var/db/certs/common/key-pair` folder of the source node (other node in the cluster) and destination node (node on which the Routing Engine was replaced) by using the following command:


```
ls -la /var/db/certs/common/key-pair/
```
 - c. If the same files exist on both nodes, back up the files on the destination node to a different location. For example:

```
root@SRX-B% pwd
/var/db/certs/common/key-pair
root@SRX-B% ls -la
total 8
drwx----- 2 root wheel 512 Jan 22 15:09
drwx----- 7 root wheel 512 Mar 26 2009
-rw-r--r-- 1 root wheel 0 Jan 22 15:09 test
root@SRX-B% mv test test.old
root@SRX-B% ls -la
total 8
```



```
drwx----- 2 root wheel 512 Jan 22 15:10
drwx----- 7 root wheel 512 Mar 26 2009
-rw-r--r-- 1 root wheel 0 Jan 22 15:09 test.old
root@SRX-B%
```

- d. Copy the files from the `/var/db/certs/common/key-pair` folder of the source node to the same folder on the destination node.

NOTE: Ensure that you use the correct node number for the destination node.

- e. In the destination node, use the `ls -la` command to verify that all files from the `/var/db/certs/common/key-pair` folder of the source node are copied.
- f. Repeat Step b through Step e for the `/var/db/certs/common/local` and `/var/db/certs/common/certification-authority` folders.

Low Impact Hardware Upgrade for SCB3 and IOC3

If your device is part of a chassis cluster, you can upgrade SRX5K-SCBE (SCB2) to SRX5K-SCB3 (SCB3) and SRX5K-MPC (IOC2) to IOC3 (SRX5K-MPC3-100G10G or SRX5K-MPC3-40G10G) using the low-impact hardware upgrade (LICU) procedure, with minimum downtime. You can also follow this procedure to upgrade SCB1 to SCB2, and RE1 to RE2.

Before you begin the LICU procedure, verify that both services gateways in the cluster are running the same Junos OS release.

NOTE: You can perform the hardware upgrade using the LICU process only.

You must perform the hardware upgrade at the same time as the software upgrade from Junos OS Release 12.3X48-D10 to 15.1X49-D10.

In the chassis cluster, the primary device is depicted as node 0 and the secondary device as node 1.

Follow these steps to perform the LICU.

1. Ensure that the secondary node does not have an impact on network traffic by isolating it from the network when LICU is in progress. For this, disable the physical interfaces (RETH child interfaces) on the secondary node.

```

For SRX5400 Services Gateways
admin@cluster#set interfaces xe-5/0/0 disable
admin@cluster#set interfaces xe-5/1/0 disable

```

```

For SRX5600 Services Gateways
admin@cluster#set interfaces xe-9/0/0 disable
admin@cluster#set interfaces xe-9/0/4 disable

```

```

For SRX5800 Services Gateways
admin@cluster#set interfaces xe-13/0/0 disable
admin@cluster#set interfaces xe-13/1/0 disable

```

2. Disable SYN bit and TCP sequence number checking for the secondary node to take over.

```

admin@cluster#set security flow tcp-session no-syn-check
admin@cluster#set security flow tcp-session no-sequence-check

```

3. Commit the configuration.

```

root@#commit

```

4. Disconnect control and fabric links between the devices in the chassis cluster so that nodes running different Junos OS releases are disconnected. For this, change the control port and fabric port to erroneous values. Fabric ports must be set to any FPC number and control ports to any non-IOC port. Issue the following commands:

```

admin@cluster#delete chassis cluster control-ports
admin@cluster#set chassis cluster control-ports fpc 10 port 0 <<<<<<< non-SPC port
admin@cluster#set chassis cluster control-ports fpc 22 port 0 <<<<<<< non-SPC port
admin@cluster#delete interfaces fab0
admin@cluster#delete interfaces fab1
admin@cluster#set interfaces fab0 fabric-options member-interfaces xe-4/0/5 <<<<<<< non-IOC port
admin@cluster#set interfaces fab1 fabric-options member-interfaces xe-10/0/5<<<<<<< non-IOC port

```

5. Commit the configuration.

```

root@#commit

```

NOTE: After you commit the configuration, the following error message appears: *Connection to node1 has been broken error:remote unlock-configuration failed on node1 due to control plane communication break.*

Ignore the error message.

6. Upgrade the Junos OS release on the secondary node from 12.3X48-D10 to 15.1X49-D10.

```
admin@cluster#request system software add <location of package/junos filename> no-validate no-copy
```

7. Power on the secondary node.

```
admin@cluster#request system reboot
```

See:

- [Powering On an AC-Powered SRX5400 Services Gateway on page 198](#)
- [Powering On a DC-Powered SRX5400 Services Gateway on page 202](#)
- *Powering On an AC-Powered SRX5600 Services Gateway*
- *Powering On a DC-Powered SRX5600 Services Gateway*
- *Powering On an AC-Powered SRX5800 Services Gateway*
- *Powering On a DC-Powered SRX5800 Services Gateway*

8. Perform the hardware upgrade on the secondary node by replacing SCB2 with SCB3, IOC2 with IOC3, and the existing midplane with the enhanced midplane.

Following these steps while upgrading the SCB:

To upgrade the Routing Engine on the secondary node:

- a. Before powering off the secondary node, copy the configuration information to a USB device.
- b. Replace RE1 with RE2 and upgrade the Junos OS on RE2.
- c. Upload the configuration to RE2 from the USB device.

For more information about mounting the USB drive on the device, refer to KB articles [KB12880](#) and [KB12022](#) from the [Knowledge Base](#).

Perform this step when you upgrade the MPC.

- a. Configure the control port, fabric port, and RETH child ports on the secondary node.

```
[edit]

root@clustert# show | display set | grep delete

delete groups global interfaces fab1

delete groups global interfaces fab0

delete interfaces reth0

delete interfaces reth1

delete interfaces xe-3/0/5 ggether-options redundant-parent reth0

delete interfaces xe-9/0/5 ggether-options redundant-parent reth0

delete interfaces xe-3/0/9 ggether-options redundant-parent reth

delete interfaces xe-9/0/9 ggether-options redundant-parent reth0

[edit]

root@clustert# show | display set | grep fab

set groups global interfaces fab1 fabric-options member-interfaces
xe-9/0/2

set groups global interfaces fab0 fabric-options member-interfaces
xe-3/0/2

[edit]

root@clustert# show | display set | grep reth0

set chassis cluster redundancy-group 1 ip-monitoring family inet
44.44.44.2 interface reth0.0 secondary-ip-address 44.44.44.3

set interfaces xe-3/0/0 ggether-options redundant-parent reth0

set interfaces xe-9/0/0 ggether-options redundant-parent reth0

set interfaces reth0 vlan-tagging

set interfaces reth0 redundant-ether-options redundancy-group 1

set interfaces reth0 unit 0 vlan-id 20

set interfaces reth0 unit 0 family inet address 44.44.44.1/8

[edit]

root@clustert# show | display set | grep reth1

set interfaces xe-3/0/4 ggether-options redundant-parent reth1

set interfaces xe-9/0/4 ggether-options redundant-parent reth1
```

```

set interfaces reth1 vlan-tagging
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth1 unit 0 vlan-id 30
set interfaces reth1 unit 0 family inet address 55.55.55.1/8

```

9. Verify that the secondary node is running the upgraded Junos OS release.

```
root@cluster> show version node1
```

```

Hostname: <displays the hostname>
Model: <displays the model number>
Junos: 15.1X49-D10
JUNOS Software Release [15.1X49-D10]

```

```
root@cluster> show chassis cluster status
```

```

Monitor Failure codes:
  CS Cold Sync monitoring          FL Fabric Connection monitoring
  GR GRES monitoring              HW Hardware monitoring
  IF Interface monitoring         IP IP monitoring
  LB Loopback monitoring          MB Mbuf monitoring
  NH Nexthop monitoring           NP NPC monitoring
  SP SPU monitoring               SM Schedule monitoring
  CF Config Sync monitoring

```

```
Cluster ID: 1
```

```
Node Priority Status Preempt Manual Monitor-failures
```

```
Redundancy group: 0 , Failover count: 1
```

```

node0 0 lost n/a n/a n/a
node1 100 primary no no None

```

```
Redundancy group: 1 , Failover count: 3
```

```

node0 0 lost n/a n/a n/a
node1 150 primary no no None

```

```
root@cluster> show chassis fpc pic-status node1
```

```

Slot 1 Online SRX5k IOC II
  PIC 0 Online 1x 100GE CFP
  PIC 2 Online 2x 40GE QSFP+
Slot 2 Online SRX5k SPC II
  PIC 0 Online SPU Cp

```

```

PIC 1 Online      SPU Flow
PIC 2 Online      SPU Flow
PIC 3 Online      SPU Flow
Slot 3 Online     SRX5k IOC II
  PIC 0 Online    10x 10GE SFP+
  PIC 2 Online    2x 40GE QSFP+
Slot 4 Online     SRX5k SPC II
  PIC 0 Online    SPU Flow
  PIC 1 Online    SPU Flow
  PIC 2 Online    SPU Flow
  PIC 3 Online    SPU Flow
Slot 5 Online     SRX5k IOC II
  PIC 0 Online    10x 10GE SFP+
  PIC 2 Online    2x 40GE QSFP+

```

10. Verify configuration changes by disabling interfaces on the primary node and enabling interfaces on the secondary.

```

For SRX5400 Services Gateways
admin@cluster#set interfaces xe-2/0/0 disable
admin@cluster#set interfaces xe-2/1/0 disable
admin@cluster#delete interfaces xe-5/0/0 disable
admin@cluster#delete interfaces xe-5/1/0 disable

```

```

For SRX5600 Services Gateways
admin@cluster#set interfaces xe-2/0/0 disable
admin@cluster#set interfaces xe-2/0/4 disable
admin@cluster#delete interfaces xe-9/0/0 disable
admin@cluster#delete interfaces xe-9/0/4 disable

```

```

For SRX5800 Services Gateways
admin@cluster#set interfaces xe-1/0/0 disable
admin@cluster#set interfaces xe-1/1/0 disable
admin@cluster#delete interfaces xe-13/0/0 disable
admin@cluster#delete interfaces xe-13/1/0 disable

```

11. Check the configuration changes.

```

root@#commit check

```

12. After verifying, commit the configuration.

```
root@#commit
```

Network traffic fails over to the secondary node.

13. Verify that the failover was successful by checking the session tables and network traffic on the secondary node.

```
admin@cluster#show security flow session summary
admin@cluster#monitor interface traffic
```

14. Upgrade the Junos OS release on the primary node from 12.3X48-D10 to 15.1X49-D10.

```
admin@cluster#request system software add <location of package/junos filename> no-validate no-copy
```

Ignore error messages pertaining to the disconnected cluster.

15. Power on the primary node.

```
admin@cluster#request system reboot
```

See:

- [Powering On an AC-Powered SRX5400 Services Gateway on page 198](#)
- [Powering On a DC-Powered SRX5400 Services Gateway on page 202](#)
- *Powering On an AC-Powered SRX5600 Services Gateway*
- *Powering On a DC-Powered SRX5600 Services Gateway*
- *Powering On an AC-Powered SRX5800 Services Gateway*
- *Powering On a DC-Powered SRX5800 Services Gateway*

16. Perform the hardware upgrade on the primary node by replacing SCB2 with SCB3, IOC2 with IOC3, and the existing midplane with the enhanced midplane.

Perform the following steps while upgrading the SCB.

To upgrade the Routing Engine on the primary node:

- a. Before powering off the secondary node, copy the configuration information to a USB device.
- b. Replace RE1 with RE2 and upgrade the Junos OS on RE2.

- c. Upload the configuration to RE2 from the USB device.

For more information about mounting the USB drive on the device, refer to KB articles [KB12880](#) and [KB12022](#) from the [Knowledge Base](#).

Perform this step when you upgrade the MPC.

- a. Configure the control port, fabric port, and RETH child ports on the primary node.

```
[edit]
root@clustert# show | display set | grep delete
delete groups global interfaces fab1
delete groups global interfaces fab0
delete interfaces reth0
delete interfaces reth1
delete interfaces xe-3/0/5 gigether-options redundant-parent reth0
delete interfaces xe-9/0/5 gigether-options redundant-parent reth0
delete interfaces xe-3/0/9 gigether-options redundant-parent reth0
delete interfaces xe-9/0/9 gigether-options redundant-parent reth0
```

```
[edit]
root@clustert# show | display set | grep fab
set groups global interfaces fab1 fabric-options member-interfaces
xe-9/0/2
set groups global interfaces fab0 fabric-options member-interfaces
xe-3/0/2
```

```
[edit]
root@clustert# show | display set | grep reth0
set chassis cluster redundancy-group 1 ip-monitoring family inet
44.44.44.2 interface reth0.0 secondary-ip-address 44.44.44.3
set interfaces xe-3/0/0 gigether-options redundant-parent reth0
set interfaces xe-9/0/0 gigether-options redundant-parent reth0
set interfaces reth0 vlan-tagging
set interfaces reth0 redundant-ether-options redundancy-group 1
set interfaces reth0 unit 0 vlan-id 20
set interfaces reth0 unit 0 family inet address 44.44.44.1/8
```

```
[edit]
root@clustert# show | display set | grep reth1
set interfaces xe-3/0/4 gigether-options redundant-parent reth1
set interfaces xe-9/0/4 gigether-options redundant-parent reth1
set interfaces reth1 vlan-tagging
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth1 unit 0 vlan-id 30
set interfaces reth1 unit 0 family inet address 55.55.55.1/8
```

17. Verify that the primary node is running the upgraded Junos OS release, and that the primary node is

available to take over network traffic.

```
root@cluster> show version node1
```

```
Hostname: <displays the hostname>
Model: <displays the model number>
Junos: 15.1X49-D10
JUNOS Software Release [15.1X49-D10]
```

```
root@cluster> show chassis cluster status
```

```
Monitor Failure codes:
  CS Cold Sync monitoring          FL Fabric Connection monitoring
  GR GRES monitoring              HW Hardware monitoring
  IF Interface monitoring         IP IP monitoring
  LB Loopback monitoring         MB Mbuf monitoring
  NH Nexthop monitoring          NP NPC monitoring
  SP SPU monitoring              SM Schedule monitoring
  CF Config Sync monitoring

Cluster ID: 1
Node  Priority Status          Preempt Manual  Monitor-failures

Redundancy group: 0 , Failover count: 1
node0  0      lost          n/a    n/a    n/a
node1  100    primary      no     no     None

Redundancy group: 1 , Failover count: 3
node0  0      lost          n/a    n/a    n/a
node1  150    primary      no     no     None
```

```
root@cluster> show chassis fpc pic-status node1
```

```
Slot 1  Online      SRX5k IOC II
  PIC 0  Online      1x 100GE CFP
  PIC 2  Online      2x 40GE QSFP+
Slot 2  Online      SRX5k SPC II
  PIC 0  Online      SPU Cp
  PIC 1  Online      SPU Flow
  PIC 2  Online      SPU Flow
  PIC 3  Online      SPU Flow
Slot 3  Online      SRX5k IOC II
```

```

PIC 0 Online      10x 10GE SFP+
PIC 2 Online      2x 40GE QSFP+
Slot 4 Online     SRX5k SPC II
PIC 0 Online      SPU Flow
PIC 1 Online      SPU Flow
PIC 2 Online      SPU Flow
PIC 3 Online      SPU Flow
Slot 5 Online     SRX5k IOC II
PIC 0 Online      10x 10GE SFP+
PIC 2 Online      2x 40GE QSFP+

```

18. Check the configuration changes.

```
root@#commit check
```

19. After verifying, commit the configuration.

```
root@#commit
```

20. Verify configuration changes by disabling interfaces on the secondary node and enabling interfaces on the primary.

```

For SRX5400 Services Gateways
admin@cluster#set interfaces xe-5/0/0 disable
admin@cluster#set interfaces xe-5/1/0 disable
admin@cluster#delete interfaces xe-2/0/0 disable
admin@cluster#delete interfaces xe-2/1/0 disable

```

```

For SRX5600 Services Gateways
admin@cluster#set interfaces xe-9/0/0 disable
admin@cluster#set interfaces xe-9/0/4 disable
admin@cluster#delete interfaces xe-2/0/0 disable
admin@cluster#delete interfaces xe-2/0/4 disable

```

```

For SRX5800 Services Gateways
admin@cluster#set interfaces xe-13/0/0 disable
admin@cluster#set interfaces xe-13/1/0 disable
admin@cluster#delete interfaces xe-1/0/0 disable
admin@cluster#delete interfaces xe-1/1/0 disable

```

Network traffic fails over to the primary node.

21. To synchronize the devices within the cluster, reconfigure the control ports and fabric ports with the correct port values on the secondary node.

```
admin@cluster#delete chassis cluster control-ports
admin@cluster#set chassis cluster control-ports fpc 1 port 0
admin@cluster#set chassis cluster control-ports fpc 13 port 0
admin@cluster#delete interfaces fab0
admin@cluster#delete interfaces fab1
admin@cluster#set interfaces fab0 fabric-options member-interfaces xe-3/0/2
admin@cluster#set interfaces fab1 fabric-options member-interfaces xe-9/0/2
```

22. Commit the configuration.

```
root@#commit
```

23. Power on the secondary node.

```
admin@cluster#request system reboot
```

See:

- [Powering On an AC-Powered SRX5400 Services Gateway on page 198](#)
 - [Powering On a DC-Powered SRX5400 Services Gateway on page 202](#)
 - *Powering On an AC-Powered SRX5600 Services Gateway*
 - *Powering On a DC-Powered SRX5600 Services Gateway*
 - *Powering On an AC-Powered SRX5800 Services Gateway*
 - *Powering On a DC-Powered SRX5800 Services Gateway*
- a. When you power on the secondary node, enable the control ports and fabric ports on the primary node, and reconfigure them with the correct port values.

```
admin@cluster#delete chassis cluster control-ports
admin@cluster#set chassis cluster control-ports fpc 1 port 0
admin@cluster#set chassis cluster control-ports fpc 13 port 0
admin@cluster#delete interfaces fab0
admin@cluster#delete interfaces fab1
admin@cluster#set interfaces fab0 fabric-options member-interfaces xe-3/0/2
admin@cluster#set interfaces fab1 fabric-options member-interfaces xe-9/0/2
```

24. Commit the configuration.

```
root@#commit
```

25. After the secondary node is up, verify that it synchronizes with the primary node.

```
admin@cluster#delete interfaces xe-4/0/5 disable
admin@cluster#delete interfaces xe-10/0/5 disable
```

26. Enable SYN bit and TCP sequence number checking for the secondary node.

```
admin@cluster#delete security flow tcp-session no-syn-check
admin@cluster#delete security flow tcp-session no-sequence-check
```

27. Commit the configuration.

```
root@#commit
```

28. Verify the Redundancy Group (RG) states and their priority.

```
root@cluster>show version
```

```
node0:
-----
Hostname: <displays the hostname>
Model: <displays the model number>
Junos: 15.1X49-D10
JUNOS Software Release [15.1X49-D10]

node1:
-----
Hostname: <displays the hostname>
Model: <displays the model>
Junos: 15.1X49-D10
JUNOS Software Release [15.1X49-D10]
```

After the secondary node is powered on, issue the following command:

```
root@cluster>show chassis fpc pic-status
```

node0:

```

-----
Slot 1  Online      SRX5k IOC II
  PIC 0 Online      1x 100GE CFP
  PIC 2 Online      2x 40GE QSFP+
Slot 2  Online      SRX5k SPC II
  PIC 0 Online      SPU Cp
  PIC 1 Online      SPU Flow
  PIC 2 Online      SPU Flow
  PIC 3 Online      SPU Flow
Slot 3  Online      SRX5k IOC3 24XGE+6XLG
  PIC 0 Online      12x 10GE SFP+
  PIC 1 Online      12x 10GE SFP+
  PIC 2 Offline     3x 40GE QSFP+
  PIC 3 Offline     3x 40GE QSFP+
Slot 4  Online      SRX5k SPC II
  PIC 0 Online      SPU Flow
  PIC 1 Online      SPU Flow
  PIC 2 Online      SPU Flow
  PIC 3 Online      SPU Flow
Slot 5  Online      SRX5k IOC II
  PIC 0 Online      10x 10GE SFP+
  PIC 2 Online      10x 10GE SFP+

```

node1:

```

-----
Slot 1  Online      SRX5k IOC II
  PIC 0 Online      1x 100GE CFP
  PIC 2 Online      2x 40GE QSFP+
Slot 2  Online      SRX5k SPC II
  PIC 0 Online      SPU Cp
  PIC 1 Online      SPU Flow
  PIC 2 Online      SPU Flow
  PIC 3 Online      SPU Flow
Slot 3  Online      SRX5k IOC3 24XGE+6XLG
  PIC 0 Online      12x 10GE SFP+
  PIC 1 Online      12x 10GE SFP+
  PIC 2 Offline     3x 40GE QSFP+
  PIC 3 Offline     3x 40GE QSFP+
Slot 4  Online      SRX5k SPC II
  PIC 0 Online      SPU Flow
  PIC 1 Online      SPU Flow
  PIC 2 Online      SPU Flow
  PIC 3 Online      SPU Flow

```



```
Slot 5   Online      SRX5k IOC II
PIC 0   Online      10x 10GE SFP+
PIC 2   Online      2x 40GE QSFP+
```

root@cluster> **show chassis cluster status**

```
CS Cold Sync monitoring      FL Fabric Connection monitoring
GR GRES monitoring           HW Hardware monitoring
IF Interface monitoring       IP IP monitoring
LB Loopback monitoring        MB Mbuf monitoring
NH Nexthop monitoring         NP NPC monitoring
SP SPU monitoring             SM Schedule monitoring
CF Config Sync monitoring
```

Cluster ID: 1

Node	Priority	Status	Preempt	Manual	Monitor-failures
------	----------	--------	---------	--------	------------------

Redundancy group: 0 , Failover count: 0

node0	250	primary	no	no	None
node1	100	secondary	no	no	None

Redundancy group: 1 , Failover count: 0

node0	254	primary	no	no	None
node1	150	secondary	no	no	None

root@cluster>**show security monitoring**

node0:

```
-----
          Flow session      Flow session      CP session      CP session
FPC PIC CPU Mem      current      maximum      current      maximum
-----
  2  0  0  11           0           0          1999999      104857600
  2  1  2  5          289065      4194304           0           0
  2  2  2  5          289062      4194304           0           0
  2  3  2  5          289060      4194304           0           0
  4  0  2  5          289061      4194304           0           0
  4  1  2  5          281249      4194304           0           0
  4  2  2  5          281251      4194304           0           0
  4  3  2  5          281251      4194304           0           0
-----
```

```
nodel:
```

```
-----
```

FPC	PIC	CPU	Mem	Flow session current	Flow session maximum	CP session current	CP session maximum
2	0	0	11	0	0	1999999	104857600
2	1	0	5	289065	4194304	0	0
2	2	0	5	289062	4194304	0	0
2	3	0	5	289060	4194304	0	0
4	0	0	5	289061	4194304	0	0
4	1	0	5	281249	4194304	0	0
4	2	0	5	281251	4194304	0	0
4	3	0	5	281251	4194304	0	0

```
-----
```

Enable the traffic interfaces on the secondary node.

```
root@cluster> show interfaces terse | grep reth0
xe-3/0/0.0 up up aenet --> reth0.0
xe-3/0/0.32767 up up aenet --> reth0.32767
xe-9/0/0.0 up up aenet --> reth0.0
xe-9/0/0.32767 up up aenet --> reth0.32767
reth0 up up
reth0.0 up up inet 44.44.44.1/8
reth0.32767 up up multiservice
```

```
root@cluster> show interfaces terse | grep reth1
xe-3/0/4.0 up up aenet --> reth1.0
xe-3/0/4.32767 up up aenet --> reth1.32767
xe-9/0/4.0 up up aenet --> reth1.0
xe-9/0/4.32767 up up aenet --> reth1.32767
reth1 up up
reth1.0 up up inet 55.55.55.1/8
reth1.32767 up up multiservice
```

For more information about LICU, refer to KB article [KB17947](#) from the [Knowledge Base](#).

