SRX3400 Services Gateway

Hardware Guide

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SRX3400 Services Gateway Hardware Guide

Revision History
August 2012—Revision 08
December 2012—Revision 09 Added NP-IOC, moved CFM and module content into *SRX1400, SRX3400, and SRX3600 Services Gateway Module Guide*.
June 2013—Revision 10 Incorporated additional warnings that the chassis must be connected to earth ground.
December 2013—Revision 11 Minor revisions.
April 2014—Added the steps to copy certificates when replacing a routing engine in a chassis cluster.
June 2014—Added the EMC compliance requirements in Israel and the procedure to perform initial software configuration using J-Web

The information in this document is current as of the date on the title page.

Table of Contents

About This Guide

Objectives

This guide describes hardware components and installation, basic configuration, and basic troubleshooting procedures for the Juniper Networks SRX3400 Services Gateway. It explains how to prepare your site for services gateway installation, unpack and install the hardware, power on the services gateway, perform initial software configuration, and perform routine maintenance. After completing the installation and basic configuration procedures covered in this guide, see the Junos OS configuration guides for information about further Junos OS configuration.

Audience

This guide is designed for network administrators who are installing and maintaining a Juniper Networks SRX3400 Services Gateway or preparing a site for services gateway installation. To use this guide, you need a broad understanding of networks in general and the Internet in particular, networking principles, and network configuration. Any detailed discussion of these concepts is beyond the scope of this guide.

Documentation Conventions

Table 1 on page x defines the 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 x defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the **configure** command: user@host> **configure**
`Fixed-width text like this`	Represents output that appears on the terminal screen.	`user@host>` **show chassis alarms** `No alarms currently active`
Italic text like this	• Introduces or emphasizes important new terms. • Identifies guide names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS CLI User Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# **set system domain-name** *domain-name*

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

Convention	Description	Examples
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level. • The console port is labeled **CONSOLE**.
< > (angle brackets)	Encloses optional keywords or variables.	**stub <default-metric *metric*>;**
| (pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	**broadcast | multicast** **(*string1* | *string2* | *string3*)**
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	**rsvp { # Required for dynamic MPLS only**
[ ] (square brackets)	Encloses a variable for which you can substitute one or more values.	**community name members [*community-ids*]**

Indention and braces ({ })	Identifies a level in the configuration hierarchy.	[edit]
		routing-options {
		  static {
		  route default {
		  nexthop *address*;
		  retain;
		  }
		  }
		}

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
GUI Conventions		
Bold text like this	Represents graphical user interface (GUI) items you click or select.	• In the Logical Interfaces box, select **All Interfaces**. • To cancel the configuration, click **Cancel**.
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select **Protocols>Ospf**.

SRX Series Documentation and Release Notes

For a list of related SRX Series documentation, see http://www.juniper.net/techpubs/hardware/srx-series-main.html . If the information in the latest SRX Series Release Notes differs from the information in the documentation, follow the SRX Series Release Notes.

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To obtain the most current version of all Juniper Networks technical documentation, see the products documentation page on the Juniper Networks website at www.juniper.net/techpubs/ .

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- Document name
- Document part number
- Page number
- Software release version (not required for *Network Operations Guides [NOGs])*

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For international or direct-dial options in countries without toll-free numbers, visit us at www.juniper.net/support/requesting-support.html.

PART 1

SRX3400 Services Gateway Overview

CHAPTER 1

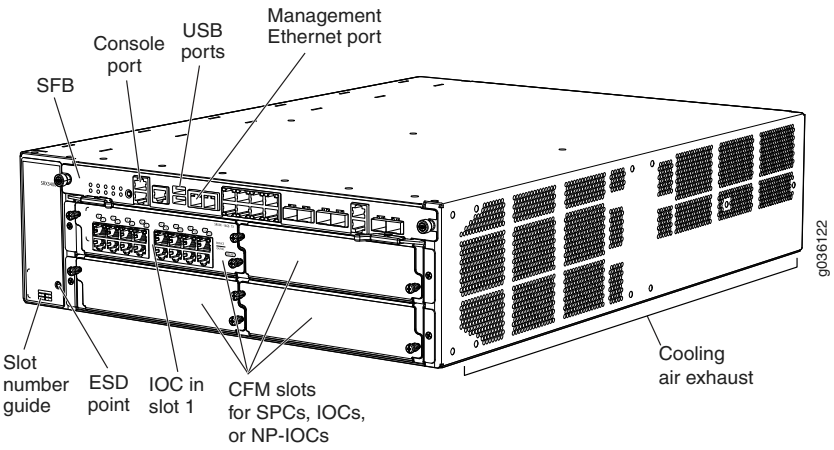
Introduction to the SRX3400 Services Gateway

This section includes the following topics:

SRX3400 Services Gateway Description

The SRX3400 Services Gateway is a high-performance, scalable, carrier-class security device with multi-processor architecture. The services gateway has a capacity of up to 20 gigabits per second (Gbps) in full duplex and is three rack units (U) tall. Sixteen services gateways can be stacked in a single floor-to-ceiling rack, for increased port density per unit of floor space. The services gateway provides seven common form-factor module (CFM) slots that can be populated with up to four Services Processing Cards (SPCs), up to two Network Processing Cards (NPCs), up to four I/O cards (IOCs), and up to six Network Processing I/O cards (NP-IOCs). The services gateway also has one dedicated slot for the Switch Fabric Board (SFB), one slot for a Routing Engine, one slot for an SRX Clustering Module (SCM), two slots for power supplies, and one slot for the fan tray and air filter.

Figure 1: SRX3400 Services Gateway



Related Documentation

- SRX3400 Services Gateway Performance and Features on page 4
- SRX3400 Services Gateway Physical Specifications on page 4
- SRX3400 Services Gateway Physical Specifications on page 4SRX3400 Services Gateway Chassis on page 7

SRX3400 Services Gateway Performance and Features

Table 3 on page 4 summarizes the performance and basic features of the SRX3400 Services Gateway.

Table 3: Summary of SRX3400 Services Gateway Features

Chassis height	3 U (5.25 in.)
Physical ports	Base configuration (built-in ports) 12 x 10/100/1000 Mbps Plus up to four IOCs of the available types.
Power supplies	• 1 for nonredundant configuration • 2 for redundant configuration

Related Documentation

- Available Components for the SRX3400 Services Gateway on page 9
- SRX3400 Services Gateway Physical Specifications on page 4
- SRX3400 Services Gateway Chassis on page 7

SRX3400 Services Gateway Physical Specifications

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

Table 4: Physical Specifications

Description	Value
Chassis dimensions	5.25 in. (13.3 cm) high 17.5 in. (44.5 cm) wide 25.5 in. (64.8 cm) deep (from front-mounting bracket to chassis rear)
Services gateway weight	Chassis with midplane, SFB, Routing Engine, fan tray, air filter, and AC power module: 51 lb (23 kg) Maximum configuration: 77 lb (35 kg)
Routing Engine weight	2.9 lb (1.3 kg)
SCM weight	2.0 lb (0.9 kg)

Table 4: Physical Specifications *(continued)*

Description	Value
SFB weight	5.1 lb (2.3 kg)
NPC weight	2.2 lb (1.0 kg)
SPC weight	3.7 lb (1.7 kg)
IOC weight	2.4 lb (1.1 kg)
Fan tray weight	4.2 lb (1.9 kg)
Air filter weight	0.2 lb (0.09 kg)
DC power supply weight	2.9 lb (1.3 kg)
AC power supply weight	3.1 lb (1.4 kg)

Related Documentation

- Available Components for the SRX3400 Services Gateway on page 9
- Hardware Component Locations in the SRX3400 Services Gateway Chassis on page 11
- SRX3400 Services Gateway Chassis on page 7

CHAPTER 2

SRX3400 Services Gateway Hardware Components

Nearly all components of the SRX3400 Services Gateway are field-replaceable units (FRUs), including the Switch Fabric Board (SFB), Routing Engine, Network Processing Cards (NPCs), Service Processing Cards (SPCs), and I/O cards (IOCs), power supply, fan tray, filter, and air deflector kits. To replace any of these components in your services gateway, see "Field-Replaceable Units on the SRX3400 Services Gateway" on page 111.

This section includes the following topics:

SRX3400 Services Gateway Chassis

The SRX3400 Services Gateway chassis, shown in Figure 2 on page 8 and Figure 3 on page 8, is a rigid sheet metal structure that houses all of the other services gateway components. The chassis measures 5.25 in. (13.3 cm) high, 17.5 in. (44.5 cm) wide, and 25.5 in. (64.8 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 telecommunications open-frame racks. Up to 16 services gateways can be installed in

one standard (48-U) rack if the rack can handle their combined weight, which can be greater than 1,232 lb (560 kg).

Figure 2: Front View of the SRX3400 Services Gateway

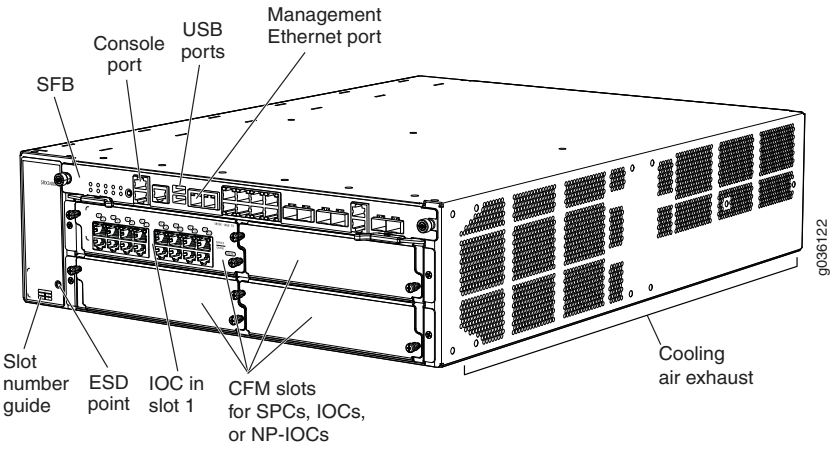
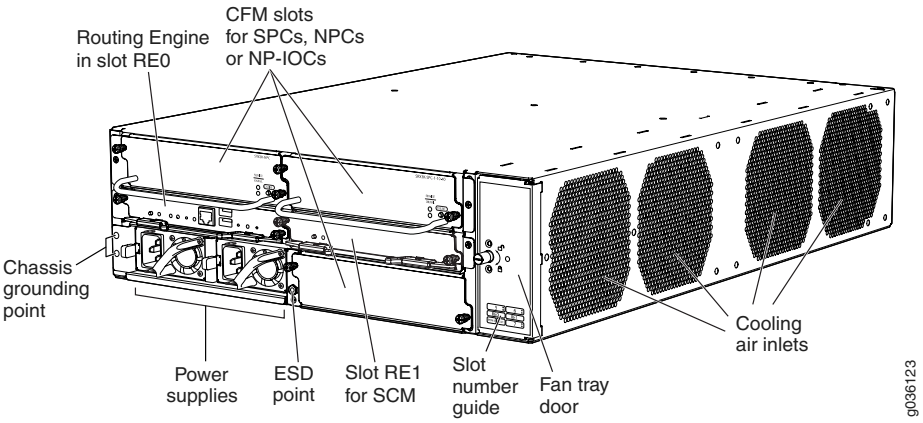


Figure 3: Rear View of the SRX3400 Services Gateway



Related Documentation

- SRX3400 Services Gateway Description on page 3
- SRX3400 Services Gateway CFMs on page 9
- Available Components for the SRX3400 Services Gateway on page 9
- Grounding the SRX3400 Services Gateway on page 76
- SRX3400 Services Gateway General Safety Guidelines and Warnings on page 145

SRX3400 Services Gateway Component Basics

This section describes the card form factors, the services gateway components available, and where they can be installed in the SRX3400 Services Gateway. It also describes the flow of data through the services gateway. This section includes the following topics:

SRX3400 Services Gateway CFMs

The services gateway chassis supports common form-factor modules (CFMs). A single-wide module format and a double-wide module format are available. I/O card (IOC), Services Processing Card (SPC), and Network Processing Card (NPC) modules are in single-wide CFM format. The Switch Fabric Board (SFB), Routing Engine, and SRX Clustering Module (SCM) are not in CFM format, and thus have assigned slots within the chassis. With the interchangeability among the IOCs, SPCs, and NPCs, you have more flexibility and scalability when deploying your networks based on the requirements in the field. For example, if you need more ports and bigger oversubscription ratio, then you can load more slots with IOCs; on the other hand, if you need smaller oversubscription ratio for better QoS behavior, or you need more security services, then you can load more slots with SPCs and only use the on-board network interface ports.

Related Documentation

- Installing CFM Cards in the SRX3400 Services Gateway on page 59
- SRX3400 Services Gateway Description on page 3
- Hardware Component Locations in the SRX3400 Services Gateway Chassis on page 11
- Available Components for the SRX3400 Services Gateway on page 9
- Data Flow in the SRX3400 Services Gateway on page 13

Available Components for the SRX3400 Services Gateway

Table 5 on page 9 lists the various components, and the number of each, that can be installed in the SRX3400 Services Gateway.

Table 5: Available SRX3400 Services Gateway Hardware Components

Hardware Component	Minimum/Maximum
Switch Fabric Board (SFB)	1 required
Routing Engine	1 required
SRX Clustering Module (SCM)	1 allowed
I/O cards (IOCs)	Up to 4 allowed

Table 5: Available SRX3400 Services Gateway Hardware Components *(continued)*

Hardware Component	Minimum/Maximum
Network Processing I/O Cards (NP-IOCs)	Up to 6 allowed (see note below)
Network Processing Cards (NPCs)	1 required, 2 allowed
Services Processing Cards (SPCs)	1 required, up to 4 allowed
Power supply	1 required, up to 2 allowed
Fan tray (containing multiple fans)	1 required

NOTE: A minimum configuration must include one SPC and either one NPC or one NP-IOC. However, if there are no NPCs in the chassis, the Ethernet ports on the SFB will not be functional. See "SRX3400 Services Gateway NPCs" on page 20, "SRX3400 Services Gateway NP-IOCs" on page 22, and "SRX3400 Services Gateway SPCs" on page 20 for details about these cards.

Table 6 on page 11 shows the supported combinations of SPCs, NPCs, and IOCs that can be installed in the SRX3400 Services Gateway. The support is different between standard and enhanced DC-powered services gateways because the standard DC power supplies have a lower power rating.

Table 6: Supported Combinations of SPCs, NPCs, and IOCs

AC Power Supplies or Enhanced DC Power Supplies			
		NPCs	
		1	2
SPCs	1	4 IOCs	4 IOCs
	2	4 IOCs	3 IOCs
	3	3 IOCs	2 IOCs
	4	2 IOCs	1 IOC
Standard DC Power Supplies			
		NPCs	
		1	2
SPCs	1	4 IOCs	4 IOCs
	2	4 IOCs	3 IOCs
	3	2 IOCs	1 IOCs
	4	0 IOCs	Not supported

Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Hardware Component Locations in the SRX3400 Services Gateway Chassis on page 11
- Data Flow in the SRX3400 Services Gateway on page 13

Hardware Component Locations in the SRX3400 Services Gateway Chassis

The SRX3400 Services Gateway is populated with one SFB, one Routing Engine, one power supply, and a fan tray plus air filter at the factory. You must install all other cards required to meet your configuration needs. Table 7 on page 12 lists the possible locations of the various hardware components in the SRX3400 Services Gateway.
Figure 4 on page 12 and Figure 5 on page 12 show the locations of the slots and the applicable modules.

Table 7: Allowed Slot Locations for the SRX3400 Services Gateway Components

Module Name	Allowed Slot Locations
SFB	Front slot labeled **0**.
Routing Engine	Rear slot labeled **RE0**.
SCM	Rear slot labeled **RE1**.
IOCs	Front slots labeled **1**–**4**.
NP-IOCs	Front slots labeled **1**–**4** and rear slots labeled **5**–**7**. We recommend that you install NP-IOCs in front panel slots to simplify cable management.
NPCs	Rear slots labeled **5**–**7**.
SPCs	Front slots labeled **1**–**4** and rear slots labeled **5**–**7**.
Power supplies	Rear slots (two) on bottom left of chassis.
Fan tray and air filter	Rear, vertical slot on far right of chassis.

Figure 4: Front Slots on the SRX3400 Services Gateway

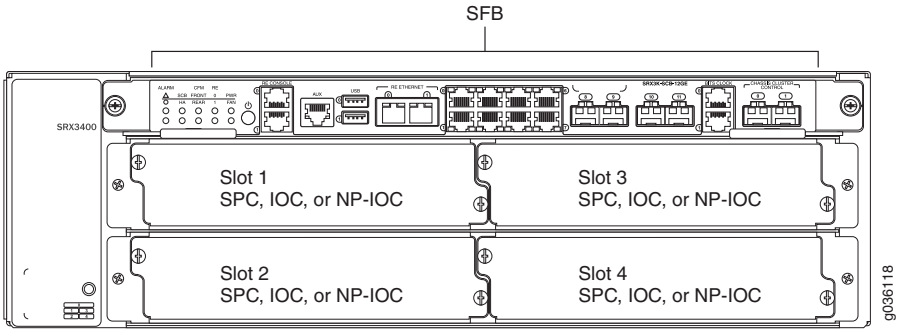
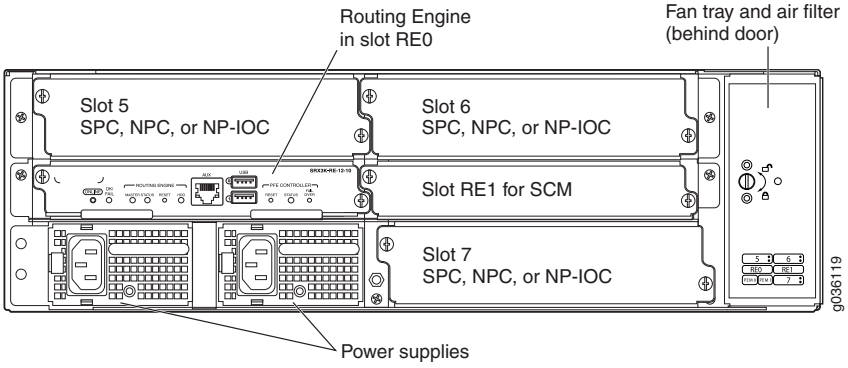


Figure 5: Rear Slots on the SRX3400 Services Gateway



NOTE: A minimum configuration must include one SPC and either one NPC or one NP-IOC. However, if there are no NPCs in the chassis, the Ethernet ports in the SFB will not be functional. See "SRX3400 Services Gateway NPCs" on page 20, "SRX3400 Services Gateway SPCs" on page 20 for details about these cards.

Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Available Components for the SRX3400 Services Gateway on page 9
- Installing CFM Cards in the SRX3400 Services Gateway on page 59
- Data Flow in the SRX3400 Services Gateway on page 13
- Installation Overview for the SRX3400 Services Gateway on page 49

Data Flow in the SRX3400 Services Gateway

The services gateway receives data from the various physical interfaces on the I/O cards (IOCs). Incoming data is passed through the Switch Fabric Board (SFB) to a Network Processing Card (NPC), back to the SFB and on to a Services Processing Card (SPC). The data is then passed out of the services gateway in reverse order—to the SFB, NPC, SFB, and out to the IOC.

Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Available Components for the SRX3400 Services Gateway on page 9
- Hardware Component Locations in the SRX3400 Services Gateway Chassis on page 11
- Installation Overview for the SRX3400 Services Gateway on page 49

SRX3400 Services Gateway Midplane

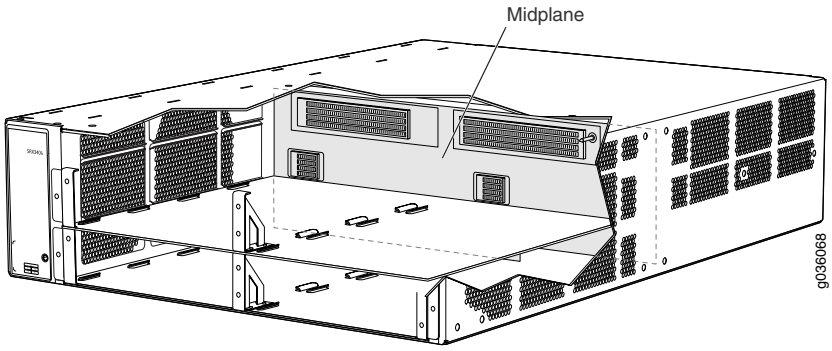
The midplane in the SRX3400 Services Gateway is in the center of the chassis and provides connections for installing up to four common form-factor modules (CFMs) through the front of the chassis and up to three CFMs through the rear of the chassis. See "Hardware Component Locations in the SRX3400 Services Gateway Chassis" on page 11 for details about where the individual modules can be installed. 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 IOCs and SPCs through the fabric ASICs on the SFBs.
- Power distribution—The services gateway power supplies are connected to the midplane, which distributes power to all of the services gateway components.

- Signal path—The midplane provides the signal path to the IOCs, SFBs, SPCs, Routing Engine, and other services gateway components for monitoring and control of the system.

Figure 6: Midplane



Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Available Components for the SRX3400 Services Gateway on page 9
- SRX3400 Services Gateway Switch Fabric Board on page 14
- SRX3400 Services Gateway NPCs on page 20
- SRX3400 Services Gateway SPCs on page 20

SRX3400 Services Gateway Switch Fabric Board

The Switch Fabric Board (SFB) is the data plane for the subsystems in the chassis. The SFB performs the following functions:

- Powers the services gateway on and off
- Controls clocking and distribution
- Provides eight copper Gigabit Ethernet ports and four fiber Gigabit Ethernet ports
- Provides two high availability (HA) Control ports
- Provides interconnections to all the IOCs within the chassis through integrated switch fabrics
- Handles arbitration among the CFMs
- Handles switching among multiple SPCs if present
- Provides service ports, system LEDs, and operational buttons on the front panel

Figure 7: Switch Fabric Board

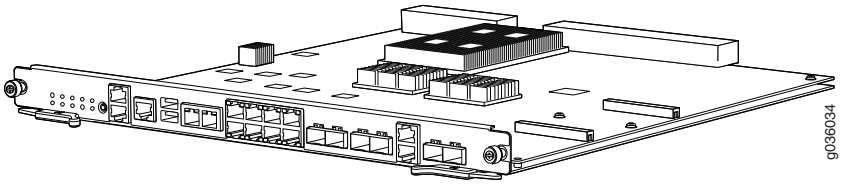


Table 8 on page 15 describes the behavior of the Power button near the left end of the SFB front panel.

Table 8: Power Button Behavior

Condition	Action	Result
Services gateway powered off	Short push (3 to 5 seconds)	Powers the services gateway on. The **PWR** LED blinks to show you that the Routing Engine is initializing.
Services gateway powered on	Short push (3 to 5 seconds)	Initiates a graceful shutdown that preserves the services gateway state information. The **PWR** LED blinks to show you that the services gateway is shutting down.
	Long push (15 seconds or more)	Initiates an immediate shutdown. The services gateway state information will be lost. Avoid using immediate shutdown unless necessary.

Table 9 on page 15 describes the system behavior indicated by the various LEDs on the front panel of the SFB. LEDs are listed based on their location on the services gateway, from left to right. Table 10 on page 18 describes the ports/connections available on the front panel of the SFB.

Table 9: Switch Fabric Board LED Indicators

Label	Color	Status	Indicated Behavior
Alarm (pair)			
Non-Critical (Top)	Yellow	On steadily	A noncritical alarm is present in the system. Examples of noncritical alarms include: • Memory usage is high on the Services Processing Unit (SPU); less than 10% available. • The maximum number of sessions has been reached. • The maximum number of tunnels has been reached. • HA status has changed. • Services gateway temperature is too warm.
	Dark (unlit)	Off	No alarms are present in the system.

Table 9: Switch Fabric Board LED Indicators *(continued)*

Label	Color	Status	Indicated Behavior
Critical (Bottom)	Red	On steadily	A critical alarm is present in the system. A hardware component or software module has failed, or the network management interface is down.
	Dark (unlit)	Off	No critical alarms are present in the system.
SFB and HA (pair)			
SFB	Green	On steadily	The SFB is operating normally.
	Green	Blinking	The SFB is initializing.
	Amber	On steadily	The switch fabric is operating normally, but the Ethernet interfaces are not operating normally.
	Red	On steadily	The SFB has failed and is not operating normally.
HA	Green	On steadily	High availability is operating normally. All cluster members and all HA links are available.
	Amber	On steadily	An alarm is present on the HA link. All cluster members are present, but some HA links are down. There are still enough links for full functionality, but performance could be impaired (reduced bandwidth could cause packets to get dropped, or reduced resiliency as a single point of failure might now exist).
	Red	On steadily	A critical alarm is present on the HA. One or more cluster members are missing or unreachable; or active when secondary-path is engaged.
	Dark (unlit)	Off	HA is disabled—Services gateway is not configured for clustering or HA is disabled by secondary path.
CFM Status (pair)			

Table 9: Switch Fabric Board LED Indicators *(continued)*

Label	Color	Status	Indicated Behavior
SERVICE (top)	Green	On steadily	The SFB and all installed CFM cards are operating normally. The **SERVICE** LEDs on all installed CFM cards are green.
	Amber	On steadily	The SFB or one or more of the installed CFM cards has reported a minor error condition. The **SERVICE** LEDs on the CFM cards reporting the error are amber.
	Red	On steadily	The SFB or one or more of the installed CFM cards has failed. The **SERVICE** LEDs on the failed CFM cards are red.
	Dark (unlit)	Off	One or more of the installed CFM cards are disabled. The **SERVICE** LEDs on the disabled CFM cards are dark.
OK/FAIL (bottom)	Green	On steadily	The SFB and all installed CFM cards are operating normally. The **OK/FAIL** LEDs on all installed CFM cards are green.
	Red	On steadily	The SFB or one or more of the installed CFM cards has failed. The **OK/FAIL** LEDs on the failed CFM cards are red.
	Dark (unlit)	Off	One or more of the installed CFM cards are offline. The **OK/FAIL** LEDs on the offline CFM cards are dark.
Routing Engine Status (pair)			
RE0 (top)	Green	On steadily	The Routing Engine in RE0 is functioning as the master Routing Engine. Only one Routing Engine can be installed.
		Blinking	The Routing Engine in slot RE0 is initializing.
	Red	On steadily	Either the Routing Engine or Control Board function on RE0 has failed and is not operating normally.
	Dark (unlit)	Off	The RE0 slot is empty.
RE1 (bottom)	Unused.		
Power and Fan (pair)			

Table 9: Switch Fabric Board LED Indicators *(continued)*

Label	Color	Status	Indicated Behavior
PWR (top)	Green	On steadily	The services gateway is receiving power. The Power Good signal for all installed power supplies has been received after Routing Engine initialization.
		Blinking	The services gateway is in one of two states: • Services gateway is receiving power and is in the process of booting up but has not yet initialized the Routing Engine. • Services gateway is in the process of graceful shutdown.
	Amber	On steadily	One of the power supplies has failed, but the power available from the remaining power supplies is sufficient to power all the installed components.
	Red	On steadily	One or more of the power supplies have failed, and the power available from the remaining power supplies is not sufficient to power all the installed components.
	Dark (unlit)	Off	The services gateway is shut down.
FAN (bottom)	Green	On steadily	The cooling system is operating normally.
	Red	On steadily	The cooling system has failed (one or more fans in the fan tray are not operating normally).