In-Service Hardware Upgrade for SRX5K-RE-1800X4 and SRX5K-SCBE or SRX5K-RE-1800X4 and SRX5K-SCB3 in a Chassis Cluster

If your device is part of a chassis cluster, using the in-service hardware upgrade (ISHU) procedure you can upgrade:

- SRX5K-SCB with SRX5K-RE-13-20 to SRX5K-SCBE with SRX5K-RE-1800X4

NOTE: Both the services gateways must have the same Junos OS version 12.3X48.

- SRX5K-SCBE with SRX5K-RE-1800X4 to SRX5K-SCB3 with SRX5K-RE-1800X4

NOTE: You cannot upgrade SRX5K-SCB with SRX5K-RE-13-20 directly to SRX5K-SCB3 with SRX5K-RE-1800X4.

NOTE: We strongly recommend that you perform the ISHU during a maintenance window, or during the lowest possible traffic as the secondary node is not available at this time.

Ensure to upgrade the SCB and Routing Engine at the same time as the following configurations are only supported:

- SRX5K-RE-13-20 and SRX5K-SCB
- SRX5K-RE-1800X4 and SRX5K-SCBE
- SRX5K-RE-1800X4 and SRX5K-SCB3

NOTE: While performing the ISHU, in the SRX5800 service gateway, the second SCB can contain a Routing Engine but the third SCB must not contain a Routing Engine. In the SRX5600 services gateway, the second SCB can contain a Routing Engine.

Ensure that the following prerequisites are completed before you begin the ISHU procedure:

- Replace all interface cards such as IOCs and Flex IOCs as specified in [Table 52 on page 268](#).

Table 52: List of Interface Cards for Upgrade

Cards to Replace	Replacement Cards for Upgrade
SRX5K-40GE-SFP	SRX5K-MPC and MICs
SRX5K-4XGE-XFP	SRX5K-MPC and MICs
SRX5K-FPC-IOC	SRX5K-MPC and MICs
SRX5K-RE-13-20	SRX5K-RE-1800X4
SRX5K-SCB	SRX5K-SCBE
SRX5K-SCBE	SRX5K-SCB3

- Verify that both services gateways in the cluster are running the same Junos OS versions; release 12.1X47-D15 or later for SRX5K-SCBE with SRX5K-RE-1800X4 and 15.1X49-D10 or later for SRX5K-SCB3 with SRX5K-RE-1800X4. For more information on cards supported on the services gateways see *Cards Supported on SRX5400, SRX5600, and SRX5800 Services Gateways*.

For more information about unified in-service software upgrade (unified ISSU), see [Upgrading Both Devices in a Chassis Cluster Using an ISSU](#).

To perform an ISHU:

1. Export the configuration information from the secondary node to a USB or an external storage device.
For more information about mounting the USB on the device, refer to KB articles [KB12880](#) and [KB12022](#) from the [Knowledge Base](#).
2. Power off the secondary node.
See, "[Powering Off the SRX5400 Services Gateway](#)" on page 203, *Powering Off the SRX5600 Services Gateway*, or *Powering Off the SRX5800 Services Gateway*.
3. Disconnect all the interface cards from the chassis backplane by pulling them out of the backplane by 6" to 8" (leaving cables in place).
4. Replace the SRX5K-SCBs with SRX5K-SCBEs, or SRX5K-SCBEs with SRX5K-SCB3s and SRX5K-RE-13-20s with SRX5K-RE-1800X4s based on the chassis specifications.
5. Power on the secondary node.

See:

- [Powering On an AC-Powered SRX5400 Services Gateway on page 198](#)
 - [Powering On a DC-Powered SRX5400 Services Gateway on page 202](#)
 - [Powering On an AC-Powered SRX5600 Services Gateway](#)
 - [Powering On a DC-Powered SRX5600 Services Gateway](#)
 - [Powering On an AC-Powered SRX5800 Services Gateway](#)
 - [Powering On a DC-Powered SRX5800 Services Gateway](#)
6. After the secondary node reboots as a standalone node, configure the same cluster ID as in the primary node.

```
root@>set chassis cluster cluster-id 1 node 1
```

7. Install the same Junos OS software image on the secondary node as on the primary node and reboot.

NOTE: Ensure that the Junos OS version installed is release 12.1X47-D15 or later for SRX5K-RE-1800X4 & SRX5K-SCBE and 15.1X49-D10 or later for SRX5K-RE-1800X4 & SRX5K-SCB3.

8. After the secondary node reboots, import all the configuration settings from the USB to the node.
- For more information about mounting the USB on the device, refer to KB articles [KB12880](#) and [KB12022](#) from the [Knowledge Base](#).
9. Power off the secondary node.
- See [“Powering Off the SRX5400 Services Gateway” on page 203](#), [Powering Off the SRX5600 Services Gateway](#), or [Powering Off the SRX5800 Services Gateway](#).
10. Re-insert all the interface cards into the chassis backplane.

NOTE: Ensure the cards are inserted in the same order as in the primary node, and maintain connectivity between the control link and fabric link.

11. Power on the node and issue this command to ensure all the cards are online:

```
user@host> show chassis fpc pic-status
```

After the node boots, it must join the cluster as a secondary node. To verify, issue the following command

```
admin@cluster> show chassis cluster status
```

NOTE: The command output must indicate that the node priority is set to a non-zero value, and that the cluster contains a primary node and a secondary node.

12. Initiate Redundancy Group (RG) failover to the upgraded node, manually, so that it is assigned to all RGs as a primary node.

For RG0, issue the following command:

```
admin@cluster> request chassis cluster failover redundancy-group 0 node 1
```

For RG1, issue the following command:

```
admin@cluster> request chassis cluster failover redundancy-group 1 node 1
```

Verify that all RGs are failed over by issuing the following command:

```
admin@cluster> show chassis cluster status
```

13. Verify the operations of the upgraded secondary node by performing the following:

- To ensure all FPC's are online, issue the following command:

```
admin@cluster> show chassis fpc pic-status
```

- To ensure all RG's are upgraded and the node priority is set to a non-zero value, issue the following command:

```
admin@cluster> show chassis cluster status
```

- To ensure that the upgraded primary node receives and transmits data, issue the following command:

```
admin@cluster> monitor interface traffic
```

- To ensure sessions are created and deleted on the upgraded node, issue the following command:

```
admin@cluster> show security monitoring
```

14. Repeat Step 1 through 12 for the primary node.

15. To ensure that the ISHU process is completed successfully, check the status of the cluster by issuing the following command:

```
admin@cluster> show chassis cluster status
```

For detailed information about chassis cluster, see the [Chassis Cluster User Guide for SRX Series Devices](http://www.juniper.net/documentation/) at www.juniper.net/documentation/.

Maintaining the SRX5400 Line Cards and Modules

IN THIS SECTION

- [Holding an SRX5400 Services Gateway Card | 272](#)
- [Storing an SRX5400 Services Gateway Card | 274](#)
- [Replacing SRX5400 Services Gateway MPCs | 274](#)
- [Replacing SRX5400 Services Gateway MICs | 280](#)
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- [In-Service Hardware Upgrade for SRX5K-SPC3 in a Chassis Cluster | 297](#)

Holding an SRX5400 Services Gateway Card

When carrying a card, you can hold it either vertically or horizontally.

NOTE: A card weighs up to 18.3 lb (8.3 kg). Be prepared to accept the full weight of the card as you lift it.

To hold a card vertically:

1. Orient the card so that the faceplate faces you. To verify orientation, confirm that the text on the card is right-side up and the EMI strip is on the right-hand side.
2. Place one hand around the card faceplate about a quarter of the way down from the top edge. To avoid deforming the EMI shielding strip, do not press hard on it.
3. Place your other hand at the bottom edge of the card.

If the card is horizontal before you grasp it, place your left hand around the faceplate and your right hand along the bottom edge.

To hold a card horizontally:

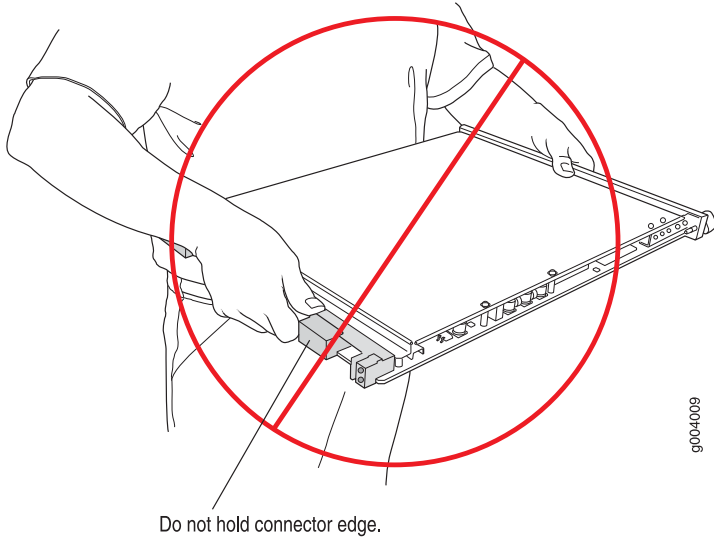
1. Orient the card so that the faceplate faces you.
2. Grasp the top edge with your left hand and the bottom edge with your right hand.

You can rest the faceplate of the card against your body as you carry it.

As you carry the card, do not bump it against anything. Card components are fragile.

Never hold or grasp the card anywhere except those places that this topic indicates are appropriate. In particular, never grasp the connector edge, especially at the power connector in the corner where the connector and bottom edges meet (see [Figure 111 on page 273](#)).

Figure 111: Do Not Grasp the Connector Edge

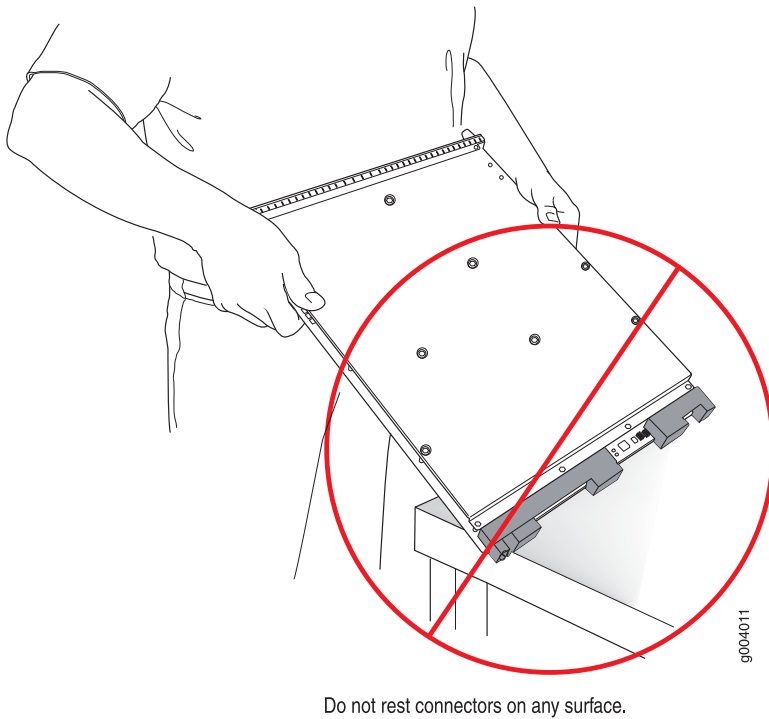


Never carry the card by the faceplate with only one hand.

Do not rest any edge of a card directly against a hard surface (see [Figure 112 on page 273](#)).

Do not stack cards.

Figure 112: Do Not Rest the Card on an Edge



If you must rest the card temporarily on an edge while changing its orientation between vertical and horizontal, use your hand as a cushion between the edge and the surface.

Storing an SRX5400 Services Gateway Card

You must store a card as follows:

- In the services gateway chassis
- In the container in which a spare card is shipped
- Horizontally and sheet metal side down

When you store a card on a horizontal surface or in the shipping container, always place it inside an antistatic bag. Because the card is heavy, and because antistatic bags are fragile, inserting the card into the bag is easier with two people. To do this, one person holds the card in the horizontal position with the faceplate facing the body, and the other person slides the opening of the bag over the card connector edge.

If you must insert the card into a bag by yourself, first lay the card horizontally on a flat, stable surface, sheet metal side down. Orient the card with the faceplate facing you. Carefully insert the card connector edge into the opening of the bag, and pull the bag toward you to cover the card.

Never stack a card under or on top of any other component.

Replacing SRX5400 Services Gateway MPCs

To replace an MPC, perform the following procedures:

1. [Removing an SRX5400 Services Gateway MPC | 275](#)
2. [Installing an SRX5400 Services Gateway MPC | 277](#)

Removing an SRX5400 Services Gateway MPC

An MPC installs horizontally in the front of the services gateway. A fully configured MPC can weigh up to 18.35 lb (8.3 kg). Be prepared to accept its full weight.

To remove an MPC:

1. Have ready a replacement MPC blank panel and an antistatic mat for the MPC. Also have ready rubber safety caps for each MIC using an optical interface on the MPC that you are removing.
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 each MIC on the MPC so that you can later reconnect the cables to the correct MICs.
4. Use one of the following methods to take the MPC offline:
 - Press and hold the corresponding online button on the craft interface. The green **OK/FAIL** LED next to the button begins to blink. Hold the button down until the LED goes off.
 - Issue the following CLI command:
user@host>request chassis fpc slot *slot-number* offline
5. If you have not already done so, power off the services gateway.
6. Disconnect the cables from the MICs installed in the MPC.



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.



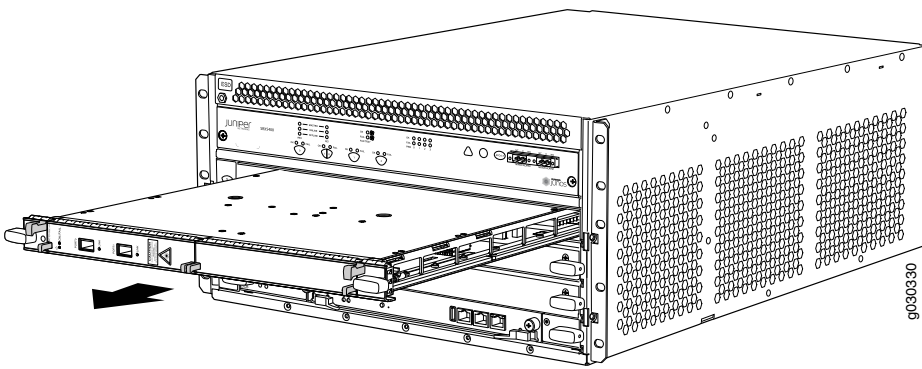
CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.



CAUTION: Avoid bending a 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. If a MIC uses fiber-optic cable, immediately cover each transceiver and the end of each cable with a rubber safety cap.
8. Arrange the disconnected cables in the cable management brackets to prevent the cables from developing stress points.
9. Simultaneously turn both the ejector handles counterclockwise to unseat the MPC.
10. Grasp the handles, and slide the MPC straight out of the card cage halfway. See [Figure 113 on page 276](#).

Figure 113: Removing an MPC



11. Place one hand around the front of the MPC (the MIC housing) and the other hand under it to support it. Slide the MPC completely out of the chassis, and place it on the antistatic mat or in the electrostatic bag.



CAUTION: The weight of the MPC is concentrated in the back end. Be prepared to accept the full weight—up to 18.35 lb (8.3 kg)—as you slide the MPC out of the chassis.

When the MPC is out of the chassis, do not hold it by the ejector handles, bus bars, or edge connectors. They cannot support its weight.

Do not stack MPCs on top of one another after removal. Place each one individually in an electrostatic bag or on its own antistatic mat on a flat, stable surface.

12. If necessary, remove each installed MIC from the MPC.

13. After you remove each MIC, immediately place it on an antistatic mat or in an electrostatic bag.
14. If you are not reinstalling an MPC into the emptied line card slots within a short time, install a blank DPC panel over each slot to maintain proper airflow in the card cage.

Installing an SRX5400 Services Gateway MPC

An MPC installs horizontally in the front of the services gateway. A fully configured MPC can weigh up to 18.35 lb (8.3 kg). Be prepared to accept its full weight.

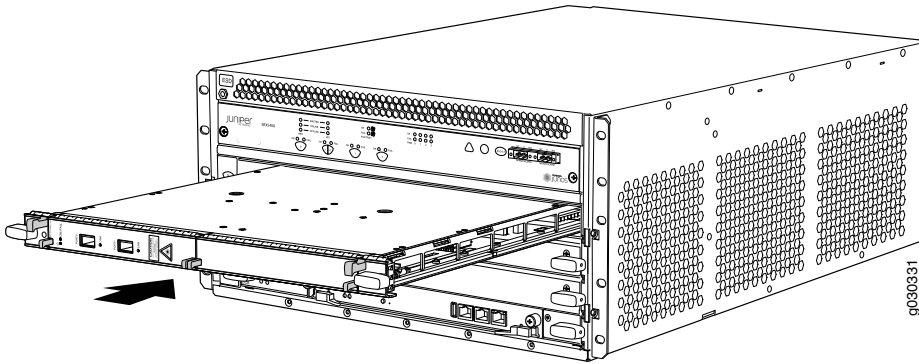
To install an MPC:

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. If you have not already done so, power off the services gateway.
3. Place the MPC on an antistatic mat.
4. Take each MIC to be installed in the replacement MPC out of its electrostatic bag, and identify the slot on the MPC where it will be connected.
5. Verify that each fiber-optic MIC has a rubber safety cap covering the MIC transceiver. If it does not, cover the transceiver with a safety cap.
6. Install each MIC into the appropriate slot on the MPC.
7. Locate the slot in the card cage in which you plan to install the MPC.
8. Orient the MPC so that the faceplate faces you.
9. Lift the MPC into place, and carefully align the sides of the MPC with the guides inside the card cage. See [Figure 114 on page 278](#).



CAUTION: When the MPC is out of the chassis, do not hold it by the ejector handles, bus bars, or edge connectors. They cannot support its weight.

Figure 114: Installing an MPC in the SRX5400 Services Gateway



10. Slide the MPC all the way into the card cage until you feel resistance.
11. Grasp both ejector handles, and rotate them clockwise simultaneously until the MPC is fully seated.
12. If any of the MICs on the MPC connect to fiber-optic cable, remove the rubber safety cap from each transceiver and cable.



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.

13. Insert the appropriate cable into the cable connector ports on each MIC on the MPC. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop, using the cable management system. Placing fasteners on a loop helps to maintain its shape.



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



CAUTION: Avoid bending a 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.

14. Power on the services gateway. The OK LED on the power supply faceplate should blink, then light steadily.
15. Verify that the MPC is functioning correctly by issuing the **show chassis fpc** and **show chassis fpc pic-status** commands. For example:

```
user@host> show chassis fpc
```

```
node0:
-----
Slot State      Temp  CPU Utilization (%)  Memory  Utilization (%)
                (C)  Total  Interrupt           DRAM (MB) Heap    Buffer
0  Online       37    23      0           2048    19     14
1  Offline      ---Offlined by cli command---
2  Online       49    37      0           1024    14     25
```

Bring the MPC online for the first time by using the following CLI command:

```
user@host> request chassis fpc slot 1 online
```

```
node0:
-----
Online initiated, use "show chassis fpc" to verify
```

```
user@host> show chassis fpc
```

```
node0:
-----
Slot State      Temp  CPU Utilization (%)  Memory  Utilization (%)
                (C)  Total  Interrupt           DRAM (MB) Heap    Buffer
0  Online       37     6      0           2048    19     14
1  Online       44    11      0           1024    23     29
2  Online       49    22      0           1024    14     25
```

```
user@host> show chassis fpc pic-status
```

```
Slot 0  Online      SRX5k SPC II
  PIC 0  Online      SPU Cp
  PIC 1  Online      SPU Flow
  PIC 2  Online      SPU Flow
  PIC 3  Online      SPU Flow
Slot 1  Online      SRX5k IOC II
```

PIC 0	Online	2x 40GE QSFP+
PIC 2	Online	10x 10GE SFP+
Slot 2	Online	SRX5k SPC II
PIC 0	Online	SPU Flow
PIC 1	Online	SPU Flow
PIC 2	Online	SPU Flow
PIC 3	Online	SPU Flow

Replacing SRX5400 Services Gateway MICs

To replace an MIC, perform the following procedures:

1. [Removing an SRX5400 Services Gateway MIC | 280](#)
2. [Installing an SRX5400 Services Gateway MIC | 282](#)

Removing an SRX5400 Services Gateway MIC

The MICs are located in the MPCs installed in the front of the services gateway. A MIC weighs less than 2 lb (0.9 kg).

To remove a MIC:

1. Place an electrostatic bag or antistatic mat on a flat, stable surface to receive the MIC. If the MIC connects to fiber-optic cable, have ready a rubber safety cap for each transceiver and 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. Power off the services gateway.
4. Label the cables connected to the MIC so that you can later reconnect each cable to the correct MIC.
5. Disconnect the cables from the MIC. If the MIC uses fiber-optic cable, immediately cover each transceiver and the end of each cable with a rubber safety cap.



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.



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

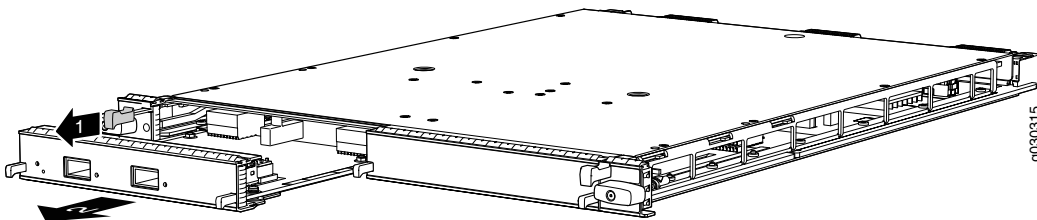
6. Arrange the cable to prevent it from dislodging or developing stress points. Secure the cable so that it is not supporting its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop.



CAUTION: Avoid bending a 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. On the MPC, pull the ejector knob that is adjacent to the MIC you are removing away from the MPC faceplate. The ejector knob is located between the MIC and the rotational knob that retains the MPC in the services gateway card cage. Pulling the ejector knob unseats the MIC from the MPC and partially ejects it. See [Figure 115 on page 281](#).

Figure 115: Removing a MIC



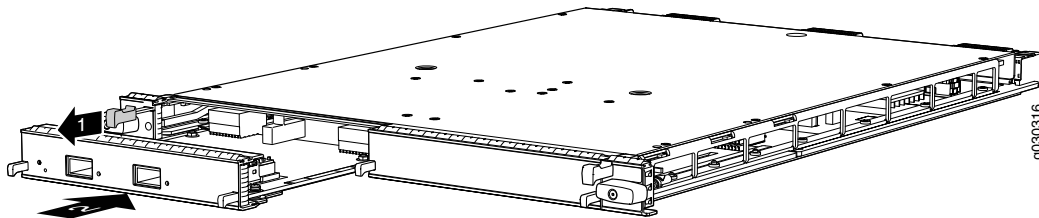
8. Grasp the handles on the MIC faceplate, and slide the MIC out of the MPC card carrier. Place it in the electrostatic bag or on the antistatic mat.
9. If you are not reinstalling a MIC into the emptied MIC slot within a short time, install a blank MIC panel over the slot to maintain proper airflow in the MPC card cage.

Installing an SRX5400 Services Gateway MIC

To install a MIC:

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. If you have not already done so, power off the services gateway.
3. If the MIC uses fiber-optic cable, verify that a rubber safety cap is over each transceiver on the faceplate. Install a cap if necessary.
4. On the MPC, pull the ejector knob that is adjacent to the MIC you are installing away from the MPC faceplate. The ejector knob is located between the MIC and the rotational knob that retains the MPC in the services gateway card cage. See [Figure 116 on page 282](#).

Figure 116: Installing a MIC



5. Align the rear of the MIC with the guides located at the corners of the MIC slot.
6. Slide the MIC into the MPC until it is firmly seated in the MPC. The ejector knob will automatically move in towards the faceplate to lock the MIC in position as it seats.

If the MIC does not seat properly in the slot, pull the ejector knob all the way out and try again to seat the MIC. The MIC will not seat properly unless the ejector knob is all the way when you start to insert the MIC.



CAUTION: Slide the MIC straight into the slot to avoid damaging the components on the MIC.

7. After the MIC is seated in its slot, verify that the ejector knob is engaged by pushing it all the way in toward the MPC faceplate.

8. If the MIC uses fiber-optic cable, remove the rubber safety cap from each transceiver and the end of each cable.



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.



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

9. Insert the appropriate cables into the cable connectors on the MIC.
10. Arrange each cable to prevent the cable from dislodging or developing stress points. Secure the cable so that it is not supporting its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop.



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



CAUTION: Avoid bending a 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.

11. Power on the services gateway. The OK LED on the power supply faceplate should blink, then light steadily.
12. Verify that the MPC and MICs are functioning correctly by issuing the **show chassis fpc** and **show chassis fpc pic-status** commands.

Installing an MPC and MICs in an Operating SRX5400 Services Gateway Chassis Cluster

If your services gateway is part of a chassis cluster, you can install an additional MPC in the services gateways in the cluster without incurring downtime on your network.

Such an installation meet the following conditions:

- Each of the services gateways in the cluster has an unoccupied slot for the MPC.
- If the chassis cluster is operating in active-active mode, you must transition it to active-passive mode before using this procedure. You transition the cluster to active-passive mode by making one node primary for all redundancy groups.
- Both of the services gateways in the cluster must be running Junos OS Release 12.1X45-D10 or later.

If your installation does not meet these criteria, use the procedure in [“Installing an SRX5400 Services Gateway MPC” on page 277](#) to install MPCs in your services gateway.

NOTE: During this installation procedure, you must shut down both devices, one at a time. During the period when one device is shut down, the remaining device operates without a backup. If that remaining device fails for any reason, you incur network downtime until you restart at least one of the devices.

To install MPCs in an operating SRX5400 Services Gateway cluster without incurring downtime:

1. Use the console port on the Routing Engine to establish a CLI session with one of the devices in the cluster.
2. Issue the **show chassis cluster status** command to determine which services gateway is currently primary, and which services gateway is secondary, within the cluster.

In the example below, all redundancy groups are primary on node 0, and secondary on node 1:

```
admin@cluster> show chassis cluster status
Cluster ID: 1
Node                Priority      Status      Preempt  Manual failover

Redundancy group: 0 , Failover count: 5
node0                1            primary    no       no
node1                100         secondary  no       no
```

```

Redundancy group: 1 , Failover count: 1
  node0                200      primary      no      no
  node1                100      secondary    no      no

Redundancy group: 2 , Failover count: 1
  node0                200      primary      no      no
  node1                100      secondary    no      no

Redundancy group: 3 , Failover count: 1
  node0                100      primary      no      no
  node1                200      secondary    no      no

Redundancy group: 4 , Failover count: 1
  node0                200      primary      no      no
  node1                100      secondary    no      no

```

3. If the device with which you established the CLI session in Step 2 is not the secondary node in the cluster, use the console port on the device that is the secondary node to establish a CLI session.
4. In the CLI session for the secondary services gateway, issue the **request system power off** command to shut down the services gateway.
5. Wait for the secondary services gateway to completely shut down.
6. Install the new MPCs in the powered-off services gateway using the procedure in [“Installing an SRX5400 Services Gateway MPC” on page 277](#).
7. Install MICs in the MPCs in the powered-off services gateway using the procedure in [“Installing an SRX5400 Services Gateway MIC” on page 282](#).
8. Power on the secondary services gateway and wait for it to finish starting.
9. Reestablish the CLI session with the secondary node device.
10. Issue the **show chassis fpc pic-status** command to make sure that all of the cards in the secondary node chassis are back online. For example:

```
user@host> show chassis fpc pic-status
```

```

Slot 0   Online      SRX5k SPC II
  PIC 0   Online      SPU Cp

```

```

PIC 1 Online      SPU Flow
PIC 2 Online      SPU Flow
PIC 3 Online      SPU Flow
Slot 1 Online     SRX5k SPC II
PIC 0 Online      SPU Flow
PIC 1 Online      SPU Flow
PIC 2 Online      SPU Flow
PIC 3 Online      SPU Flow
Slot 2 Online     SRX5k IOC II
PIC 0 Online      2x 40GE QSFP+
PIC 2 Online      10x 10GE SFP+

```

11. Issue the **show chassis cluster status** command to make sure that the priority for all redundancy groups is greater than zero.
12. Use the console port on the device that is the primary node to establish a CLI session.
13. In the CLI session for the primary node device, issue the **request chassis cluster failover** command to fail over each redundancy group that has an ID number greater than zero.

For example:

```
admin@cluster> request chassis cluster failover redundancy-group 1 node 1
```

14. In the CLI session for the primary node device, issue the **request system power off** command to shut down the services gateway. This action causes redundancy group 0 to fail over onto the other services gateway, making it the active node in the cluster.
15. Repeat Step 6 to install MPCs in the powered-off services gateway.
16. Repeat Step 7 to install MICs in the MPCs in the powered-off services gateway.
17. Power on the services gateway and wait for it to finish starting.
18. Issue the **show chassis fpc pic-status** command on each node to confirm that all cards are online and both services gateways are operating correctly. For example:

```
user@host> show chassis fpc pic-status
```

```

Slot 0   Online      SRX5k SPC II
  PIC 0 Online      SPU Cp
  PIC 1 Online      SPU Flow
  PIC 2 Online      SPU Flow
  PIC 3 Online      SPU Flow
Slot 1   Online      SRX5k SPC II
  PIC 0 Online      SPU Flow
  PIC 1 Online      SPU Flow
  PIC 2 Online      SPU Flow
  PIC 3 Online      SPU Flow
Slot 2   Online      SRX5k IOC II
  PIC 0 Online      2x 40GE QSFP+
  PIC 2 Online      10x 10GE SFP+

```

19. Issue the **show chassis cluster status** command to make sure that the priority for all redundancy groups is greater than zero.

Maintaining SPCs on the SRX5400 Services Gateway

Purpose

For optimum services gateway performance, verify the condition of the Services Processing Cards (SPCs). The services gateway can have up to three FPCs (two SPCs) mounted horizontally in the card cage at the front of the chassis. To maintain SPCs, perform the following procedures regularly.

Action

On a regular basis:

- Check the LEDs on the craft interface corresponding to each SPC slot. The green LED labeled **OK** lights steadily when an SPC is functioning normally.
- Check the **OK/FAIL** LED on the faceplate of each SPC. If the SPC detects a failure, it sends an alarm message to the Routing Engine.
- Issue the CLI **show chassis fpc** command to check the status of installed SPCs. As shown in the sample output, the value *Online* in the column labeled *State* indicates that the SPC is functioning normally:

```
user@host> show chassis fpc
```

Slot	State	(C)	Total	Interrupt	DRAM (MB)	Heap	Buffer
0	Online	35	4	0	1024	13	25
1	Online	47	3	0	1024	13	25

```
2 Online          37      8          0      2048      18      14
```

For more detailed output, add the **detail** option. The following example does not specify a slot number, which is optional:

```
user@host> show chassis fpc detail
```

```
Slot 0 information:
  State                Online
  Temperature          35
  Total CPU DRAM       1024 MB
  Total RLDRAM         259 MB
  Total DDR DRAM       4864 MB
  Start time:          2013-12-10 02:58:16 PST
  Uptime:              1 day, 11 hours, 59 minutes, 15 seconds
  Max Power Consumption 585 Watts

Slot 1 information:
  State                Online
  Temperature          47
  Total CPU DRAM       1024 MB
  Total RLDRAM         259 MB
  Total DDR DRAM       4864 MB
  Start time:          2013-12-10 02:55:30 PST
  Uptime:              1 day, 12 hours, 2 minutes, 1 second
  Max Power Consumption 585 Watts

Slot 2 information:
  State                Online
  Temperature          37
  Total CPU DRAM       2048 MB
  Total RLDRAM         1036 MB
  Total DDR DRAM       6656 MB
  Start time:          2013-12-10 02:58:07 PST
  Uptime:              1 day, 11 hours, 59 minutes, 24 seconds
  Max Power Consumption 570 Watts
```

- Issue the CLI **show chassis fpc pic-status** command. The slots are numbered **0** through **2**, bottom to top:

```
user@host> show chassis fpc pic-status
```

```
Slot 0  Online      SRX5k SPC II
  PIC 0  Online      SPU Cp
  PIC 1  Online      SPU Flow
  PIC 2  Online      SPU Flow
```



```

PIC 3 Online SPU Flow
Slot 1 Online SRX5k SPC II
PIC 0 Online SPU Flow
PIC 1 Online SPU Flow
PIC 2 Online SPU Flow
PIC 3 Online SPU Flow
Slot 2 Online SRX5k IOC II
PIC 0 Online 2x 40GE QSFP+
PIC 2 Online 10x 10GE SFP+

```

For further description of the output from the command, see *Junos OS System Basics and Services Command Reference* at www.juniper.net/documentation/.

Replacing SRX5400 Services Gateway SPCs

To replace an SPC, perform the following procedures:

1. [Removing an SRX5400 Services Gateway SPC | 289](#)
2. [Installing an SRX5400 Services Gateway SPC | 291](#)

Removing an SRX5400 Services Gateway SPC

An SPC weighs up to 18.3 lb (8.3 kg). Be prepared to accept its full weight.

To remove an SPC (see [Figure 117 on page 291](#)):

1. Have ready a replacement SPC or blank panel and an antistatic mat for the SPC. Also have ready rubber safety caps for each SPC you are removing that uses an optical interface.
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. Power off the services gateway using the command **request system power-off**.

```
user@host# request system power-off
```

NOTE: Wait until a message appears on the console confirming that the services stopped.

4. Physically turn off the power and remove the power cables from the chassis.
5. Label the cables connected to each port on the SPC so that you can later reconnect the cables to the correct ports.
6. Disconnect the cables from the SPC. If the SPC uses fiber-optic cable, immediately cover each transceiver and the end of each cable with a rubber safety cap. Arrange the disconnected cables in the cable management system to prevent the cables from developing stress points.



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.



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



CAUTION: Avoid bending a 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.



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

7. Simultaneously turn both of the ejector handles counterclockwise to unseat the SPC.
8. Grasp the handles and slide the SPC straight out of the card cage halfway.
9. Place one hand around the front of the SPC and the other hand under it to support it. Slide the SPC completely out of the chassis, and place it on the antistatic mat or in the electrostatic bag.



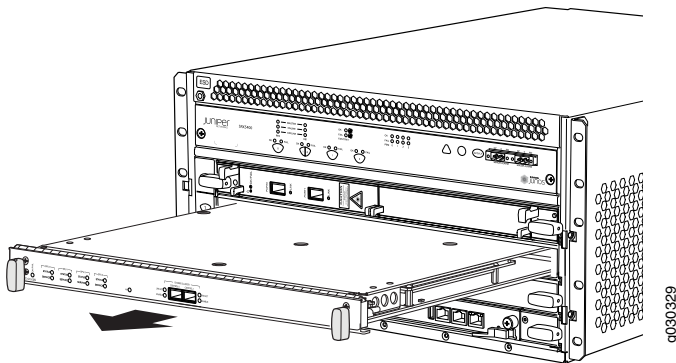
CAUTION: The weight of the SPC is concentrated in the back end. Be prepared to accept the full weight—up to 18.3 lb (8.3 kg)—as you slide the SPC out of the chassis.

When the SPC is out of the chassis, do not hold it by the ejector handles, bus bars, or edge connectors. They cannot support its weight.

Do not stack SPCs on top of one another after removal. Place each one individually in an electrostatic bag or on its own antistatic mat on a flat, stable surface.

10. If you are not reinstalling an SPC into the empty slot within a short time, install a blank panel over the slot to maintain proper airflow in the card cage.

Figure 117: Removing an SPC



Installing an SRX5400 Services Gateway SPC

To install an SPC (see [Figure 118 on page 293](#)):

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. Power off the services gateway using the command **request system power-off**.

```
user@host# request system power-off
```

NOTE: Wait until a message appears on the console confirming that the services stopped.

3. Physically turn off the power and remove the power cables from the chassis.
4. Place the SPC on an antistatic mat or remove it from its electrostatic bag.
5. Identify the slot on the services gateway where the SPC will be installed.
6. Verify that each fiber-optic transceiver is covered with a rubber safety cap. If it does not, cover the transceiver with a safety cap.
7. Orient the SPC so that the faceplate faces you, the text on the card is right-side up, and the EMI strip is on the right-hand side.
8. Lift the SPC into place and carefully align the right and left edges of the card with the guides inside the card cage.
9. Slide the SPC all the way into the card cage until you feel resistance.
10. Grasp both ejector handles and rotate them clockwise simultaneously until the SPC is fully seated.
11. If the SPC uses fiber-optic cable, remove the rubber safety cap from each transceiver and cable.



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.

12. Insert the appropriate cables into the cable connector ports on each SPC (see [Figure 119 on page 293](#)). Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop, using the cable management system. Placing fasteners on a loop helps to maintain its shape.



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



CAUTION: Avoid bending a 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.

13. Connect the power cables to the chassis.

14. Power on the services gateway. The **OK** LED on the power supply faceplate should blink, then light steadily.

15. Verify that the SPC is functioning correctly by issuing the **show chassis fpc** and **show chassis fpc pic-status** commands.

Figure 118: Installing an SPC

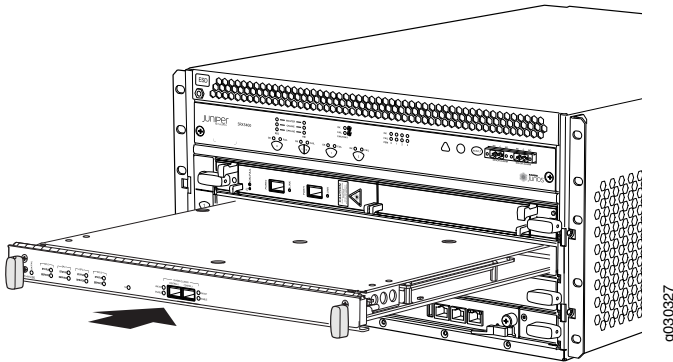
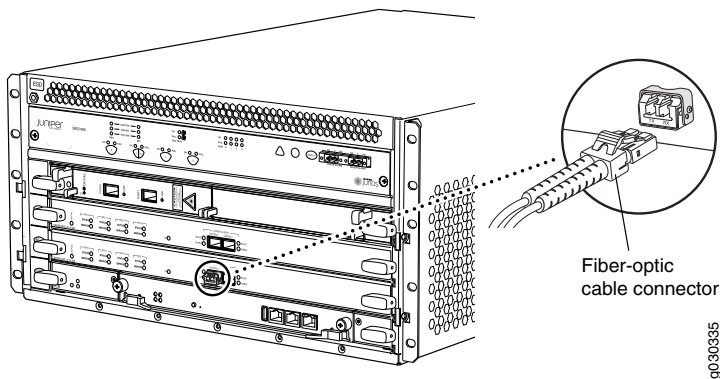


Figure 119: Attaching a Cable to an SPC



Replacing SPCs in an Operating SRX5400, SRX5600, or SRX5800 Services Gateways Chassis Cluster

If your Services Gateway is part of an operating chassis cluster, you can replace the first-generation SRX5K-SPC-2-10-40 SPCs with the second generation SRX5K-SPC-4-15-320 SPCs by incurring a minimum downtime on your network. But when you are replacing the SRX5K-SPC-2-10-40 or SRX5K-SPC-4-15-320 SPCs with the SRX5K-SPC3 SPCs, there will be no downtime in your network.

NOTE: SRX5K-SPC-2-10-40 SPC is not supported on SRX5400 Services Gateway.

To replace SPCs in a services gateway that is part of a chassis cluster, it must meet the following conditions:

- Each services gateway must have at least one SPC installed. The installation may warrant additional SPCs if the number of sessions encountered is greater than the session limit of one SPC.
- If the chassis cluster is operating in active-active mode, you must transition it to active-passive mode before using this procedure. You transition the cluster to active-passive mode by making one node primary for all redundancy groups.
- To replace first-generation SRX5K-SPC-2-10-40 SPCs, both of the services gateways in the cluster must be running Junos OS Release 11.4R2S1, 12.1R2, or later.
- To replace second-generation SRX5K-SPC-4-15-320 SPCs, both of the services gateways in the cluster must be running Junos OS Release 12.1X44-D10, or later.
- To replace next-generation SRX5K-SPC3 SPCs, both of the services gateways in the cluster must be running Junos OS Release 18.2R1-S1, or later.
- You must install SPCs of the same type and in the same slots in both of the services gateways in the cluster. Both services gateways in the cluster must have the same physical configuration of SPCs.
- If you are replacing an existing first-generation SRX5K-SPC-2-10-40 SPC with a second-generation SRX5K-SPC-4-15-320 SPC, you must install the new SPC so that the second-generation SRX5K-SPC-4-15-320 SPC is the SPC with the lowest-numbered slot. For example, if the chassis has SPCs installed in slots 2 and 3, then you must replace the SPC in slot 2 first. This ensures that the central point (CP) functionality is performed by an SRX5K-SPC-4-15-320 SPC.
- If you are adding next-generation SRX5K-SPC3 SPCs to the chassis, you must install the new SPCs so that a next-generation SRX5K-SPC3 is the SPC in the original lowest-numbered slot. For example, if the chassis already has two second-generation SPCs installed in slots 2 and 3, you must install SRX5K-SPC3 SPCs in slots 0 or 1. You will need to make sure that an SRX5K-SPC3 SPC is installed in the slot providing central point (CP) functionality so that the CP functionality is performed by an SRX5K-SPC3 SPC.