NOTE: All SFB status LEDs remain unlit until Routing Engine initialization is complete. The PWR LED blinks green until Routing Engine initialization is complete, at which point the LED becomes solid green.

Table 10: Switch Fabric Board Front Panel Ports and Connectors

Panel Label	Description
RE CONSOLE 0	RJ-45 console port used to connect to the Routing Engine inserted in slot RE0.
RE CONSOLE 1	Unused.
AUX	Unused.
USB0 (top), **USB1** (bottom)	Universal serial bus connectors that can be managed and accessed by the master Routing Engine.
RE ETHERNET 0	RJ-45 port used to manage the Routing Engine in slot RE0.

Table 10: Switch Fabric Board Front Panel Ports and Connectors *(continued)*

Panel Label	Description
RE ETHERNET 1	Unused.
(On-board copper Ethernet ports)	Eight 10/100/1000 Ethernet over copper media ports. The ports use RJ-45 connectors and are numbered from 0-7, top to bottom, left to right.
(On-board fiber Ethernet ports)	Four Ethernet over fiber media ports. The ports use small form-factor connectors and are numbered 8-11 from left to right. Also supports copper SFPs.
BITSCLK0 (top), **BITSCLK1** (bottom)	Unused.
CHASSIS CLUSTER CONTROL 0 (left), **CHASSIS CLUSTER CONTROL 1** (right)	SFP high availability ports. **CHASSIS CLUSTER CONTROL 0** connects to the control functions on the Routing Engine in slot RE0. **CHASSIS CLUSTER CONTROL 1** connects to the SRX Clustering Module (SCM), if any, in slot RE1. NOTE: We strongly recommend the use of Juniper Networks SFP and XFP transceivers. We cannot guarantee correct operation if other transceivers are used. The transceiver type can be different in each port, as long as a supported part number is used.

Related Documentation

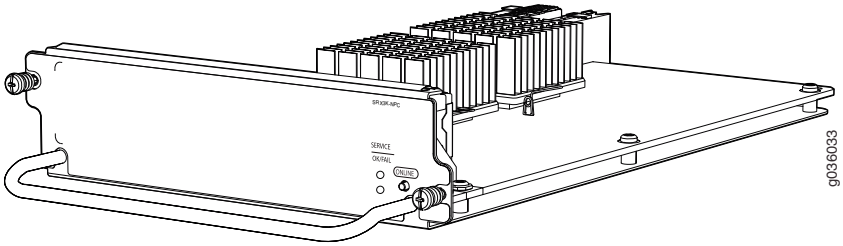
- SRX3400 Services Gateway Chassis on page 7
- Available Components for the SRX3400 Services Gateway on page 9
- SRX3400 Services Gateway NPCs on page 20
- SRX3400 Services Gateway SPCs on page 20
- SRX3400 Services Gateway NP-IOCs on page 22

SRX3400 Services Gateway NPCs

Network Processing Cards (NPCs) are common form-factor module (CFM) cards that receive inbound traffic from I/O cards (IOCs) and direct it to the appropriate Services Processing Card (SPC) for processing. Once services processing is complete, the NPC receives outbound traffic from the SPC(s) and directs it back to the appropriate IOC. Additionally, the NPC performs the following functions:

- Buffers incoming traffic and queues outgoing traffic.
- Performs advanced traffic management, including DoS/DDoS protective measures. For example, it can drop traffic to or from a particular IP address, protecting from ICMP, UDP, and TCP SYN flooding, and buffering bursty traffic to protect the Services Processing Card (SPC).

Figure 8: Typical NPC



For detailed information about the NPCs supported by the services gateway, see the *SRX1400, SRX3400, and SRX3600 Services Gateway Module Guide* at www.juniper.net/techpubs/.

Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Installing CFM Cards in the SRX3400 Services Gateway on page 59
- Available Components for the SRX3400 Services Gateway on page 9
- SRX3400 Services Gateway Switch Fabric Board on page 14
- SRX3400 Services Gateway SPCs on page 20
- SRX3400 Services Gateway IOCs on page 21
- SRX3400 Services Gateway NP-IOCs on page 22

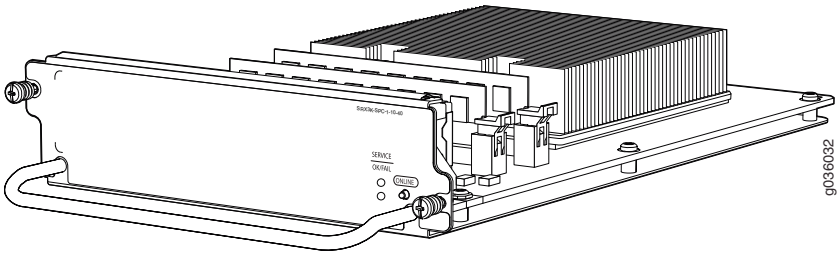
SRX3400 Services Gateway SPCs

Services Processing Cards (SPCs) are common form-factor module (CFM) cards that 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 service processing applied to it. Traffic is intelligently distributed by Network Processing Cards (NPCs) to SPCs for service processing, including session setup based on policies, fast packet processing for packets that match a session, encryption and decryption, and IKE negotiation.

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

NOTE: If a CFM 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 9: Typical Services Processing Card



For detailed information about the SPCs supported by the services gateway, see the *SRX1400, SRX3400, and SRX3600 Services Gateway Module Guide* at www.juniper.net/techpubs/.

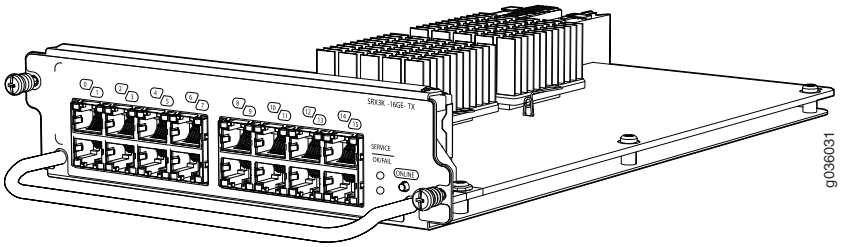
Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Installing CFM Cards in the SRX3400 Services Gateway on page 59
- Available Components for the SRX3400 Services Gateway on page 9
- SRX3400 Services Gateway Switch Fabric Board on page 14
- SRX3400 Services Gateway NPCs on page 20
- SRX3400 Services Gateway IOCs on page 21
- SRX3400 Services Gateway NP-IOCs on page 22

SRX3400 Services Gateway IOCs

I/O cards (IOCs) are common form-factor module (CFM) cards that provide additional physical network connections to the services gateway to supplement the Ethernet ports on the Switch Fabric Board (SFB). Their primary function is to deliver data packets arriving on the physical ports to the Network Processing Card (NPC) and to forward data packets out the physical ports after services processing. The SRX3400 Services Gateway has four slots in the front of the chassis where you can install IOCs. You can install any combination of IOCs in the slots. Figure 10 on page 22 shows a typical IOC.

Figure 10: Typical IOC (16-Port Copper 10/100/1000 IOC Shown, Other IOCs Similar)



NOTE: When the services gateway is in the services offload mode supported in Junos OS release 12.1X44-D10 and later, IOCs are only supported in front panel slots 1 through 3. See the Junos OS documentation for more information about services offload mode.

For detailed information about the IOCs supported by the services gateway, see the *SRX1400, SRX3400, and SRX3600 Services Gateway Module Guide* at www.juniper.net/techpubs/.

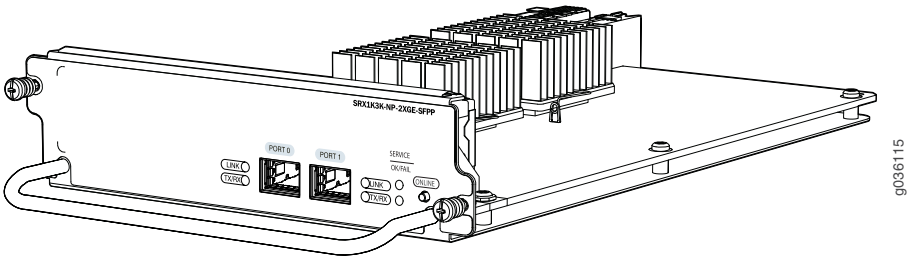
Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Installing CFM Cards in the SRX3400 Services Gateway on page 59
- Available Components for the SRX3400 Services Gateway on page 9
- SRX3400 Services Gateway Switch Fabric Board on page 14
- SRX3400 Services Gateway NPCs on page 20
- SRX3400 Services Gateway SPCs on page 20
- SRX3400 Services Gateway NP-IOCs on page 22

SRX3400 Services Gateway NP-IOCs

Network Processing I/O Cards (NP-IOCs) are IOCs designed specifically for low-latency applications. Each NP-IOC has its own network processing unit (NPU), so that traffic traversing the NP-IOC does not have to traverse the services gateway bus to a remote network processing card (NPC). It is inserted horizontally into the midplane of the services gateway to communicate with the Switch Fabric Board (SFB) and to receive power. Figure 11 on page 23 shows a typical NP-IOC.

Figure 11: Typical NP-IOC



NOTE: You can install NP-IOCs instead of NPCs and IOCs in the services gateway. However, if no NPCs are present, the Ethernet ports on the SFB will not be functional.

For detailed information about the NP-IOCs supported by the services gateway, see the *SRX1400, SRX3400, and SRX3600 Services Gateway Module Guide* at www.juniper.net/techpubs/.

Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Installing CFM Cards in the SRX3400 Services Gateway on page 59
- Available Components for the SRX3400 Services Gateway on page 9
- SRX3400 Services Gateway Switch Fabric Board on page 14
- SRX3400 Services Gateway NPCs on page 20
- SRX3400 Services Gateway SPCs on page 20

SRX3400 Services Gateway Routing Engine

The Routing Engine is a PowerPC 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 services gateway, control the services gateway interfaces, control some chassis components, and provide the interface for system management and user access to the services gateway.

Two USB ports on the Routing Engine accept USB memory cards that allow you to load Junos OS and perform file transfers.

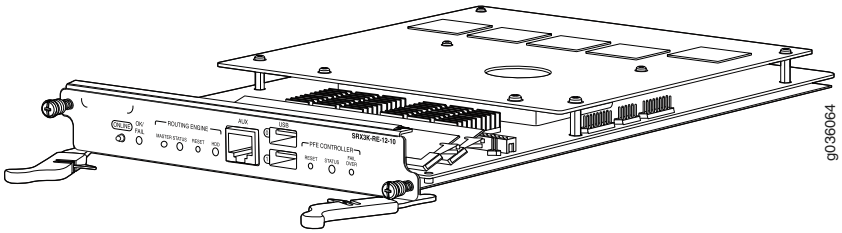
The Routing Engine also provides the following integrated services:

- Central Packet Forwarding Engine Processing (CPP)—This service manages all CFM cards.
- System Control—This service handles Routing Engine arbitration and switching between multiple control planes and acts as the host for the Switch Fabric Board (SFB) and midplane components.

The services gateway must have one Routing Engine installed in slot RE0. A Gigabit Ethernet port on the front panel of the Switch Fabric Board (SFB) is connected directly to the processors on the REs for management purposes. The SFB port labeled **RE ETHERNET 0** connects to the Routing Engine in slot RE0.

NOTE: Unless you have installed an SRX Clustering Module (SCM) in slot RE1, the empty RE1 slot should have a blank panel installed to shield it and to allow cooling air to circulate properly through the services gateway.

Figure 12: Routing Engine



For detailed information about the Routing Engines supported by the services gateway, see the *SRX1400, SRX3400, and SRX3600 Services Gateway Module Guide* at www.juniper.net/techpubs/.

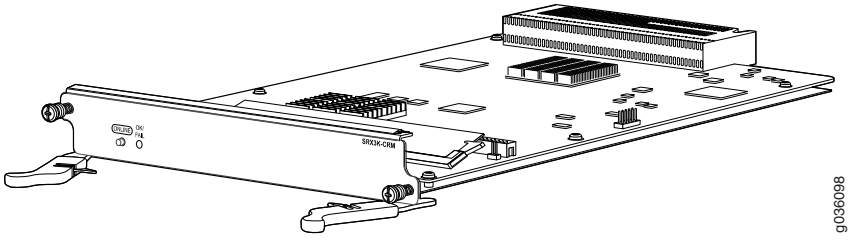
Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Available Components for the SRX3400 Services Gateway on page 9
- Hardware Component Locations in the SRX3400 Services Gateway Chassis on page 11

SRX3400 Services Gateway SRX Clustering Module

The SRX Clustering Module (SCM) is a card that you can install in the services gateway to enable the dual control link feature for chassis cluster supported in Junos OS Release 10.2 and later. You install the SCM in the **RE1** slot on the rear panel of the services gateway. The SCM is shown in Figure 13 on page 24.

Figure 13: SRX Clustering Module



NOTE: The services gateway must be running Junos OS Release 10.2 or later to use the SCM. When running earlier Junos OS Releases, the services gateway does not properly recognize it.

For more information about configuring and managing chassis clusters, see the chapter "Chassis Cluster" in the *Junos OS Security Configuration Guide*.

For detailed information about the SCMs supported by the services gateway, see the *SRX1400, SRX3400, and SRX3600 Services Gateway Module Guide* at www.juniper.net/techpubs/.

Related Documentation

- Installing an SCM in the SRX3400 Services Gateway on page 65

SRX3400 Services Gateway Power Supplies

The SRX3400 Services Gateway uses either one AC or one DC power supply. A second AC or DC power supply can be used with its matching type of power supply to offer redundancy. 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.

All power supplies are hot-removable and hot-insertable. Each power supply is cooled by its own internal cooling system. The power supplies are described in the following topics:

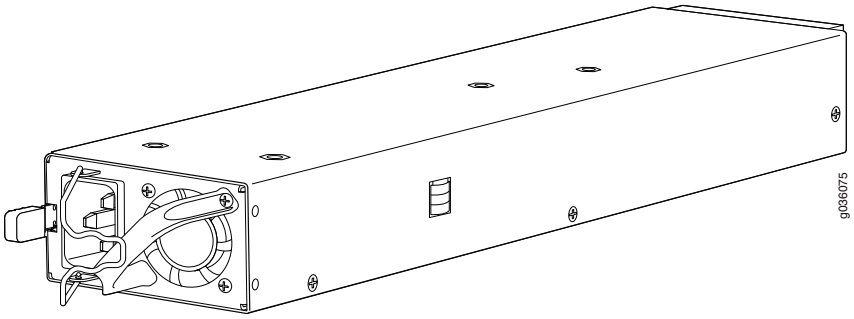
- SRX3400 Services Gateway AC Power Supply Overview on page 25
- SRX3400 Services Gateway AC Power Supply Electrical Specifications on page 26
- SRX3400 Services Gateway DC Power Supply Overview on page 27
- SRX3400 Services Gateway DC Power Supply Electrical Specifications on page 28

SRX3400 Services Gateway AC Power Supply Overview

In an AC power configuration, the SRX3400 Services Gateway contains one or two AC power supplies, located at the rear of the chassis in slots PEM0 and PEM1. Each power supply provides power to all components in the services gateway. When two power supplies are present, they share power almost equally within a fully populated system.

One AC power supply can meet the services gateway power requirements. Installing a second AC power supply provides full power redundancy. If one power supply fails or is removed, the remaining power supply assumes the electrical load without interruption. The services gateway reassesses the power required to support its configuration and issues errors if the available power is insufficient.

Figure 14: AC Power Supply



Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Hardware Component Locations in the SRX3400 Services Gateway Chassis on page 11
- SRX3400 Services Gateway AC Power Supply Electrical Specifications on page 26
- Installing an AC Power Supply in the SRX3400 Services Gateway on page 66

SRX3400 Services Gateway AC Power Supply Electrical Specifications

Table 11 on page 26 lists the AC power supply electrical specifications.

Table 11: AC Power Supply Electrical Specifications

Parameter	Specification
Maximum output power	1000 W (110 VAC input)
	1200 W (220 VAC input)
AC input voltage	100-127 V / 200-240 V
AC input line frequency	50 / 60 Hz
AC input current rating	12.0 A @ 100-127 V / 7 A @ 200-240 V

Each AC power supply faceplate displays a single LED to indicate the status of the power supply (see Table 12 on page 26).

Table 12: AC Power Supply LED

Color	Status	Condition Indicated
Green	On steadily	AC input voltage is present, and both main 12V output and standby 3.3V output are enabled and healthy.
	Blinking	AC input voltage is present, standby 3.3V output is on, but the main 12V output is disabled. This condition usually indicates that the services gateway has been powered off at the Power button on the SFB front panel. It might also indicate that either the SFB or the Routing Engine has been removed from the services gateway.

Table 12: AC Power Supply LED *(continued)*

Color	Status	Condition Indicated
Amber	On steadily	The power supply has detected one or more of the following faults: • Power supply fan failure • Power supply over-temperature condition • Over-current or under-voltage condition on the standby 3.3V output
	Blinking	The power supply has detected one or more of the following faults: • Under-voltage condition on the 12V output • Over-voltage condition on the 12V output • Over-current condition on the 12V output

Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Hardware Component Locations in the SRX3400 Services Gateway Chassis on page 11
- SRX3400 Services Gateway AC Power Supply Overview on page 25

SRX3400 Services Gateway DC Power Supply Overview

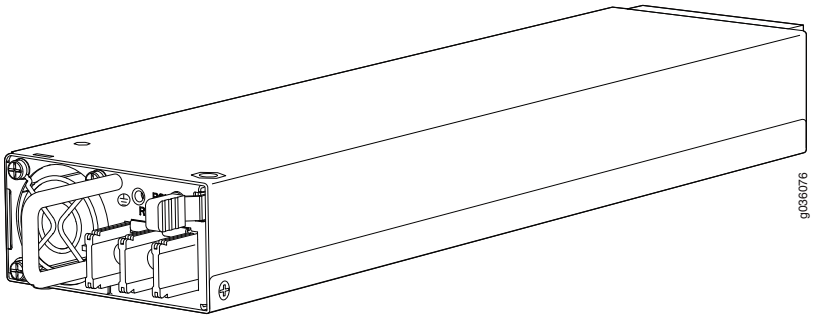
In a DC power configuration, the SRX3400 Services Gateway contains one or two DC power supplies, located at the rear of the chassis in slots PEM0 and PEM1. Each power supply provides power to all components in the services gateway. When two power supplies are present, they share power almost equally within a fully populated system.

One DC power supply can meet the services gateway power requirements. Installing a second DC power supply provides full power redundancy. If one power supply fails or is removed, the remaining power supply assumes the electrical load without interruption. The services gateway reassesses the power required to support its configuration and issues errors if the available power is insufficient.

Two types of DC power supply are available. The standard DC power supply has a maximum power output of 850 W. The enhanced DC power supply has a maximum power output of 1200 W, and also has additional filters required to meet NEBS and ETSI requirements. The two types of DC power supply are identical in all other respects.

NOTE: **Mixing standard and enhanced DC power supplies within the same chassis is not supported. All installed DC power supplies must be either of standard or enhanced types.**

Figure 15: DC Power Supply



Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- SRX3400 Services Gateway NEBS and ETSI Compliance on page 180
- Hardware Component Locations in the SRX3400 Services Gateway Chassis on page 11
- SRX3400 Services Gateway DC Power Supply Electrical Specifications on page 28
- Installing a DC Power Supply in the SRX3400 Services Gateway on page 69

SRX3400 Services Gateway DC Power Supply Electrical Specifications

Two types of DC power supply are available. The standard DC power supply has a maximum power output of 850 W. The enhanced DC power supply has a maximum power output of 1200 W, and also has additional filters required to meet NEBS and ETSI requirements. The two types of DC power supply are identical in all other respects. Each DC power supply has a single DC input (-48 VDC and return) that requires a dedicated 40 A (-48 VDC) circuit breaker. Table 13 on page 28 lists the DC power supply electrical specifications.

Table 13: DC Power Supply Electrical Specifications

Item	Standard DC Power Supply	Enhanced DC Power Supply
Maximum output power	850 W	1200 W
DC input voltage	–40.5 to –72 VDC	–40.5 to –72 VDC
DC input current rating	22.2 A @ -48 VDC	31.3 A @ -48 VDC

NOTE: Mixing standard and enhanced DC power supplies within the same chassis is not supported. All installed DC power supplies must be either of standard or enhanced types.

Each DC power supply faceplate displays a single LED to indicate the status of the power supply (see Table 14 on page 29).

Table 14: DC Power Supply LED

Color	LED Status	Indicated Condition
Green	On steadily	DC input voltage is present, and both main 12V output and standby 3.3V output are enabled and healthy.
	Blinking	DC input voltage is present, standby 3.3V output is on, but the main 12V output is disabled. This condition usually indicates that the services gateway has been powered off at the Power button on the SFB front panel. It might also indicate that either the SFB or the Routing Engine has been removed from the services gateway.
Red	On steadily	The power supply has detected one or more of the following faults: • Power supply fan failure • Power supply over-temperature condition • Over-current or under-voltage condition on the standby 3.3V output
	Blinking	The power supply has detected one or more of the following faults: • Under-voltage condition on the 12V output • Over-voltage condition on the 12V output • Over-current condition on the 12V output

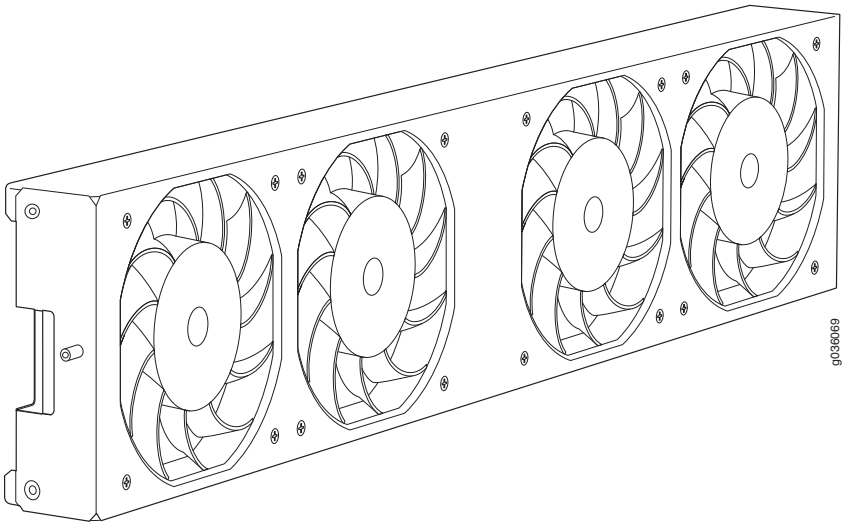
Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Hardware Component Locations in the SRX3400 Services Gateway Chassis on page 11
- SRX3400 Services Gateway DC Power Supply Overview on page 27

SRX3400 Services Gateway Fan Tray

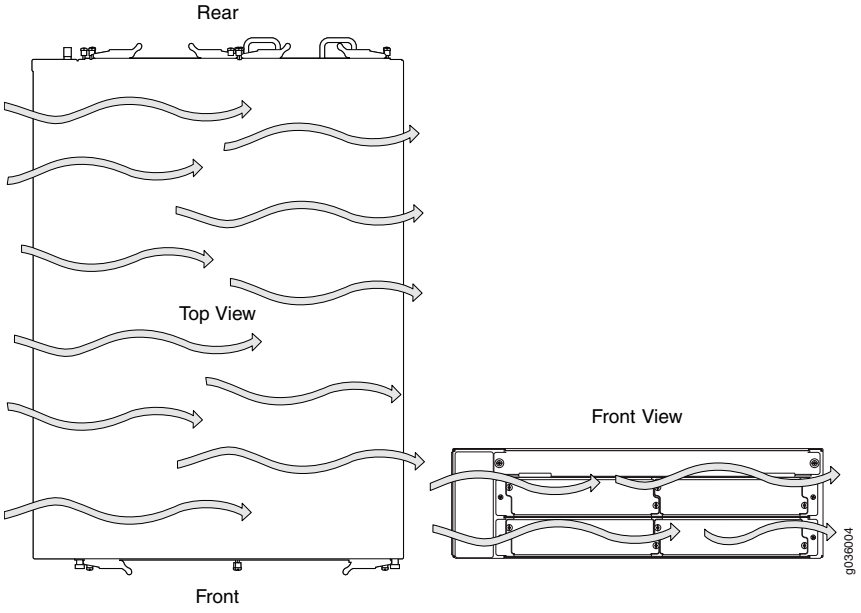
The cooling system consists of a fan tray containing four fans and an air filter. These components work together to keep all services gateway components within the acceptable temperature range. The SRX3400 Services Gateway has one fan tray located in the rear of the services gateway that installs vertically to the right of the card cage. The fan tray is hot-insertable and hot-removable.

Figure 16: Fan Tray



From the front of the chassis, there is a single air intake on the left side of the services gateway. Air is pushed from the fan tray through the air filter and then to the card cage. The air is exhausted out the right of the system. Figure 17 on page 30 illustrates the air flow from the top of the chassis and the front of the chassis.

Figure 17: Airflow Through the Chassis



At startup, the Routing Engine runs the fans at full speed until it can obtain reliable temperature data from its temperature sensors. After it finishes booting and has reliable temperature data, the Routing Engine monitors the temperature of certain critical services gateway components and adjusts the speed of the fans accordingly.

The fans have three speeds: low, intermediate, and high. Table 15 on page 31 shows the correlations between fan speed and critical component temperature. Note that there is

hysteresis built into the correlation, so that the fans are not subject to spurious speed changes. Also, if one of the fans in the fan tray fails, the speeds of the remaining fans are automatically adjusted to keep the temperature within the acceptable range.

Table 15: Critical Component Temperatures and Fan Speed Transitions

Critical Component Temperature	Fan Speed Response
Increase to 60°C	Increase from Low to Medium
Increase to 75°C	Increase from Medium to High
Decrease to 65°C	Decrease from High to Medium
Decrease to 55°C	Decrease from Medium to Low

If the maximum internal 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.

Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Hardware Component Locations in the SRX3400 Services Gateway Chassis on page 11
- Available Components for the SRX3400 Services Gateway on page 9
- Replacing the Fan Tray on the SRX3400 Services Gateway on page 114

SRX3400 and SRX5600 Services Gateways Air Deflector Kits

Optional air deflector kits are available that let you install the SRX3400 and SRX5600 Services Gateways in a hot aisle/cold aisle ventilation environment. These kits convert the services gateway from side-to-side ventilation into front-to-back ventilation. The air deflectors contain no additional fans, so they require no additional electrical power. Air deflector kits are not available for the SRX3600 Services Gateway.

For more information about the hot aisle/cold aisle air deflector kits, send an e-mail to DL-Air-Deflectors@juniper.net.

The air deflector kits consist of four main components: two intake/exhaust boxes and two side plenums. The two intake/exhaust boxes are identical to each other, as are the side plenums.

The intake/exhaust boxes are installed above and below the services gateway to direct intake air from the air space in front of the services gateway into the side plenum mounted on the intake side of the device. The intake air plenum directs air into the services gateway, and the exhaust air plenum collects the exhaust air on the opposite side of the device. The exhaust plenum directs the exhausted air into the intake/exhaust boxes above and below the unit, where it is expelled into the air space behind the services gateway.

The air deflector kit requires additional space around the services gateway, increasing its overall height and width as described in Table 16 on page 32.