NOTE: Your services gateway cannot have a mix of SRX5K-SPC-2-10-40 SPCs and SRX5K-SPC3 SPCs, but starting with Junos OS release 18.2R2 and then 18.4R1 but not 18.3R1 you can have a mix of SRX5K-SPC-4-15-320 SPCs and SRX5K-SPC3 SPCs.

- If you are adding the second-generation SRX5K-SPC-4-15-320 SPCs or the next-generation SRX5K-SPC3 SPCs to a services gateway, the services gateway must already be equipped with high-capacity power supplies and fan trays, and the high-capacity air filters. See *Upgrading an SRX5600 Services Gateway from Standard-Capacity to High-Capacity Power Supplies* or *Upgrading an SRX5600 Services Gateway from Standard-Capacity to High-Capacity Power Supplies* for more information.

If your installation does not meet these criteria, use the procedure in [“Installing an SRX5400 Services Gateway SPC” on page 291](#), or *Installing an SRX5600 Services Gateway SPC*, or *Installing an SRX5800 Services Gateway SPC* to install SPCs in your services gateway.

NOTE: During this installation procedure, you must shut down both devices, one at a time. During the period when one device is shut down, the remaining device operates without a backup. If that remaining device fails for any reason, you incur network downtime until you restart at least one of the devices.

To replace SPCs in an Services Gateway cluster without incurring downtime:

1. Use the console port on the Routing Engine to establish a CLI session with one of the devices in the cluster.
2. Use the **show chassis cluster status** command to determine which services gateway is currently primary, and which services gateway is secondary, within the cluster.
3. If the device with which you established the CLI session in Step 2 is not the secondary node in the cluster, use the console port on the device that is the secondary node to establish a CLI session.
4. Use the **show chassis fpc pic-status** command to check the status of all the cards on both the nodes.
5. In the CLI session for the secondary services gateway, use the **request system power off** command to shut down the services gateway.
6. Wait for the secondary services gateway to shut down completely and then remove the power cables from the chassis.

7. Remove the SPC from the powered-off services gateway using the procedure in [“Removing an SRX5400 Services Gateway SPC” on page 289](#), or *Removing an SRX5600 Services Gateway SPC*, or *Removing an SRX5800 Services Gateway SPC*.
8. Install the new SPC or SPCs in the powered-off services gateway using the procedure in [“Installing an SRX5400 Services Gateway SPC” on page 291](#), or *Installing an SRX5600 Services Gateway SPC*, or *Installing an SRX5800 Services Gateway SPC*.
9. Insert the power cables to the chassis and power on the secondary services gateway and wait for it to finish starting.
10. Reestablish the CLI session with the secondary node device.
11. Use the **show chassis fpc pic-status** command to make sure that all of the cards in the secondary node chassis are back online.
12. Use the **show chassis cluster status** command to make sure that the priority for all redundancy groups is greater than zero.
13. Use the console port on the device that is the primary node to establish a CLI session.
14. In the CLI session for the primary node device, use the **request chassis cluster failover** command to fail over each redundancy group that has an ID number greater than zero.
15. In the CLI session for the primary node device, use the **request system power off** command to shut down the services gateway. This action causes redundancy group 0 to fail over onto the other services gateway, making it the active node in the cluster.
16. Repeat Step 7 and Step 8 to replace or install SPCs in the powered-off services gateway.
17. Power on the services gateway and wait for it to finish starting.
18. Use the **show chassis fpc pic-status** command on each node to confirm that all cards are online and both services gateways are operating correctly.
19. Use the **show chassis cluster status** command to make sure that the priority for all redundancy groups is greater than zero.

In-Service Hardware Upgrade for SRX5K-SPC3 in a Chassis Cluster

If your device is part of a chassis cluster, you can install SRX5K-SPC3 (SPC3), using the In-Service Hardware Upgrade (ISHU) procedure and avoid network downtime.

NOTE: This ISHU procedure will not replace any existing Services Processing Cards (SPC), it will guide you to install an additional SPC3 card in a chassis cluster.

NOTE: We strongly recommend that you perform the ISHU during a maintenance window, or during the lowest possible traffic as the secondary node is not available at this time.

To install SPC3s in a services gateway that is part of a chassis cluster using the ISHU procedure, the following conditions have to be met:

- Each services gateway must have at least one SPC3 installed. ISHU is not supported if you want to add SPC3s into a node that only contains SRX5K-SPC-4-15-320s (SPC2).
- Starting in Junos OS Release 19.4R1, ISHU for SRX5K-SPC3 is supported on all SRX5000 line of devices chassis cluster:
 - If the chassis has only one SPC2 or one SPC3, you can install only one additional SPC2 or SPC3 by using the ISHU procedure.
 - If the chassis already has three or more SPC2 or SPC3 cards, you can install additional SPC2 or SPC3 cards by using the ISHU procedure.
 - If the chassis has two SPC2 or SPC3 cards, you cannot install any more SPC2 or SPC3 cards by using the ISHU procedure.
- Installing SPC3s to the chassis cluster must not change the central point (CP) functionality mode from Combo CP mode to Full CP mode.

When there are two or less than two SPC3s in the chassis, the CP mode is Combo CP mode. More than two SPC3s in the chassis, the CP mode is Full CP mode.

- If the chassis cluster is operating in active-active mode, you must transition it to active-passive mode before using this procedure. You transition the cluster to active-passive mode by making one node primary for all redundancy groups.
- When you are adding a new SPC3 to a chassis, it must be installed in the higher-numbered slot than any other installed SPCs in the chassis.
- The services gateway must already be equipped with high-capacity power supplies and fan trays, and the high-capacity air filters. See *Upgrading an SRX5600 Services Gateway from Standard-Capacity to High-Capacity Power Supplies* or *Upgrading an SRX5600 Services Gateway from Standard-Capacity to High-Capacity Power Supplies* for more information.

During this installation procedure, you must shut down both devices, one at a time. During the period when one device is shut down, the other device operates without a backup. If that other device fails for any reason, you incur network downtime until you restart at least one of the devices.

To add SPC3s in an Services Gateway cluster without incurring downtime:

1. Use the console port on the Routing Engine to establish a CLI session with one of the devices in the cluster.
2. Use the **show chassis cluster status** command to determine which services gateway is currently primary, and which services gateway is secondary, within the cluster.
3. If the device with which you established the CLI session in Step 2 is not the secondary node in the cluster, use the console port on the device that is the secondary node to establish a CLI session.
4. Use the **show chassis fpc pic-status** command to check the status of all the cards on both the nodes.
5. In the CLI session for the secondary services gateway, use the **request system power off** command to shut down the services gateway.
6. Wait for the secondary services gateway to shut down completely and then remove the power cables from the chassis.
7. Install the new SPC3 or SPC3s in the powered-off services gateway using the procedure in [“Installing an SRX5400 Services Gateway SPC” on page 291](#), or *Installing an SRX5600 Services Gateway SPC*, or *Installing an SRX5800 Services Gateway SPC*.
8. Insert the power cables to the chassis and power on the secondary services gateway and wait for it to finish starting.
9. Reestablish the CLI session with the secondary node device.
10. Use the **show chassis fpc pic-status** command to make sure that all of the cards in the secondary node chassis are back online.
11. Use the **show chassis cluster status** command to make sure that the priority for all redundancy groups is greater than zero.
12. Use the console port on the device that is the primary node to establish a CLI session.
13. In the CLI session for the primary node device, use the **request chassis cluster failover** command to fail over each redundancy group that has an ID number greater than zero.

14. In the CLI session for the primary node device, use the **request system power off** command to shut down the services gateway. This action causes redundancy group 0 to fail over onto the other services gateway, making it the active node in the cluster.
15. Repeat Step 7 to install SPC3s in the powered-off services gateway.
16. Power on the services gateway and wait for it to finish starting.
17. Use the **show chassis fpc pic-status** command on each node to confirm that all cards are online and both services gateways are operating correctly.
18. Use the **show chassis cluster status** command to make sure that the priority for all redundancy groups is greater than zero.

Maintaining the SRX5400 Cables and Connectors

IN THIS SECTION

- [Maintaining SRX5400 Services Gateway Network Cables | 300](#)
- [Replacing the Management Ethernet Cable on the SRX5400 Services Gateway | 302](#)
- [Replacing the SRX5400 Services Gateway Console or Auxiliary Cable | 303](#)
- [Replacing an SRX5400 Services Gateway Network Cable | 304](#)
- [Replacing SRX5400 Services Gateway Transceivers | 306](#)

Maintaining SRX5400 Services Gateway Network Cables

Purpose

For optimum services gateway performance, verify the condition of the network cables.

Action

On a regular basis:

- Secure excess cable in tidy loops that do not obstruct access to the services gateway. Do not allow fastened loops of cable to dangle from the connector, because this stresses the cable at the fastening point. Putting fasteners on the loops helps to maintain their shape.

- Keep the cable connections clean and free of dust and other particles, which can cause drops in the received power level. Always inspect cables and clean them if necessary before connecting an interface.
- Label both ends of the cables to identify them.

The following guidelines apply specifically to fiber-optic cables:

- When you unplug a fiber-optic cable, always place a rubber safety plug over the transceiver on the MIC faceplate and on the end of the cable.
- Anchor fiber-optic cables to avoid stress on the connectors. Be sure to secure fiber-optic cables so that they do not support their own weight as they hang to the floor. Never let fiber-optic cable hang free from the connector.
- Avoid bending fiber-optic cable beyond its bend radius. An arc smaller than a few inches can damage the cable and cause problems that are difficult to diagnose.
- Frequent plugging and unplugging of fiber-optic cable into and out of optical instruments can cause damage to the instruments that is expensive to repair. Instead, attach a short fiber extension to the optical equipment. Any wear and tear due to frequent plugging and unplugging is then absorbed by the short fiber extension, which is easy and inexpensive to replace.
- Keep fiber-optic cable connections clean. Small microdeposits of oil and dust in the canal of the transceiver or cable connector could cause loss of light, reducing signal power and possibly causing intermittent problems with the optical connection.

To clean the transceivers, use an appropriate fiber-cleaning device, such as RIFOCS Fiber Optic Adaptor Cleaning Wands (part number 946). Follow the directions for the cleaning kit you use.

After you clean an optical transceiver, make sure that the connector tip of the fiber-optic cable is clean. Use only an approved alcohol-free fiber-optic cable cleaning kit, such as the Optex Cletop-S Fiber Cleaner. Follow the directions for the cleaning kit you use.

Replacing the Management Ethernet Cable on the SRX5400 Services Gateway

One Ethernet cable with RJ-45 connectors is provided with the services gateway.

Before you begin to replace the management ethernet cable:

- Ensure you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 401.

Ensure that you have the following available:

- ESD grounding strap

To replace the cable connected to the **ETHERNET** port:

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. Press the tab on the connector and pull the connector straight out of the port. [Figure 120 on page 302](#) shows the connector.
3. Disconnect the cable from the network device.
4. Plug one end of the replacement cable into the **ETHERNET** port. [Figure 121 on page 302](#) shows the port.
5. Plug the other end of the cable into the network device.

Figure 120: Cable Connector

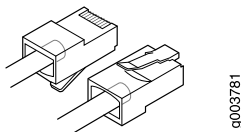
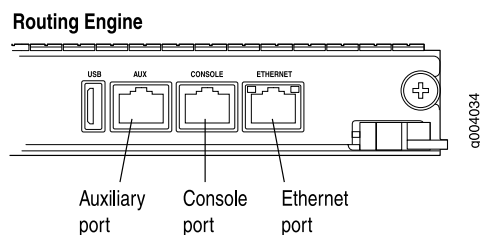


Figure 121: Ethernet Port



Replacing the SRX5400 Services Gateway Console or Auxiliary Cable

To use a system console to configure and manage the Routing Engine, connect it to the **CONSOLE** port on the Routing Engine. To use a laptop, modem, or other auxiliary device, connect it to the **AUX** port on the Routing Engine. Both ports accept a cable with an RJ-45 connector. One RJ-45/DB-9 cable is provided with the services gateway. If you want to connect a device to both ports, you must supply another cable.

Before you begin to replace the console or auxiliary Cable:

- Ensure you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 401.

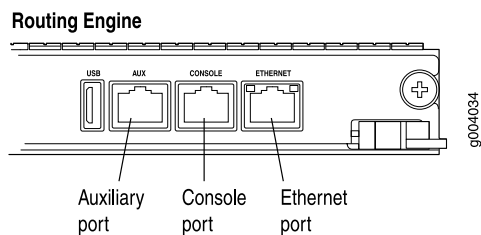
Ensure that you have the following available:

- ESD grounding strap

To replace a cable connected to a management console or auxiliary device:

1. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end of the strap to an ESD point.
2. Press the tab on the connector and pull the connector straight out of the port.
3. Disconnect the cable from the console or auxiliary device.
4. Plug the RJ-45 end of the replacement serial cable into the **CONSOLE** or **AUX** port. [Figure 122](#) on page 303 shows the external device ports on the Routing Engine.
5. Plug the DB-9 socket end into the console or auxiliary device's serial port.

Figure 122: Auxiliary and Console Ports



Replacing an SRX5400 Services Gateway Network Cable

IN THIS SECTION

- [Removing an SRX5400 Services Gateway Network Cable | 304](#)
- [Installing an SRX5400 Services Gateway Network Cable | 305](#)

Removing an SRX5400 Services Gateway Network Cable

Removing and installing network cables does not affect services gateway function, except that the component does not receive or transmit data while its cable is disconnected.

To remove a fiber-optic cable from a MIC:

1. If the component connects to fiber-optic cable, have ready a rubber safety cap for each cable and transceiver.
2. If removing all cables connected to a MIC, use one of the following methods to take the MIC offline:
 - Press the online/offline button on the port module. Use a narrow-ended tool that fits inside the opening that leads to the button. Press and hold the button until the port module LED goes out (about 5 seconds).
 - Issue the following CLI command:

```
user@host> request chassis pic fpc-slot fpc-slot pic-slot pic-slot port-module-slot offline
```

For more information about the command, see *Junos OS System Basics and Services Command Reference* at www.juniper.net/documentation/.

3. Unplug the cable from the cable connector port. If the MIC uses fiber-optic cable, immediately cover each transceiver and the end of each cable with a rubber safety cap.



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.



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

Installing an SRX5400 Services Gateway Network Cable

To install a cable in a MIC:

1. Have ready a length of the type of cable used by the MIC.
2. If the cable connector port is covered by a rubber safety plug, remove the plug.



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.



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

3. Insert the cable connector into the cable connector port on the faceplate.

NOTE: The cages and optics on the components are industry standard parts that have limited tactile feedback for insertion of optics and fiber. You need to insert the optics and fiber firmly until the latch is securely in place.

4. Arrange the cable in the cable manager to prevent it from dislodging or developing stress points. Secure the cable so that it is not supporting its own weight as it hangs to the floor. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on the loop helps to maintain its shape.



CAUTION: Avoid bending a 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.



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

Replacing SRX5400 Services Gateway Transceivers

IN THIS SECTION

- [Removing an SRX5400 Services Gateway Transceiver | 306](#)
- [Installing an SRX5400 Services Gateway Transceiver | 308](#)

Removing an SRX5400 Services Gateway Transceiver

Transceivers are installed in a MIC or SPC. Transceivers are hot-insertable and hot-removable. Removing a transceiver does not interrupt the functioning of the card, but the removed transceiver no longer receives or transmits data.

Before you begin to remove a SFP or XFP transceiver:

- Ensure you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 401](#).

Ensure that you have the following available:

- ESD grounding strap
- Replacement transceiver or transceiver slot plug
- Antistatic mat
- Rubber safety cap for the transceiver
- Needle-nose pliers

To remove a transceiver (see [Figure 123 on page 308](#)):

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. Label the cables connected to the transceiver so that you can reconnect them correctly later.



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.



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

3. Remove the cable connector from the transceiver. Cover the transceiver and the end of each fiber-optic cable connector with a rubber safety cap immediately after disconnecting the fiber-optic cables.
4. Carefully arrange the disconnected cable in the cable manager to prevent the cable from developing stress points.



CAUTION: Avoid bending a 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.

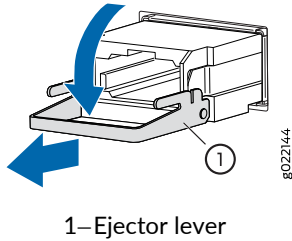
5. Using needle-nose pliers, open the ejector lever on the transceiver completely to unlock the transceiver. See [Figure 123 on page 308](#).



CAUTION: Make sure that you open the ejector lever completely until you hear it click. This prevents damage to the transceiver.

6. Grasp the transceiver ejector lever and pull the transceiver approximately 0.5 in. (1.3 cm) out of the port.
7. Using your fingers, grasp the body of the transceiver and pull it straight out of the port.

Figure 123: Removing a Transceiver



8. Place a rubber safety cap over the transceiver.
9. Place the removed transceiver on an antistatic mat or in an electrostatic bag.
10. If you are not replacing the transceiver, insert transceiver slot plug into the card.



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

Installing an SRX5400 Services Gateway Transceiver

Transceivers that are installed in an MIC or SPC. Transceivers are hot-insertable and hot-removable. Removing a transceiver does not interrupt the functioning of the card, but the removed transceiver no longer receives or transmits data.



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

To install a transceiver:

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Take each transceiver to be installed out of its electrostatic bag and identify the slot on the component where it will be installed.

3. Verify that each transceiver is covered by a rubber safety cap. If it is not, cover the transceiver with a safety cap.
4. Carefully align the transceiver with the slots in the component. The connectors should face the component.
5. Slide the transceiver until the connector is seated in the component slot. If you are unable to fully insert the transceiver, make sure the connector is facing the right way.
6. Close the ejector handle of the transceiver.
7. Remove the rubber safety cap from the transceiver and the end of the cable. Insert the cable into the transceiver.
8. Verify that the status LEDs on the component faceplate indicate that the transceiver is functioning correctly.

Replacing a Routing Engine in an SRX Series High-End Chassis Cluster

IN THIS SECTION

- [Replacing a Routing Engine: USB Flash-Drive Method | 309](#)
- [Replacing a Routing Engine: External SCP Server Method | 316](#)
- [Replacing the Routing Engine: File Transfer Method | 323](#)

You can replace a Routing Engine on a node in a chassis cluster by using one of the following methods:

Replacing a Routing Engine: USB Flash-Drive Method

The following are the prerequisites and assumptions for this procedure:

- Console and SSH access are available.

- Firmware package is available on the USB flash drive and the firmware version matches the version of Junos OS currently installed on the device. Use the **show version** command to identify the Junos OS version. You can download the firmware from <https://support.juniper.net/support/downloads/>
- The chassis cluster has only two redundancy groups (RG0 and RG1) configured.

This procedure includes the steps for replacing the Routing Engine on node 0 of a chassis cluster setup. You can follow the same steps to replace the Routing Engine on node 1.

To replace a Routing Engine on node 0 of a chassis cluster using a USB flash drive:

1. Prepare to shut down node 0:

- a. Perform a manual failover of the redundancy groups (RGs) from node 0 to node 1.

Fail over RG1:

```
root@node0> request chassis cluster failover redundancy-group 1 node 1
```

Fail over RG0:

```
root@node0> request chassis cluster failover redundancy-group 0 node 1
```

- b. Verify that both RGs are active on node 1 after the failover:

```
root@node0> show chassis cluster status
```

```
{secondary:node0}
root@node0> show chassis cluster status
Monitor Failure codes:
  CS Cold Sync monitoring      FL Fabric Connection monitoring
  GR GRES monitoring          HW Hardware monitoring
  IF Interface monitoring     IP IP monitoring
  LB Loopback monitoring      MB Mbuf monitoring
  NH Nexthop monitoring       NP NPC monitoring
  SP SPU monitoring           SM Schedule monitoring
  CF Config Sync monitoring   RE Relinquish monitoring

Cluster ID: 1
Node  Priority Status          Preempt Manual  Monitor-failures

Redundancy group: 0 , Failover count: 1
node0 129 secondary no no None
node1 255 primary no no None

Redundancy group: 1 , Failover count: 1
node0 129 secondary no no None
node1 255 primary no no None
```

- c. Check whether any licenses are installed:

```
root@node0> show system licenses
```

```
{secondary:node0}
root@node0> show system licenses
License usage:

```

Feature name	Licenses used	Licenses installed	Licenses needed	Expiry
subscriber-acct	0	1	0	permanent
subscriber-auth	0	1	0	permanent
subscriber-addr	0	1	0	permanent
subscriber-vlan	0	1	0	permanent
subscriber-ip	0	1	0	permanent
scale-subscriber	0	1000	0	permanent
scale-l2tp	0	1000	0	permanent
scale-mobile-ip	0	1000	0	permanent

```

Licenses installed:
License identifier: xxxxxxxxxxxx
License version: 2
Features:
subscriber-acct - Per Subscriber Radius Accounting
permanent
subscriber-auth - Per Subscriber Radius Authentication
permanent
subscriber-addr - Address Pool Assignment
permanent
subscriber-vlan - Dynamic Auto-sensed Vlan
permanent
subscriber-ip - Dynamic and Static IP
permanent

```

- d. If licenses are installed, copy the output of the **show system license keys** command into a file:

```
root@node0> show system license keys
```

2. Back up the Routing Engine configuration and scripts (if any) on node 0 to a USB flash drive:

- a. Access the UNIX-level shell on node 0:

```
root@node0>start shell user root
```

```
{secondary:node0}
root@node0> start shell user root
```

```
Password:
root@node0%
```

- b. Before you mount the USB flash drive, list all the directories with names starting with **da** in the **dev** folder:

```
root@node0% ls /dev/da*
```

```
root@node0% ls /dev/da*
/dev/da0 /dev/da0s1c /dev/da0s2a /dev/da0s3 /dev/da0s3e
/dev/da0s1 /dev/da0s1f /dev/da0s2c /dev/da0s3c
/dev/da0s1a /dev/da0s2 /dev/da0s2f /dev/da0s3d
```

- c. Insert the USB flash drive in the USB port.

The following output is displayed:

```
root@node0% umassl: TOSHIBA TransMemory, rev 2.00/1.00, addr 3
da2 at umass-sim1 bus 1 target 0 lun 0
da2: <TOSHIBA TransMemory 5.00> Removable Direct Access SCSI-0 device
da2: 40.000MB/s transfers
da2: 983MB (2013184 512 byte sectors: 64H 32S/T 983C)
```

- d. List all the directories with names starting with **da** in the **dev** folder, and identify the USB drive.

```
root@node0% ls /dev/da*
```

```
root@node0% ls /dev/da*
/dev/da0 /dev/da0s1c /dev/da0s2a /dev/da0s3 /dev/da0s3e
/dev/da0s1 /dev/da0s1f /dev/da0s2c /dev/da0s3c /dev/da2
/dev/da0s1a /dev/da0s2 /dev/da0s2f /dev/da0s3d /dev/da2s1
```

In this example, the USB flash drive is **/dev/da2s1**.

- e. Create a directory to mount the USB flash drive:

```
root@node0% mkdir /var/tmp/usb
```

- f. Mount the USB flash drive to the **/var/tmp/usb** directory:

```
root@node0% mount -t msdosfs /dev/da2s1 /var/tmp/usb
```

- g. Save the configuration on node 0 to the **tmp** folder:


```
root@node0% cli show configuration | save /var/tmp/config[date]
```

- h. Copy the configuration file to the USB flash drive:

```
root@node0% cp /var/tmp/config[date] /var/tmp/usb/config[date]
```

- i. Check whether any scripts are referenced in the configuration:

```
root@node0> show configuration system scripts
```

```
{secondary:node0}
root@node0> show configuration system scripts
set system scripts commit file interface-monitoring-check.slax
set system scripts op file srx-monitor.xsl
```

```
root@node0> show configuration event-options
```

```
{secondary:node0}
root@node0> show configuration event-options
set event-options generate-event 60s time-interval 60
set event-options policy NAT-POOL-UTIL events 60s
set event-options policy NAT-POOL-UTIL then event-script
srx-nat-bucket-overload.slax arguments utilization-threshold 90
set event-options policy NAT-POOL-UTIL then event-script
srx-nat-bucket-overload.slax arguments pool GLOBAL
set event-options event-script traceoptions file escript.log size 1m files 2
set event-options event-script traceoptions flag output
set event-options event-script file srx-monitor-addbook-policy-count.slax
```

- j. If any scripts are referenced in the configuration, back up these scripts:

```
root@node0% cp -r /var/db/scripts/ /var/tmp/usb/scripts/
```

- k. Verify the files copied to the USB flash drive:

```
root@node0% ls /var/tmp/usb
```

- l. Unmount the USB flash drive:

```
root@node0% umount /var/tmp/usb
```

- m. Remove the USB flash drive.

- n. Exit the shell.

```
root@node0% exit
```

3. Install the replacement Routing Engine:

- a. Power off node 0:

```
root@node0> request system power-off
```

- b. Wait until a message appears on the console confirming that the services have stopped, and then physically turn off the power.
- c. Label and disconnect all the cables connected to node 0.
- d. Replace the Routing Engine.
- e. To prevent a split-brain scenario (where the control link is connected while both the nodes are in the primary state), reconnect only the console cable and the cable to the fxp0 interface. Leave the rest of the cables disconnected.
- f. Ensure that the status of the control link and fabric link on node 1 is down:

```
root@node1> show chassis cluster interfaces
```

```
{primary:node1}
root@node1> show chassis cluster interfaces
Control link status: Down
Control interfaces:
Index      Interface      Monitored-Status      Internal-SA      Security
0          em0            Down                   Disabled         Disabled
1          em1            Down                   Disabled         Disabled
```

```
Fabric link status: Down
Control interfaces:
Name       Child-Interface      Status
              (Physical/Monitored)
fab0      xe-11/0/3            Down / Down
fab0
```

- g. Power on node 0.

4. Load the configuration file, firmware, and scripts file on the new Routing Engine:

- a. Insert the USB flash drive into the USB port on node 0, and access the UNIX-level shell on node 0:

```
root@node0> start shell user root
```

- b. Copy the configuration file, firmware, and scripts file from the USB:

```
root@node0% cp /var/tmp/usb/config[date] /var/tmp/config[date]
root@node0% cp /var/tmp/usb/junos version /var/tmp/junos version
```

```
root@node0% cp -r /var/tmp/usb/scripts/ /var/db/scripts/
```

- c. Unmount the USB flash drive:

```
root@node0% umount /var/tmp/usb
```

- d. Remove the USB flash drive.
e. Exit the shell.

```
root@node0% exit
```

5. Configure the Routing Engine:

- a. Load the firmware:

```
root@node0>request software add /var/tmp/junos-release-domestic.tgz reboot
```

The device reboots and comes up with the intended Junos OS version.

- b. (Optional) Apply the licenses that you backed up in step 1:

```
root@node0> request system license add terminal
```

See [Adding New Licenses \(CLI Procedure\)](#)

- c. Load and commit the configuration:

```
root@node0> configure shared
root@node0# load override /var/tmp/filename
root@node0# commit
root@node0# exit
```

6. Check the status of all the FPCs and PICs, and ensure that all the FPCs and PICs are online.

```
root@node0>show chassis fpc pic-status
```

7. Halt node 0 from the console:

```
root@node0>request system halt
```

8. Wait until a message appears on the console confirming that the services have stopped, and then connect all the cables to node 0.

9. Boot up node 0 by pressing any key on the console.

10. Check the chassis cluster status on node 1:

```
root@node1> show chassis cluster status
```

Node 0 comes up and becomes the secondary node on both RG0 and RG1. Wait until the node 0 priority on RG1 changes to the configured value.

11. Verify that sessions are showing up on node 0, and that the number of sessions on node 0 is nearly equal to the number of sessions on the primary node, node 1:

```
root@node1> show security monitoring
```

12. If the cluster is healthy, reset the cluster priorities:

```
root@node1> request chassis cluster failover reset redundancy-group 1
```

```
root@node1> request chassis cluster failover reset redundancy-group 0
```

Replacing a Routing Engine: External SCP Server Method

The following are the assumptions and prerequisites for this procedure:

- Console access and SSH access are available.
- The chassis cluster has only two redundancy groups (RG0 and RG1) configured.

This procedure includes the steps for replacing the Routing Engine on node 0 of a chassis cluster setup. You can follow the same steps to replace the Routing Engine on node 1.

To replace a Routing Engine on node 0 of a chassis cluster using an external Secure Copy Protocol (SCP) server:

1. Prepare to shut down node 0:

- a. Perform a manual failover of the redundancy groups (RGs) from node 0 to node 1.

Fail over RG1:

```
root@node0> request chassis cluster failover redundancy-group 1 node 1
```

Fail over RG0:

```
root@node0> request chassis cluster failover redundancy-group 0 node 1
```

- b. Verify that both RGs are active on node 1 after the failover::

```
root@node0> show chassis cluster status
```

```
{secondary:node0}
root@node0> show chassis cluster status
Monitor Failure codes:
    CS Cold Sync monitoring      FL Fabric Connection monitoring
    GR GRES monitoring           HW Hardware monitoring
    IF Interface monitoring      IP IP monitoring
    LB Loopback monitoring       MB Mbuf monitoring
    NH Nexthop monitoring        NP NPC monitoring
    SP SPU monitoring            SM Schedule monitoring
    CF Config Sync monitoring    RE Relinquish monitoring

Cluster ID: 1
Node  Priority Status          Preempt Manual  Monitor-failures

Redundancy group: 0 , Failover count: 1
node0 129 secondary no no None
node1 255 primary no no None

Redundancy group: 1 , Failover count: 1
node0 129 secondary no no None
node1 255 primary no no None
```

- c. Check whether any licenses are installed:

```
root@node0> show system licenses
```

```
{secondary:node0}
root@node0> show system licenses
License usage:

```

Feature name	Licenses used	Licenses installed	Licenses needed	Expiry
subscriber-acct	0	1	0	permanent
subscriber-auth	0	1	0	permanent
subscriber-addr	0	1	0	permanent
subscriber-vlan	0	1	0	permanent
subscriber-ip	0	1	0	permanent
scale-subscriber	0	1000	0	permanent
scale-l2tp	0	1000	0	permanent
scale-mobile-ip	0	1000	0	permanent

```

Licenses installed:
License identifier: xxxxxxxxxxxx
License version: 2
Features:
subscriber-acct - Per Subscriber Radius Accounting
permanent
subscriber-auth - Per Subscriber Radius Authentication
permanent
subscriber-addr - Address Pool Assignment
permanent
subscriber-vlan - Dynamic Auto-sensed Vlan
permanent
subscriber-ip - Dynamic and Static IP
permanent

```

- d. If licenses are installed, copy the output of the **show system license keys** command into a file:

```
root@node0> show system license keys
```

2. Back up the Routing Engine configuration:

- a. Save the configuration to the **tmp** folder:

```
root@node0> edit
root@node0# save /var/tmp/config[date]
```

- b. Access the UNIX-level shell on node 0:

```
root@node0> start shell user root
```

- c. Copy the configuration file to an external server with SCP enabled:

```
root@node0% scp /var/tmp/node0-config-yyyy-mm-dd root@server-ip:/node0-config-yyyy-mm-dd
```

- d. Check whether any scripts are referenced in the configuration:

```
root@node0> show configuration system scripts
```

```
{secondary:node0}
root@node0> show configuration system scripts
set system scripts commit file interface-monitoring-check.slax
set system scripts op file srx-monitor.xsl
```

```
root@node0> show configuration event-options
```

```
{secondary:node0}
root@node0> show configuration event-options
set event-options generate-event 60s time-interval 60
set event-options policy NAT-POOL-UTIL events 60s
set event-options policy NAT-POOL-UTIL then event-script
srx-nat-bucket-overload.slax arguments utilization-threshold 90
set event-options policy NAT-POOL-UTIL then event-script
srx-nat-bucket-overload.slax arguments pool GLOBAL
set event-options event-script traceoptions file escript.log size 1m files 2
set event-options event-script traceoptions flag output
set event-options event-script file srx-monitor-addbook-policy-count.slax
```

- e. If any scripts are referenced in the configuration, back up these scripts:

```
root@node0% scp /var/db/scripts/commit/commit-script.slax root@server-ip: /commit-script.slax
```

- f. Verify the saved configuration on the external SCP server.
g. Exit the shell.

```
root@node0% exit
```

3. Install the replacement Routing Engine:

- a. Power off node 0:

```
root@node0> request system power-off
```

- b. Wait until a message appears on the console confirming that the services have stopped, and then physically turn off the power.
- c. Label and disconnect all the cables connected to node 0.
- d. Replace the Routing Engine.
- e. To prevent a split-brain scenario (where the control link is connected while both the nodes are in the primary state), reconnect only the console cable and the cable to the fxp0 interface. Leave the rest of the cables disconnected.
- f. Ensure that the status of the control link and fabric link on node 1 is down:

root@node1> show chassis cluster interfaces

```
{primary:node1}
root@node1> show chassis cluster interfaces
Control link status: Down
Control interfaces:
Index      Interface      Monitored-Status      Internal-SA      Security
0          em0             Down                   Disabled         Disabled
1          em1             Down                   Disabled         Disabled
```

```
Fabric link status: Down
Control interfaces:
Name       Child-Interface      Status
              (Physical/Monitored)
fab0       xe-11/0/3            Down / Down
fab0
```

- g. Power on node 0.
4. Load the configuration file and scripts on the new Routing Engine:
 - a. Log in to the Routing Engine on node 0 from the console.
 - b. Configure the IP address for the fxp0 interface, and add the necessary route to access the external server:

root@node0> edit

root@node0# set system services ssh

root@node0# set interfaces fxp0 unit 0 family inet address *ip-address mask*

root@node0# set system root-authentication plain-text-password

The chassis cluster information is stored in the Switch Control Board (SCB). The device comes up with the cluster enabled and does not allow a commit without the cluster port configuration. Apply the node 1 port configuration on node 0.

You can view the control port configuration from node 1:

```
root@node1>show configuration chassis cluster control-ports | display set
```

- c. Commit the configuration:

```
root@node0# commit
```

NOTE: Management and basic routing configuration are complete at this point. You can verify the reachability of the external server from the node by using the **ping** command.

- d. Exit configuration mode:

```
root@node0# exit
root@node0>
```

- e. Load the Junos OS image from the external server:

```
root@node0> start shell user root
root@node0% cd /var/tmp
root@node0% scp root@server-ip: junos-release-domestic.tgz /var/tmp/
root@node0% cli
root@node0>request system software add /var/tmp/junos-release-domestic.tgz reboot
```

The device reboots and comes up with the intended Junos OS version.

- f. Copy the configuration file from the external SCP server:

```
root@node0% scp root@server-ip: /node0-config-yyyy-mm-dd /var/tmp/node0-config-yyyy-mm-dd
```

- g. (Optional) If you backed up scripts, then restore the scripts from the external SCP server:

```
root@node0% scp root@server-ip: /commit-script.slax /var/db/scripts/commit/commit-script.slax
```

- h. (Optional) Apply the licenses that you backed up in step 1:

```
root@node0>request system license add terminal
```

See [Adding New Licenses \(CLI Procedure\)](#)

- i. Load the configuration:

```
root@node0> configure shared
root@node0# load override /var/tmp/node0-config-yyyy-mm-dd
```

```
root@node0# commit
```

```
root@node0# exit
```

5. Check the status of all the FPCs and PICs, and ensure that all the FPCs and PICs are online.

```
root@node0>show chassis fpc pic-status
```

6. Halt node 0 from the console:

```
root@node0> request system halt
```

7. Wait until a message appears on the console confirming that the services have stopped, and then connect all the cables to node 0.

8. Boot up node 0 by pressing any key on the console.

9. Check the chassis cluster status on node 1:

```
root@node1> show chassis cluster status
```

Node 0 comes up and becomes the secondary node on both RG0 and RG1. Wait until the node 0 priority on RG1 changes to the configured value.

10. Verify that sessions are showing up on node 0, and that the number of sessions on node 0 is nearly equal to the number of sessions on the primary node, node 1:

```
root@node1> show security monitoring
```

11. If the cluster is healthy, reset the cluster priorities:

```
root@node1> request chassis cluster failover reset redundancy-group 1
```

```
root@node1> request chassis cluster failover reset redundancy-group 0
```

Replacing the Routing Engine: File Transfer Method

To replace and configure a Routing Engine by transferring files from another node in a chassis cluster (node 0 is used as an example):

1. Ensure that the firmware image is available on node 1 in the `/var/tmp` folder. You can download the firmware from <https://support.juniper.net/support/downloads/>.
2. Save a local copy of the configuration in the `/var/tmp` folder on node 1:

```
user@node1# show configuration | save /var/tmp/cfg-node1
```

3. Prepare to shut down node 0:
 - a. Perform a manual failover of the redundancy groups (RGs) from node 0 to node 1.

Fail over RG1:

```
root@node0> request chassis cluster failover redundancy-group 1 node 1
```

Fail over RG0:

```
root@node0> request chassis cluster failover redundancy-group 0 node 1
```

- b. Verify that both RGs are active on node 1 after the failover:

```
root@node0> show chassis cluster status
```

```
{secondary:node0}
root@node0> show chassis cluster status
Monitor Failure codes:
  CS Cold Sync monitoring      FL Fabric Connection monitoring
  GR GRES monitoring          HW Hardware monitoring
  IF Interface monitoring      IP IP monitoring
  LB Loopback monitoring       MB Mbuf monitoring
  NH Nexthop monitoring        NP NPC monitoring
  SP SPU monitoring            SM Schedule monitoring
  CF Config Sync monitoring    RE Relinquish monitoring

Cluster ID: 1
Node  Priority Status          Preempt Manual  Monitor-failures
-----
Redundancy group: 0 , Failover count: 1
node0  129    secondary  no    no    None
node1  255    primary    no    no    None
```

```

Redundancy group: 1 , Failover count: 1
node0 129      secondary      no      no      None
node1 255      primary        no      no      None

```

- c. Check whether any licenses are installed:

```
root@node0> show system licenses
```

```

{secondary:node0}
root@node0> show system licenses
License usage:

Feature name          Licenses      Licenses      Licenses      Expiry
                    used         installed     needed
subscriber-acct      0             1             0             permanent
subscriber-auth      0             1             0             permanent
subscriber-addr      0             1             0             permanent
subscriber-vlan      0             1             0             permanent
subscriber-ip        0             1             0             permanent
scale-subscriber     0             1000          0             permanent
scale-l2tp           0             1000          0             permanent
scale-mobile-ip     0             1000          0             permanent

Licenses installed:
License identifier: xxxxxxxxxxxx
License version: 2
Features:
subscriber-acct - Per Subscriber Radius Accounting
permanent
subscriber-auth - Per Subscriber Radius Authentication
permanent
subscriber-addr - Address Pool Assignment
permanent
subscriber-vlan - Dynamic Auto-sensed Vlan
permanent
subscriber-ip   - Dynamic and Static IP
permanent

```

- d. If licenses are installed, copy the output of the **show system license keys** command into a file:

```
root@node0> show system license keys
```

- e. Check whether any scripts are referenced in the configuration:

```
root@node0> show configuration system scripts
```

```
{secondary:node0}
root@node0> show configuration system scripts
set system scripts commit file interface-monitoring-check.slax
set system scripts op file srx-monitor.xsl
```

root@node0> show configuration event-options

```
{secondary:node0}
root@node0> show configuration event-options
set event-options generate-event 60s time-interval 60
set event-options policy NAT-POOL-UTIL events 60s
set event-options policy NAT-POOL-UTIL then event-script
srx-nat-bucket-overload.slax arguments utilization-threshold 90
set event-options policy NAT-POOL-UTIL then event-script
srx-nat-bucket-overload.slax arguments pool GLOBAL
set event-options event-script traceoptions file escript.log size 1m files 2
set event-options event-script traceoptions flag output
set event-options event-script file srx-monitor-addbook-policy-count.slax
```

- f. If any scripts are referenced in the configuration, then back up these scripts:

```
root@node0# scp /var/db/scripts/commit/commit-script.slax root@node1-fxp0-ip:
/commit-script.slax
```

4. Install the replacement Routing Engine:

- a. Power off node 0:

```
root@node0> request system power-off
```

- b. Wait until a message appears on the console confirming that the services have stopped, and then physically turn off the power.
- c. Label and disconnect all the cables connected to node 0.
- d. Replace the Routing Engine.
- e. To prevent a split-brain scenario (where the control link is connected while both the nodes are in the primary state), reconnect only the console cable and the cable to the fxp0 interface. Leave the rest of the cables disconnected.
- f. Ensure that the status of the control link and fabric link on node 1 is down:

```
root@node1> show chassis cluster interfaces
```

```
{primary:node1}
root@node1> show chassis cluster interfaces
Control link status: Down
Control interfaces:
Index      Interface      Monitored-Status      Internal-SA      Security
0          em0            Down                   Disabled         Disabled
1          em1            Down                   Disabled         Disabled
```

```
Fabric link status: Down
Control interfaces:
Name       Child-Interface      Status
              (Physical/Monitored)
fab0       xe-11/0/3            Down / Down
fab0
```

- g. Power on node 0.
5. Load the configuration file and scripts on the new Routing Engine:
 - a. Log in to the Routing Engine on node 0 from the console.
 - b. Configure the root password and the IP address for the fxp0 interface. Do not commit the configuration.

NOTE: You need not configure a gateway as the assumption is that the fxp0 interfaces on both nodes are in the same subnet.

```
root@node0> edit
```

```
root@node0# set system root-authentication plain-text-password
```

```
New password: type password here
```

```
Retype new password: retype password here
```

```
root@node0# set interfaces fxp0 unit 0 family inet address IP-address
```

The chassis cluster information is stored in the Switch Control Board (SCB). The device comes up with the cluster enabled and does not allow a commit without the cluster port configuration. Apply the node 1 port configuration on node 0.

You can view the control port configuration from node 1:

```
root@node1> show configuration chassis cluster control-ports | display set
```

- c. Commit the configuration:

```
root@node0# commit
```

- d. Exit configuration mode:

```
root@node0# exit
root@node0>
```

- e. Copy the image and configuration from node 1 to node 0 using Secure Copy Protocol (SCP). Use the IP address configured for the node 0 fxp0 interface in Step 5.

```
root@node1> scp /var/tmp/image-file root@node0-fxp0-ip:/var/tmp/
root@node1> scp /var/tmp/cfg-node1 root@node0-fxp0-ip:/var/tmp/
```

- f. Update the Junos OS image on the Routing Engine to the required version:

```
root@node1> request system software add /var/tmp/junos-release-domestic.tgz reboot
```

The device reboots and comes up with the intended Junos OS version.

- g. (Optional) Copy the scripts that you backed up in Step 3 from node 1:

```
root@node1> scp /var/db/scripts/op/op-script.slax root@node0-fxp0-ip: /var/db/scripts/op/
```

- h. (Optional) Apply the licenses that you backed up in Step 3:

```
root@node0> request system license add terminal
```

See [Adding New Licenses \(CLI Procedure\)](#).

- i. Load the configuration:

```
root@node0> load override /var/tmp/cfg-node1
root@node0> commit
```

Verify that the configuration commits without any error.

6. Check the status of all the FPCs and PICs, and ensure that all the FPCs and PICs are online:

```
root@node0> show chassis fpc pic-status
```

7. Halt node 0 from the console:

```
root@node0> request system halt
```

8. Wait until a message appears on the console confirming that the services have stopped, and then connect all the disconnected cables.

9. Boot up node 0 by pressing any key on the console.

10. Check the chassis cluster status on node 1:

```
root@node1>show chassis cluster status
```

Node 0 comes up and becomes the secondary node on both RG0 and RG1. Wait until the node 0 priority on RG1 changes to the configured value.