Table 16: Services Gateway and Air Deflector Dimensions

Specification	SRX3400 Services Gateway	SRX5600 Services Gateway
Services gateway height	3 U (5.25 in. or 13.3 cm)	8 U (14 in. or 35.6 cm)
Additional height required for air deflector kit	4 U (7 in. or 17.8 cm)	6 U (10.5 in. or 26.7 cm)
Total height of services gateway and air deflector kit	7 U (12.25 in. or 31.1 cm)	14 U (24.5 in. or 62.2 cm)
Services gateway chassis width	17.5 in. (44.5 cm)	17.5 in. (44.5 cm)
Additional width required for air deflector kit	5.6 in. (14.2 cm) per side 11.2 in. (28.4 cm) total	5.6 in. (14.2 cm) per side 11.2 in. (28.4 cm) total
Total width of services gateway and air deflector kit	28.7 in. (72.9 cm)	28.7 in. (72.9 cm)

Figure 18 on page 32 and Figure 19 on page 33 show the SRX3400 and SRX5600 Services Gateways, respectively, installed in typical four-post mounting racks with the air deflector kit parts in place.

Figure 18: SRX3400 Services Gateway Air Deflector Kit

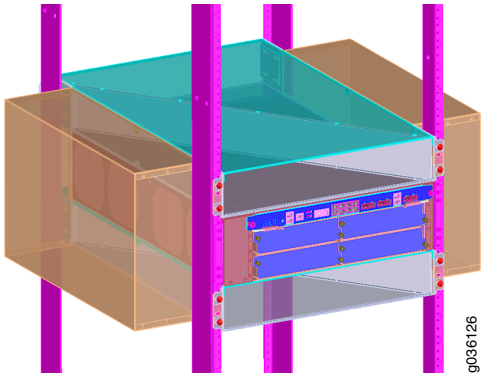
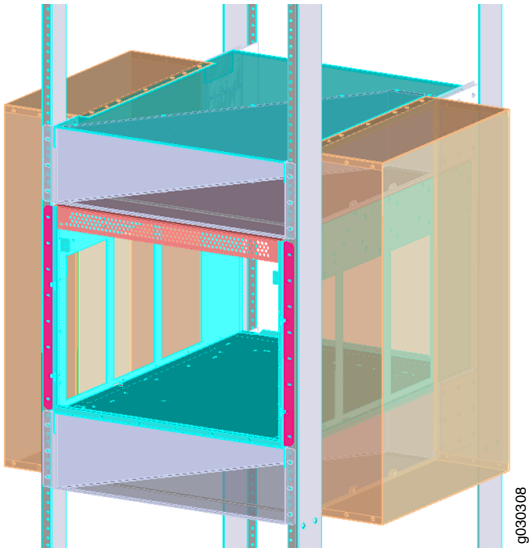


Figure 19: SRX5600 Services Gateway Air Deflector Kit (Services Gateway Chassis Contents Omitted for Clarity)



Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- *SRX5600 Services Gateway Chassis*

PART 2

Setting Up the SRX3400 Services Gateway

CHAPTER 3

Preparing the Site for SRX3400 Services Gateway Installation

This section includes the following topics:

Site Preparation Checklist for the SRX3400 Services Gateway

The checklist in Table 17 on page 37 summarizes the tasks you need to perform when preparing a site for SRX3400 Services Gateway installation.

Table 17: 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.	"SRX3400 Services Gateway Environmental Specifications" on page 183		
Select the type of rack or cabinet.	"SRX3400 Services Gateway Cabinet Size and Clearance Requirements" on page 38 and "SRX3400 Services Gateway Rack Size and Strength Requirements" on page 40		
Plan rack or cabinet location, including required space clearances.	"SRX3400 Services Gateway Cabinet Airflow Requirements" on page 39		
If a rack is used, secure rack to floor and building structure.	"Connecting the SRX3400 Services Gateway to the Building Structure" on page 42		
Acquire cables and connectors.			
Locate sites for connection of system grounding.	"DC Power Electrical Safety Guidelines and Warnings" on page 172		

Table 17: Site Preparation Checklist *(continued)*

Item or Task	For More Information ...	Performed By	Date
Measure distance between external power sources and services gateway installation site.			
Calculate the optical power budget and optical power margin.	"Calculating the Power Budget for Fiber-Optic Cable for the SRX3400 Services Gateway" on page 202 and "Calculating the Power Margin for Fiber-Optic Cable for the SRX3400 Services Gateway" on page 202		

Related Documentation

- Installation Overview for the SRX3400 Services Gateway on page 49
- Unpacking the SRX3400 Services Gateway on page 45

SRX3400 Services Gateway Cabinet Requirements

The services gateway can be installed in an enclosed cabinet. The cabinet requirements are described in the following topics:

- SRX3400 Services Gateway Cabinet Size and Clearance Requirements on page 38
- SRX3400 Services Gateway Cabinet Airflow Requirements on page 39

SRX3400 Services Gateway Cabinet Size and Clearance Requirements

The minimum size cabinet that can accommodate the services gateway is 27.5 in. (69.8 cm) wide and 31.5 in. (80.0 cm) deep. The cabinet must allow at least 5 in. (13 cm) of clearance on each side of the chassis to allow for cooling air to flow through the vents on each side of the device. A cabinet larger than the minimum requirement provides better airflow and reduces the chance of overheating.

Allow at least 3 in. (7.6 cm) of vertical clearance between the top and bottom of the services gateway and other devices in the cabinet.

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. (78 cm) between the inside of the front door and the inside of the rear door.

The device has not been tested for NEBS and ETSI compliance when mounted inside an enclosed cabinet. NEBS certification only applies if the device is mounted in a two-post or four-post rack.

Related Documentation

- SRX3400 Services Gateway Cabinet Airflow Requirements on page 39
- SRX3400 Services Gateway Rack Size and Strength Requirements on page 40
- SRX3400 Services Gateway Spacing of Mounting Bracket Holes on page 41
- Clearance Requirements for Airflow and Hardware Maintenance of the SRX3400 Services Gateway on page 42

- SRX3400 Services Gateway NEBS and ETSI Compliance on page 180

SRX3400 Services Gateway Cabinet Airflow Requirements

When you mount the services gateway 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 services gateway.
- Allow at least 3 in. (7.6 cm) of vertical clearance between the top and bottom of the services gateway and other devices in the cabinet.
- Ensure that the cabinet allows the chassis hot exhaust air to exit from the cabinet without recirculating into the services gateway. An open cabinet (without a top or doors) that employs hot air exhaust extraction from the top allows the best airflow through the chassis.
- Ensure that the cabinet provides at least 13 cm (5 in) of clearance on each side of the chassis for cooling airflow.
- If the cabinet contains a top or doors, you must provide perforations in these elements to allow adequate airflow through the cabinet to dissipate the heat generated by all of the devices in the cabinet.
- Route and dress all cables to minimize the blockage of airflow to and from the chassis.

Related Documentation

- SRX3400 Services Gateway Environmental Specifications on page 183
- Clearance Requirements for Airflow and Hardware Maintenance of the SRX3400 Services Gateway on page 42
- SRX3400 Services Gateway Cabinet Size and Clearance Requirements on page 38
- SRX3400 Services Gateway Rack Size and Strength Requirements on page 40
- SRX3400 Services Gateway Spacing of Mounting Bracket Holes on page 41

SRX3400 Services Gateway Rack Requirements

The SRX3400 Services Gateway can be installed in a rack. Many types of racks are acceptable, including four-post (telco) racks and open-frame racks. The rack requirements are described in the following topics:

- SRX3400 Services Gateway Rack Size and Strength Requirements on page 40
- SRX3400 Services Gateway Spacing of Mounting Bracket Holes on page 41
- Connecting the SRX3400 Services Gateway to the Building Structure on page 42

SRX3400 Services Gateway Rack Size and Strength Requirements

The services gateway is designed for installation into a 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).

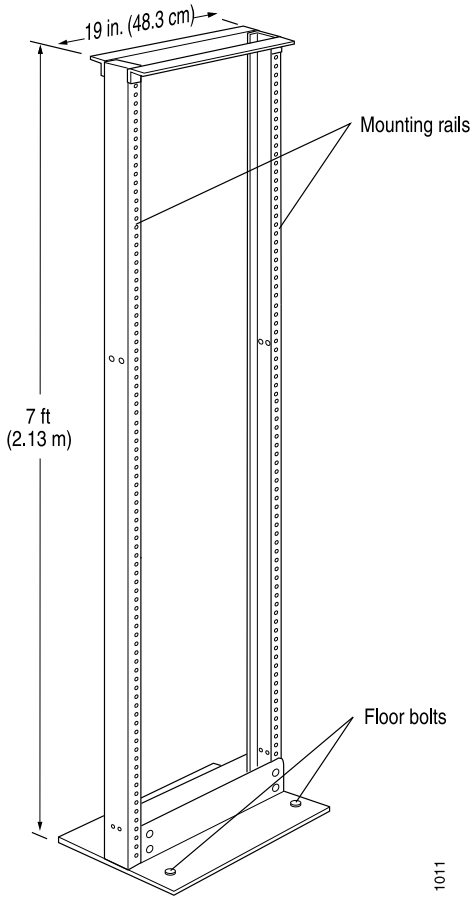
With the use of adapters, the services gateway is designed to fit into a 600-mm-wide rack or cabinet, as defined in the four-part *Equipment Engineering (EE); European telecommunications standard for equipment practice* (document numbers ETS 300 119-1 through 119-4) published by the European Telecommunications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

The rack rails must be spaced widely enough to accommodate the services gateway chassis's external dimensions: 5.25 in. (13.3 cm) high, 25.5 in. (64.8 cm) deep, and 17.5 in. (44.5 cm) wide. The spacing of rails and adjacent racks must also allow for the clearances around the services gateway and rack.

The chassis height of 5.25 in. (13.3 cm) is approximately 3 U. A U is the standard rack unit defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310-D) published by the Electronics Industry Association. You can stack eight SRX3400 Services Gateways in a rack that has at least 40 U (70 in. or 1.78 m) of usable vertical space.

The rack must be strong enough to support the weight of the fully configured services gateway, up to 77 lb (35 kg). If you stack eight fully configured services gateways in one rack, it must be capable of supporting up to 616 lb (280 kg).

Figure 20: Typical Open-Frame Rack



Related Documentation

- SRX3400 Services Gateway Spacing of Mounting Bracket Holes on page 41
- Clearance Requirements for Airflow and Hardware Maintenance of the SRX3400 Services Gateway on page 42
- Connecting the SRX3400 Services Gateway to the Building Structure on page 42

SRX3400 Services Gateway Spacing of Mounting Bracket Holes

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 to fasten to holes spaced at those distances.

Related Documentation

- SRX3400 Services Gateway Rack Size and Strength Requirements on page 40
- Clearance Requirements for Airflow and Hardware Maintenance of the SRX3400 Services Gateway on page 42
- Connecting the SRX3400 Services Gateway to the Building Structure on page 42

Connecting the SRX3400 Services Gateway to the Building Structure

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.

Related Documentation

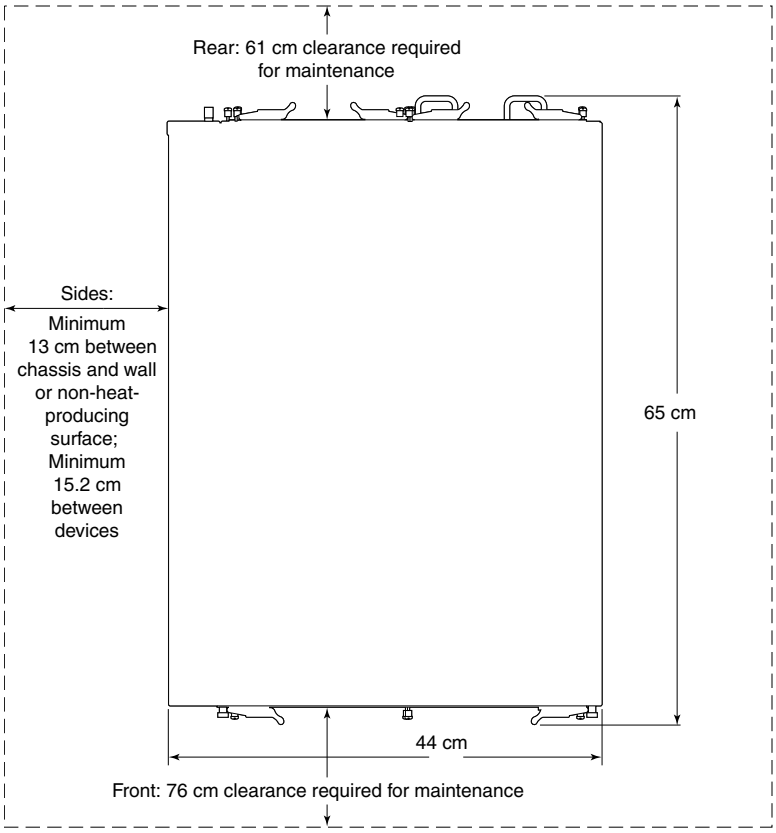
- Rack-Mounting Requirements and Warnings on page 153
- SRX3400 Services Gateway Rack Size and Strength Requirements on page 40
- Clearance Requirements for Airflow and Hardware Maintenance of the SRX3400 Services Gateway on page 42
- SRX3400 Services Gateway Spacing of Mounting Bracket Holes on page 41

Clearance Requirements for Airflow and Hardware Maintenance of the SRX3400 Services Gateway

When planning the installation site, you need to allow sufficient clearance around the rack (see Figure 21 on page 43):

- For the cooling system to function properly, the airflow around the chassis must be unrestricted. Allow at least 6 in. (15.2 cm) of clearance between services gateways. Allow 5 in. (13 cm) between the side of the chassis and any non-heat-producing surface such as a wall.
- For service personnel to remove and install hardware components, there must be adequate space at the front and back of the services gateway. At least 24 in. (61 cm) is required both in front of and behind the services gateway. NEBS GR-63 recommends that you allow at least 30 in. (76 cm) in front of the rack and 24 in. (61 cm) behind the rack.

Figure 21: Clearance Requirements



Related Documentation

- SRX3400 Services Gateway Rack Size and Strength Requirements on page 40
- Connecting the SRX3400 Services Gateway to the Building Structure on page 42
- SRX3400 Services Gateway Spacing of Mounting Bracket Holes on page 41

CHAPTER 4

Unpacking the SRX3400 Services Gateway

This section includes the following topics:

Required Tools and Parts for Unpacking the SRX3400 Services Gateway

To unpack the SRX3400 Services Gateway and prepare for installation, you need the following tools:

- Phillips (+) screwdriver, number 2
- Blank panels to cover any slots not occupied by a component

Related Documentation

- Unpacking the SRX3400 Services Gateway on page 45
- Verifying Parts Received with the SRX3400 Services Gateway on page 47

Unpacking the SRX3400 Services Gateway

The services gateway is shipped in a cardboard carton. The *SRX3400 Services Gateway Getting Started Guide* and an accessory box are also included in the shipping carton.

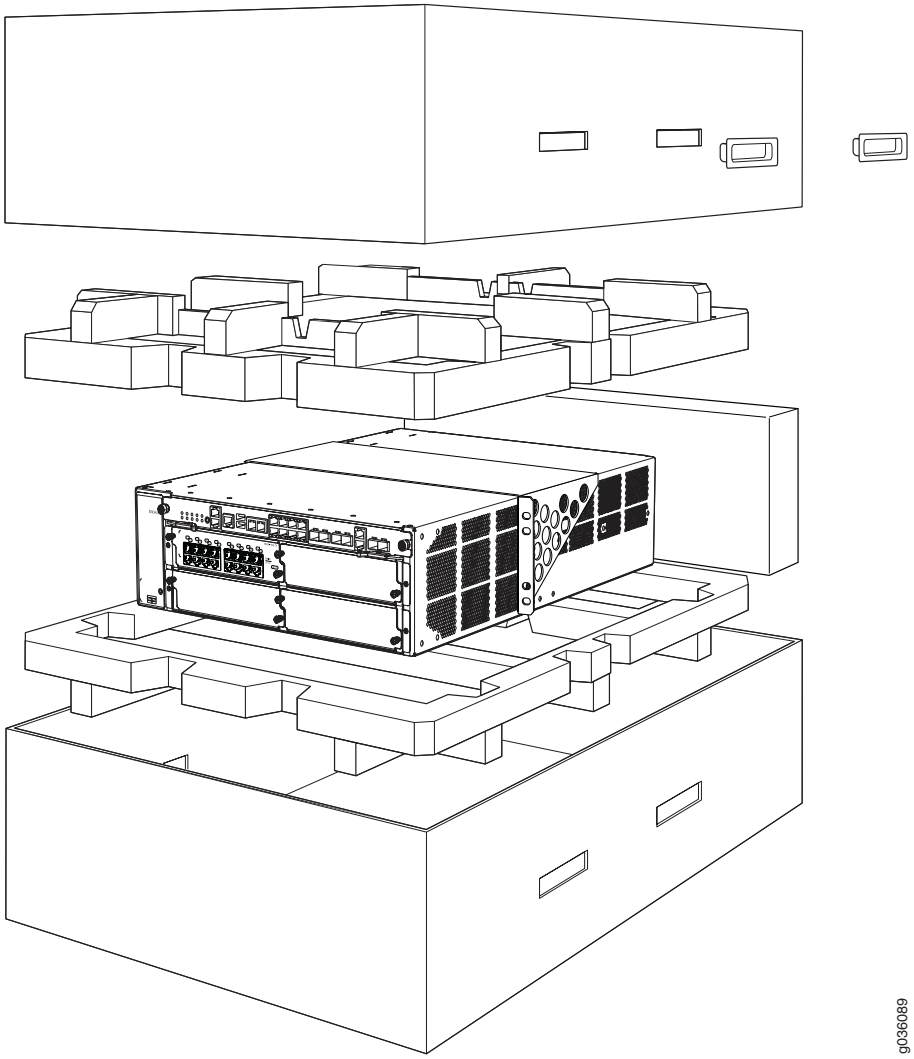
The shipping container measures 11 in. (28 cm) high, 24.1 in. (61 cm) wide, and 33.6 in. (85 cm) deep. The system and its packaging have a total weight of 62 lb (42.2 kg).

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

To unpack the services gateway:

1. Move the shipping carton to a staging area as close to the installation site as possible, where you have enough room to remove the components from the chassis.
2. Position the shipping carton with the arrows pointing up.
3. Remove the plastic handle inserts and lift the cardboard cover off the services gateway.
4. Remove the foam covering the top of the services gateway.
5. Remove the accessory box, the mounting shelf, and the *SRX3400 Services Gateway Getting Started Guide*.

Figure 22: Unpacking the SRX3400 Services Gateway



6. With a person on each side of the carton, carefully lift the services gateway from the carton and place on lift. Remove the bag covering the services gateway.
7. Verify the parts received against the lists in "Verifying Parts Received with the SRX3400 Services Gateway" on page 47.

8. Save the shipping carton and packing materials in case you need to move or ship the services gateway at a later time.
9. To proceed with the installation, see "Installing the SRX3400 Services Gateway in a Rack or Cabinet Using a Mechanical Lift" on page 53.

Related Documentation

- Required Tools and Parts for Unpacking the SRX3400 Services Gateway on page 45
- Verifying Parts Received with the SRX3400 Services Gateway on page 47

Verifying Parts Received with the SRX3400 Services Gateway

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. Note that feature and service cards are shipped in separate boxes from the chassis.

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

A fully configured services gateway contains the chassis with installed components, listed in Table 18 on page 47, and an accessory box, which contains the parts listed in Table 19 on page 48. The parts shipped with your services gateway can vary depending on the configuration you ordered.

Table 18: Parts List for a Fully Configured SRX3400 Services Gateway

Component	Quantity
Chassis, including midplane, and rack-mounting brackets	1
IOCs	Up to 4
NP-IOCs	Up to 6
SPCs	At least one, and up to 4
NPCs	At least one, and up to 2
Routing Engine	1
SCM	0 or 1
SFB	1
Power supplies	At least 1 and up to 2
Fan tray	1
Air filter	1

Table 18: Parts List for a Fully Configured SRX3400 Services Gateway *(continued)*

Component	Quantity
SRX3400 Services Gateway Getting Started Guide	1
Blank panels for slots without components installed	One blank panel for each slot not occupied by a component

Table 19: Accessory Box Parts List

Part	Quantity
Rack mount kit	1
RJ-45-to-DB-9 cable to connect the services gateway through the serial port	1
Juniper Networks Product Warranty	1
End User License Agreement	1
SRX3400 Services Gateway Getting Started Guide	1
Documentation Information Card	1
Product Registration	1
Juniper Compliance Form Letter; RoHS	1
Declaration of Conformity	1
Document sleeve	1
ESD wrist strap with cable	1

Related Documentation

- Required Tools and Parts for Unpacking the SRX3400 Services Gateway on page 45
- Unpacking the SRX3400 Services Gateway on page 45

CHAPTER 5

Installing the SRX3400 Services Gateway

This section provides instructions for installing the services gateway in a rack or cabinet. Because of the size and weight of the services gateway—up to 77 lb (35 kg) depending on the configuration—we strongly recommend that you install it using a mechanical lift. The services gateway should not be installed in a front-mounted position.

This section includes the following topics:

Installation Overview for the SRX3400 Services Gateway

After you have prepared your installation site, as described in "Site Preparation Checklist for the SRX3400 Services Gateway" on page 37, you are ready to unpack and install the services gateway. It is important to proceed through the installation process in the following order:

1. Review the safety guidelines explained in "SRX3400 Services Gateway Definition of Safety Warning Levels" on page 143.
2. Install the services gateway, as described in "Installing the SRX3400 Services Gateway in a Rack or Cabinet Using a Mechanical Lift" on page 53.
3. Connect cables to external devices, as described in "Connecting the SRX3400 Services Gateway to a Management Console or an Auxiliary Device" on page 72 or "Connecting the SRX3400 Services Gateway to a Network for Out-of-Band Management" on page 72.

4. Connect the grounding cable, as described in "Grounding the SRX3400 Services Gateway" on page 76.
5. Connect the power cables, as described in "Connecting the SRX3400 Services Gateway to a DC Power Source" on page 79 or "Connecting the SRX3400 Services Gateway to an AC Power Source" on page 77.
6. Power on the services gateway, as described in "Powering On the SRX3400 Services Gateway" on page 81.
7. Perform the initial system startup, as described in "Performing Initial Software Configuration on the SRX3400 Services Gateway" on page 86.

Related Documentation

- SRX3400 Services Gateway Chassis on page 7
- Routine Maintenance Procedures for the SRX3400 Services Gateway on page 96

SRX3400 Services Gateway Safety Requirements, Warnings, and Guidelines

To avoid harm to yourself or the services gateway as you install and maintain it, follow the guidelines for working with and near electrical equipment, as well as the safety procedures for working with networking devices. However, providing an exhaustive set of guidelines for working with electrical equipment is beyond the scope of this guide.

Related Documentation

- Site Preparation Checklist for the SRX3400 Services Gateway on page 37
- SRX3400 Services Gateway Definition of Safety Warning Levels on page 143
- General Electrical Safety Guidelines and Warnings on page 167

Required Tools for Installing the SRX3400 Services Gateway

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

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

Related Documentation

- Preparing the SRX3400 Services Gateway for Rack-Mount or Cabinet Installation on page 51
- Installing the Mounting Hardware for the SRX3400 Services Gateway on page 51
- Installing the SRX3400 Services Gateway in a Rack or Cabinet Using a Mechanical Lift on page 53

Preparing the SRX3400 Services Gateway for Rack-Mount or Cabinet Installation

Before you begin the installation, verify the following:

- Your site has been properly prepared for the services gateway. See "Site Preparation Checklist for the SRX3400 Services Gateway" on page 37 for a summary of the tasks you need to perform.
- The services gateway has been removed from the shipping container. See "Unpacking the SRX3400 Services Gateway" on page 45.
- You have read the safety information in "Chassis Lifting Guidelines" on page 152.
- Ensure 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. For details, see "Clearance Requirements for Airflow and Hardware Maintenance of the SRX3400 Services Gateway" on page 42.

Related Documentation

- SRX3400 Services Gateway Definition of Safety Warning Levels on page 143
- Installing the Mounting Hardware for the SRX3400 Services Gateway on page 51
- Installing the SRX3400 Services Gateway in a Rack or Cabinet Using a Mechanical Lift on page 53

Installing the Mounting Hardware for the SRX3400 Services Gateway

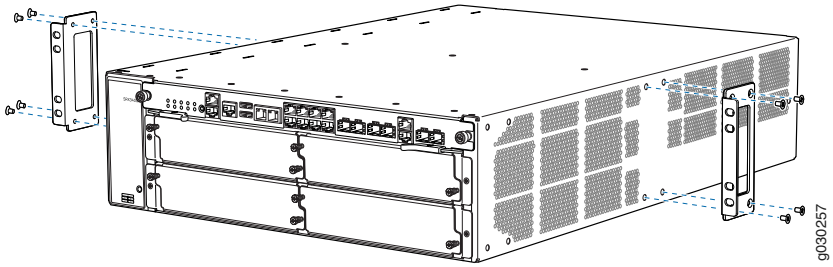
The specific mounting hardware used depends on the type of rack being utilized. Use the appropriate procedure steps to install the mounting hardware for your situation.

To install the mounting hardware:

1. Locate the rack mount brackets in the accessory kit.
2. Use the screws provided to secure the rack mount brackets to the sides of the chassis:
   - For a two-post rack, mount the brackets at the mid-mount holes, as shown in Figure 23 on page 52.

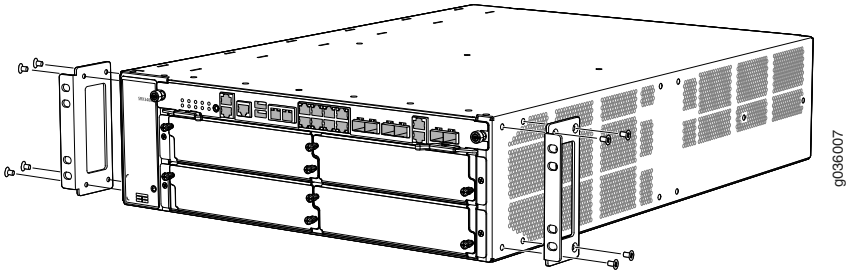
WARNING: When you install the services gateway in a two-post rack, you must attach the mounting brackets at the middle of each chassis side, as shown in Figure 23 on page 52. Do not attempt to install the services gateway in a two-post rack with the mounting brackets attached at the front of the chassis. Such an installation might overstress either the brackets or the rack, causing the chassis to fall and inflict injury.