11. Verify that sessions are showing up on node 0, and that the number of sessions on node 0 is nearly equal to the number of sessions on the primary node, node 1:

```
root@node1>show security monitoring
```

12. If the cluster is healthy, reset the cluster priorities:

```
root@node1>request chassis cluster failover reset redundancy-group 1
```

```
root@node1>request chassis cluster failover reset redundancy-group 0
```


5

CHAPTER

Troubleshooting Hardware

Troubleshooting the SRX5400 | **330**

Troubleshooting the SRX5400

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Troubleshooting the SRX5400 Services Gateway with the Junos OS CLI

The Junos OS command-line interface (CLI) is the primary tool for controlling and troubleshooting services gateway hardware, Junos OS, routing protocols, and network connectivity. CLI commands display information from routing tables, information specific to routing protocols, and information about network connectivity derived from the ping and traceroute utilities.

You enter CLI commands on one or more external management devices connected to ports on the Routing Engine.

For information about using the CLI to troubleshoot Junos OS, see the appropriate Junos OS configuration guide.

Troubleshooting the SRX5400 Services Gateway with Chassis and Interface Alarm Messages

When the Routing Engine detects an alarm condition, it lights the major or minor alarm LED on the craft interface as appropriate. To view a more detailed description of the alarm cause, issue the `show chassis alarms` CLI command:

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

There are two classes of alarm messages:

- Chassis alarms—Indicate a problem with a chassis component such as the cooling system or power supplies.
- Interface alarms—Indicate a problem with a specific network interface.

Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways

Table 53 on page 331 lists the alarms that the chassis components can generate on SRX5400, SRX5600, and SRX5800 Services Gateways.

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways

Chassis Component	Alarm Condition	Remedy	Alarm Severity
Air filters	Change air filter.	Change air filter.	Yellow
Alternative media	The Services Gateway boots from an alternate boot device, the hard disk. The CompactFlash card is typically the primary boot device. The Routing Engine boots from the hard disk when the primary boot device fails.	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States).	Yellow
Craft interface	The craft interface has failed.	Replace failed craft interface.	Red

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
Interface Cards (MPC/IOC/Flex IOC)	An interface card is offline.	Check the card. Remove and reinsert the card. If this fails, replace failed card.	Yellow
	An interface card has failed.	Replace failed card.	Red
	An interface card has been removed.	Insert card into empty slot.	Red
	Volt Sensor Fail	Reboot the specified card.	Red

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
Service Processing Card (SPC)	Abnormal exit in the current flow sessions of an SPU.	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States).	Red
	CPU Digital Thermal Sensor (DTS) of the SPC reaches high or over temperature threshold.	Check the status of all fan trays.	Red
	FPC airflow temperature sensors in SRX5K-SPC3 reach high or over or crosses fire temperature threshold.	Check the status of all fan trays.	Red
	FPC airflow temperature sensors in SRX5K-SPC3 read/access failure.	If the alarm is present consistently, then it indicates a hardware issue. Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States).	Yellow
	SRX5K-SPC3 checks for missing devices during boot and reports.	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States).	Red
			Red

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
	SRX5K-SPC3 LTC Firm Ware Version Mismatch. LEDs on the front panel of the chassis indicate major alarm.		

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
		<p>To manually upgrade the LTC Firmware Version:</p> <ol style="list-style-type: none"> <li data-bbox="764 512 1040 758">1. Issue the CLI show chassis alarm command to check which FPC slot is raising the LTC FW Version Mismatch alarm. <li data-bbox="764 821 1040 1178">2. Issue the CLI show system firmware command to check the current LTC firmware version, if a new version of LTC firmware is available for the SRX5K-SPC3 card, and the firmware status is OK. <li data-bbox="764 1241 1040 1598">3. If there is a new version of LTC firmware, issue the CLI command request system firmware upgrade pic fpc-slot x pic-slot x tag x to upgrade the LTC firmware on the SRX5K-SPC3 card. <li data-bbox="764 1661 1040 1900">4. Issue the CLI command show system firmware to confirm the status of the SRX5K-SPC3 LTC firmware is UPGRADED SUCCESSFULLY. 	

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
		5. Re-boot the Services Gateway.	
	Memory faults: DIMM failures and ECC errors.	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States).	Red
	Real Time Clock battery failure.	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States).	Red
	SSDs on the SRX5K-SPC3 missing or read/write to SSD is failing or SSD file system corrupt.	Replace the SSD. or Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States).	Red
	OPMC Boot FPGA Faults	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States).	Red
	Voltage sensor faults		Red

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
		<p>From the CLI use the command restart chassis-control to reboot the services gateway.</p> <p>If SPC still doesn't come online, then remove and insert back the SPC.</p>	

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
Fan trays	A fan tray has been removed from the chassis.	Install missing fan tray.	Red
	Fan tray not working or failed.	Replace fan tray.	Red
	One fan in the chassis is not spinning or is spinning below required speed.	Replace fan tray.	Red
	A higher-cooling capacity fan tray is required when an MPC or high-density SPCs are installed on the chassis.	Upgrade to a high-capacity fan tray.	Yellow
	Fan tray under voltage.	Reseat the Fan Tray. If problem still continues open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States).	Red
	Wrong fan tray installed.	Check and insert the appropriate fan tray.	Red
	In SRX5800 Services Gateway, mix of fan trays.	Insert the appropriate fan trays.	Red
	In SRX5800 Services Gateway, wrong fan tray installed on the top.	Check and insert the appropriate fan tray.	Red

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
Host subsystem	A host subsystem has been removed.	Insert host subsystem into empty slot.	Yellow
	A host subsystem has failed.	Replace failed host subsystem.	Red

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
Power supplies	A power supply has been removed from the chassis.	Insert power supply into empty slot.	Yellow
	A power supply has a high temperature.	Replace failed power supply or power entry module.	Red
	A power supply input has failed.	Check power supply input connection.	Red
	A power supply output has failed.	Check power supply output connection.	Red
	A power supply has failed.	Replace failed power supply.	Red
	Invalid AC power supply configuration.	When two AC power supplies are installed, insert one power supply into an odd-numbered slot and the other power supply into an even-numbered slot.	Red
	Invalid DC power supply configuration.	When two DC power supplies are installed, insert one power supply into an odd-numbered slot and the other power supply into an even-numbered slot.	Red
	Mix of AC and DC power supplies.	Do not mix AC and DC power supplies. For DC power, remove the AC power supply. For AC power, remove the DC power supply.	Red

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
	Not enough power supplies.	Install an additional power supply.	Red

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
Routing Engine	Excessive framing errors on console port. An excessive framing error alarm is triggered when the default framing error threshold of 20 errors per second on a serial port is exceeded. This might be caused by a faulty serial console port cable connected to the device.	Replace the serial cable connected to the device. If the cable is replaced and no excessive framing errors are detected within 5 minutes from the last detected framing error, the alarm is cleared automatically.	Yellow
	Error in reading or writing hard disk.	Reformat hard disk and install bootable image. If this fails, replace failed Routing Engine.	Yellow
	Error in reading or writing CompactFlash card.	Reformat CompactFlash card and install bootable image. If this fails, replace failed Routing Engine.	Yellow
	System booted from default backup Routing Engine. If you manually switched primary role, ignore this alarm condition.	Install bootable image on default primary Routing Engine. If this fails, replace failed Routing Engine.	Yellow
	System booted from hard disk.	Install bootable image on CompactFlash card. If this fails, replace failed Routing Engine.	Yellow
	CompactFlash card missing in boot list.	Replace failed Routing Engine.	Red
			Red

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
	Hard disk missing in boot list.	Replace failed Routing Engine.	
	Routing Engine failed to boot.	Replace failed Routing Engine.	Red
	The Ethernet management interface (fxp0 or em0) on the Routing Engine is down.	<ul style="list-style-type: none"> • Check the interface cable connection. • Reboot the system. • If the alarm recurs, open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States) 	Red

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
System Control Board (SCB)	An SCB has been removed.	Insert SCB into empty slot.	Yellow
	An SCB temperature sensor alarm has failed.	Replace failed SCB.	Yellow
	An SCB has failed.	Replace failed SCB.	Red
	An SCB throughput decreased.	<ul style="list-style-type: none"> • Check fabric plane summary if all 4 fabric planes are online. • This alarm could be raised before all fabric planes are brought up. It will be cleared after at least 4 planes are up. • If all planes are up and still seeing alarms, raise a case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States) 	Yellow

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
Temperature	The chassis temperature has exceeded 55 degrees C (131 degrees F), the fans have been turned on to full speed, and one or more fans have failed.	<ul style="list-style-type: none"> • Check room temperature. • Check air filter and replace it. • Check airflow. • Check fan. 	Yellow
	The chassis temperature has exceeded 65 degrees C (149 degrees F), and the fans have been turned on to full speed.	<ul style="list-style-type: none"> • Check room temperature. • Check air filter and replace it. • Check airflow. • Check fan. 	Yellow
	The chassis temperature has exceeded 65 degrees C (149 degrees F), and a fan has failed. If this condition persists for more than 4 minutes, the Services Gateway shuts down.	<ul style="list-style-type: none"> • Check room temperature. • Check air filter and replace it. • Check airflow. • Check fan. 	Red
	Chassis temperature has exceeded 75 degrees C (167 degrees F). If this condition persists for more than 4 minutes, the Services Gateway shuts down.	<ul style="list-style-type: none"> • Check room temperature. • Check air filter and replace it. • Check airflow. • Check fan. 	Red
	The temperature sensor has failed.		Red

Table 53: Chassis Component Alarm Conditions on SRX5400, SRX5600, and SRX5800 Services Gateways (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
		<ul style="list-style-type: none"> • Check environmental conditions and alarms on other devices. • Ensure that environmental factors (such as hot air blowing around the equipment) are not affecting the temperature sensor. • If the alarm recurs, open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States). 	

Backup Routing Engine Alarms

For Services Gateways with primary and backup Routing Engines, a primary Routing Engine can generate alarms for events that occur on a backup Routing Engine. [Table 54 on page 347](#) lists chassis alarms generated for a backup Routing Engine.

NOTE: Because the failure occurs on the backup Routing Engine, alarm severity for some events (such as Ethernet interface failures) is yellow instead of red.

NOTE: For information about configuring redundant Routing Engines, see the *Junos OS High Availability Library for Routing Devices*.

Table 54: Backup Routing Engine Alarms

Chassis Component	Alarm Condition	Remedy	Alarm Severity
Alternative media	The backup Routing Engine boots from an alternate boot device, the hard disk. The CompactFlash card is typically the primary boot device. The Routing Engine boots from the hard disk when the primary boot device fails.	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States).	Yellow
Boot Device	The boot device (CompactFlash or hard disk) is missing in boot list on the backup Routing Engine.	Replace failed backup Routing Engine.	Red
Ethernet	The Ethernet management interface (fxp0 or em0) on the backup Routing Engine is down.	<ul style="list-style-type: none"> • Check the interface cable connection. • Reboot the system. • If the alarm recurs, open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States). 	Yellow
FRU Offline	The backup Routing Engine has stopped communicating with the primary Routing Engine.	Open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States).	Yellow
Hard Disk	Error in reading or writing hard disk on the backup Routing Engine.	Reformat hard disk and install bootable image. If this fails, replace failed backup Routing Engine.	Yellow

Table 54: Backup Routing Engine Alarms (continued)

Chassis Component	Alarm Condition	Remedy	Alarm Severity
Multibit Memory ECC	The backup Routing Engine reports a multibit ECC error.	<ul style="list-style-type: none"> • Reboot the system with the board reset button on the backup Routing Engine. • If the alarm recurs, open a support case using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US & Canada) or 1-408-745-9500 (from outside the United States). 	Yellow

Troubleshooting the SRX5400 Services Gateway with Alarm Relay Contacts

The craft interface has two alarm relay contacts for connecting the services gateway to external alarm devices. Whenever a system condition triggers either the major or minor alarm on the craft interface, the alarm relay contacts are also activated. The alarm relay contacts are located on the upper right of the craft interface.

Troubleshooting the SRX5400 Services Gateway with the Craft Interface LEDs

The craft interface is the panel on the front of the services gateway located above the card cage that contains LEDs and buttons that allow you to troubleshoot the device.

LEDs on the craft interface include the following:

- Alarm LEDs—One large major alarm circular LED and one large minor alarm triangular LED, located on the upper right of the craft interface, indicate two levels of alarm conditions. The circular major alarm LED lights to indicate a critical condition that can result in a system shutdown. The triangular minor alarm LED lights to indicate a less severe condition that requires monitoring or maintenance. Both LEDs can be lit simultaneously. A condition that causes an alarm LED to light also activates the corresponding alarm relay contact on the craft interface.
- Host subsystem LEDs—Three LEDs, **MASTER**, **ONLINE**, and **OFFLINE**, indicate the status of the host subsystem. A green **MASTER** LED indicates that the host is functioning as primary. The **ONLINE** LED indicates the host is online. The **OFFLINE** LED indicates the host is offline. The host subsystem LEDs are located on the left of the craft interface and are labeled **RE0** and **RE1**.
- Power supply LEDs—Two LEDs (**PEM**) indicate the status of each power supply. Green indicates that the power supply is functioning normally. Red indicates that the power supply is not functioning normally. The power supply LEDs are located in the center craft interface, and are labeled **0** through **3**.
- Card OK/Fail LEDs—Two LEDs, **OK** and **FAIL**, indicate the status of the card in each slot in the card cage. Green indicates OK and red indicates a failure. The card OK/Fail LEDs are located along the bottom of the craft interface, and are labeled **0** through **5**.
- SCB LEDs—Two LEDs, **OK** and **FAIL**, indicate the status of the SCB. Green indicates OK and red indicates a failure. The SCB LEDs are located in the center of the craft interface along the bottom, and are labeled **0** and **1**.
- Fan LEDs—Two LEDs indicate the status of the fan. Green indicates **OK** and red indicates **FAIL**. The fan LEDs are located on the upper left of the craft interface.

Troubleshooting the SRX5400 Services Gateway with the Component LEDs

The following LEDs are located on various services gateway components and display the status of those components:

- Card LED—One LED labeled **OK/FAIL** on each card in the card cage indicates the card's status.
- MIC LED—One LED labeled **OK/FAIL** on the faceplate of each MIC installed in an MPC indicates the MIC's status.
- SCB LEDs—Three LEDs, labeled **FABRIC ACTIVE**, **FABRIC ONLY**, and **OK/FAIL**, on each SCB faceplate indicate the status of the SCB. If no LEDs are lit, the primary Routing Engine might still be booting, or the SCB is not receiving power.
- Routing Engine LEDs—Four LEDs, labeled **MASTER**, **HDD**, **ONLINE**, and **FAIL** on the Routing Engine faceplate indicate the status of the Routing Engine and hard disk drive.
- Power supply LEDs—Three or four LEDs on each power supply faceplate indicate the status of that power supply.

Troubleshooting the SRX5400 Services Gateway Cooling System

Problem

Description: The fans in a fan tray are not functioning normally.

Solution

Follow these guidelines to troubleshoot the fans:

- Check the fan LEDs and alarm LEDs on the craft interface.
- If the major alarm LED on the craft interface lights, use the CLI to get information about the source of an alarm condition: **user@host> show chassis alarms**.

If the CLI output lists only one fan failure, and the other fans are functioning normally, the fan is most likely faulty and you must replace the fan tray.

- Place your hand near the exhaust vents at the side of the chassis to determine whether the fans are pushing air out of the chassis.
- If the fan tray is removed, a minor alarm and a major alarm occur.
- The following conditions automatically cause the fans to run at full speed and also trigger the indicated alarm:
 - A fan fails (major alarm).
 - The services gateway temperature exceeds the “temperature warm” threshold (minor alarm).
 - The temperature of the services gateway exceeds the maximum (“temperature hot”) threshold (major alarm and automatic shutdown of the power supplies).

Troubleshooting SRX5400 Services Gateway MPCs

Problem

Description: The MPCs are not functioning normally.

Solution

- Monitor the green LED labeled **OK** on the craft interface corresponding to the slot as soon as an MPC is seated in an operating services gateway.

The Routing Engine downloads the MPC software to it under two conditions: the MPC is present when the Routing Engine boots Junos OS, and the MPC is installed and requested online through the CLI or push button on the front panel. The MPC then runs diagnostics, during which the **OK** LED blinks. When the MPC is online and functioning normally, the **OK** LED lights green steadily.

- Make sure the MPC is properly seated in the midplane. Check that each ejector handle has been turned clockwise and is tight.

- Check the **OK/FAIL** LED on the MPC and **OK** and **FAIL** LEDs for the slot on the craft interface. When the MPC is online and functioning normally, the **OK** LED lights green steadily.
- Issue the CLI **show chassis fpc** command to check the status of installed MPC. As shown in the sample output, the value *Online* in the column labeled *State* indicates that the MPC is functioning normally:

```
user@host> show chassis fpc
```

```
Slot State          (C) Total Interrupt      DRAM (MB) Heap      Buffer
 0 Online           35     4         0        1024    13       25
 1 Online           47     3         0        1024    13       25
 2 Online           37     8         0        2048    18       14
```

```
user@host> request chassis fpc slot 2 offline
```

```
node0:
-----
Offline initiated, use "show chassis fpc" to verify

{primary:node0}
```

```
user@host> show chassis fpc
```

```
node0:
-----
Temp CPU Utilization (%) Memory Utilization (%)
Slot State (C) Total Interrupt      DRAM (MB) Heap      Buffer
 0 Online   35     7         0        1024    13       25
 1 Online   46     4         0        1024    13       25
 2 Offline  ---Offlined by cli command---

After pushing MPC online button:
```

```
user@host> show chassis fpc
```

```
Temp CPU Utilization (%) Memory Utilization (%)
Slot State (C) Total Interrupt      DRAM (MB) Heap      Buffer
 0 Online   34     5         0        1024    13       25
 1 Online   46     3         0        1024    13       25
 2 Offline  ---Offlined by button press---
```

For more detailed output, add the **detail** option. The following example does not specify a slot number, which is optional:

```
user@host> show chassis fpc detail
```

```
Slot 0 information:
  State                               Online
  Temperature                           35
  Total CPU DRAM                         1024 MB
  Total RLDRAM                           259 MB
  Total DDR DRAM                         4864 MB
  Start time:                            2013-12-10 02:58:16 PST
  Uptime:                                1 day, 11 hours, 59 minutes, 15 seconds
  Max Power Consumption                  585 Watts

Slot 1 information:
  State                               Online
  Temperature                           47
  Total CPU DRAM                         1024 MB
  Total RLDRAM                           259 MB
  Total DDR DRAM                         4864 MB
  Start time:                            2013-12-10 02:55:30 PST
  Uptime:                                1 day, 12 hours, 2 minutes, 1 second
  Max Power Consumption                  585 Watts

Slot 2 information:
  State                               Online
  Temperature                           37
  Total CPU DRAM                         2048 MB
  Total RLDRAM                           1036 MB
  Total DDR DRAM                         6656 MB
  Start time:                            2013-12-10 02:58:07 PST
  Uptime:                                1 day, 11 hours, 59 minutes, 24 seconds
  Max Power Consumption                  570 Watts
```

For further description of the output from the command, see *Junos OS System Basics and Services Command Reference* at www.juniper.net/documentation/.

Troubleshooting SRX5400 Services MICs

Problem

Description: The MICs are not functioning normally.

Solution

- Check the status of each port on a MIC by looking at the LED located on the MIC faceplate.
- Check the status of a port module by issuing the **show chassis fpc pic-status** CLI command. The MIC slots in the MPC are numbered from **0** through **1**:


```
user@host> show chassis fpc pic-status
```

```
Slot 0  Online      SRX5k SPC II
  PIC 0  Online      SPU Cp
  PIC 1  Online      SPU Flow
  PIC 2  Online      SPU Flow
  PIC 3  Online      SPU Flow
Slot 1  Online      SRX5k SPC II
  PIC 0  Online      SPU Flow
  PIC 1  Online      SPU Flow
  PIC 2  Online      SPU Flow
  PIC 3  Online      SPU Flow
Slot 2  Online      SRX5k IOC II
  PIC 0  Online      2x 40GE QSFP+
  PIC 2  Online      10x 10GE SFP+
```

For further description of the output from the command, see *Junos OS System Basics and Services Command Reference* at www.juniper.net/documentation/.

Troubleshooting SRX5400 Services Gateway SPCs

Problem

Description: A Services Processing Card (SPC) is not functioning normally.

Solution

- Make sure the SPC is properly seated in the midplane. Check that each ejector handle has been turned clockwise and is tight.
- Issue the CLI **show chassis fpc** command to check the status of installed SPCs. As shown in the sample output, the value *Online* in the column labeled *State* indicates that the SPC is functioning normally:

```
user@host> show chassis fpc
```

Slot	State	(C)	Total	Interrupt	DRAM (MB)	Heap	Buffer
0	Online	35	4	0	1024	13	25
1	Online	47	3	0	1024	13	25
2	Online	37	8	0	2048	18	14

For more detailed output, add the **detail** option. The following example does not specify a slot number, which is optional:

```
user@host> show chassis fpc detail
```

```

Slot 0 information:
  State                Online
  Temperature          35
  Total CPU DRAM       1024 MB
  Total RLDRAM         259 MB
  Total DDR DRAM       4864 MB
  Start time:         2013-12-10 02:58:16 PST
  Uptime:              1 day, 11 hours, 59 minutes, 15 seconds
  Max Power Consumption 585 Watts

Slot 1 information:
  State                Online
  Temperature          47
  Total CPU DRAM       1024 MB
  Total RLDRAM         259 MB
  Total DDR DRAM       4864 MB
  Start time:         2013-12-10 02:55:30 PST
  Uptime:              1 day, 12 hours, 2 minutes, 1 second
  Max Power Consumption 585 Watts

Slot 2 information:
  State                Online
  Temperature          37
  Total CPU DRAM       2048 MB
  Total RLDRAM         1036 MB
  Total DDR DRAM       6656 MB
  Start time:         2013-12-10 02:58:07 PST
  Uptime:              1 day, 11 hours, 59 minutes, 24 seconds
  Max Power Consumption 570 Watts

```

For further description of the output from the command, see *Junos OS System Basics and Services Command Reference* at www.juniper.net/documentation/.

Troubleshooting the SRX5400 Services Gateway Power System

Problem

Description: The power system is not functioning normally.

Solution

- Check the LEDs on each power supply faceplate.
 - If an AC power supply is correctly installed and functioning normally, the **AC OK** and **DC OK** LEDs light steadily, and the **PS FAIL** LED is not lit.

- If a DC power supply is correctly installed and functioning normally, the **PWR OK**, **BREAKER ON**, and **INPUT OK** LEDs light steadily.
- Issue the CLI **show chassis environment pem** command to check the status of installed power supplies. As shown in the sample output, the value *Online* in the rows labeled *State* indicates that each of the power supply is functioning normally:

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

```

PEM 0 status:
  State                Online
  Temperature          OK
  DC Input:            OK
  DC Output            Voltage(V) Current(A) Power(W) Load(%)
                       52          8          416    17
  Voltage:
    48.0 V input      52000 mV

PEM 1 status:
  State                Empty

PEM 2 status:
  State                Online
  Temperature          OK
  DC Input:            OK
  DC Output            Voltage(V) Current(A) Power(W) Load(%)
                       53          10         530    21
  Voltage:
    48.0 V input      53000 mV

PEM 3 status:
  State                Empty

```

If a power supply is not functioning normally, perform the following steps to diagnose and correct the problem:

- If a major alarm condition occurs, issue the **show chassis alarms** command to determine the source of the problem.
- Check that the AC input switch (–) or DC circuit breaker (I) is in the on position and that the power supply is receiving power.
- Verify that the source circuit breaker has the proper current rating. Each power supply must be connected to a separate source circuit breaker.
- Verify that the AC power cord or DC power cables from the power source to the services gateway are not damaged. If the insulation is cracked or broken, immediately replace the cord or cable.

- Connect the power supply to a different power source with a new power cord or power cables. If the power supply status LEDs indicate that the power supply is not operating normally, the power supply is the source of the problem. Replace the power supply with a spare.
- If all power supplies have failed, the system temperature might have exceeded the threshold, causing the system to shut down.

NOTE: If the system temperature exceeds the threshold, Junos OS shuts down all power supplies so that no status is displayed.

Junos OS also can shut down one of the power supplies for other reasons. In this case, the remaining power supplies provide power to the services gateway, and you can still view the system status through the CLI or display.

To restart a high-capacity AC power supply after a shut down due to an over-temperature situation:

1. Move the power switch on the power supply to the off (o) position.
2. Turn off power to where the AC line goes into the power distribution module (PDM) area.
3. Wait for the power supply LEDs to fade out and for the fans inside the power supply to shutdown. This can take up to 10 seconds.



CAUTION: Do not attempt to power-on the power supply if the LED is still lit and the fan is still running. If you do, the services gateway will not reboot.

4. Turn on power to where the AC line goes into the power distribution module (PDM) area.
5. Move the power switch on the power supply to the on (I) position.
6. Verify that the LEDs on the power supply faceplate are properly lit.
7. Issue the CLI **show chassis environment pem** command and verify the State is **ONLINE** and the Temperature is **OK**.

To restart a high-capacity DC power supply after a shut down due to an over-temperature situation:

1. Switch off the circuit breaker(s) on the DC distribution panel to remove power to the chassis and power supplies.
2. Switch on the circuit breaker(s) on the distribution panel to power up the chassis and power supplies.

NOTE: The power switch on the power supplies is not part of the outer or inner DC circuits and therefore does not need to be switched off when restarting the chassis.

Behavior of the SRX5400, SRX5600, and SRX5800 Services Gateways When the SRX5K-SCBE and SRX5K-RE-1800X4 in a Chassis Cluster Fail

It is important to understand the behavior of the SRX5400, SRX5600, and SRX5800 Services Gateways when the Switch Control Board (SRX5K-SCBE) and Routing Engine (SRX5K-RE-1800X4) in the chassis cluster fail.

NOTE: This procedure is also applicable for SCB3 except that SCB3 redundancy is supported.

NOTE: We strongly recommend that you perform the ISHU during a maintenance window, or during the lowest possible traffic as the secondary node is not available at this time.

NOTE: The SRX5K-SCBE and SRX5K-RE-1800X4 are not hot-swappable.

NOTE: Four fabric planes must be active at any time in a chassis cluster. If fewer than four fabric planes are active, then the Redundancy Group (RG1+) will fail over to the secondary node.

[Table 55 on page 357](#) shows the minimum fabric plane requirements for the SCB.

Table 55: Expected Device Behavior and Minimum SRX5K-SCBE and Fabric Plane Requirements

Platform	Number of SRX5K-SCBs	Active Planes	Redundant Planes	Expected Behavior After the SCB and Routing Engine are Removed
SRX5400	1	4 (virtual)	0 (virtual)	If the SCB in the primary node fails, the device will fail over to the secondary node as the primary node powers off.
SRX5600	2	4 (virtual)	4 (virtual)	If the active SCB in the primary node fails, the behavior of the device does not change as the redundant SCB becomes active provided all four fabric planes are in good condition. If the second SCB in the primary node fails, the device will fail over to the secondary node as the primary node powers off.

Table 55: Expected Device Behavior and Minimum SRX5K-SCBE and Fabric Plane Requirements (*continued*)

Platform	Number of SRX5K-SCBs	Active Planes	Redundant Planes	Expected Behavior After the SCB and Routing Engine are Removed
SRX5800	3	4	2	<p>This device supports one SCB for two fabric planes, providing a redundancy of three SCBs. If the active SCB fails, the device behavior does not change as the remaining two SCBs fulfill the requirement to have four fabric planes.</p> <p>If the second SCB also fails, no spare planes are available in the chassis triggering inter-chassis redundancy. Therefore, RG1+ will fail over to the secondary node.</p>

NOTE: In SRX5600 and SRX5800 Services Gateways, failover does not happen when the secondary Routing Engine in slot 1 fails, while the SCB in slot 1 is inactive.

For detailed information about chassis cluster, see the [Chassis Cluster User Guide for SRX Series Devices](http://www.juniper.net/documentation/) at www.juniper.net/documentation/.

6

CHAPTER

Contacting Customer Support and Returning the Chassis or Components

Returning the SRX5400 Chassis or Components | **360**

Returning the SRX5400 Chassis or Components

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Contacting Customer Support

Once you have located the serial numbers of the services gateway or component, you can return the services gateway or component for repair or replacement. For this, you need to contact Juniper Networks Technical Assistance Center (JTAC).

You can contact JTAC 24 hours a day, 7 days a week, using any of the following methods:

- 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.

Return Procedure for the SRX5400 Services Gateway

If a problem cannot be resolved by the JTAC technician, a Return Materials Authorization (RMA) is issued. This number is used to track the returned material at the factory and to return repaired or new components to the customer as needed.

NOTE: Do not return any component to Juniper Networks, Inc. unless you have first obtained an RMA number. Juniper Networks, Inc. reserves the right to refuse shipments that do not have an RMA. Refused shipments will be returned to the customer via collect freight.

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

To return a services gateway or component to Juniper Networks for repair or replacement:

1. Determine the part number and serial number of the services gateway or component. For the serial number locations of cards and modules such as MPCs, SPCs, port modules and Routing Engines, see the *SRX5400, SRX5600, and SRX5800 Services Gateway Card Reference* at www.juniper.net/documentation/.
2. Obtain a Return Materials Authorization (RMA) number from JTAC.

NOTE: Do not return the services gateway or any component to Juniper Networks unless you have first obtained an RMA number. Juniper Networks reserves the right to refuse shipments that do not have an RMA. Refused shipments are returned to the customer via collect freight.

3. Pack the services gateway or component for shipping.

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

For product problems or technical support issues, open a support case using the Case Manager link at <https://www.juniper.net/support/> or call 1-888-314-JTAC (within the United States) or 1-408-745-9500 (outside the United States).

Listing the SRX5400 Services Gateway Component Serial Numbers with the CLI

Before contacting Juniper Networks, Inc. to request a Return Materials Authorization (RMA), you must find the serial number on the services gateway or component. To display all of the services gateway components and their serial numbers, enter the following command-line interface (CLI) command:

```
user@host> show chassis hardware
```

Most components also have a small rectangular serial number ID label (see [Figure 124 on page 362](#)) attached to the component body.

Figure 124: Serial Number ID Label



Locating the SRX5400 Services Gateway Chassis Serial Number Label

The chassis serial number is located on the right side, top corner of the chassis.

Locating the SRX5400 Services Gateway Power Supply Serial Number Labels

The serial number label is located on the top of the AC power supply (see [Figure 125 on page 363](#)).

The serial number label is located on the top of the DC power supply faceplate (see [Figure 126 on page 363](#)).

Figure 125: AC Power Supply Serial Number Label

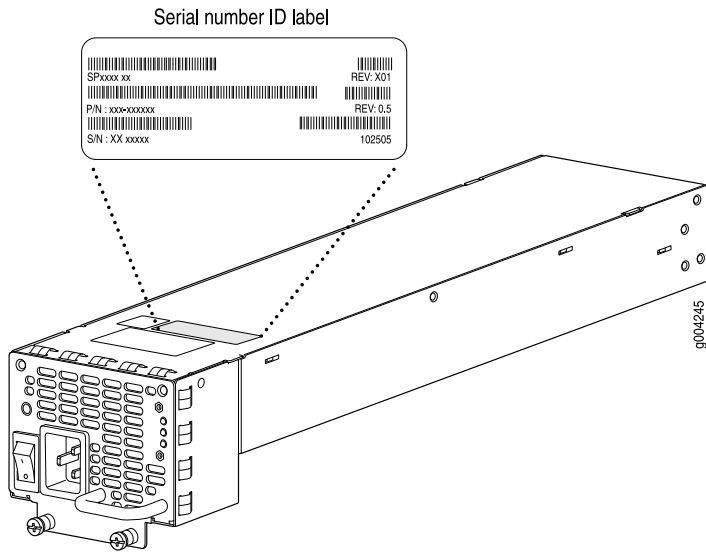
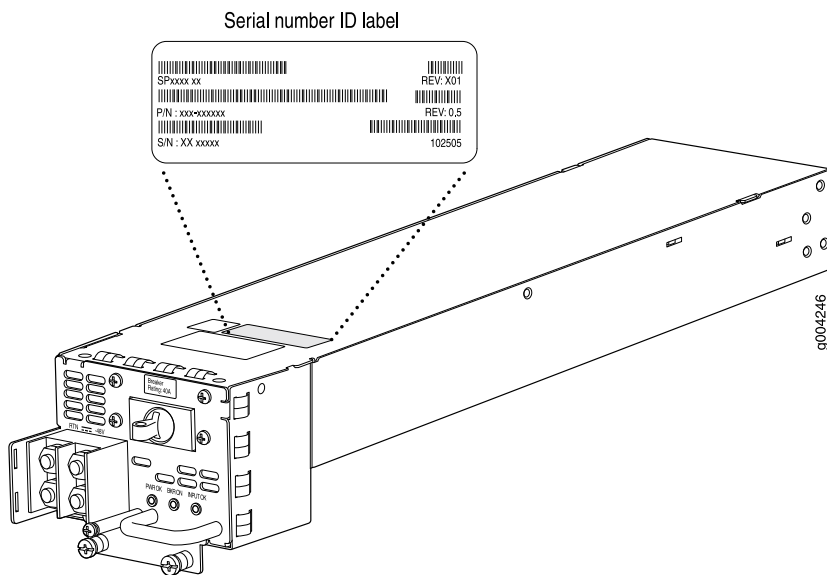


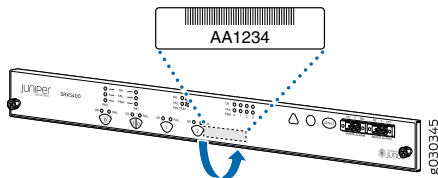
Figure 126: DC Power Supply Serial Number Label



Locating the SRX5400 Services Gateway Craft Interface Serial Number Label

The serial number is located on the back of the craft interface panel (see [Figure 127 on page 364](#)).

Figure 127: Craft Interface Serial Number Label



Information You Might Need to Supply to JTAC

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

- Your existing case number, if you have one
- Details of the failure or problem
- Type of activity being performed on the services gateway when the problem occurred
- Configuration data displayed by one or more **show** commands
- Your name, organization name, telephone number, fax number, and shipping address

Required Tools and Parts for Packing the SRX5400 Services Gateway

To remove components from the services gateway or the services gateway from a rack, you need the following tools and parts:

- 2.5-mm flat-blade (-) screwdriver, for detaching alarm relay terminal block
- 7/16-in. (11 mm) nut driver
- Blank panels to cover empty slots
- Electrostatic bag or antistatic mat, for each component
- Electrostatic discharge (ESD) grounding wrist strap
- Flat-blade (-) screwdriver
- Mechanical lift, if available
- Phillips (+) screwdrivers, numbers 1 and 2
- Rubber safety cap for fiber-optic interfaces or cable
- Wire cutters

Packing the SRX5400 Services Gateway for Shipment

To pack the services gateway for shipment:

1. Retrieve the shipping crate and packing materials in which the services gateway was originally shipped. If you do not have these materials, contact your Juniper Networks representative about approved packaging materials.
2. On the console or other management device connected to the primary Routing Engine, enter CLI operational mode and issue the following command to shut down the services gateway software.

```
user@host> request system halt
```

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

For more information about the command, see *Junos OS System Basics and Services Command Reference* at www.juniper.net/documentation/.

3. Wrap and fasten one end of the ESD grounding strap around your bare wrist, and connect the other end of the strap to an ESD point.
4. Shut down power to the services gateway by pressing the AC input switch or DC circuit breaker for all power supplies to the off (O) position.
5. Disconnect power from the services gateway.
6. Remove the cables that connect to all external devices.
7. Remove all field replaceable units (FRUs) from the services gateway.
8. Remove the services gateway chassis from the rack:
 - If you are using a mechanical lift, place the lift platform under the chassis, unscrew and remove the mounting screws from the rack, and move the chassis to the shipping crate.
 - If you are not using a mechanical lift and the chassis weight is fully supported by a shelf or another device, unscrew and remove the mounting screws from the rack. Three people can then lift the chassis and move it to the shipping crate.
 - If you are not using a mechanical lift and the chassis weight is not fully supported by a shelf or another device, three people should grasp the chassis while a fourth person unscrews and removes the mounting screws from the rack. The three lifters can then move the chassis to the shipping container.
9. Place the services gateway in the shipping crate or onto the pallet. If on a pallet, bolt the services gateway to the pallet.

10. Cover the services gateway with an ESD bag and place the packing foam on top of and around the services gateway.
11. Replace the accessory box on top of the packing foam.
12. Securely tape the box closed or place the crate cover over the services gateway.
13. Write the RMA number on the exterior of the box to ensure proper tracking.

Packing SRX5400 Services Gateway Components for Shipment

Follow these guidelines for packing and shipping individual components of the services gateway:

- When you return a component, make sure that it is 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 the individual component in an electrostatic bag.
- Write the Return Materials Authorization (RMA) number on the exterior of the box to ensure proper tracking.



CAUTION: Do not stack any of the services gateway components during packing.

7

CHAPTER

Safety and Compliance Information

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General Safety Guidelines and Warnings

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

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



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

Definitions of Safety Warning Levels

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

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



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



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



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

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

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

Attention 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.

Restricted Access Area Warning



WARNING: The services gateway 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 possui 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

[Definitions of Safety Warning Levels | 370](#)

[General Safety Guidelines and Warnings | 369](#)

[Qualified Personnel Warning | 378](#)

[Prevention of Electrostatic Discharge Damage | 401](#)

Fire Safety Requirements

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

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

Fire Suppression

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

Fire Suppression Equipment

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

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

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

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

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

Qualified Personnel Warning



WARNING: Only trained and qualified personnel should install or replace the device.

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

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

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.

Warning Statement for Norway and Sweden



WARNING: The equipment must be connected to an earthed mains socket-outlet.

Advarsel Apparatet skal kobles til en jordet stikkontakt.

Warning! Apparatens skall anslutas till jordat nätuttag.

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.

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

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

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

Advarsel Les installasjonsinstruksjonene før systemet kobles til strømkilden.

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

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

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

Chassis and Component Lifting Guidelines

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

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

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.

Attention 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

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

Rack-Mounting and Cabinet-Mounting Warnings

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



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

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

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

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

Varoitus Kun laite asetetaan telineeseen tai huolletaan sen ollessa telineessä, on noudatettava erityisiä varotoimia järjestelmän vakavuuden säilyttämiseksi, jotta 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.

Attention 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, oerriormente durante su mantenimiento, se debe poner mucho cuidado en que el sistema quede bien estable. Para garantizar su seguridad, proceda según las siguientes instrucciones:

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

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

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

Grounded Equipment Warning



WARNING: This device must be properly grounded at all times. Follow the instructions in this guide to properly ground the device to earth.

Waarschuwing Dit apparaat moet altijd goed geaard zijn. Volg de instructies in deze gids om het apparaat goed te aarden.

Varoitus Laitteen on oltava pysyvästi maadoitettu. Maadoita laite asianmukaisesti noudattamalla tämän oppaan ohjeita.

Attention L'appareil doit être correctement mis à la terre à tout moment. Suivez les instructions de ce guide pour correctement mettre l'appareil à la terre.

Warnung Das Gerät muss immer ordnungsgemäß geerdet sein. Befolgen Sie die Anweisungen in dieser Anleitung, um das Gerät ordnungsgemäß zu erden.

Avvertenza Questo dispositivo deve sempre disporre di una connessione a massa. Seguire le istruzioni indicate in questa guida per connettere correttamente il dispositivo a massa.

Advarsel Denne enheten på jordes skikkelig hele tiden. Følg instruksjonene i denne veiledningen for å jorde enheten.

Aviso Este equipamento deverá estar ligado à terra. Siga las instrucciones en esta guía para conectar correctamente este dispositivo a tierra.

¡Atención! Este dispositivo debe estar correctamente conectado a tierra en todo momento. Siga las instrucciones en esta guía para conectar correctamente este dispositivo a tierra.

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

Laser and LED Safety Guidelines and Warnings

IN THIS SECTION

- [General Laser Safety Guidelines | 387](#)
- [Class 1 Laser Product Warning | 388](#)
- [Class 1 LED Product Warning | 389](#)
- [Laser Beam Warning | 390](#)

Juniper Networks devices are equipped with laser transmitters, which are considered a Class 1 Laser Product by the U.S. Food and Drug Administration and are evaluated as a Class 1 Laser Product per EN 60825-1 requirements.

Observe the following guidelines and warnings:

General Laser Safety Guidelines

When working around ports that support optical transceivers, observe the following safety guidelines to prevent eye injury:

- Do not look into unterminated ports or at fibers that connect to unknown sources.
- Do not examine unterminated optical ports with optical instruments.
- Avoid direct exposure to the beam.



WARNING: Unterminated optical connectors can emit invisible laser radiation. The lens in the human eye focuses all the laser power on the retina, so focusing the eye directly on a laser source—even a low-power laser—could permanently damage the eye.

Class 1 Laser Product Warning



WARNING: Class 1 laser product.

Waarschuwing Klasse-1 laser produkt.

Varoitus Luokan 1 lasertuote.

Attention Produit laser de classe I.

Warnung Laserprodukt der Klasse 1.

Avvertenza Prodotto laser di Classe 1.

Advarsel Laserprodukt av klasse 1.

Aviso Produto laser de classe 1.

¡Atención! Producto láser Clase I.

Varning! Laserprodukt av klass 1.

Class 1 LED Product Warning



WARNING: Class 1 LED product.

Waarschuwing Klasse 1 LED-product.

Varoitus Luokan 1 valodiodituote.

Attention Alarme de produit LED Class I.

Warnung Class 1 LED-Produktwarnung.

Avvertenza Avvertenza prodotto LED di Classe 1.

Advarsel LED-produkt i klasse 1.

Aviso Produto de classe 1 com LED.

¡Atención! Aviso sobre producto LED de Clase 1.

Varning! Lysdiodprodukt av klass 1.

Laser Beam Warning



WARNING: Do not stare into the laser beam or view it directly with optical instruments.

Waarschuwing Niet in de straal staren of hem rechtstreeks bekijken met optische instrumenten.

Varoitus Älä katso säteeseen äläkä tarkastele sitä suoraan optisen laitteen avulla.

Attention Ne pas fixer le faisceau des yeux, ni l'observer directement à l'aide d'instruments optiques.

Warnung Nicht direkt in den Strahl blicken und ihn nicht direkt mit optischen Geräten prüfen.

Avvertenza Non fissare il raggio con gli occhi né usare strumenti ottici per osservarlo direttamente.

Advarsel Stirr eller se ikke direkte p strlen med optiske instrumenter.

Aviso Não olhe fixamente para o raio, nem olhe para ele directamente com instrumentos ópticos.

¡Atención! No mirar fijamente el haz ni observarlo directamente con instrumentos ópticos.

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

Radiation from Open Port Apertures Warning



WARNING: Because invisible radiation might be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures.

Waarschuwing Aangezien onzichtbare straling vanuit de opening van de poort kan komen als er geen fiberkabel aangesloten is, dient blootstelling aan straling en het kijken in open openingen vermeden te worden.

Varoitus Koska portin aukosta voi emittoitua näkymätöntä säteilyä, kun kuitukaapelia ei ole kytkettynä, vältä säteilylle altistumista äläkä katso avoimiin aukkoihin.

Attention 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 stråling genom att inte stirra in i oskyddade öppningar.