Figure 23: Attaching Mounting Hardware for Two-Post Rack



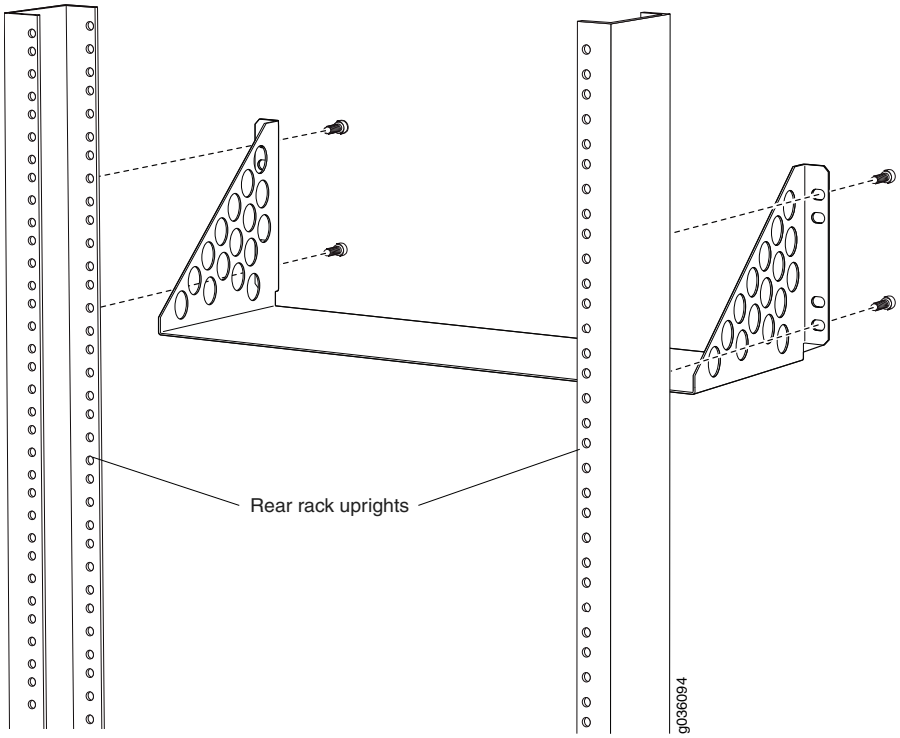
- For a four-post rack, mount the brackets near the front edge of the chassis, as shown in Figure 24 on page 52.

Figure 24: Attaching Mounting Hardware for Cabinet or Four-Post Rack



3. For installation in a cabinet or a four-post rack, install the support shelf on the rear posts, as shown in Figure 25 on page 52.

Figure 25: Attaching Four-Post and Cabinet Support Shelf



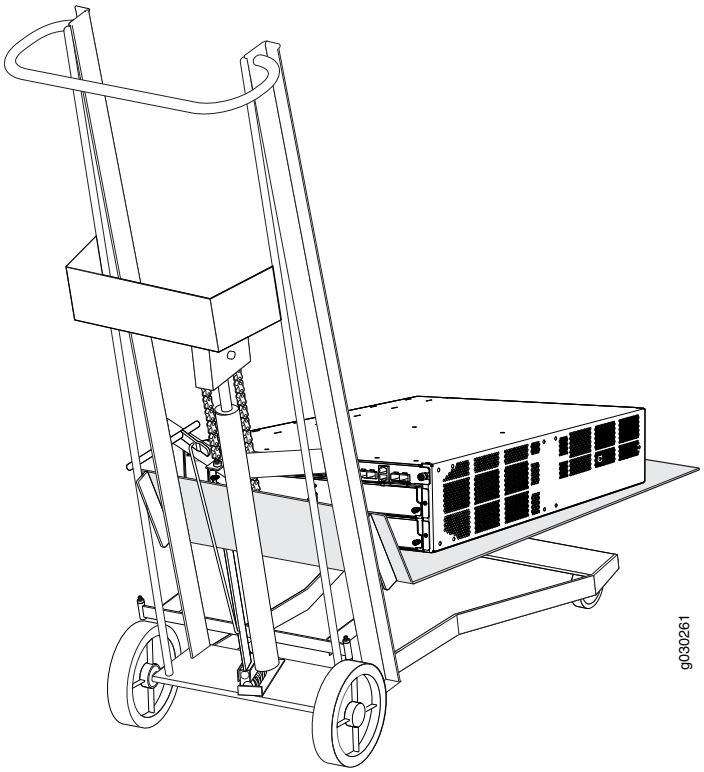
Related Documentation

- SRX3400 Services Gateway Definition of Safety Warning Levels on page 143
- Preparing the SRX3400 Services Gateway for Rack-Mount or Cabinet Installation on page 51
- Installing the SRX3400 Services Gateway in a Rack or Cabinet Using a Mechanical Lift on page 53

Installing the SRX3400 Services Gateway in a Rack or Cabinet Using a Mechanical Lift

1. Ensure 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. For details, see "Site Preparation Checklist for the SRX3400 Services Gateway" on page 37.
2. Load the services gateway onto the lift, making sure it rests securely on the lift platform (see Figure 26 on page 53).

Figure 26: Load the Services Gateway onto the Lift



3. Using the lift, position the services gateway in the rack:
   - For two-post rack mounting, align the bottom hole in each mounting bracket with a hole in each rack rail.
   - For four-post rack or cabinet mounting, position the services gateway so that the bottom rear edge of the chassis rests on the support shelf you installed earlier, as described in "Installing the Mounting Hardware for the SRX3400 Services Gateway" on page 51.

4. Install a mounting screw into each of the two aligned holes, as shown in Figure 27 on page 54 (two-post rack) or Figure 28 on page 54 (four-post rack). Use a number-2 Phillips screwdriver to tighten the screws.

Figure 27: Installing the Services Gateway in a Two-Post Rack

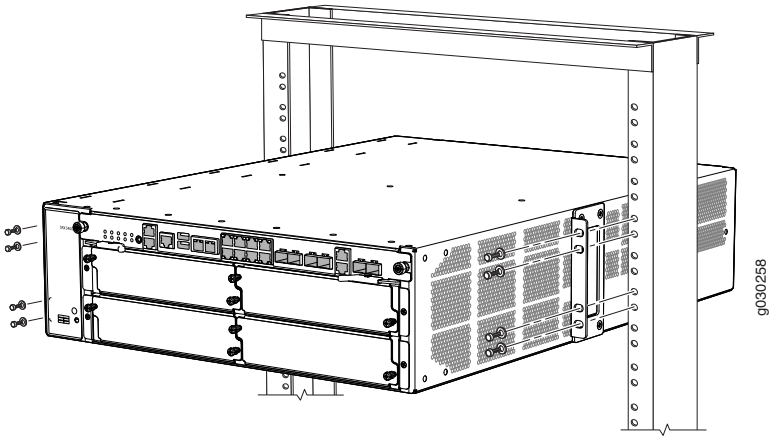
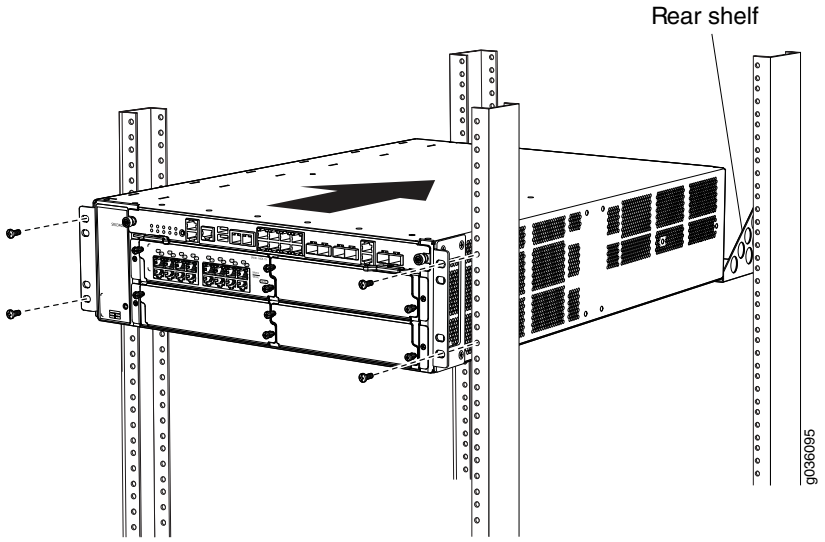


Figure 28: Installing the Services Gateway in a Four-Post Rack



5. Install the remaining screws in each mounting bracket.
6. Move the lift away from the rack.
7. 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.

Related Documentation

- SRX3400 Services Gateway Definition of Safety Warning Levels on page 143
- Preparing the SRX3400 Services Gateway for Rack-Mount or Cabinet Installation on page 51

Installing the SRX3400 Services Gateway in a Rack or Cabinet 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 32.3 lb (14.7 kg).

Before installing the services gateway in the rack, read the safety information in "Chassis Lifting Guidelines" on page 152. Remove the services gateway from the shipping container, as described in "Unpacking the SRX3400 Services Gateway" on page 45. Install the mounting hardware, as described in "Installing the Mounting Hardware for the SRX3400 Services Gateway" on page 51.

Required Tools for Installing the SRX3400 Services Gateway Without a Mechanical Lift

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

- Phillips (+) screwdrivers, numbers 1 and 2
- ESD grounding wrist strap

Related Documentation

- Removing Components from the Chassis for Manual Lifting of the SRX3400 Services Gateway on page 55
- Lifting the SRX3400 Services Gateway Chassis into the Rack on page 57
- Reinstalling Components in the SRX3400 Services Gateway Chassis on page 58

Removing Components from the Chassis for Manual Lifting of the SRX3400 Services Gateway

To make the services gateway light enough to install manually, you first remove the following components from the chassis, as shown in Figure 29 on page 56 and Figure 30 on page 56:

- Power supplies
- SFB
- IOCs
- NP-IOCs

- NPCs
- SPCs
- Fan tray

The procedure in this section for removing components from the chassis is for initial installation only, and assumes that you have not connected power cables to the services gateway.

Figure 29: Components to Remove from the Front of the Services Gateway

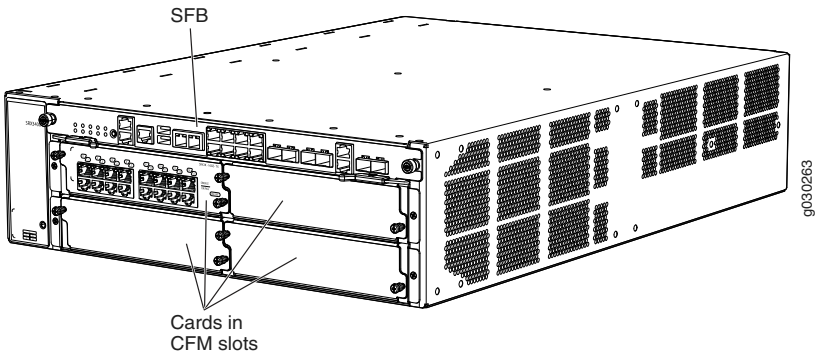
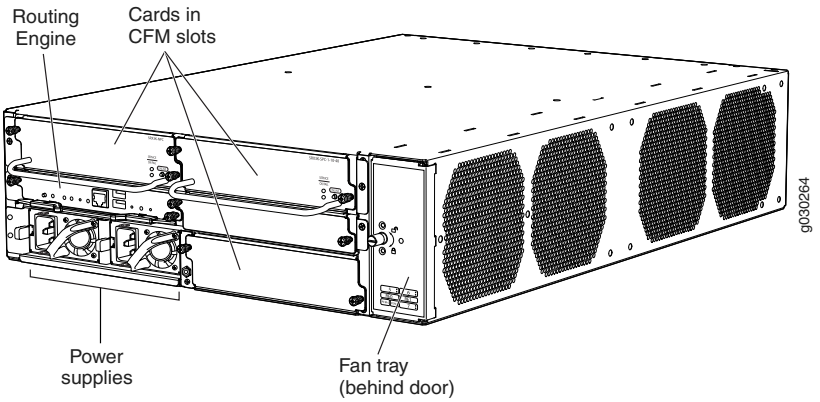


Figure 30: Components to Remove from the Rear of the Services Gateway



To remove the components from the services gateway:

1. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
2. If you have not already done so, power off the services gateway by pressing the Power button on the front panel of the SFB for three to five seconds. The **PWR** LED blinks to show you that the services gateway is shutting down. Wait for the services gateway to shut down before you proceed to the next step.
3. Release each component by loosening its retaining screws and unlatching its ejector handles as appropriate.

4. Slide each component out of the chassis evenly so that it does not become stuck or damaged.
5. Label each component as you remove it so you can reinstall it in the correct location.
6. Immediately store each removed component in an electrostatic bag.
7. Do not stack removed components. Lay each one on a flat surface.

Related Documentation

- Required Tools for Installing the SRX3400 Services Gateway Without a Mechanical Lift on page 55
- Lifting the SRX3400 Services Gateway Chassis into the Rack on page 57
- Reinstalling Components in the SRX3400 Services Gateway Chassis on page 58

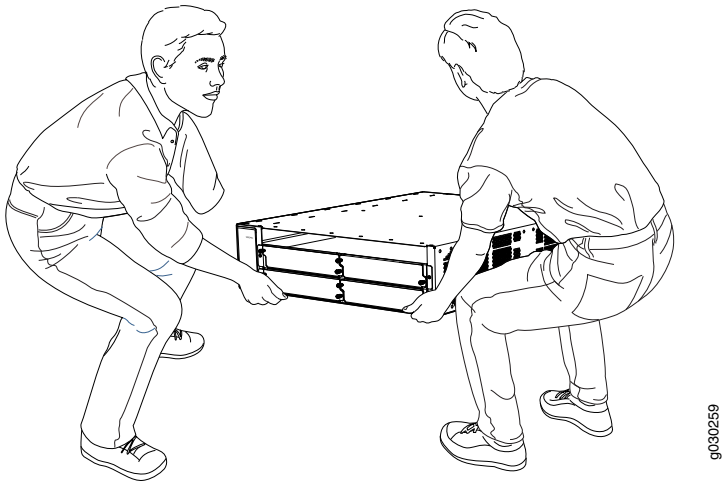
Lifting the SRX3400 Services Gateway Chassis into the Rack

Lifting the chassis and mounting it in a rack requires two people. The empty chassis weighs approximately 32.3 lb (14.7 kg).

1. Ensure the rack is in its permanent location and is secured to the building.
2. Position the chassis in front of the rack or cabinet. Use a pallet jack if one is available.
3. With one person on each side, lift the chassis into position in the rack:
   - For two-post rack mounting, align the bottom hole in each mounting bracket with a hole in each rack rail.
   - For four-post rack or cabinet mounting, position the services gateway so that the bottom rear edge of the chassis rests on the support shelf you installed earlier, as described in "Installing the Mounting Hardware for the SRX3400 Services Gateway" on page 51.

WARNING: **Do not attempt to lift the chassis by the handles on the power supplies or on the common form-factor modules (CFMs). The handles might break off and cause the chassis to fall and inflict injury.**

Figure 31: Lifting the Chassis into the Rack



4. Use the screws to attach the left and right brackets to the rack.
5. Visually inspect the alignment of the chassis. If the chassis is installed properly in the rack, all the mounting screws on one side of the rack should be aligned with the mounting screws on the opposite side and the chassis should be level.

Related Documentation

- Installing the Mounting Hardware for the SRX3400 Services Gateway on page 51
- Required Tools for Installing the SRX3400 Services Gateway Without a Mechanical Lift on page 55
- Removing Components from the Chassis for Manual Lifting of the SRX3400 Services Gateway on page 55
- Reinstalling Components in the SRX3400 Services Gateway Chassis on page 58

Reinstalling Components in the SRX3400 Services Gateway Chassis

1. Slide each component into the chassis evenly so that it does not become stuck or damaged.
2. Tighten the latching levers and captive screws for each component as appropriate.

NOTE: **Make sure that all empty slots are covered with blank panels before operating the services gateway.**

Related Documentation

- Required Tools for Installing the SRX3400 Services Gateway Without a Mechanical Lift on page 55
- Removing Components from the Chassis for Manual Lifting of the SRX3400 Services Gateway on page 55
- Lifting the SRX3400 Services Gateway Chassis into the Rack on page 57

CHAPTER 6

Installing Additional Components in the SRX3400 Services Gateway

This section provides instructions for installing the supported cards and subsystem components that are not pre-installed at the factory. Note that the services gateway requires one NPC or NP-IOC and one SPC for proper operation. Additional IOCs, NP-IOCs, NPCs, SPCs, and power supplies are optional. For detailed information about the modules supported by the services gateway, see the *SRX1400, SRX3400, and SRX3600 Services Gateway Module Guide* at www.juniper.net/techpubs/.

This section includes the following topics:

Installing CFM Cards in the SRX3400 Services Gateway

The most common modules for the services gateway use the common form-factor module (CFM) format:

- IOCs
- NP-IOCs
- SPCs
- NPCs

NOTE: If your services gateway is part of an operating chassis cluster, you might be able to install additional SPCs in the clustered devices without shutting down both of the devices at the same time. This process, called *in-service hardware upgrade* (ISHU), eliminates the network downtime you would otherwise incur while adding SPCs. For more information, see "Installing SPCs in an Operating SRX3400 Services Gateway Chassis Cluster" on page 62.

To install a CFM card in the services gateway:

1. Locate an eligible slot for the CFM in the services gateway. For information about the slot eligibility of various CFM types, see "Hardware Component Locations in the SRX3400 Services Gateway Chassis" on page 11. For information about the slot eligibility of specific CFMs, see the *SRX1400, SRX3400, and SRX3600 Services Gateway Module Guide* at www.juniper.net/techpubs/.

   NOTE: For the services gateway to meet NEBS and ETSI standards, it must not have any two SPCs installed side by side in the CFM slots in the front of the chassis (CFM slots 1 through 4). You can install SPCs side by side in the CFM slots in the rear of the chassis (CFM slots 5 through 7). See "SRX3400 Services Gateway NEBS and ETSI Compliance" on page 180 for more information.

2. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.

3. If you are installing a cold-swap-only CFM, power off the services gateway. See *Field-Replaceable Units on the SRX3600 Services Gateway* for a list of hot-swappable and cold-swap-only components.

   To power off the services gateway, press the Power button on the front panel of the Switch Fabric Board (SFB) for three to five seconds.

   The **PWR** LED blinks to show you that the services gateway is shutting down. Wait for the services gateway to shut down before you proceed to the next step.

4. Place the CFM on an antistatic mat or remove it from its electrostatic bag.

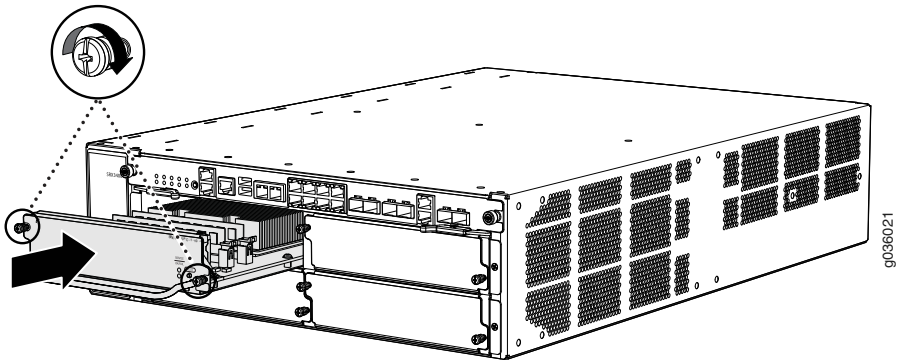
5. If the slot is covered by a blank panel, loosen the screws at each end of the blank panel and remove the blank panel from the services gateway.

   NOTE: 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.

6. Orient the CFM so that the faceplate faces you. Slide the CFM all the way into the card cage until you feel resistance (Figure 32 on page 61).

7. Tighten the screws on either side of the card (Figure 32 on page 61).

Figure 32: Installing a CFM (SPC Shown, Other CFMs Similar)



8. If you are installing additional CFMs at this time, repeat steps 4 through 7, and then continue with the following steps to connect the appropriate cables.
9. Insert the appropriate cables into the cable connector ports on each CFM as applicable. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps to maintain its shape.
10. If you inserted hot-swappable CFMs such as NP-IOCs without powering off the services gateway, bring each new CFM online and power it on by pressing its **ONLINE** button for five or more seconds.

NOTE: **You may find it easiest to use a pen, screwdriver, or other tool to press the button.**

11. If you powered off the services gateway to install CFMs, power on the services gateway, as described in *Powering On the SRX3600 Services Gateway*.
12. Check the **OK/FAIL** LED on each new CFM. The **OK/FAIL** LED on the CFM faceplate should blink green, then light steadily. If it is red, remove and reinstall the CFM. If the **OK/FAIL** LED remains red, the CFM is not functioning properly. Contact your customer support representative.

WARNING: **Never lift the services gateway using the handles on the front panels of the CFM cards. The handles might come off, causing the chassis to drop and inflicting possible grave injury.**

Related Documentation

- Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway on page 149
- SRX3400 Services Gateway NEBS and ETSI Compliance on page 180
- Installing SPCs in an Operating SRX3400 Services Gateway Chassis Cluster on page 62
- Hardware Component Locations in the SRX3400 Services Gateway Chassis on page 11

Installing SPCs in an Operating SRX3400 Services Gateway Chassis Cluster

If your SRX3600 Services Gateway is part of a chassis cluster, you can install additional SPCs in the services gateways in the cluster without incurring downtime on your network. This process is sometimes called in-service hardware upgrade (ISHU).

To perform such an installation, it must meet the following conditions:

- 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 11.4R2S1, 12.1R2, or later.
- You must install SPCs of the same type in both of the services gateways in the cluster.
- You must install the SPCs in the same slots in each chassis.
- You must install the SPCs so that they are not the SPCs with the lowest-numbered slots in the chassis. For example, if the chassis already has two SPCs with one SPC each in slots 2 and 3, you cannot install additional SPCs in slots 0 or 1 using this procedure.

If your installation does not meet these criteria, use the procedure in "Installing CFM Cards in the SRX3400 Services Gateway" on page 59 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.

NOTE: If the services gateway only has one SPC installed, you must make sure that the full-cp-key license that enables large central point mode is not installed. If the license is installed when you upgrade from a single SPC to multiple SPCs, it changes the mode of the SPC in the lowest numbered slot from combo mode to large central point. After that change, the run time objects (RTOs) do not synchronize properly between the two devices in the cluster, and you incur network downtime while the devices discard their existing RTOs and rebuild their RTO tables.

To install SPCs in an SRX3400 Services Gateway cluster without incurring downtime:

1. Use the console port on the Routing Engine to establish a command-line interface (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.

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. If the services gateway has only one SPC installed in it, in the CLI session for the secondary services gateway, use the **show system license** command to make sure the device does not have the full-cp-key license installed:

```
admin@node1_device> show system license
License usage:
                                Licenses     Licenses    Licenses    Expiry
  Feature name                       used    installed      needed
  full-cp-key                           0            1           0    permanent

  logical-system                        1            1           0    permanent

Licenses installed:
  License identifier: JUNOS274930
  License version: 2
  Valid for device: AB3210AA0016
  Features:
    full-cp-key      - Expanded CP performance and capacity
      permanent
```

5. If the services gateway has only one SPC installed and the full-cp-key license is also installed, record the identifier of the full-cp-key license from the command output of the previous step. Then use the following command to remove the license:

```
admin@node1_device> request system license delete identifier
```

6. In the CLI session for the secondary services gateway, use the **request system power off** command to shut down the services gateway.
7. Wait for the secondary services gateway to completely shut down.
8. Install the new SPC or SPCs in the powered-off services gateway using the procedure in "Installing CFM Cards in the SRX3400 Services Gateway" on page 59.
9. 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.

    In the example below, the second column shows that all of the cards are online. This example is for an SRX3400 Services Gateway; for other devices the output will be similar.

```
admin@node1_device> show chassis fpc pic-status
node0:
--------------------------------------------------------------------------
Slot 0   Online      SRX3k SFB 12GE
  PIC 0  Online      8x 1GE-TX 4x 1GE-SFP
Slot 1   Online     SRX3k SPC
  PIC 0  Online      SPU Cp-Flow
Slot 2   Online      SRX3k SPC
  PIC 0  Online      SPU Flow
Slot 3   Online      SRX3k 2x10GE XFP
  PIC 0  Online      2x 10GE-XFP
Slot 5   Online      SRX3k SPC
  PIC 0  Online      SPU Flow
Slot 6   Online      SRX3k NPC
  PIC 0  Online      NPC PIC

node1:
--------------------------------------------------------------------------
Slot 0   Online      SRX3k SFB 12GE
  PIC 0  Online      8x 1GE-TX 4x 1GE-SFP
Slot 1   Online     SRX3k SPC
  PIC 0  Online      SPU Cp-Flow
Slot 2   Online      SRX3k SPC
  PIC 0  Online      SPU Flow
Slot 3   Online      SRX3k 2x10GE XFP
  PIC 0  Online      2x 10GE-XFP
Slot 5   Online      SRX3k SPC
  PIC 0  Online      SPU Flow
Slot 6   Online      SRX3k NPC
  PIC 0  Online      NPC PIC

{secondary:node1}
```

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.

    For example:

    ```
    admin@node0_device> request chassis cluster failover redundancy-group 1 node 1

    admin@node0_device> request chassis cluster failover redundancy-group 2 node 1

    admin@node01_device> request chassis cluster failover redundancy-group 3 node
    1

    admin@node0_device> request chassis cluster failover redundancy-group 4 node 1
    ```

15. If the services gateway has only one SPC in it and the full-cp-key license is installed, remove the full-cp-key license as described in Step 5.
16. 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.
17. Install the new SPC or SPCs in the powered-off services gateway using the procedure in "Installing CFM Cards in the SRX3400 Services Gateway" on page 59.
18. Power on the services gateway and wait for it to finish starting.
19. 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.
20. Use the **show chassis cluster status** command to make sure that the priority for all redundancy groups is greater than zero.

Related Documentation

- Installing CFM Cards in the SRX3400 Services Gateway on page 59

Installing an SCM in the SRX3400 Services Gateway

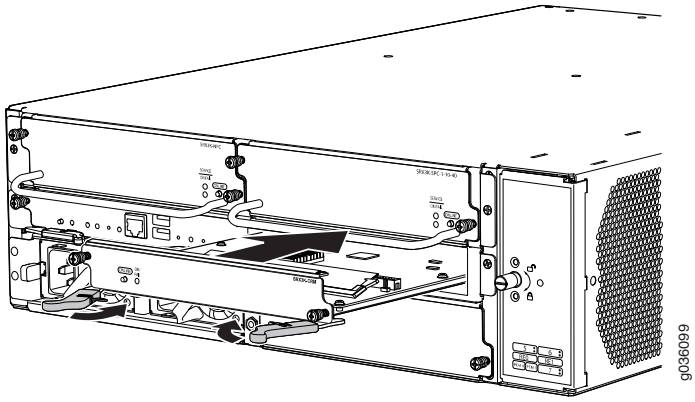
You install the SRX Clustering Module (SCM) in the **RE1** slot on the rear panel of the services gateway. To install the SCM:

1. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
2. If you have not already done so, power off the services gateway by pressing the Power button on the front panel of the SFB for three to five seconds.

   The **PWR** LED blinks to show you that the services gateway is shutting down. Wait for the services gateway to shut down before you proceed to the next step.
3. Loosen the captive screws at each end of the blank faceplate over the **RE1** slot and remove the faceplate.

4. Place the SCM on an antistatic mat or remove it from its electrostatic bag and place it on the bag.
5. Press both of the ejector handles on the SCM faceplate outward to release them.
6. Orient the SCM so that its faceplate faces you. Slide the SCM all the way into the card cage until you feel resistance. See Figure 33 on page 66.