Maintenance and Operational Safety Guidelines and Warnings

IN THIS SECTION

- [Battery Handling Warning | 393](#)
- [Jewelry Removal Warning | 394](#)
- [Lightning Activity Warning | 396](#)
- [Operating Temperature Warning | 397](#)
- [Product Disposal Warning | 399](#)

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 ontplofingsgevaar als de batterij verkeerd vervangen wordt. Vervang de batterij slechts met hetzelfde of een equivalent type dat door de fabrikant aanbevolen is. Gebruikte batterijen dienen overeenkomstig fabrieksvoorschriften weggeworpen te worden.

Varoitus Räjähdyksen vaara, jos akku on vaihdettu väärään akkuun. Käytä vaihtamiseen ainoastaan saman- tai vastaavantyyppistä akkua, joka on valmistajan suosittelema. Hävitä käytetyt akut valmistajan ohjeiden mukaan.

Attention 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 kuumentuvat, kun ne ovat yhteydessä sähkövirran ja maan kanssa, ja ne voivat aiheuttaa vakavia palovammoja tai hitsata metalliesineet kiinni liitännänpoihin.

Attention 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 klokke) 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.

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

Attention 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.

Attention 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 encaminhador 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 aberturas 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.

Attention 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 requirements and protect against lightning surges and commercial power disturbances, the intrabuilding ports *must not* be metallicity 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 metallicity to OSP wiring.



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.

- Install the device in compliance with the following local, national, and international electrical codes:
 - United States—National Fire Protection Association (NFPA 70), United States National Electrical Code.
 - Other countries—International Electromechanical Commission (IEC) 60364, Part 1 through Part 7.
 - Evaluated to the TN power system.
 - Canada—Canadian Electrical Code, Part 1, CSA C22.1.
 - Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.

Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.
- Locate the emergency power-off switch for the room in which you are working so that if an electrical accident occurs, you can quickly turn off the power.
- Make sure that grounding surfaces are cleaned and brought to a bright finish before grounding connections are made.
- Do not work alone if potentially hazardous conditions exist anywhere in your workspace.
- Never assume that power is disconnected from a circuit. Always check the circuit before starting to work.

- Carefully look for possible hazards in your work area, such as moist floors, ungrounded power extension cords, and missing safety grounds.
- Operate the device within marked electrical ratings and product usage instructions.
- To ensure that the device and peripheral equipment function safely and correctly, use the cables and connectors specified for the attached peripheral equipment, and make certain they are in good condition.

You can remove and replace many device components without powering off or disconnecting power to the device, as detailed elsewhere in the hardware documentation for this device. Never install equipment that appears to be damaged.

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 128 on page 402](#)) in one hand and touch the exposed, bare metal of the device with the other hand immediately before inserting the component into the device.



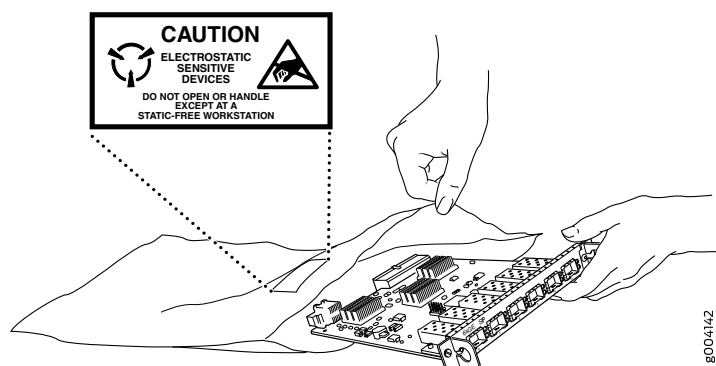
WARNING: For safety, periodically check the resistance value of the ESD grounding strap. The measurement must be in the range 1 through 10 Mohms.

- 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 128 on page 402](#)). If you are returning a component, place it in an antistatic bag before packing it.

Figure 128: 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.

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。

9017253

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.

Attention 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 Electrical Safety Guidelines

DC Power Electrical Safety Guidelines

The following electrical safety guidelines apply to a DC-powered services gateway:

- A DC-powered services gateway is equipped with a DC terminal block that is rated for the power requirements of a maximally configured services gateway. To supply sufficient power, terminate the DC input wiring on a facility DC source capable of supplying at least 30 A @ -48 VDC for the system. We recommend that the 48 VDC facility DC source be equipped with a circuit breaker rated at 40 A (-48 VDC) minimum, or as required by local code. Incorporate an easily accessible disconnect device into the facility wiring. In the United States and Canada, the -48 VDC facility should be equipped with a circuit breaker rated a minimum of 125% of the power provisioned for the input in accordance with the National Electrical Code in the US and the Canadian Electrical Code in Canada. Be sure to connect the ground wire or conduit to a solid office (earth) ground. A closed loop ring is recommended for terminating the ground conductor at the ground stud.
- Run two wires from the circuit breaker box to a source of 48 VDC. Use appropriate gauge wire to handle up to 40 A.
- A DC-powered services gateway that is equipped with a DC terminal block is intended only for installation in a restricted access location. In the United States, a restricted access area is one in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code ANSI/NFPA 70.

NOTE: Primary overcurrent protection is provided by the building circuit breaker. This breaker should protect against excess currents, short circuits, and earth faults in accordance with NEC ANSI/NFPA70.

- Ensure that the polarity of the DC input wiring is correct. Under certain conditions, connections with reversed polarity might trip the primary circuit breaker or damage the equipment.
- For personal safety, connect the green and yellow wire to safety (earth) ground at both the services gateway and the supply side of the DC wiring.

- The marked input voltage of -48 VDC for a DC-powered services gateway is the nominal voltage associated with the battery circuit, and any higher voltages are only to be associated with float voltages for the charging function.
- Because the services gateway is a positive ground system, you must connect the positive lead to the terminal labeled **RETURN**, the negative lead to the terminal labeled **-48V**, and the earth ground to the chassis grounding points.

DC Power Disconnection Warning



WARNING: Before performing any of the following 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 switch 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.

Attention Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifiez que le circuit en courant continu n'est plus sous tension. Pour en être sûr, localiser le disjoncteur situé sur le panneau de service du circuit en courant continu, placer le disjoncteur en position fermée (OFF) et, à l'aide d'un ruban adhésif, bloquer la poignée du disjoncteur en position OFF.

Warnung Vor Ausführung der folgenden Vorgänge ist sicherzustellen, daß die Gleichstromschaltung keinen Strom erhält. Um sicherzustellen, daß sämtlicher Strom abgestellt ist, machen Sie auf der Schalttafel den Unterbrecher für die Gleichstromschaltung ausfindig, stellen Sie den Unterbrecher auf AUS, und kleben Sie den Schaltergriff des Unterbrechers mit Klebeband in der AUS-Stellung fest.

Avvertenza Prima di svolgere una qualsiasi delle procedure seguenti, verificare che il circuito CC non sia alimentato. Per verificare che tutta l'alimentazione sia scollegata (OFF), individuare l'interruttore automatico sul quadro strumenti che alimenta il circuito CC, mettere l'interruttore in posizione OFF e fissarlo con nastro adesivo in tale posizione.

Advarsel Før noen av disse prosedyrene utføres, kontroller at strømmen er frakoblet likestrømkretsen. Sørg for at all strøm er slått AV. Dette gjøres ved å lokalisere strømbryteren på brytertavlen som betjener likestrømkretsen, slå strømbryteren AV og teipe bryterhåndtaket på strømbryteren i AV-stilling.

Aviso Antes de executar um dos seguintes procedimentos, certifique-se que desligou a fonte de alimentação de energia do circuito de corrente contínua. Para se assegurar

que toda a corrente foi DESLIGADA, localize o disjuntor no painel que serve o circuito de corrente contínua e coloque-o na posição OFF (Desligado), segurando nessa posição a manivela do interruptor do disjuntor com fita isoladora.

¡Atención! Antes de proceder con los siguientes pasos, comprobar que la alimentación del circuito de corriente continua (CC) esté cortada (OFF). Para asegurarse de que toda la alimentación esté cortada (OFF), localizar el interruptor automático en el panel que alimenta al circuito de corriente continua, cambiar el interruptor automático a la posición de Apagado (OFF), y sujetar con cinta la palanca del interruptor automático en posición de Apagado (OFF).

Varning! Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten. Kontrollera att all strömförsörjning är BRUTEN genom att slå AV det överspänningsskydd som skyddar likströmskretsen och tejpa fast överspänningsskyddets omkopplare i FRÅN-läget.

DC Power Grounding Requirements and Warning

An insulated grounding conductor that is identical in size to the grounded and ungrounded branch circuit supply conductors, but is identifiable by green and yellow stripes, is installed as part of the branch circuit that supplies the unit. The grounding conductor is a separately derived system at the supply transformer or motor generator set.



WARNING: When installing the services gateway, 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.

Attention 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 should 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 V naar -48 V, +RTN naar +RTN, aarde naar aarde.

Varoitus Oikea yhdistettävä 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.

Attention 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 na extremidade da fiação. Ao conectar a potência, a seqüência apropriada da fiação é moída para moer, +RTN a +RTN, então -48 V a -48 V. Ao desconectar a potência, a seqüência apropriada da fiação é -48 V a -48 V, +RTN a +RTN, moeu então para moer. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último.

Varning! Korrekt kopplingssekvens ar jord till jord, +RTN till +RTN, -48 V till - 48 V. Korrekt kopplas kopplingssekvens ar -48 V till -48 V, +RTN till +RTN, jord till jord.

DC Power Wiring Terminations Warning



WARNING: When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations should be the appropriate size for the wires and should clamp both the insulation and conductor.

Waarschuwing Wanneer geslagen bedrading vereist is, dient u bedrading te gebruiken die voorzien is van goedgekeurde aansluitingspunten, zoals het gesloten-lus type of het grijperschop type waarbij de aansluitpunten omhoog wijzen. Deze aansluitpunten dienen de juiste maat voor de draden te hebben en dienen zowel de isolatie als de geleider vast te klemmen.

Varoitus Jos säikeellinen johdin on tarpeen, käytä hyväksyttyä johdinliitääntä, esimerkiksi suljettua silmukkaa tai kourumaista liitääntä, jossa on ylöspäin käännetyt kiinnityskorvat. Tällaisten liitääntöjen tulee olla kooltaan johtimiin sopivia ja niiden tulee puristaa yhteen sekä eristeen että johdinosan.

Attention 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 Verdrahtungsanschlüsse, z.B. Ringoesen oder gabelförmige Kabelschuhe mit nach oben gerichteten Enden 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 ledningen.

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 slutet eller öppen typ med uppåtvänd tapp. Storleken på dessa kontakter måste vara avpassad till ledningarna och måste kunna hålla både isoleringen och ledaren fastklämda.

RELATED DOCUMENTATION

[Action to Take After an Electrical Accident | 428](#)

[General Electrical Safety Guidelines and Warnings | 400](#)

[AC Power Electrical Safety Guidelines | 402](#)

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.

Attention Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifiez 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).

Warning! Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten. Kontrollera att all strömförsörjning är BRUTEN genom att slå AV det överspänningsskydd som skyddar likströmskretsen och tejpa fast överspänningsskyddets omkopplare i FRÅN-läget.

DC Power Grounding Requirements and Warning

An insulated grounding conductor that is identical in size to the grounded and ungrounded branch circuit supply conductors but is identifiable by green and yellow stripes is installed as part of the branch circuit that supplies the device. The grounding conductor is a separately derived system at the supply transformer or motor generator set.



WARNING: When you install the device, the ground connection must always be made first and disconnected last.

Waarschuwing Bij de installatie van het toestel moet de aardverbinding altijd het eerste worden gemaakt en het laatste worden losgemaakt.

Varoitus Laitetta asennettaessa on maahan yhdistäminen aina tehtävä ensiksi ja maadoituksen irti kytkeminen viimeiseksi.

Attention Lors de l'installation de l'appareil, la mise à la terre doit toujours être connectée en premier et déconnectée en dernier.

Warnung Der Erdanschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden.

Avvertenza In fase di installazione dell'unità, eseguire sempre per primo il collegamento a massa e disconnetterlo per ultimo.

Advarsel Når enheten installeres, må jordledningen alltid tilkobles først og frakobles sist.

Aviso Ao instalar a unidade, a ligação à terra deverá ser sempre a primeira a ser ligada, e a última a ser desligada.

¡Atención! Al instalar el equipo, conectar la tierra la primera y desconectarla la última.

Varning! Vid installation av enheten måste jordledningen alltid anslutas först och kopplas bort sist.

DC Power Wiring Sequence Warning



WARNING: Wire the DC power supply using the appropriate lugs. When connecting power, the proper wiring sequence is ground to ground, +RTN to +RTN, then -48 V to -48 V. When disconnecting power, the proper wiring sequence is -48 V to -48 V, +RTN to +RTN, then ground to ground. Note that the ground wire must always be connected first and disconnected last.

Waarschuwing De juiste bedradingsvolgorde verbonden is aarde naar aarde, +RTN naar +RTN, en -48 V naar -48 V. De juiste bedradingsvolgorde losgemaakt is en -48 naar -48 V, +RTN naar +RTN, aarde naar aarde.

Varoitus Oikea yhdistettävä kytkentäjäjestys on maajohto maajohtoon, +RTN varten +RTN, -48 V varten -48 V. Oikea irrotettava kytkentäjäjestys on -48 V varten -48 V, +RTN varten +RTN, maajohto maajohtoon.

Attention 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 na EXTremidade da fiação. Ao conectar a potência, a seqüência apropriada da fiação é moída para moer, +RTN a +RTN, então -48 V a -48 V. Ao desconectar a potência, a seqüência apropriada da fiação é -48 V a -48 V, +RTN a +RTN, moeu então para moer. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último.

Varning! Korrekt kopplingssekvens ar jord till jord, +RTN till +RTN, -48 V till -48 V. Korrekt kopplas kopplingssekvens ar -48 V till -48 V, +RTN till +RTN, jord till jord.

DC Power Wiring Terminations Warning



WARNING: When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations must be the appropriate size for the wires and must clamp both the insulation and conductor.

Waarschuwing Wanneer geslagen bedrading vereist is, dient u bedrading te gebruiken die voorzien is van goedgekeurde aansluitingspunten, zoals het gesloten-lus type of het grijperschop type waarbij de aansluitpunten omhoog wijzen. Deze aansluitpunten dienen de juiste maat voor de draden te hebben en dienen zowel de isolatie als de geleider vast te klemmen.

Varoitus Jos säikeellinen johdin on tarpeen, käytä hyväksyttyä johdinliitääntä, esimerkiksi suljettua silmukkaa tai kourumaista liitääntä, jossa on ylöspäin käännetyt kiinnityskorvat. Tällaisten liitääntöjen tulee olla kooltaan johtimiin sopivia ja niiden tulee puristaa yhteen sekä eristeen että johdinosan.

Attention Quand des fils torsadés sont nécessaires, utiliser des douilles terminales homologuées telles que celles à circuit fermé ou du type à plage ouverte avec cosses rebroussées. Ces douilles terminales doivent être de la taille qui convient aux fils et doivent être refermées sur la gaine isolante et sur le conducteur.

Warnung Wenn Litzenverdrahtung erforderlich ist, sind zugelassene Verdrahtungsabschlüsse, z.B. für einen geschlossenen Regelkreis oder gabelförmig, mit nach oben gerichteten Kabelschuhen zu verwenden. Diese Abschlüsse sollten die angemessene Größe für die Drähte haben und sowohl die Isolierung als auch den Leiter festklemmen.

Avvertenza Quando occorre usare trecce, usare connettori omologati, come quelli a occhiello o a forcella con linguette rivolte verso l'alto. I connettori devono avere la misura adatta per il cablaggio e devono serrare sia l'isolante che il conduttore.

Advarsel Hvis det er nødvendig med flertrådede ledninger, brukes godkjente ledningsavslutninger, som for eksempel lukket sløyfe eller spadetype med oppoverbøyde kabelsko. Disse avslutningene skal ha riktig størrelse i forhold til ledningene, og skal klemme sammen både isolasjonen og lederen.

Aviso Quando forem requeridas montagens de instalação eléctrica de cabo torcido, use terminações de cabo aprovadas, tais como, terminações de cabo em circuito fechado e planas com terminais de orelha voltados para cima. Estas terminações de cabo deverão ser do tamanho apropriado para os respectivos cabos, e deverão prender simultaneamente o isolamento e o fio condutor.

¡Atención! Cuando se necesite hilo trenzado, utilizar terminales para cables homologados, tales como las de tipo "bucle cerrado" o "espada", con las lengüetas de

conexión vueltas hacia arriba. Estos terminales deberán ser del tamaño apropiado para los cables que se utilicen, y tendrán que sujetar tanto el aislante como el conductor.

Varning! När flertrådiga ledningar krävs måste godkända ledningskontakter användas, t.ex. kabelsko av slutet 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.

Attention 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.

Attention Ce dispositif a été conçu pour fonctionner avec des systèmes d'alimentation TN.

Warnung Das Gerät ist für die Verwendung mit TN-Stromsystemen ausgelegt.

Avvertenza Il dispositivo è stato progettato per l'uso con sistemi di alimentazione TN.

Advarsel Utstyret er utfomet til bruk med TN-strømsystemer.

Aviso O dispositivo foi criado para operar com sistemas de corrente TN.

¡Atención! El equipo está diseñado para trabajar con sistemas de alimentación tipo TN.

Varning! Enheten är konstruerad för användning tillsammans med elkraftssystem av TN-typ.

Action to Take After an Electrical Accident

If an electrical accident results in an injury, take the following actions in this order:

1. Use caution. Be aware of potentially hazardous conditions that could cause further injury.
2. Disconnect power from the device.
3. If possible, send another person to get medical aid. Otherwise, assess the condition of the victim, then call for help.

SRX5400 Services Gateway Agency Approvals

The services gateway complies with the following standards:

- Safety
 - EN 60825-1 Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide
 - CSA 60950-1 Safety of Information Technology Equipment
 - UL 60950-1 Safety of Information Technology Equipment
 - EN 60950-1 Safety of Information Technology Equipment
 - IEC 60950-1 Safety of Information Technology Equipment (with country deviations)
- EMC/EMI/ETSI
 - AS/NZS CISPR22 (Australia/New Zealand)
 - FCC Part 15 Class A USA Radiated Emissions
 - EN 55022 Class A European Radiated Emissions
 - VCCI Class A Japanese Radiated Emissions
 - ETSI EN-300386 V1.3.3 Telecom Network Equipment. Electromagnetic Compatibility Requirements
- Immunity
 - EN 55024 +A1+A2 Information Technology Equipment Immunity Characteristics
 - EN-61000-3-2 Power Line Harmonics
 - EN-61000-3-3 +A1 +A2 +A3 Power Line Voltage Fluctuations and Flicker
 - EN-61000-4-2 +A1 +A2 Electrostatic Discharge
 - EN-61000-4-3 +A1+A2 Radiated Immunity
 - EN-61000-4-4 Electrical Fast Transients
 - EN-61000-4-5 Surge
 - EN-61000-4-6 Immunity to Conducted Disturbances
 - EN-61000-4-11 Voltage Dips and Sags
- NEBS
 - 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)

RELATED DOCUMENTATION

[SRX5400 Services Gateway Environmental Specifications | 146](#)

[SRX5400 Services Gateway Physical Specifications | 29](#)

[SRX5400 Services Gateway Compliance Statements for EMC Requirements | 430](#)

SRX5400 Services Gateway Compliance Statements for EMC Requirements

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- [European Community | 430](#)
- [Israel | 431](#)
- [Japan | 431](#)
- [United States | 431](#)

Canada

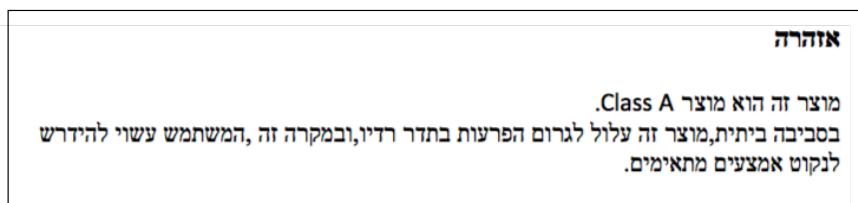
This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

European Community

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user might be required to take adequate measures.

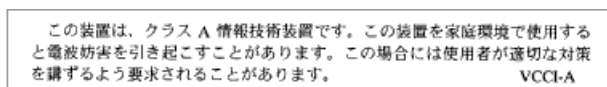
Israel



The preceding translates as follows:

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

Japan



The preceding translates as follows:

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

VCCI-A

United States

The services gateway has been tested and found to comply with the limits for a Class A digital device of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RELATED DOCUMENTATION

[SRX5400 Services Gateway Environmental Specifications | 146](#)

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](#)
- [EX4500](#)

- EX4550
- EX4600
- EX8200
- XRE200 External Routing Engine

LN Series:

- LN1000-CC

MX Series:

- M7i
- M7i Compact Forwarding Engine Board (CFEB)
- M40e and M10i
- M320
- MX5, MX10, MX40, and MX80
- MX104
- MX204
- MX240, MX480, and MX960
- MX10003
- RE-A-2000 Route Engine
- RE-S-X6-64G Routing Engine

QFX Series:

- QFX3008-I
- QFX3100
- QFX3500
- QFX3600
- QFX5100-24Q
- QFX5100-48S
- QFX5100-48T
- QFX5110-32Q
- QFX5110-48S
- QFX5200

- QFX5200-32C
- QFX10008 and QFX10016

SRX Series:

- SRX100
- SRX110
- SRX210B
- SRX210H-POE
- SRX210H-P-MGW
- SRX220
- SRX240H
- SRX240H-POE
- SRX300
- SRX320
- SRX340 and SRX345
- SRX550
- SRX650
- SRX1400
- SRX1500
- SRX3400 and SRX3600
- SRX5400, SRX5600, and SRX5800
- SRX-MP-1SERIAL
- SSG-520M

T Series:

- RE-A-2000 Route Engine