Figure 33: Installing the SCM in the SRX3400 Services Gateway



7. Press both of the ejector handles inward to seat the SCM.
8. Tighten the screws on either side of the SCM faceplate.

Related Documentation

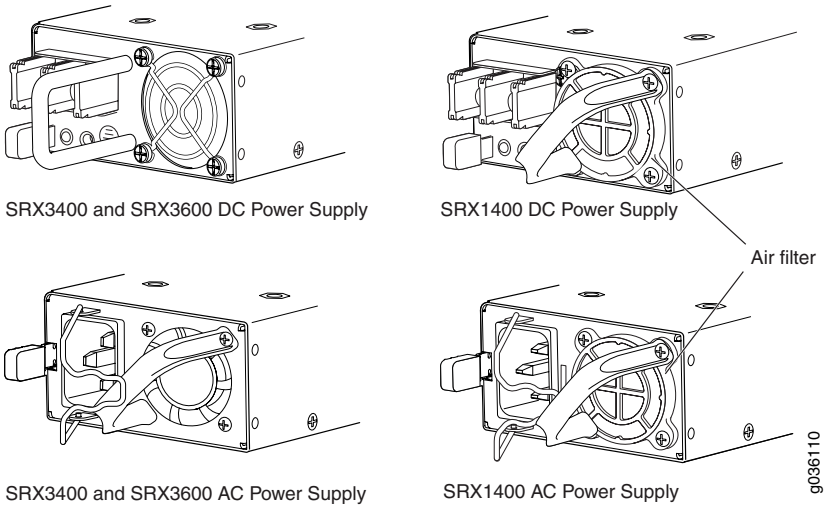
- SRX3400 Services Gateway SRX Clustering Module on page 24
- Replacing an SCM on the SRX3400 Services Gateway on page 123

Installing an AC Power Supply in the SRX3400 Services Gateway

NOTE: For the services gateway to meet NEBS and ETSI standards, both AC power supplies must be Revision 09 or later. See "SRX3400 Services Gateway NEBS and ETSI Compliance" on page 180 for more information.

NOTE: The same AC power supply is used in both the SRX3400 and SRX3600 Services Gateways. However, this power supply is not interchangeable with that used in the SRX1400 Services Gateway. The SRX1400 Services Gateway power supply will fit into the SRX3400 Services Gateway, but will not work properly. You can identify the SRX1400 Services Gateway power supply by the plastic air filter assembly installed over the cooling air inlet as shown in Figure 34 on page 67.

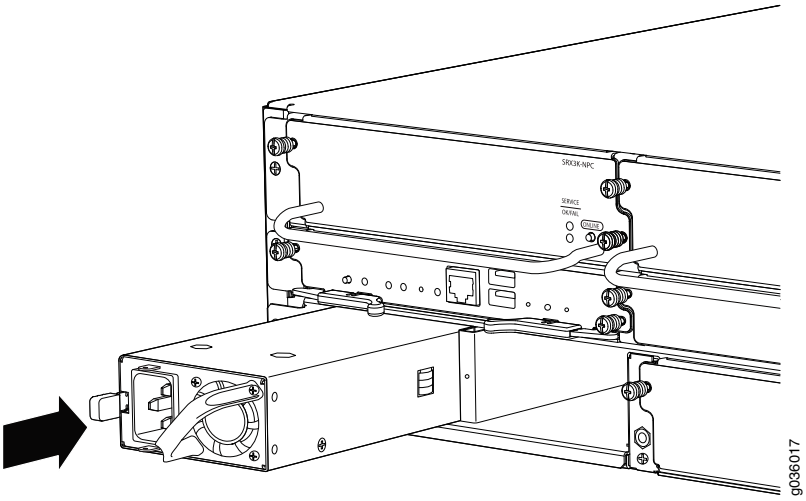
Figure 34: Identifying Power Supply Types



To install an AC power supply:

1. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
2. Orient the power supply so that the locking lever is on the left, as shown in Figure 35 on page 68.

Figure 35: Installing an AC Power Supply



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.

See "Connecting the SRX3400 Services Gateway to an AC Power Source" on page 77 for information on connecting the power supply to AC power.

Related Documentation

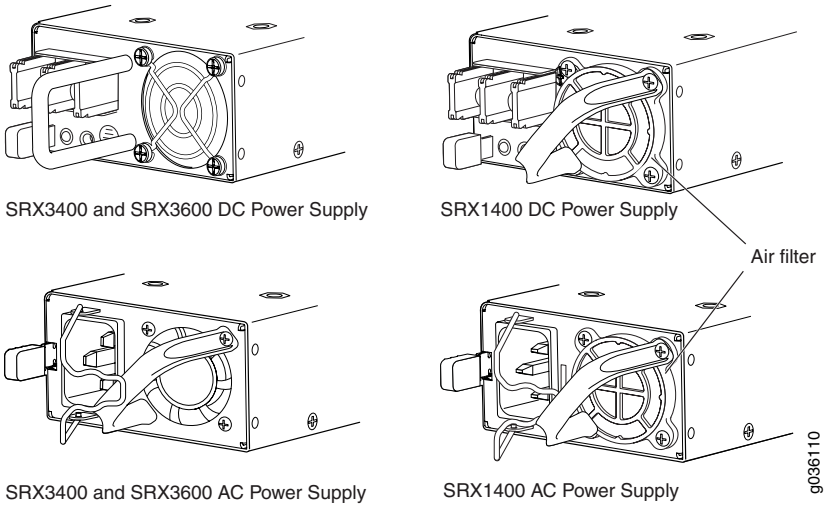
- Installing CFM Cards in the SRX3400 Services Gateway on page 59
- Installing a DC Power Supply in the SRX3400 Services Gateway on page 69

Installing a DC Power Supply in the SRX3400 Services Gateway

NOTE: For the services gateway to meet NEBS and ETSI standards, both DC power supplies must be enhanced DC power supplies. See "SRX3400 Services Gateway NEBS and ETSI Compliance" on page 180 for more information.

NOTE: The same DC power supply is used in both the SRX3400 and SRX3600 Services Gateways. However, this power supply is not interchangeable with that used in the SRX1400 Services Gateway. The SRX1400 Services Gateway power supply will fit into the SRX3400 Services Gateway, but will not work properly. You can identify the SRX1400 Services Gateway power supply by the plastic air filter assembly installed over the cooling air inlet as shown in Figure 36 on page 69.

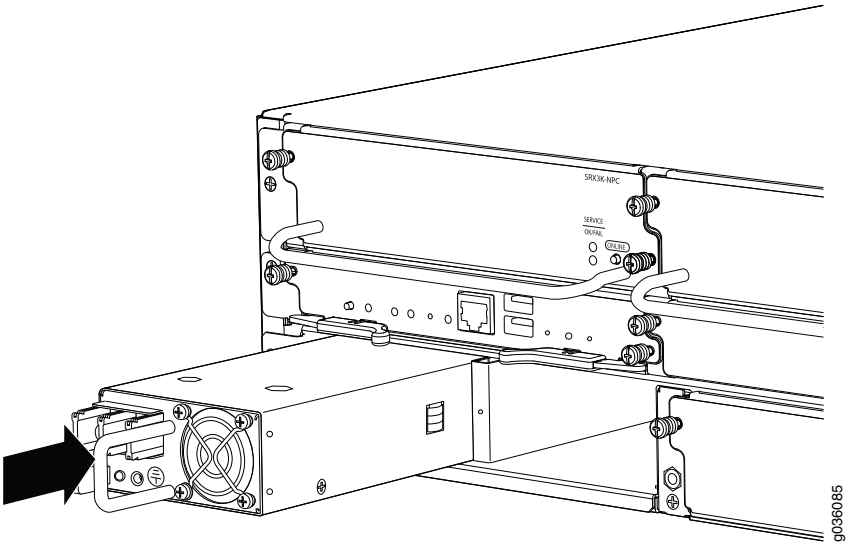
Figure 36: Identifying Power Supply Types



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. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
3. Orient the power supply so that the locking lever is on the left, as shown in Figure 37 on page 70.

Figure 37: Installing a DC Power Supply



4. 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 "Connecting the SRX3400 Services Gateway to a DC Power Source" on page 79 for information on connecting the power supply to DC power.

Related Documentation

- Installing CFM Cards in the SRX3400 Services Gateway on page 59
- Installing an AC Power Supply in the SRX3400 Services Gateway on page 66

CHAPTER 7

Connecting the SRX3400 Services Gateway

This section includes the following topics:

Required Tools and Parts for Connecting the SRX3400 Services Gateway

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

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

Related Documentation

- Connecting the SRX3400 Services Gateway to a Network for Out-of-Band Management on page 72
- Connecting the SRX3400 Services Gateway to a Management Console or an Auxiliary Device on page 72
- Grounding the SRX3400 Services Gateway on page 76

Connecting the SRX3400 Services Gateway to Management Devices

After you have installed the services gateway into the rack, attach one or more external devices to the ports on the SFB that connect to the installed Routing Engine for management and service operations.

To connect external devices to the SFB management ports, perform the procedures described in the following topics:

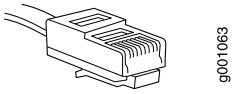
- Connecting the SRX3400 Services Gateway to a Network for Out-of-Band Management on page 72
- Connecting the SRX3400 Services Gateway to a Management Console or an Auxiliary Device on page 72

Connecting the SRX3400 Services Gateway to a Network for Out-of-Band Management

To connect the Routing Engine to a network for out-of-band management:

1. Plug one end of an Ethernet cable with RJ-45 connectors (Figure 38 on page 72 shows the connector) into the **RE ETHERNET 0** port on the front of the SFB.

Figure 38: SFB Ethernet Cable Connector



One Ethernet cable is provided with the services gateway.

2. Plug the other end of the cable into the network device.

Related Documentation

- Required Tools and Parts for Connecting the SRX3400 Services Gateway on page 71
- Connecting the SRX3400 Services Gateway to a Management Console or an Auxiliary Device on page 72
- Grounding the SRX3400 Services Gateway on page 76
- Console Port Cable and Wire Specifications for the SRX3400 Services Gateway on page 204
- SRX3400 Services Gateway Switch Fabric Board on page 14

Connecting the SRX3400 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 one of the **RE CONSOLE** ports on the SFB using the RJ-45 cable.

To connect a management console or an auxiliary device:

1. Plug the RJ-45 end of the cable (Figure 40 on page 73 shows the connector) into the **RE CONSOLE 0** port on the SFB.
2. Plug the female DB-9 end into the device's serial port.

Figure 39: Connecting to the Console Port

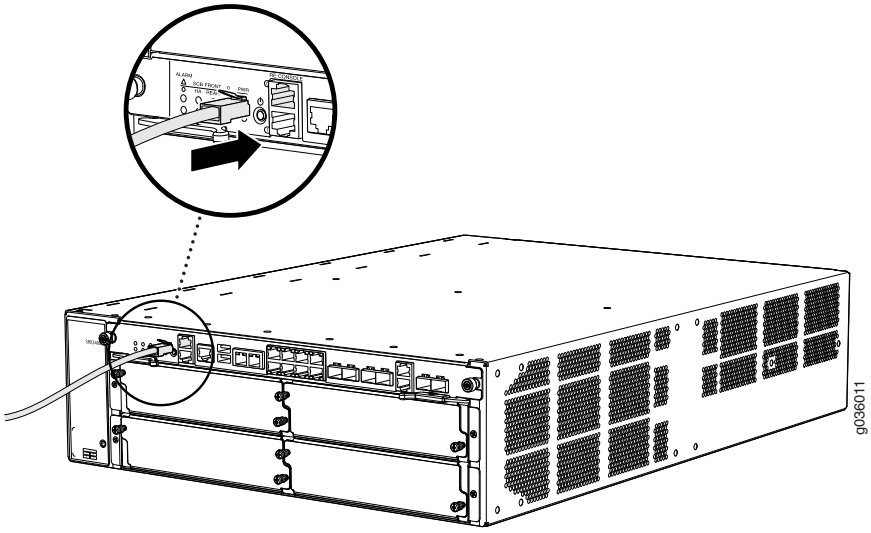
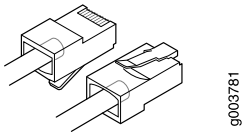


Figure 40: Console and Auxiliary Cable Connector



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

Related Documentation

- Required Tools and Parts for Connecting the SRX3400 Services Gateway on page 71
- Connecting the SRX3400 Services Gateway to a Network for Out-of-Band Management on page 72
- Grounding the SRX3400 Services Gateway on page 76
- Console Port Cable and Wire Specifications for the SRX3400 Services Gateway on page 204
- SRX3400 Services Gateway Switch Fabric Board on page 14

CHAPTER 8

Grounding and Providing Power to the SRX3400 Services Gateway

This section includes the following topics:

Required Tools and Parts for Grounding and Providing Power to the SRX3400 Services Gateway

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
- Wire cutters
- Electrostatic discharge (ESD) grounding wrist strap

Related Documentation

- Grounding the SRX3400 Services Gateway on page 76
- Connecting the SRX3400 Services Gateway to an AC Power Source on page 77
- Connecting the SRX3400 Services Gateway to a DC Power Source on page 79
- Powering On the SRX3400 Services Gateway on page 81
- Powering Off the SRX3400 Services Gateway on page 82

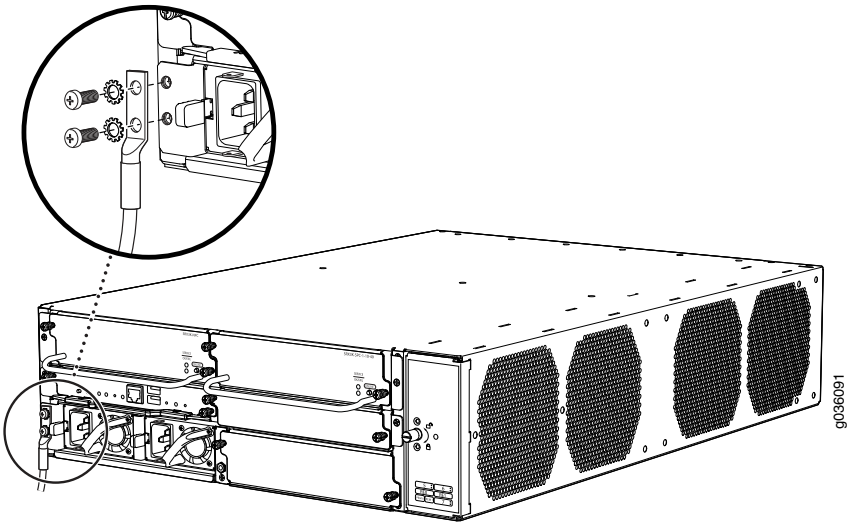
Grounding the SRX3400 Services Gateway

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 services gateway by connecting a grounding cable to earth ground and then attaching it to the chassis grounding point using two M5 screws. You must provide the grounding cable (the cable lug is supplied with the services gateway). For grounding cable specifications, see "SRX3400 Services Gateway Grounding Cable Specification" on page 187.

1. Verify that a licensed electrician has attached the cable lug provided with the services gateway to the grounding cable.
2. Attach an ESD grounding strap to your bare wrist and connect the strap to an approved site ESD grounding point. See the instructions for your site.
3. Ensure that all grounding surfaces are clean and brought to a bright finish before grounding connections are made.
4. Connect the grounding cable to a proper earth ground.
5. Detach the ESD grounding strap from the site ESD grounding point.
6. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
7. Place the grounding cable lug over the grounding point—a pair of M5 holes to the left of the power supply slots. See Figure 41 on page 76.

Figure 41: Connecting the Grounding Cable



8. Secure the grounding cable lug to the chassis, first with the washers, then with the screws.
9. Dress the grounding cable and verify that it does not touch or block access to services gateway components, and that it does not drape where people could trip on it.

Related Documentation

- Required Tools and Parts for Grounding and Providing Power to the SRX3400 Services Gateway on page 75
- Connecting the SRX3400 Services Gateway to an AC Power Source on page 77
- Connecting the SRX3400 Services Gateway to a DC Power Source on page 79
- Powering On the SRX3400 Services Gateway on page 81
- Powering Off the SRX3400 Services Gateway on page 82

Connecting the SRX3400 Services Gateway to an AC Power Source

You connect AC power to the services gateway by attaching power cords from the AC power sources to the AC appliance inlets located on the power supplies.

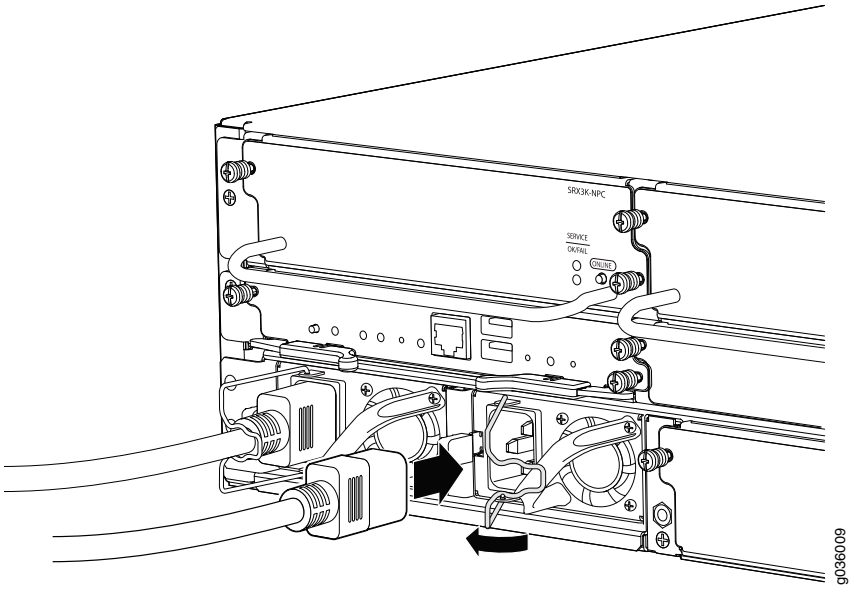
WARNING: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must properly ground the services gateway chassis before connecting power. See "Grounding the SRX3400 Services Gateway" on page 76 for instructions.

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

To connect the AC power cords to the services gateway for each power supply:

1. Locate the power cord or cords you will use to connect the services gateway to AC power. The services gateway is not shipped with AC power cords. You must order them separately using the model numbers shown in "SRX3400 Services Gateway AC Power Cord Specifications" on page 195.
2. Insert the appliance coupler end of the power cord into the appliance inlet on the power supply, as shown in Figure 42 on page 78.

Figure 42: Connecting to AC Power



3. Snap the wire bail on the power supply over the power cord to prevent the power cord from accidentally disengaging.
4. 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.

5. Dress the power cord appropriately. 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.
6. Repeat steps 1 through 5 for the remaining power supplies.

NOTE: If power is lost to the services gateway, the Power-On/Power-Off state is retained. For example, if the services gateway loses power while the services gateway is on, when power returns, it will still be in the On state.

Related Documentation

- Required Tools and Parts for Grounding and Providing Power to the SRX3400 Services Gateway on page 75
- SRX3400 Services Gateway AC Power Cord Specifications on page 195
- Grounding the SRX3400 Services Gateway on page 76
- Connecting the SRX3400 Services Gateway to a DC Power Source on page 79
- Powering On the SRX3400 Services Gateway on page 81

- Powering Off the SRX3400 Services Gateway on page 82

Connecting the SRX3400 Services Gateway to a DC Power Source

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.

WARNING: Before performing the following procedure, 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 SRX3400 Services Gateway" on page 76 for instructions.

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

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

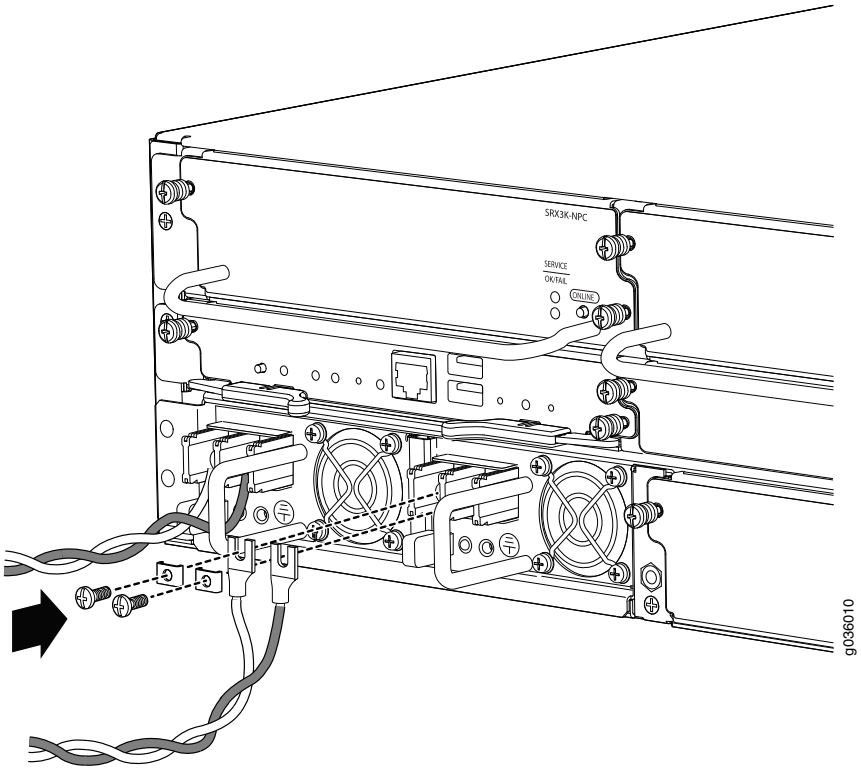
To connect the DC source power cables to the services gateway for each power supply:

1. Switch off the dedicated facility 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. Remove the clear plastic cover protecting the terminal studs on the faceplate.
3. Verify that the DC power cables are correctly labeled before making connections to the power supply. In a typical power distribution scheme where the return is connected to chassis ground at the battery plant, you can use a multimeter to verify that the ohm output of the **-48V** and **RTN** DC cables to chassis ground. The cable with very large resistance (indicating an open circuit) to chassis ground will be **-48V** and the cable with very low resistance (indicating a closed circuit) to chassis ground will be **RTN**.

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

4. Remove the screws and square washers from the terminals. Use a number-2 Phillips screwdriver.
5. Secure each power cable lug to the terminals, first with the square washer, then with the screw. Apply between 23 lb-in. (2.6 Nm) and 25 lb-in. (2.8 Nm) of torque to each screw.
   - Secure each positive (+) DC source power cable lug to a **RTN** (return) terminal.
   - Secure each negative (–) DC source power cable lug to a **-48V** (input) terminal.
6. Replace the clear plastic cover over the terminal studs on the faceplate.
7. Verify that the power cables are connected correctly, that they are not touching or blocking access to services gateway components, and that they do not drape where people could trip on them.
8. If you are installing multiple power supplies, repeat steps 1 through 7 for the other power supplies.

Figure 43: Connecting to DC Power



NOTE: If power is lost to the services gateway, the Power-On/Power-Off state is retained. For example, if the services gateway loses power while the services gateway is on, when power returns, it will still be in the On state.

Related Documentation

- Required Tools and Parts for Grounding and Providing Power to the SRX3400 Services Gateway on page 75
- Grounding the SRX3400 Services Gateway on page 76
- Connecting the SRX3400 Services Gateway to an AC Power Source on page 77
- Powering On the SRX3400 Services Gateway on page 81
- Powering Off the SRX3400 Services Gateway on page 82

Powering On the SRX3400 Services Gateway

To power on the services gateway, press the Power button on the front of the SFB for three to five seconds.

NOTE: If power is lost to the services gateway, the Power-On/Power-Off state is retained. For example, if the services gateway loses power while it is switched on, when power returns, the services gateway will still be in the On state.

Related Documentation

- Required Tools and Parts for Grounding and Providing Power to the SRX3400 Services Gateway on page 75
- Grounding the SRX3400 Services Gateway on page 76
- Connecting the SRX3400 Services Gateway to an AC Power Source on page 77
- Connecting the SRX3400 Services Gateway to a DC Power Source on page 79
- Powering Off the SRX3400 Services Gateway on page 82

Powering Off the SRX3400 Services Gateway

You can power off the services gateway in one of the following ways:

- Graceful shutdown—Press and immediately release the POWER button on the front of the SFB (for 3 to 5 seconds) to initiate graceful shutdown. The device begins gracefully shutting down the operating system and then powers itself off.
- Forced shutdown—Press the POWER button and hold it for 15 seconds to power down the device immediately.

  You need to press the POWER button again to power on the device.

  CAUTION: Use the graceful shutdown method to power off or reboot the services gateway whenever possible. Use the forced shutdown method as a last resort to recover the services gateway if the services gateway operating system is not responding to the graceful shutdown method.

  By default, even if you press the POWER button and hold it for 15 seconds, the device will still do a graceful shutdown as long as the device is responsive and operating normally. The device will resort to forced shutdown only if it fails or does not respond to the operating system.

- To remove power completely from the device, unplug the AC power cord (for AC-powered devices) or switch off the DC power source (for DC-powered devices). After powering off the device, wait for at least 10 seconds before powering on the device again. After powering on the device, wait for at least 10 seconds before powering it off.

CAUTION: Forced shutdown can result in data loss and corruption of the file system.

NOTE: If power is lost to the services gateway, the Power-On/Power-Off state is retained. For example, if the services gateway loses power it is switched on, when power returns, the services gateway will still be in the On state.

Related Documentation

- Required Tools and Parts for Grounding and Providing Power to the SRX3400 Services Gateway on page 75
- Grounding the SRX3400 Services Gateway on page 76
- Connecting the SRX3400 Services Gateway to an AC Power Source on page 77
- Connecting the SRX3400 Services Gateway to a DC Power Source on page 79
- Powering On the SRX3400 Services Gateway on page 81

CHAPTER 9

Performing Initial Software Configuration on the SRX3400 Services Gateway

This section includes the following topics:

SRX3400 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 services gateway 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 services gateway 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 services gateway 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 **RE CONSOLE 0** port on the SFB, or over a Telnet connection to a network connected to the **RE ETHERNET 0** port on the SFB.

Gather the following information before configuring the services gateway:

- Name the services gateway will use on the network
- Domain name the services gateway 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

Related Documentation

- Performing Initial Software Configuration on the SRX3400 Services Gateway on page 86
- SRX3400 Services Gateway Switch Fabric Board on page 14

Performing Initial Software Configuration on the SRX3400 Services Gateway

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

To configure the software:

1. Verify that the services gateway 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 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 services gateway. 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 services gateway.

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

8. Log in as the administrative user you configured in step 6.
9. Configure the name of the services gateway. 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 connected to 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 ge-0/0/0 unit 0 family inet address address/prefix-length
admin@# set interfaces ge-0/0/1 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 ge-0/0/0
admin@# set security zones security-zone untrust interfaces ge-0/0/1
```

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
admin@# 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 services gateway.

```
[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 ge-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 {
    ge-0/0/0 {
        unit 0 {
            family inet {
                address 192.1.1.1/24;
            }
        }
    }
    ge-0/0/1 {
        unit 0 {
            family inet {
                address 5.1.1.1/24;
            }
        }
    }
    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 {
                ge-0/0/0.0;
            }
        }
        security-zone untrust {
            interfaces {
                ge-0/0/1.0;
            }
        }
    }
    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 services gateway.

    ```
    [edit]
    admin@# commit
    ```

19. Optionally, configure additional properties by adding the necessary configuration statements. Then commit the changes to activate them on the services gateway.

    ```
    [edit]
    admin@# commit
    ```

20. When you have finished configuring the services gateway, exit configuration mode.

    ```
    [edit]
    admin@# exit
    admin@#
    ```

Related Documentation

- SRX3400 Services Gateway Software Configuration Overview on page 85
- SRX3400 Services Gateway Switch Fabric Board on page 14

Performing Initial Software Configuration Using J-Web

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

You can configure hostnames, interfaces, zones, and security policies using J-Web.

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 89
- Enable HTTP on the device to access J-Web. See "Configuring Root Authentication and the Management Interface from the CLI" on page 89

Configure the device with J-Web using the following procedures.

- Configuring the Hostname on page 90
- Configuring Interfaces on page 91
- Configuring Zones and Assigning Interfaces on page 91
- Configuring Security Policies on page 92

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 89.
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 Steps 1 through 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.

Related Documentation

- *Performing Initial Software Configuration on the SRX1400 Services Gateway (CLI Procedure)*
- Performing Initial Software Configuration on the SRX3400 Services Gateway on page 86
- *Performing Initial Software Configuration on the SRX3600 Services Gateway*
- *Initially Configuring the SRX5400 Services Gateway*
- *Initially Configuring the SRX5600 Services Gateway*
- *Initially Configuring the SRX5800 Services Gateway*

PART 3

SRX3400 Services Gateway Hardware Maintenance, Replacement, and Troubleshooting Procedures

CHAPTER 10

Maintaining the SRX3400 Services Gateway Hardware Components

This section includes the following topics:

Required Tools and Parts for Maintaining the SRX3400 Services Gateway Hardware Components

To maintain hardware components, you need the following tools and parts:

- ESD grounding wrist strap
- Flat-blade (–) screwdriver
- Phillips (+) screwdriver, number 1
- Phillips (+) screwdriver, number 2

Related Documentation

- Routine Maintenance Procedures for the SRX3400 Services Gateway on page 96
- Maintaining the Air Filter on the SRX3400 Services Gateway on page 96
- Maintaining the Fan Tray on the SRX3400 Services Gateway on page 97
- Maintaining the Routing Engine on the SRX3400 Services Gateway on page 98
- Maintaining the Power Supplies on the SRX3400 Services Gateway on page 99

Routine Maintenance Procedures for the SRX3400 Services Gateway

For optimum services gateway performance, perform the following preventive maintenance procedures regularly:

- Inspect the installation site for moisture, loose wires or cables, and excessive dust. Make sure that airflow is unobstructed around the services gateway and into the air intake vents.
- Inspect the air filter, cleaning or replacing it as needed for optimum cooling system performance. Do not run the services gateway for more than a few minutes without the air filter in place.

Related Documentation

- Maintaining the Air Filter on the SRX3400 Services Gateway on page 96
- Maintaining the Fan Tray on the SRX3400 Services Gateway on page 97
- Maintaining the Routing Engine on the SRX3400 Services Gateway on page 98
- Maintaining the Power Supplies on the SRX3400 Services Gateway on page 99

Maintaining the Air Filter on the SRX3400 Services Gateway

A dirty air filter restricts airflow in the unit, reducing 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.

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.**

Use spare filters within one year of manufacture. Check the date of manufacture printed on the filter. Store spare air filters in a dark, cool, and dry place. Storing air filters at higher temperatures, or where they can be exposed to ultraviolet (UV) radiation, hydrocarbon emissions, or vapors from solvents, can significantly reduce their life.

Related Documentation

- Replacing the Air Filter on the SRX3400 Services Gateway on page 116
- Required Tools and Parts for Maintaining the SRX3400 Services Gateway Hardware Components on page 95
- Routine Maintenance Procedures for the SRX3400 Services Gateway on page 96
- Maintaining the Fan Tray on the SRX3400 Services Gateway on page 97
- Maintaining the Routing Engine on the SRX3400 Services Gateway on page 98
- Maintaining the Power Supplies on the SRX3400 Services Gateway on page 99

Maintaining the Fan Tray on the SRX3400 Services Gateway

The fan tray contains multiple fans that work in unison to cool the services gateway components. If one fan fails, the Routing Engine adjusts the speed of the remaining fans to maintain proper cooling. A red alarm is triggered when a fan fails, and a yellow alarm and red alarm is triggered when a fan tray is removed.

To display the status of the cooling system, issue the **show chassis environment** command. The output is similar to the following:

```
user@host> show chassis environment

Class Item                          Status     Measurement
Temp  PEM 0                         OK
      PEM 1                         OK
      Routing Engine 0              OK
      Routing Engine 1              Absent
      CB 0 Intake                   OK         36 degrees C / 96 degrees F
      CB 0 Exhaust A                OK         43 degrees C / 109 degrees F
      CB 0 Mezz                     OK         45 degrees C / 113 degrees F
      CB 1 Intake                   Absent
      CB 1 Exhaust A                Absent
      CB 1 Mezz                     Absent
      FPC 0 Intake                  OK         35 degrees C / 95 degrees F
      FPC 0 Exhaust A               OK         35 degrees C / 95 degrees F
      FPC 0 Exhaust B               OK         36 degrees C / 96 degrees F
      FPC 0 SF                      OK         50 degrees C / 122 degrees F
      FPC 1 Intake                  OK         34 degrees C / 93 degrees F
      FPC 1 Exhaust A               OK         41 degrees C / 105 degrees F
      FPC 1 XLR                     OK         53 degrees C / 127 degrees F
      FPC 2 Intake                  OK         34 degrees C / 93 degrees F
      FPC 2 Exhaust A               OK         44 degrees C / 111 degrees F
      FPC 4 Intake                  OK         40 degrees C / 104 degrees F
      FPC 4 Exhaust A               OK         45 degrees C / 113 degrees F
      FPC 6 Intake                  OK         38 degrees C / 100 degrees F
      FPC 6 Exhaust A               OK         44 degrees C / 111 degrees F

Fans  Fan 1                         OK         Spinning at intermediate-speed
      Fan 2                         OK         Spinning at intermediate-speed
      Fan 3                         OK         Spinning at intermediate-speed
      Fan 4                         OK         Spinning at intermediate-speed
```

Related Documentation

- Required Tools and Parts for Maintaining the SRX3400 Services Gateway Hardware Components on page 95
- Routine Maintenance Procedures for the SRX3400 Services Gateway on page 96
- Maintaining the Air Filter on the SRX3400 Services Gateway on page 96
- Maintaining the Routing Engine on the SRX3400 Services Gateway on page 98
- Maintaining the Power Supplies on the SRX3400 Services Gateway on page 99

Maintaining the Routing Engine on the SRX3400 Services Gateway

The host subsystem comprises a Routing Engine installed directly into the midplane. To maintain the host subsystem components, follow these guidelines:

- Check the LEDs on the SFB 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)
    DRAM                        1023 MB
    Memory utilization            34 percent
    CPU utilization:
      User                         0 percent
      Background                   0 percent
      Kernel                       3 percent
      Interrupt                    0 percent
      Idle                        96 percent
    Model                          RE-PPC-1200-A
    Start time                     2010-04-05 14:01:33 PDT
    Uptime                         47 minutes, 48 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
    Load averages:                 1 minute   5 minute  15 minute
                                       0.04       0.04       0.05
```

- To check the status of the SFB, 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                37 degrees C / 98 degrees F
  Power 1
    1.0 V                      982 mV
    1.1 V                     1057 mV
    1.2 V                     1169 mV
    1.25 V                    1214 mV
    1.5 V                     1450 mV
    1.8 V                     1753 mV
    2.5 V                     2449 mV
    3.3 V                     3248 mV
    3.3 V bias                3296 mV
    5.0 V                     4975 mV
    12.0 V                   11640 mV
  Bus Revision               108
  FPGA Revision              0
```

For more information about using the CLI, see the CLI Explorer.

Related Documentation

- Required Tools and Parts for Maintaining the SRX3400 Services Gateway Hardware Components on page 95

- SRX3400 Services Gateway Switch Fabric Board on page 14
- SRX3400 Services Gateway Routing Engine on page 23
- Routine Maintenance Procedures for the SRX3400 Services Gateway on page 96
- Maintaining the Air Filter on the SRX3400 Services Gateway on page 96
- Maintaining the Fan Tray on the SRX3400 Services Gateway on page 97
- Maintaining the Power Supplies on the SRX3400 Services Gateway on page 99

Maintaining the Power Supplies on the SRX3400 Services Gateway

To maintain the power supplies, follow these guidelines:

- To check the status of the power supplies, issue the **show chassis environment pem** command. The output is similar to the following:

```
user@host> show chassis environment pem
PEM 0 status:
  State                       Online
PEM 1 status:
  State                       Online
```

- 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 **PWR** status LED on the SFB faceplate. If this LED is solid green, the power supplies are functioning normally.
- Periodically inspect the site to ensure that the grounding and power cables connected to the services gateway are securely in place and that there is no moisture accumulating near the services gateway.

Related Documentation

- Required Tools and Parts for Maintaining the SRX3400 Services Gateway Hardware Components on page 95
- Routine Maintenance Procedures for the SRX3400 Services Gateway on page 96
- Grounding the SRX3400 Services Gateway on page 76
- Maintaining the Air Filter on the SRX3400 Services Gateway on page 96
- Maintaining the Fan Tray on the SRX3400 Services Gateway on page 97
- Maintaining the Routing Engine on the SRX3400 Services Gateway on page 98

CHAPTER 11

Troubleshooting the SRX3400 Services Gateway

This section includes the following topics:

Troubleshooting Hardware Components on the SRX3400 Services Gateway

This section includes the following topics:

Troubleshooting with the CLI on the SRX3400 Services Gateway

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 **traceroute** and **traceroute** utilities.

CLI commands are entered on one or more external management devices. These devices are connected to the services gateway through the **RE CONSOLE 0** port on the SFB.

You can use the CLI to display details about alarms generated by interfaces and hardware components.

For information about using the CLI to troubleshoot Junos OS, see the appropriate Junos OS configuration guide.

Related Documentation

- SRX3400 Services Gateway Switch Fabric Board on page 14
- Troubleshooting with Chassis and Interface Alarm Messages on the SRX3400 Services Gateway on page 103
- Troubleshooting with LEDs on the SRX3400 Services Gateway on page 102

Troubleshooting with LEDs on the SRX3400 Services Gateway

LEDs on the services gateway display the status of various components:

- Common form-factor module (CFM) LED—One LED labeled **OK/FAIL** on the faceplate of each IOC, NP-IOC, SPC, and NPC indicates the CFM's status.
- SFB LEDs—Ten LEDs, labeled **ALARM** (2 LEDs), **SFB**, **HA**, **CFM SERVICE**, **CFM OK/FAIL**, **RE0**, **RE1**, **PWR**, and **FAN**, on the SFB faceplate indicate the status of the SFB. If no LEDs are lit, the Routing Engine might still be booting or the SFB is not receiving power.
- Routing Engine LEDs—Five LEDs, labeled **MASTER**, **HDD**, **STATUS** for the Routing Engine function, **STATUS** for the PFE controller, and **OK/FAIL** for general board status, on the Routing Engine faceplate indicate the status of the Routing Engine and hard disk drive.
- SRX Clustering Module (SCM) LED—One LED, labeled **OK/FAIL**, on the SCM faceplate indicates the status of the SCM.
- Power supply LEDs—One LED on each power supply faceplate indicates the status of that power supply.

For detailed information about the LEDs on CFMs and other modules supported by the services gateway, see the *SRX1400, SRX3400, and SRX3600 Services Gateway Module Guide* at www.juniper.net/techpubs/.

Related Documentation

- SRX3400 Services Gateway IOCs on page 21
- SRX3400 Services Gateway SPCs on page 20
- SRX3400 Services Gateway NPCs on page 20
- SRX3400 Services Gateway Switch Fabric Board on page 14
- SRX3400 Services Gateway Routing Engine on page 23
- SRX3400 Services Gateway SRX Clustering Module on page 24
- SRX3400 Services Gateway AC Power Supply Overview on page 25
- SRX3400 Services Gateway DC Power Supply Overview on page 27
- Troubleshooting with the CLI on the SRX3400 Services Gateway on page 101
- Troubleshooting with Chassis and Interface Alarm Messages on the SRX3400 Services Gateway on page 103

Troubleshooting with Chassis and Interface Alarm Messages on the SRX3400 Services Gateway

When the Routing Engine detects an alarm condition, it lights the red or yellow alarm LED on the SFB 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.

Related Documentation

- Troubleshooting with the CLI on the SRX3400 Services Gateway on page 101
- Troubleshooting with LEDs on the SRX3400 Services Gateway on page 102

Juniper Networks Technical Assistance Center

If you need assistance while troubleshooting a services gateway, open a support case using the Case Manager link at: http://www.juniper.net/support/ , or call 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

Related Documentation

- Troubleshooting with the CLI on the SRX3400 Services Gateway on page 101
- Troubleshooting with LEDs on the SRX3400 Services Gateway on page 102
- Troubleshooting with Chassis and Interface Alarm Messages on the SRX3400 Services Gateway on page 103

Troubleshooting the Cooling System on the SRX3400 Services Gateway

The services gateway cooling system consists of a fan tray and an air filter, both of which are located vertically in the rear of the chassis. The fan tray contains four fans. The fan tray provides cooling to the components installed in the services gateway.

An air filter installed in the rear of the chassis helps keep dust and other particles from entering the cooling system. To function properly, the entire cooling system requires an unobstructed airflow and proper clearance around the site, as described in "Site Preparation Checklist for the SRX3400 Services Gateway" on page 37.

During normal operation, the fans in the fan tray function at less than full speed. The Routing Engine constantly monitors the temperatures detected by sensors and services gateway components, adjusting the speed of the fans as necessary. If the services gateway temperature exceeds the acceptable maximum, the Routing Engine turns off the power supplies. The following conditions automatically cause the fans to run at full speed and also trigger the indicated alarm:

- A fan fails (red alarm).
- The fan tray is removed (yellow alarm and red alarm).

- The services gateway temperature exceeds the “temperature warm” threshold (yellow alarm).
- The temperature of the services gateway exceeds the maximum (“temperature hot”) threshold (red alarm and automatic shutdown of the power supplies).

To troubleshoot the fans, follow these guidelines:

- If the FAN LED on the SFB lights red, 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 need to replace the fan tray, as described in “Replacing the Fan Tray on the SRX3400 Services Gateway” on page 114.
- 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 all power supplies have failed, the system temperature might have exceeded the threshold, causing the system to shut down.

Related Documentation

- Replacing the Fan Tray on the SRX3400 Services Gateway on page 114
- Troubleshooting with the CLI on the SRX3400 Services Gateway on page 101
- Troubleshooting IOCs and NP-IOCs on the SRX3400 Services Gateway on page 104
- Troubleshooting NPCs on the SRX3400 Services Gateway on page 106
- Troubleshooting SPCs on the SRX3400 Services Gateway on page 107
- Troubleshooting the Power System on the SRX3400 Services Gateway on page 108

Troubleshooting IOCs and NP-IOCs on the SRX3400 Services Gateway

To troubleshoot an IOC or NP-IOC, follow these guidelines:

- Make sure the IOC or NP-IOC is properly seated in the midplane and its screws are tightened.
- Issue the CLI **show chassis fpc** command to check the status of installed IOCs and NP-IOCs. As shown in the sample output, the value **Online** in the column labeled **State** indicates that the IOC or NP-IOC is functioning normally:

```
user@host> show chassis fpc
                     Temp  CPU Utilization (%)   Memory    Utilization (%)
Slot State           (C)  Total  Interrupt      DRAM (MB) Heap     Buffer
  0  Online           35     43          0       1024        4         27
  1  Online           34     43          0       1024        4         27
  2  Online           34     43          0       1024        4         27
  3  Empty
  4  Online           40     43          0       1024        4         27
  5  Empty
  6  Online           39     43          0       1024        4         27
  7  Empty
```

```
  8  Empty
  9  Empty
 10  Online           35     43          0       1024        4         27
 11  Online           36     43          0       1024        4         27
 12  Empty
```

Using a question mark (?) gives you a listing of the various options for the command:

```
user@host> show chassis fpc ?
Possible completions:
  <[Enter]>            Execute this command
  <fpc-slot>           FPC slot number (0..12)
  detail               Display detailed output
  pic-status           Show Physical Interface Cards installed in FPC
  |                    Pipe through a command
```

To view information about a particular card in the chassis, use the **fpc *slot*** option:

```
user@host> show chassis fpc 6
                     Temp  CPU Utilization (%)   Memory    Utilization (%)
Slot State            (C)  Total  Interrupt      DRAM (MB) Heap     Buffer
  6  Online            35     42          0       1024        4         27
```

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                        34 degrees C / 93 degrees F
  Total CPU DRAM                   1024 MB
  Total RLDRAM                        0 MB
  Total DDR DRAM                      0 MB
  Start time:                           2008-11-04 07:07:48 PST
  Uptime:                               5 hours, 48 minutes, 43 seconds
Slot 1 information:
  State                                 Online
  Temperature                        34 degrees C / 93 degrees F
  Total CPU DRAM                   1024 MB
  Total RLDRAM                        0 MB
  Total DDR DRAM                      0 MB
  Start time:                           2008-11-04 07:07:50 PST
  Uptime:                               5 hours, 48 minutes, 41 seconds
Slot 2 information:
  State                                 Online
  Temperature                        33 degrees C / 91 degrees F
  Total CPU DRAM                   1024 MB
  Total RLDRAM                        0 MB
  Total DDR DRAM                      0 MB
  Start time:                           2008-11-04 07:07:51 PST
  Uptime:                               5 hours, 48 minutes, 40 seconds
Slot 4 information:
  State                                 Online
  Temperature                        40 degrees C / 104 degrees F
  Total CPU DRAM                   1024 MB
  Total RLDRAM                        0 MB
  Total DDR DRAM                      0 MB
  Start time:                           2008-11-04 07:07:44 PST
  Uptime:                               5 hours, 48 minutes, 47 seconds
Slot 6 information:
  State                                 Online
  Temperature                        38 degrees C / 100 degrees F
```

```
  Total CPU DRAM                  1024 MB
  Total RLDRAM                       0 MB
  Total DDR DRAM                     0 MB
  Start time:                          2008-11-04 07:07:44 PST
  Uptime:                              5 hours, 48 minutes, 47 seconds
```

For further description of the output from the commands, see the *Junos System Basics and Services Command Reference*.

Related Documentation

- Troubleshooting with the CLI on the SRX3400 Services Gateway on page 101
- Troubleshooting the Cooling System on the SRX3400 Services Gateway on page 103
- Troubleshooting NPCs on the SRX3400 Services Gateway on page 106
- Troubleshooting SPCs on the SRX3400 Services Gateway on page 107
- Troubleshooting the Power System on the SRX3400 Services Gateway on page 108

Troubleshooting NPCs on the SRX3400 Services Gateway

To troubleshoot an NPC, follow these guidelines:

- Make sure the NPC is properly seated in the midplane and its screws are tightened.
- Issue the CLI **show chassis fpc** command with the slot number to check the status of installed NPCs. As shown in the sample output, the value **Online** in the column labeled **State** indicates that the NPC is functioning normally:

```
user@host> show chassis fpc 5
                    Temp  CPU Utilization (%)   Memory    Utilization (%)
Slot State            (C)  Total  Interrupt      DRAM (MB) Heap     Buffer
  5  Online            42      6          0       1024       16         57
```

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 5 detail
Slot 5 information:
  State                               Online
  Temperature                      42 degrees C / 107 degrees F
  Total CPU DRAM                  1024 MB
  Total RLDRAM                     256 MB
  Total DDR DRAM                  4096 MB
  Start time:                         2007-07-10 12:28:42 PDT
  Uptime:                             1 hour, 33 minutes, 43 seconds
```

For further description of the output from the commands, see the *Junos System Basics and Services Command Reference*.

Related Documentation

- Troubleshooting with the CLI on the SRX3400 Services Gateway on page 101
- Troubleshooting the Cooling System on the SRX3400 Services Gateway on page 103
- Troubleshooting IOCs and NP-IOCs on the SRX3400 Services Gateway on page 104

Troubleshooting SPCs on the SRX3400 Services Gateway

To troubleshoot an SPC, follow these guidelines:

- Make sure the SPC is properly seated in the midplane and its screws are tightened.
- 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 an SPC in slot 2 is functioning normally:

```
user@host> show chassis fpc
                    Temp  CPU Utilization (%)   Memory    Utilization (%)
Slot State            (C)  Total  Interrupt      DRAM (MB) Heap     Buffer
  1  Empty             41      9          0       1024       15         57
  2  Online            43      5          0       1024       16         57
  3  Online            43     11          0       1024       16         57
  4  Empty
  5  Empty
  6  Online            42      6          0       1024       16         57
```

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 2 information:
  State                                Online
  Temperature                       43 degrees C / 109 degrees F
  Total CPU DRAM                  1024 MB
  Total RLDRAM                     256 MB
  Total DDR DRAM                  4096 MB
  Start time:                          2007-07-10 12:28:38 PDT
  Uptime:                              1 hour, 33 minutes, 47 seconds
Slot 3 information:
  State                                Online
  Temperature                       43 degrees C / 109 degrees F
  Total CPU DRAM                  1024 MB
  Total RLDRAM                     256 MB
  Total DDR DRAM                  4096 MB
  Start time:                          2007-07-10 12:28:40 PDT
  Uptime:                              1 hour, 33 minutes, 45 seconds
Slot 6 information:
  State                                Online
  Temperature                       42 degrees C / 107 degrees F
  Total CPU DRAM                  1024 MB
  Total RLDRAM                     256 MB
  Total DDR DRAM                  4096 MB
  Start time:                          2007-07-10 12:28:42 PDT
  Uptime:                              1 hour, 33 minutes, 43 seconds
```

For further description of the output from the commands, see the *Junos System Basics and Services Command Reference*.

Related Documentation

- Troubleshooting with the CLI on the SRX3400 Services Gateway on page 101
- Troubleshooting the Cooling System on the SRX3400 Services Gateway on page 103
- Troubleshooting IOCs and NP-IOCs on the SRX3400 Services Gateway on page 104
- Troubleshooting NPCs on the SRX3400 Services Gateway on page 106
- Troubleshooting the Power System on the SRX3400 Services Gateway on page 108

Troubleshooting the Power System on the SRX3400 Services Gateway

To verify that a power supply is functioning normally, perform the following steps:

- Check the LEDs on each power supply faceplate. If a power supply is correctly installed and functioning normally, the LED on the power supply faceplate blinks green while the services gateway is booting up, and lights steadily green once the services gateway has finished booting.
- 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 the power supplies in slots **0** and **1** are functioning normally:

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

If a power supply is not functioning normally, perform the following steps to diagnose and correct the problem:

- If a red alarm condition occurs, issue the **show chassis alarms** command to determine the source of the problem.

  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 J-Web interface.

- 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 functioning normally, the power supply is the source of the problem. Replace the power supply with a spare, as described in "Replacing an AC Power Supply on the SRX3400 Services

Gateway" on page 131 or "Replacing a DC Power Supply on the SRX3400 Services Gateway" on page 135.

- If you cannot determine the cause of the problem or need additional assistance while troubleshooting a services gateway, open a support case using the Case Manager link at: http://www.juniper.net/support/ , or call 1-888-314-JTAC (within the United States) or 1-408-745-9500.

Related Documentation

- SRX3400 Services Gateway AC Power Supply Electrical Specifications on page 26
- Troubleshooting with the CLI on the SRX3400 Services Gateway on page 101
- Troubleshooting the Cooling System on the SRX3400 Services Gateway on page 103
- Troubleshooting IOCs and NP-IOCs on the SRX3400 Services Gateway on page 104
- Troubleshooting NPCs on the SRX3400 Services Gateway on page 106
- Troubleshooting SPCs on the SRX3400 Services Gateway on page 107

CHAPTER 12

Replacing Hardware Components on the SRX3400 Services Gateway

This section includes the following topics:

Field-Replaceable Units on the SRX3400 Services Gateway

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:

- Hot-swappable FRUs—You can remove and replace these components without powering off the services gateway or disrupting the routing functions.
- Cold-swap-only FRUs—You must power off the services gateway in order to remove, replace, or add these components.

Table 20 on page 111 lists the FRUs for the services gateway.

Table 20: Field-Replaceable Units

Hot-Swappable FRUs	Cold-Swap-Only FRUs
Air filter	Routing Engine
Fan tray	SFB
AC and DC power supplies (if redundant)	IOCs
NP-IOCs	NPCs
SFP, SFP+, and XFP Transceivers	SPCs
	SCM

Related Documentation

- Required Tools and Parts for Replacing Hardware Components on the SRX3400 Services Gateway on page 112
- Replacing the Fan Tray on the SRX3400 Services Gateway on page 114
- Replacing the Air Filter on the SRX3400 Services Gateway on page 116
- Replacing the SFB on the SRX3400 Services Gateway on page 118
- Replacing a Routing Engine on the SRX3400 Services Gateway on page 120
- Replacing an AC Power Supply on the SRX3400 Services Gateway on page 131
- Replacing a DC Power Supply on the SRX3400 Services Gateway on page 135

Required Tools and Parts for Replacing Hardware Components on the SRX3400 Services Gateway

To replace hardware components, you need the tools and parts listed in Table 21 on page 112.

Table 21: Tools and Parts Required

Tool or part	Components
3/8-in. nut driver or pliers	Cables and connectors DC power supply
Blank panels (if component is not reinstalled)	SFB Any CFM (IOC, NP-IOC, SPC, NPC) Power supply Routing Engine or SRX Clustering Module
Electrostatic bag or antistatic mat	SFB Any CFM (IOC, NP-IOC, SPC, NPC) Power supply Routing Engine or SRX Clustering Module SFP, SFP+, and XFP Transceivers
Electrostatic discharge (ESD) grounding wrist strap	All
Flat-blade (–) screwdriver	Cables and connectors IOC

Table 21: Tools and Parts Required *(continued)*

Tool or part	Components
Phillips (+) screwdrivers, numbers 1 and 2	Air filter Fan tray Routing Engine or SRX Clustering Module SFB Any CFM (IOC, NP-IOC, SPC, NPC) Cables and connectors
Rubber safety cap	IOC or NP-IOC SFP, SFP+, and XFP Transceivers
Wire cutters	Cables and connectors DC power supply

Related Documentation

- Field-Replaceable Units on the SRX3400 Services Gateway on page 111
- Replacing the Fan Tray on the SRX3400 Services Gateway on page 114
- Replacing the Air Filter on the SRX3400 Services Gateway on page 116
- Replacing the SFB on the SRX3400 Services Gateway on page 118
- Replacing a Routing Engine on the SRX3400 Services Gateway on page 120
- Replacing an SCM on the SRX3400 Services Gateway on page 123
- Replacing a CFM Card on the SRX3400 Services Gateway on page 124
- Replacing an AC Power Supply on the SRX3400 Services Gateway on page 131
- Replacing a DC Power Supply on the SRX3400 Services Gateway on page 135

Replacing Cooling System Components on the SRX3400 Services Gateway

When the air flow through the chassis is inhibited due to a clogged filter or a fan failure, you must replace the respective component. The cooling system components are hot-removable and hot-insertable.

The following topics provide instructions on how to replace these components:

- Replacing the Fan Tray on the SRX3400 Services Gateway on page 114
- Replacing the Air Filter on the SRX3400 Services Gateway on page 116

Replacing the Fan Tray on the SRX3400 Services Gateway

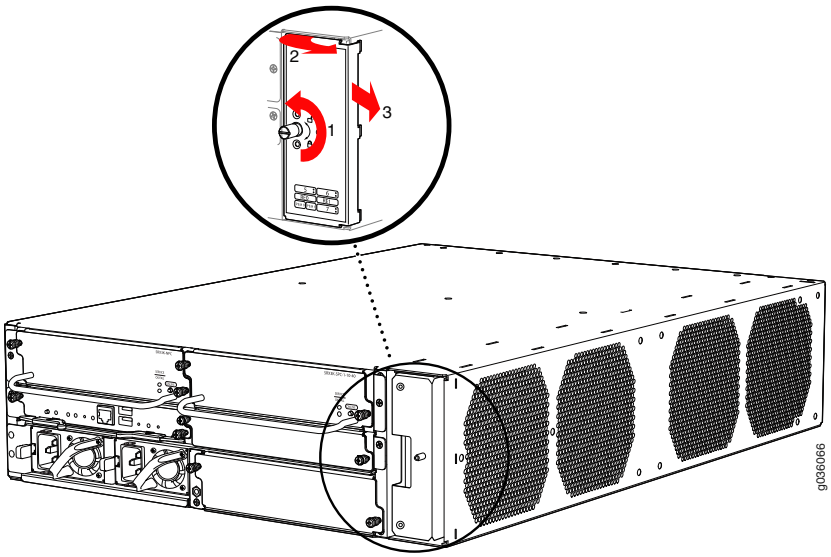
The services gateway has one fan tray that installs vertically in the right rear of the chassis. The fan tray contains four fans. The fan tray is hot-removable and hot-insertable. It weighs about 4.2 lb (1.9 kg).

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

To replace the fan tray:

1. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
2. Turn the screw to the left on the fan tray door. Open it to the right and remove it.

Figure 44: Removing the Fan Tray Door

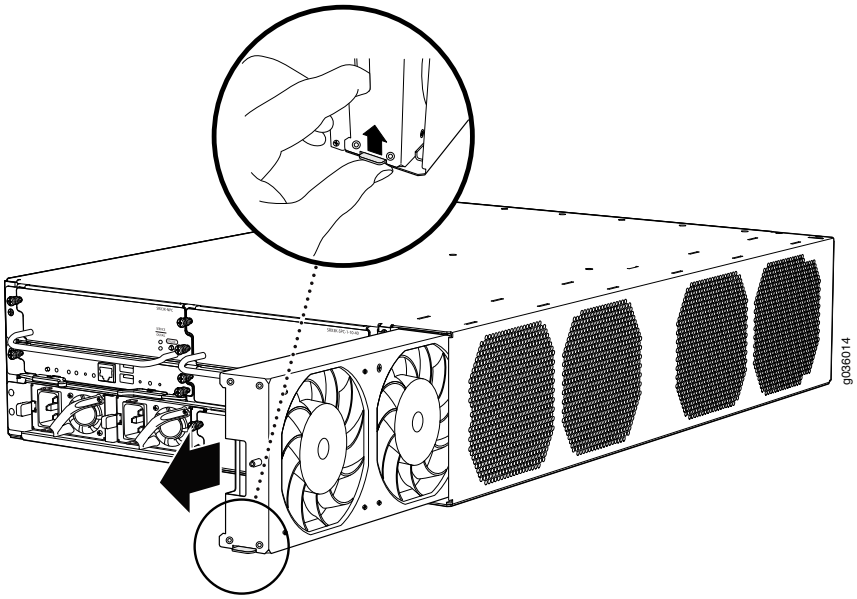


3. Grasp the fan tray and pull it out 1 in. (2.5 cm) to disengage its power connection. A mechanical latch stops the fan tray from coming out any further.
4. Wait for the fans to stop spinning.

WARNING: To avoid injury, do not proceed until the fans have stopped spinning.

5. After the fans have stopped spinning, lift upward on the latch at the bottom of the fan tray to release it. See Figure 45 on page 115.

Figure 45: Removing the Fan Tray

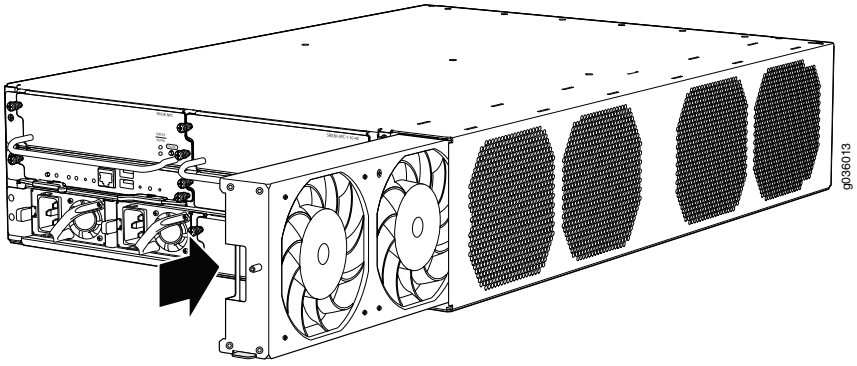


6. Grasp the fan tray and pull it out approximately 6 in. (15 cm).
7. Place one hand under the fan tray to support it and pull the fan tray completely out of the chassis and set it aside.
8. Grasp the replacement fan tray and insert it straight into the chassis until you hear a click, indicating the latch has closed.

NOTE: Be sure the fan tray is correctly oriented in the slot, with the latch on the bottom of the vertically aligned fan tray.

9. Press the fan tray into the chassis about 1 in. (2.5 cm) beyond where the latch closes to engage the power connection.

Figure 46: Inserting the Fan Tray



10. Reinsert the fan tray door, and close and tighten the captive screw to secure it in the chassis.

Related Documentation

- Required Tools and Parts for Replacing Hardware Components on the SRX3400 Services Gateway on page 112
- Replacing the Air Filter on the SRX3400 Services Gateway on page 116

Replacing the Air Filter on the SRX3400 Services Gateway

The services gateway has one air filter that installs vertically in the rear of the chassis. The air filter is hot-insertable and hot-removable.

The air filter is located in the rear of the chassis on the right side. The air filter weighs approximately 0.2 lb (0.09 kg).

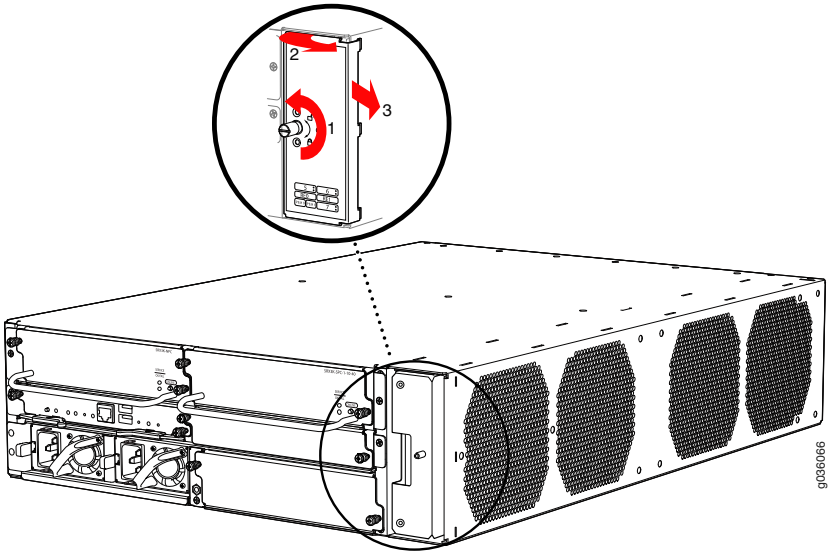
CAUTION: Do not run the services gateway for more than a few minutes without the air filter in place.

CAUTION: Always keep the air filter in place while the services gateway is operating, except during replacement. 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.

To replace the air filter:

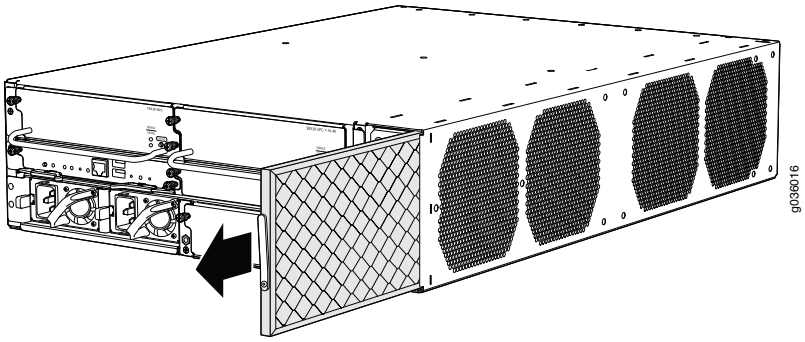
1. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
2. Turn the screw to the left on the fan tray door. Open it to the right and remove it.

Figure 47: Removing the Fan Tray Door



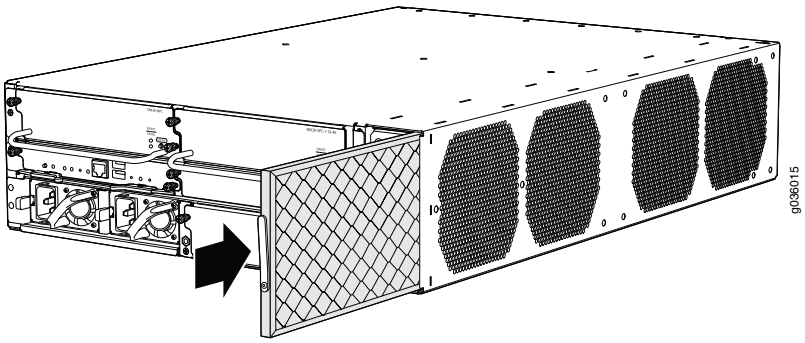
3. Slide the air filter out of the chassis and properly dispose of it.

Figure 48: Removing the Air Filter



4. Locate the up arrow on the replacement filter to ensure that the air filter is right side up.
5. Slide the air filter straight into the chassis until it stops.
6. Replace the fan tray door and tighten the screw to secure it in the chassis.

Figure 49: Installing the Air Filter



Related Documentation

- Required Tools and Parts for Replacing Hardware Components on the SRX3400 Services Gateway on page 112
- Replacing the Fan Tray on the SRX3400 Services Gateway on page 114

Replacing Host Subsystem Components on the SRX3400 Services Gateway

To replace subsystem components of the services gateway, you must power down the services gateway.

The following topics provide instructions on how to replace host subsystem components:

- Replacing the SFB on the SRX3400 Services Gateway on page 118
- Replacing a Routing Engine on the SRX3400 Services Gateway on page 120
- Replacing an SCM on the SRX3400 Services Gateway on page 123

- Replacing a CFM Card on the SRX3400 Services Gateway on page 124
- Replacing SFP, SFP+, and XFP Transceivers on the SRX3400 Services Gateway on page 127

Replacing the SFB on the SRX3400 Services Gateway

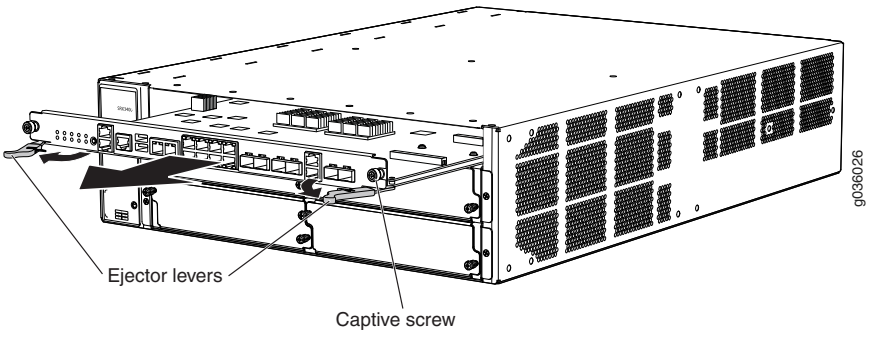
The SFB is accessible from the front panel, in the topmost slot. It weighs approximately 5.1 lb (2.3 kg). Before you replace the SFB, you must power off the services gateway.

To replace an SFB:

1. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
2. If you have not already done so, power off the services gateway by pressing the Power button on the front panel of the SFB for three to five seconds.

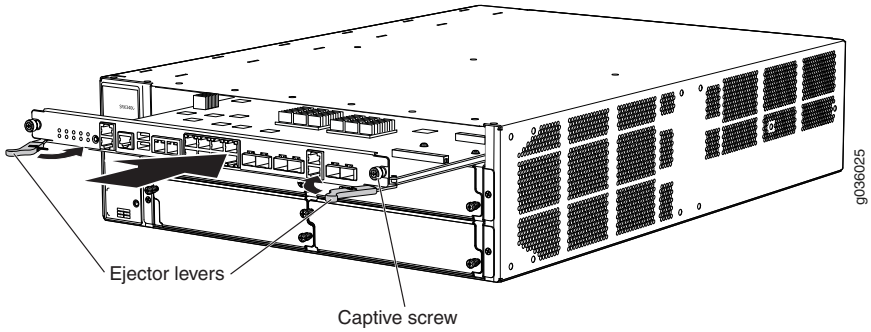
   The **PWR** LED blinks to show you that the services gateway is shutting down. Wait for the services gateway to shut down before you proceed to the next step.
3. Place an electrostatic bag or antistatic mat on a flat, stable surface.
4. Disconnect any cables attached to the SFB front panel connectors.
5. Loosen the screws on either end of the SFB front panel.
6. Pull open the ejector handles and slide the SFB halfway out of the chassis.
7. Place one hand underneath the SFB to support it and slide it completely out of the chassis.
8. Place the SFB on the antistatic mat.

Figure 50: Removing the SFB



9. Carefully align the sides of the replacement SFB with the guides inside the chassis.
10. Slide the SFB into the chassis until you feel resistance.
11. Grasp both ejector handles and press toward the center of the card to fully seat the SFB.
12. Tighten the screws on either side of the card.
13. Reconnect the cables, if any, that you disconnected from the SFB front panel connectors in Step 4.

Figure 51: Inserting the SFB



14. Power on the services gateway by pressing the Power button on the front panel of the SFB for three to five seconds. Wait for the services gateway to start.

15. Verify that the SFB is functioning normally by checking the LEDs on its faceplate. The **SFB STATUS** LED should light steadily green a few minutes after the services gateway is powered on. If the **SFB STATUS** LED is red, remove and install the SFB again. If the **SFB STATUS** LED still lights steadily red, the SFB is not functioning properly. Contact your customer support representative.

    To check the status of the SFB:

```
user@host> show chassis environment fpc 0
CB 0 status:
  State                       Online Master
  Temperature                 30 degrees C / 86 degrees F
  Power 1
    1.2 V                      1202 mV
    1.5 V                      1511 mV
    1.8 V                      1798 mV
    2.5 V                      2481 mV
    3.3 V                      3306 mV
    5.0 V                      4956 mV
    12.0 V                    12084 mV
    1.25 V                     1250 mV
    3.3 V SM3                  3287 mV
    5.0 V RE                   5046 mV
    12.0 V RE                 11910 mV
  Power 2
    11.3 V bias PEM           11292 mV
    11.3 V bias FPD           11156 mV
    11.3 V bias POE 0         11253 mV
    11.3 V bias POE 1         11272 mV
  Bus Revision                42
  FPGA Revision               1
```

Related Documentation

- Required Tools and Parts for Replacing Hardware Components on the SRX3400 Services Gateway on page 112
- Replacing a Routing Engine on the SRX3400 Services Gateway on page 120
- Replacing an SCM on the SRX3400 Services Gateway on page 123
- Replacing a CFM Card on the SRX3400 Services Gateway on page 124
- Replacing an AC Power Supply on the SRX3400 Services Gateway on page 131

Replacing a Routing Engine on the SRX3400 Services Gateway

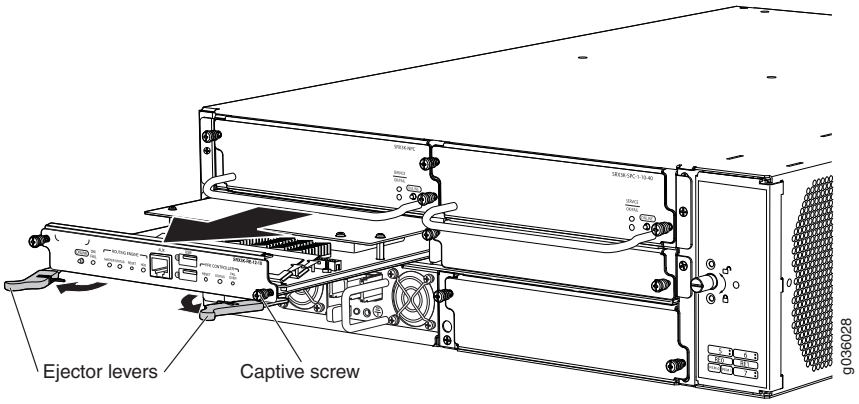
The Routing Engine is located in the rear slot labeled **RE0** on the services gateway. Before you replace the Routing Engine, you must power off the services gateway.

To replace the Routing Engine:

1. Place an electrostatic bag or antistatic mat on a flat, stable surface.
2. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
3. If you have not already done so, power off the services gateway by pressing the Power button on the front panel of the SFB for three to five seconds.

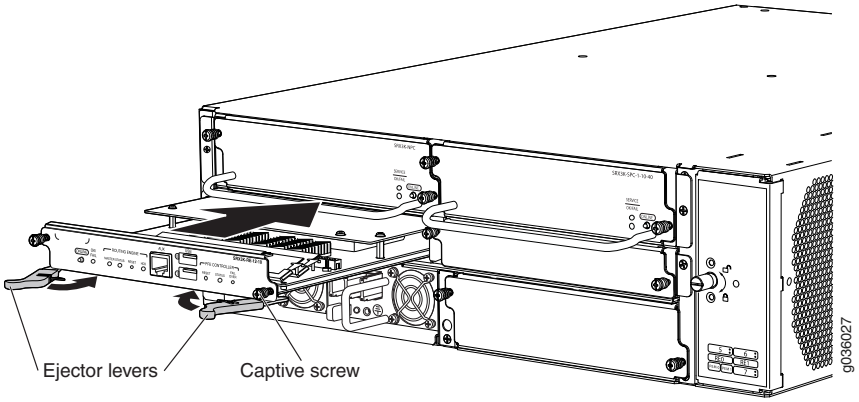
   The **PWR** LED blinks to show you that the services gateway is shutting down. Wait for the services gateway to shut down before you proceed to the next step.
4. Disconnect any cables connected to the **AUX** or **USB** ports.
5. Loosen the captive screws at each end of the Routing Engine faceplate.
6. Pull open the ejector handles to unseat the Routing Engine.
7. Grasp the Routing Engine by the ejector handles and slide it halfway out of the chassis.

Figure 52: Removing a Routing Engine



8. Place one hand underneath the Routing Engine to support it and slide it completely out of the chassis.
9. Place the Routing Engine on the antistatic mat.
10. Carefully align the sides of the replacement Routing Engine with the guides inside the chassis.
11. Slide the Routing Engine into the slot until you feel resistance, and then press the Routing Engine's faceplate until it engages the connectors.
12. Press both of the ejector handles inward to seat the Routing Engine.
13. Tighten the captive screws on the left and right of the Routing Engine.

Figure 53: Installing a Routing Engine



14. Reconnect cables previously attached to the AUX or USB ports.

15. Power on the services gateway by pressing the Power button on the front panel of the SFB for three to five seconds. Wait for the services gateway to start. The **OK/FAIL** LED on the Routing Engine faceplate should blink green, then light steadily.

NOTE: The Routing Engine might require several minutes to boot. If after this time the OK/FAIL LED is red, remove and reinstall the Routing Engine. If the OK/FAIL LED remains red, the Routing Engine is not functioning properly. Contact your customer support representative.

To check the status of the Routing Engine:

```
user@host> show chassis routing-engine

Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    DRAM                        1016 MB
    Memory utilization            39 percent
    CPU utilization:
      User                         0 percent
      Background                   0 percent
      Kernel                       3 percent
      Interrupt                    0 percent
      Idle                        97 percent
    Model                          RE-SRX3400
    Start time                     2008-11-03 10:25:37 PST
    Uptime                         1 day, 2 hours, 33 minutes, 6 seconds
    Last reboot reason             0x1:power cycle/failure
    Load averages:                 1 minute   5 minute  15 minute
                                       0.02       0.04       0.00
```

For more information about using the CLI, see the CLI Explorer.

16. 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.

Related Documentation

- Required Tools and Parts for Replacing Hardware Components on the SRX3400 Services Gateway on page 112
- Replacing an SCM on the SRX3400 Services Gateway on page 123
- Replacing the SFB on the SRX3400 Services Gateway on page 118
- Replacing a CFM Card on the SRX3400 Services Gateway on page 124
- Replacing an AC Power Supply on the SRX3400 Services Gateway on page 131

Replacing an SCM on the SRX3400 Services Gateway

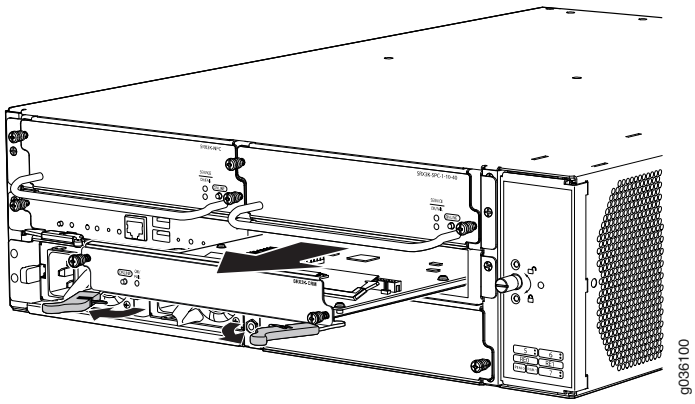
When it is installed, the SRX Clustering Module (SCM) is located in the rear slot labeled **RE1** on the services gateway.

To replace the SCM:

1. Place an electrostatic bag or antistatic mat on a flat, stable surface.
2. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
3. If you have not already done so, power off the services gateway by pressing the Power button on the front panel of the SFB for three to five seconds.

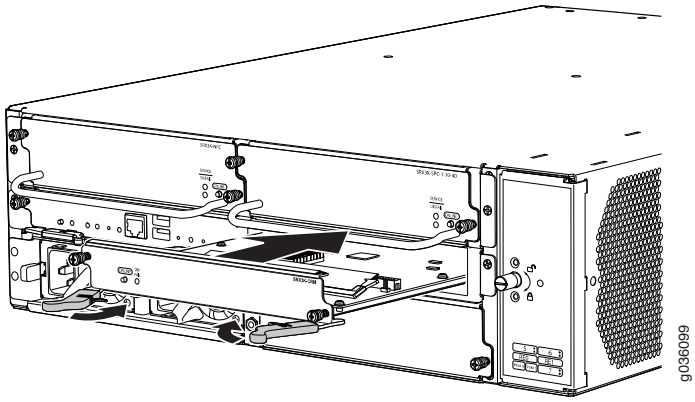
   The **PWR** LED blinks to show you that the services gateway is shutting down. Wait for the services gateway to shut down before you proceed to the next step.
4. Loosen the captive screws at each end of the SCM faceplate.
5. Pull open the ejector handles to unseat the SCM.
6. Grasp the SCM by the ejector handles and slide it halfway out of the chassis.

Figure 54: Removing an SCM



7. Place one hand underneath the SCM to support it and slide it completely out of the chassis.
8. Place the SCM on the antistatic mat.
9. Carefully align the sides of the replacement SCM with the guides inside the chassis.
10. Slide the SCM into the slot until you feel resistance, and then press the SCM faceplate until it engages the connectors.
11. Press both of the ejector handles inward to seat the SCM.
12. Tighten the captive screws at either end of the SCM faceplate.

Figure 55: Installing an SCM



13. Power on the services gateway by pressing the Power button on the front panel of the SFB for three to five seconds.

    If the services gateway is configured for chassis clustering, the **OK/FAIL** LED on the SCM faceplate should blink green, then light steadily. For more information about configuring and managing chassis clusters, see the chapter "Chassis Cluster" in the *Junos OS Security Configuration Guide*.

Related Documentation

- SRX3400 Services Gateway SRX Clustering Module on page 24
- Installing an SCM in the SRX3400 Services Gateway on page 65

Replacing a CFM Card on the SRX3400 Services Gateway

The most common modules for the services gateway use theCFM format:

- IOCs
- NP-IOCs
- SPCs
- NPCs

NOTE: For the services gateway to meet NEBS and ETSI standards, it must not have any two SPCs installed side by side in the CFM slots in the front of the chassis (CFM slots 1 through 4). You can install SPCs side by side in the CFM slots in the rear of the chassis (CFM slots 5 through 7). See "SRX3400 Services Gateway NEBS and ETSI Compliance" on page 180 for more information.

To replace a CFM card:

1. Place an electrostatic bag or antistatic mat on a flat, stable surface.
2. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
3. If you are replacing a cold-swap-only CFM, power off the services gateway. See "Field-Replaceable Units on the SRX3400 Services Gateway" on page 111 for a list of hot-swappable and cold-swap-only components.

   To power off the services gateway, press the Power button on the front panel of the Switch Fabric Board (SFB) for three to five seconds.

   The **PWR** LED blinks to show you that the services gateway is shutting down. Wait for the services gateway to shut down before you proceed to the next step.
4. If you are replacing a hot-swappable CFM such as an NP-IOC without powering off the services gateway, toggle the CFM offline and power it off by pressing its **ONLINE** button for five or more seconds.

   NOTE: You may find it easiest to use a pen, screwdriver, or other tool to press the button.
5. For IOCs or NP-IOCs, disconnect any cables connected to the Ethernet ports, marking them so they can be reconnected in the proper location. If the IOC or NP-IOC 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 cable connected to a transceiver emit laser light that can damage your eyes.

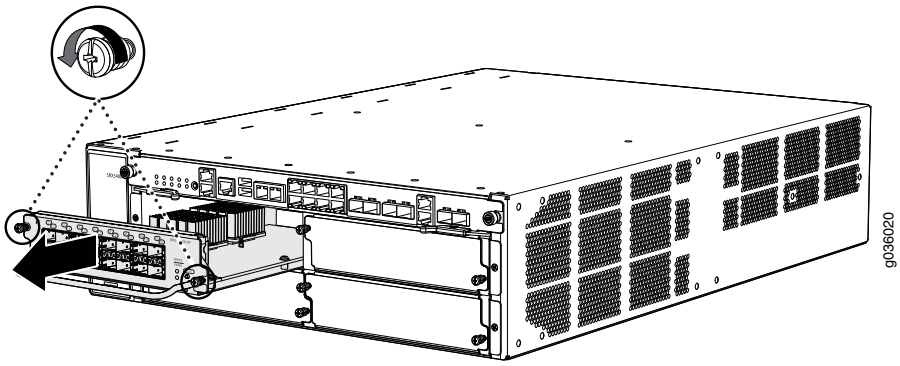
   CAUTION: Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

   CAUTION: Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.
6. Loosen the captive screws at each end of the CFM faceplate.
7. Grasp the CFM by its handle and slide it halfway out of the chassis.

8. Place one hand underneath the CFM to support it and slide it completely out of the chassis.

Figure 56: Removing a CFM (IOC Shown, Other CFMs Similar)



9. Place the CFM on the antistatic mat. If you are not reinstalling a replacement CFM into the emptied slot within 30 minutes, install a blank panel over the slot to maintain proper airflow in the card cage.

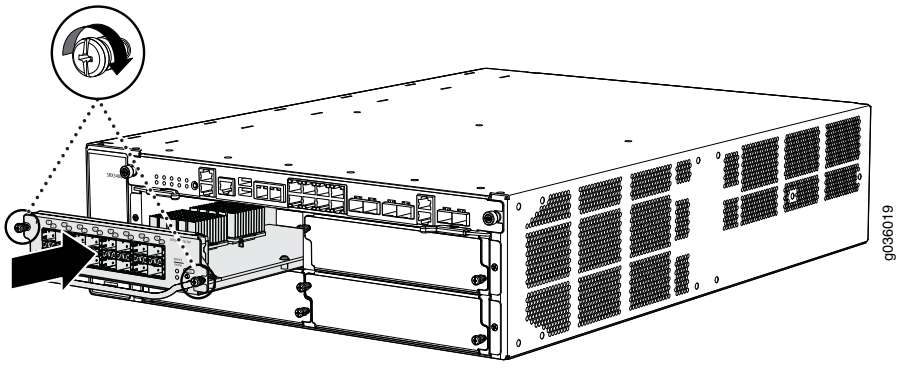
   If you need to replace IOC transceivers, see "Replacing SFP, SFP+, and XFP Transceivers on the SRX3400 Services Gateway" on page 127; otherwise, continue with step 10.

10. Carefully align the sides of the replacement CFM with the guides inside the chassis.

11. Slide the CFM into the slot until you feel resistance, and then press the CFM's faceplate until it engages the connectors.

12. Tighten the captive screws on the left and right of the CFM.

Figure 57: Inserting a CFM (IOC Shown, Other CFMs Similar)



13. If the CFM is an IOC or NP-IOC that 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 cable connected to a transceiver emit laser light that can damage your eyes.

14. If the CFM is an IOC or NP-IOC, insert the appropriate cables into the cable connector ports on the CFM.

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

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

15. If you replaced a hot-swappable CFM such as an NP-IOC without powering off the services gateway, power on and bring the new CFM online by pressing its **ONLINE** button for five or more seconds.

NOTE: You may find it easiest to use a pen, screwdriver, or other tool to press the button.

16. If you powered off the services gateway to replace the CFM, power on the services gateway, as described in *Powering On the SRX3600 Services Gateway*.

17. Check the **OK/FAIL** LED on the new CFM. The **OK/FAIL** LED on the CFM faceplate should blink green, then light steadily. If it is red, remove and reinstall the CFM. If the **OK/FAIL** LED remains red, the CFM is not functioning properly. Contact your customer support representative.

WARNING: Never lift the services gateway using the handles on the front panels of CFM cards. The handles might come off, causing the chassis to drop and inflicting possible grave injury.

Related Documentation

- Required Tools and Parts for Replacing Hardware Components on the SRX3400 Services Gateway on page 112
- Replacing the SFB on the SRX3400 Services Gateway on page 118
- Replacing a Routing Engine on the SRX3400 Services Gateway on page 120
- Replacing an SCM on the SRX3400 Services Gateway on page 123
- Replacing an AC Power Supply on the SRX3400 Services Gateway on page 131

Replacing SFP, SFP+, and XFP Transceivers on the SRX3400 Services Gateway

Small form-factor pluggable (SFP), enhanced small form-factor pluggable (SFP+), and 10-Gigabit SFP (XFP) are transceivers that you install in sockets in various cards or modules in the services gateway. These transceivers are hot-insertable and

hot-removable. Removing a transceiver does not interrupt the functioning of the card or module, but the removed transceiver no longer receives or transmits data.

NOTE: We strongly recommend the use of Juniper Networks transceivers. We cannot guarantee correct operation if other transceivers are used. The transceiver type can be different in each port, as long as a supported part number is used.

For the services gateway to meet NEBS and ETSI standards, all transceivers installed in the services gateway must be of extended temperature (ET) type.Table 22 on page 128 describes the applicable transceivers available from Juniper Networks.

Table 22: Extended Temperature SFP, SFP+, and XFP Transceivers

SKU	Description
SRX-SFP-1GE-LH-ET	1000BASE-LH SFP optical transceiver
SRX-SFP-1GE-LX-ET	1000BASE-LX SFP optical transceiver
SRX-SFP-1GE-SX-ET	1000BASE-SX SFP optical transceiver
SRX-SFP-1GE-T-ET	1000BASE-T SFP copper transceiver
SRX-XFP-10GE-ER-ET	10GBASE-ER XFP optical transceiver
SRX-XFP-10GE-LR-ET	10GBASE-LR XFP optical transceiver
SRX-XFP-10GE-SR-ET	10GBASE-SR XFP optical transceiver
SRX-SFP-10GE-ER	10GBASE-ER SFP+ optical transceiver
SRX-SFP-10GE-LR	10GBASE-LR SFP+ optical transceiver

To replace an SFP, SFP+, or XFP transceiver:

1. Have ready a replacement transceiver or a transceiver slot plug, an antistatic mat, and a rubber safety cap for the transceiver.
2. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis.
3. 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 end of a fiber-optic cable. Fiber-optic transceivers contain laser light sources that can damage your eyes.

4. Remove the cable connector plugged into the transceiver.
5. Carefully drape the disconnected cables to prevent the cable from developing stress points.

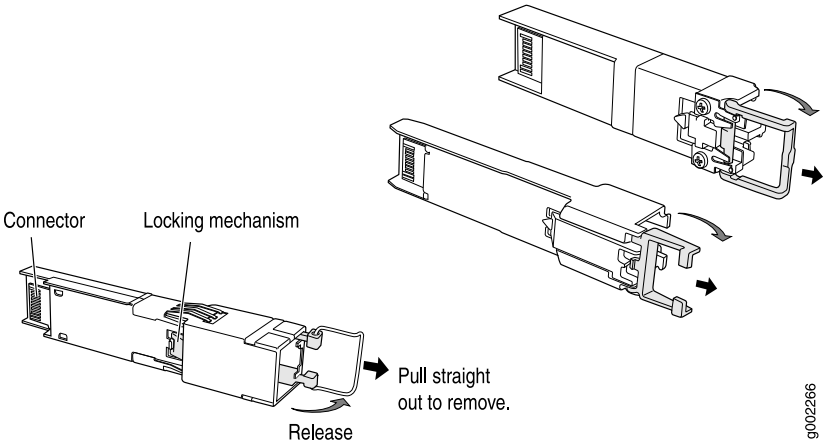
   CAUTION: Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

6. Pull the ejector handle out from the transceiver to unlock the transceiver.

   CAUTION: Make sure that you open the ejector handle completely until you hear it click. This prevents damage to the transceiver.

   Use needlenose pliers to pull the ejector handle out from the SFP.
7. Grasp the transceiver ejector handle and pull the transceiver approximately 0.5 in. (1.3 cm) out of the IOC.
8. Using your fingers, grasp the body of the transceiver and pull it the rest of the way out of the IOC.

Figure 58: Removing SFP, SFP+, or XFP Transceivers



9. Place a rubber safety cap over the transceiver.
10. Place the removed transceiver on an antistatic mat or in an electrostatic bag.
11. Repeat steps 3 through 10 for each transceiver you need to replace.
12. Take each new transceiver to be installed out of its electrostatic bag and identify the port on the IOC where it will be installed.
13. Verify that each transceiver is covered by a rubber safety cap. If it is not, cover the transceiver with a safety cap.
14. Carefully align the transceiver with the slot in the SFB or CFM. The connectors should face the SFB or CFM.

15. Slide the transceiver until the connector is seated in the SFB or CFM slot. If you are unable to fully insert the transceiver, make sure the connector is facing the right way.
16. Close the ejector handle of the transceiver.
17. Remove the rubber safety cap from the transceiver and the end of the cable. Reconnect the cables into the transceivers.
18. Verify that the status LEDs on the SFB or CFM faceplate indicate that the SFP or XFP is functioning correctly. You can also verify that the SFB or CFM is functioning by issuing the **show chassis fpc pic-status** command.

Related Documentation

- Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway on page 149
- Required Tools and Parts for Replacing Hardware Components on the SRX3400 Services Gateway on page 112
- Replacing a CFM Card on the SRX3400 Services Gateway on page 124

Replacing Power System Components on the SRX3400 Services Gateway

The power supplies are located at the rear of the chassis. Each AC power supply weighs approximately 3.1 lb (1.4 kg). Each DC power supply weighs approximately 2.9 lb (1.3 kg). Only redundant power supplies (AC or DC) are hot-insertable and hot-removable.

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

The following topics provide instructions on how to replace power system components:

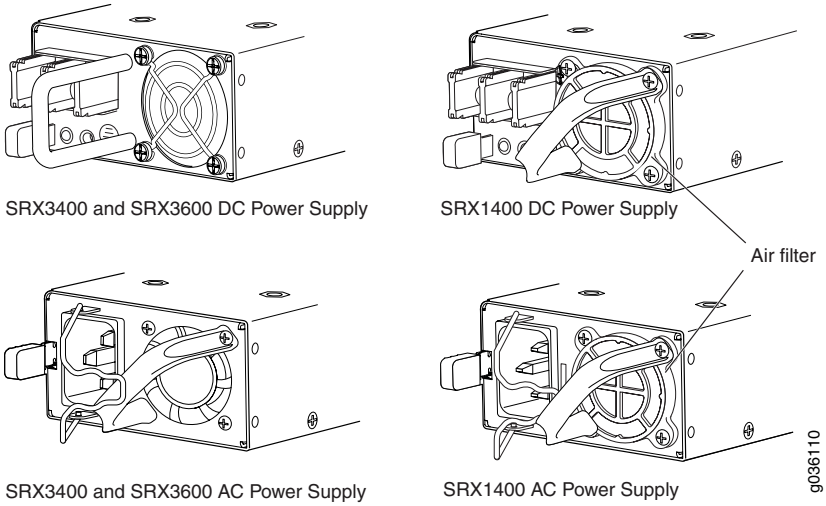
- Replacing an AC Power Supply on the SRX3400 Services Gateway on page 131
- Replacing AC Power Supply Cables on the SRX3400 Services Gateway on page 133
- Replacing a DC Power Supply on the SRX3400 Services Gateway on page 135
- Replacing DC Power Supply Cables on the SRX3400 Services Gateway on page 138

Replacing an AC Power Supply on the SRX3400 Services Gateway

NOTE: For the services gateway to meet NEBS and ETSI standards, both AC power supplies must be Revision 09 or later. See "SRX3400 Services Gateway NEBS and ETSI Compliance" on page 180 for more information.

NOTE: The same AC power supply is used in both the SRX3400 and SRX3600 Services Gateways. However, this power supply is not interchangeable with that used in the SRX1400 Services Gateway. The SRX1400 Services Gateway power supply will fit into the SRX3400 Services Gateway, but will not work properly. You can identify the SRX1400 Services Gateway power supply by the plastic air filter assembly installed over the cooling air inlet as shown in Figure 59 on page 131.

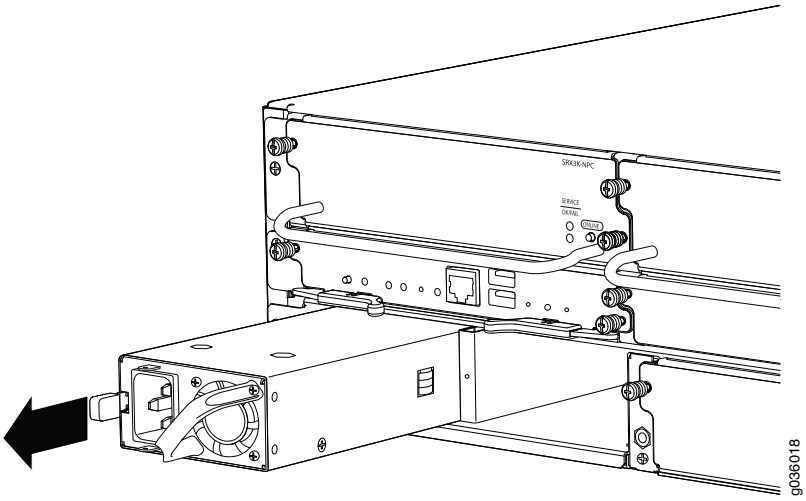
Figure 59: Identifying Power Supply Types



To replace an AC power supply:

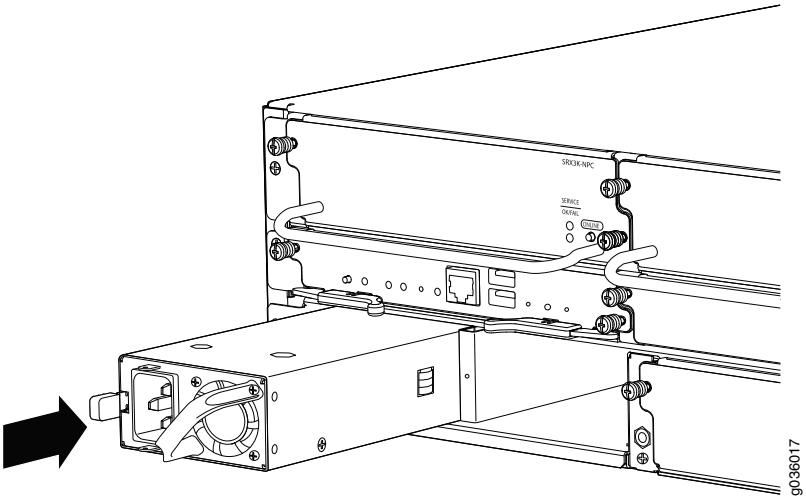
1. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
2. Remove the power cord from the power supply.
3. Push the tab on the left edge of the power supply to the right.
4. Pull the power supply straight out of the chassis using the provided handle. Use one hand to support underneath the supply as you remove it.

Figure 60: Removing an AC Power Supply



5. Orient the replacement power supply so that the tab is on the left side, as shown in Figure 61 on page 132.

Figure 61: Inserting an AC Power Supply



6. Using both hands, slide the replacement power supply straight into the chassis until the power supply is fully seated in the chassis slot. Make sure the tab on the left edge of the power supply clicks into place. The power supply faceplate should be flush with any adjacent power supply faceplate.

NOTE: Be sure to have the power supply oriented correctly. The tab must be on the left and click into place when fully seated. If the power supply does not insert easily or does not become flush with the chassis, you might have inserted the power supply upside down.

7. Attach the power cord to the power supply. If the power supply is correctly installed and functioning normally, the power supply powers up immediately.

NOTE: You must have an SFB and a Routing Engine installed in the services gateway for the power supply to turn on automatically.

NOTE: If you were moving this power supply from one slot to another, wait at least 60 seconds before inserting it into the new slot.

Related Documentation

- Required Tools and Parts for Replacing Hardware Components on the SRX3400 Services Gateway on page 112
- Replacing AC Power Supply Cables on the SRX3400 Services Gateway on page 133

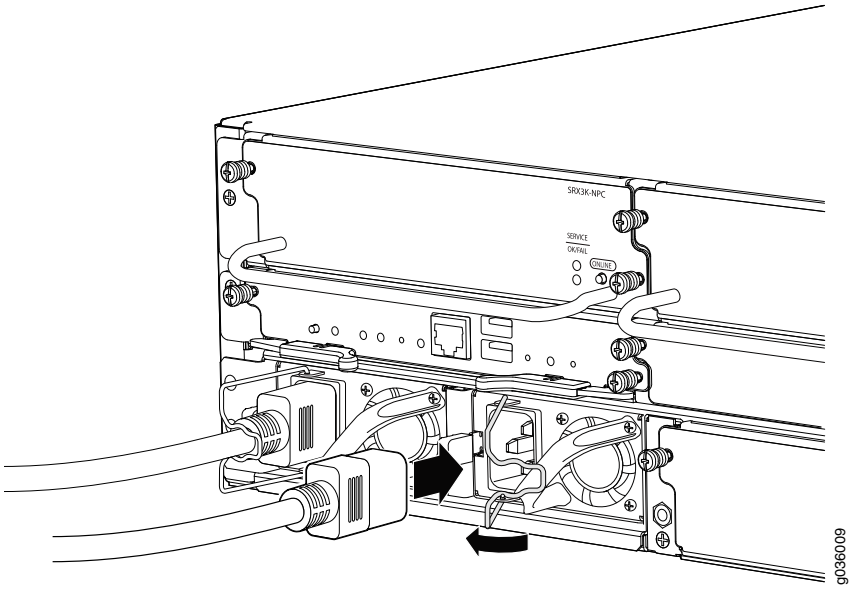
Replacing AC Power Supply Cables on the SRX3400 Services Gateway

WARNING: Before working on an AC-powered services gateway or near power supplies, unplug the power cord.

To replace an AC power supply cord:

1. Unplug the power cord from the power source receptacle.
2. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
3. Unplug the power cord from the appliance inlet on the power supply.
4. Locate a replacement C19 power cord with the type of plug appropriate for your geographical location.
5. Insert the power cord plug into an external AC power source receptacle.
6. Connect the power cord to the power supply.

Figure 62: Inserting an AC Power Cord



7. 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.
8. If the power supply is correctly installed and functioning normally, the supply automatically powers up.

Related Documentation

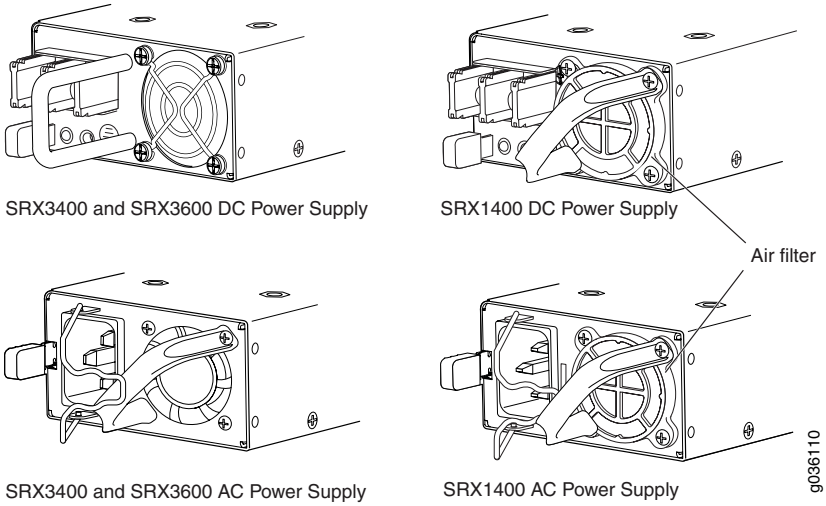
- Required Tools and Parts for Replacing Hardware Components on the SRX3400 Services Gateway on page 112
- Replacing an AC Power Supply on the SRX3400 Services Gateway on page 131

Replacing a DC Power Supply on the SRX3400 Services Gateway

NOTE: For the services gateway to meet NEBS and ETSI standards, both DC power supplies must be enhanced DC power supplies. See "SRX3400 Services Gateway NEBS and ETSI Compliance" on page 180 for more information.

NOTE: The same DC power supply is used in both the SRX3400 and SRX3600 Services Gateways. However, this power supply is not interchangeable with that used in the SRX1400 Services Gateway. The SRX1400 Services Gateway power supply will fit into the SRX3400 Services Gateway, but will not work properly. You can identify the SRX1400 Services Gateway power supply by the plastic air filter assembly installed over the cooling air inlet as shown in Figure 63 on page 135.

Figure 63: Identifying Power Supply Types

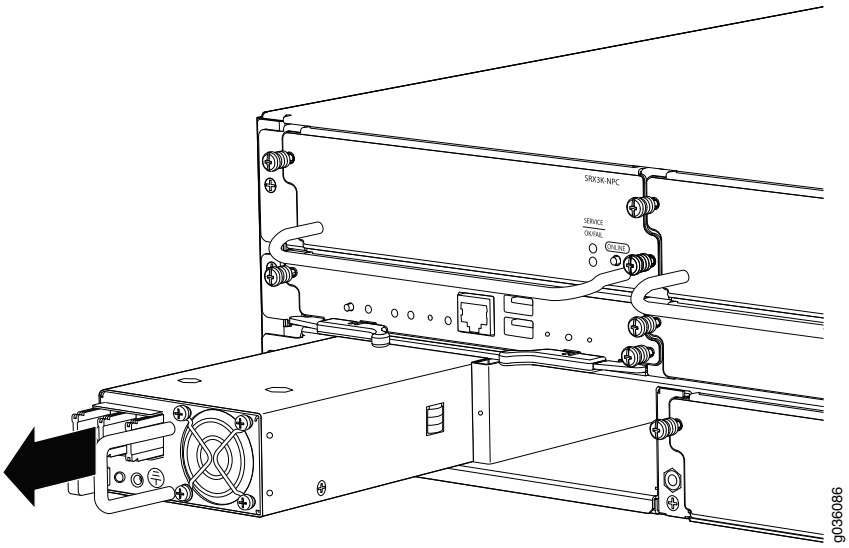


To replace a DC power supply:

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. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
4. Remove the clear plastic cover protecting the terminal studs on the faceplate.
5. Remove the screws and washers from the terminals. Use a number-2 Phillips screwdriver to loosen and remove the screws.

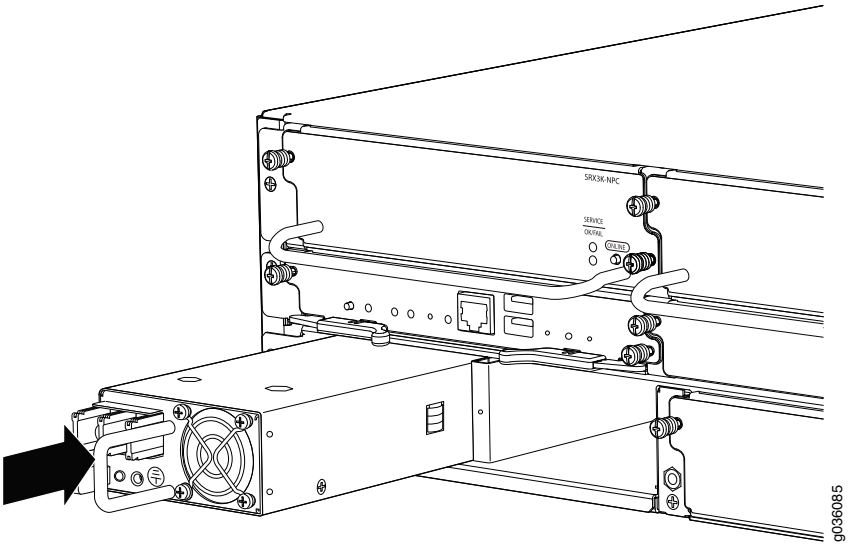
6. Remove the cable lugs from the terminals.
7. Carefully move the power cables out of the way.
8. Push the tab on the left edge of the power supply to the right.
9. Pull the power supply straight out of the chassis.

Figure 64: Removing a DC Power Supply



10. Orient the replacement power supply so that the tab is on the left side, as shown in Figure 65 on page 136.

Figure 65: Inserting a DC Power Supply



11. Using both hands, slide the replacement power supply straight into the chassis until the power supply is fully seated in the chassis slot. Make sure the tab on the left edge of the power supply clicks into place. The power supply faceplate should be flush with any adjacent power supply faceplate.

NOTE: Be sure to have the power supply oriented correctly. The tab must be on the left and click into place when fully seated. If the power supply does not insert easily or does not become flush with the chassis, you might have inserted the power supply upside down.

12. Remove the clear plastic cover protecting the terminal studs on the faceplate.
13. Remove the screws and washers from the terminals.
14. Secure each power cable lug to the terminal studs, first with the washer, then with the screw. Apply between 23 lb-in. (2.6 Nm) and 25 lb-in. (2.8 Nm) of torque to each screw.
    a. Secure each positive (+) DC source power cable lug to a **RTN** (return) terminal.
    b. Secure each negative (–) DC source power cable lug to a **-48V** (input) terminal.

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

NOTE: The DC power supply in slot **PEM0** must be powered by dedicated power feeds derived from feed A, and the DC power supply in slot **PEM1** must be powered by dedicated power feeds derived from feed B. This configuration provides the commonly deployed A/B feed redundancy for the system.

NOTE: For information about connecting to DC power sources, see "SRX3400 Services Gateway DC Power System Electrical Specifications" on page 187.

15. Replace the clear plastic cover over the terminal studs on the faceplate.
16. 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. If the power supply is correctly installed and functioning normally, the LED on the power supply lights green steadily.

NOTE: You must have an SFB and a Routing Engine installed in the services gateway for the power supply to turn on automatically.

Related Documentation

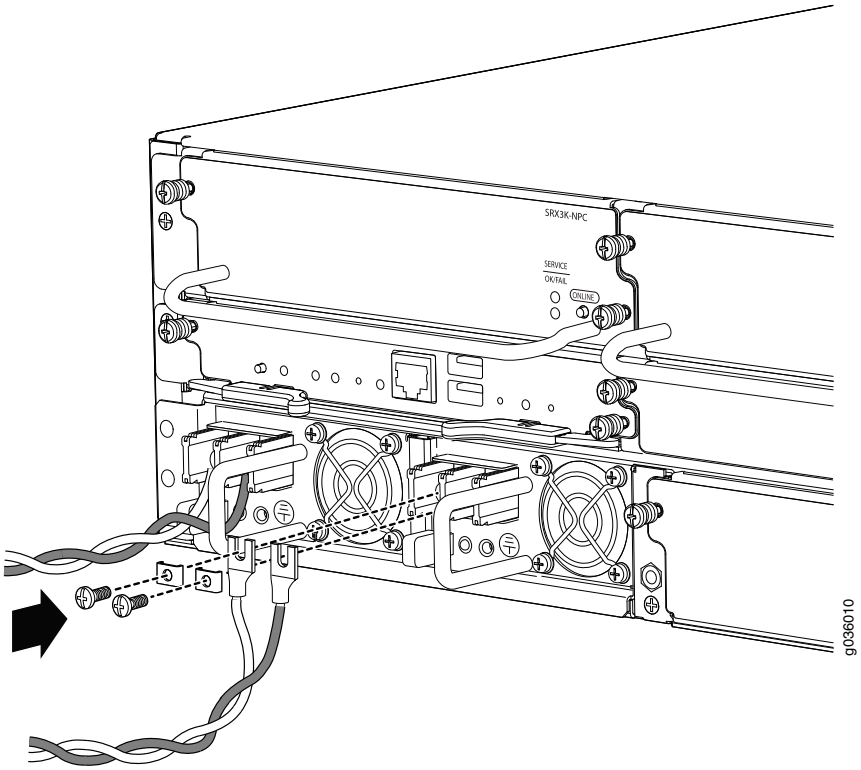
- Required Tools and Parts for Replacing Hardware Components on the SRX3400 Services Gateway on page 112
- Replacing DC Power Supply Cables on the SRX3400 Services Gateway on page 138

Replacing DC Power Supply Cables on the SRX3400 Services Gateway

To replace a power supply cable connected to a DC power supply:

1. Attach an ESD grounding strap to your bare wrist and connect the strap to an approved site ESD grounding point. See the instructions for your site.
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. Attach an ESD grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway" on page 149.
5. Make sure the cable is not touching or in the way of any services gateway components, and that it does not drape where people could trip on it.
6. Replace the clear plastic cover over the terminal studs on the faceplate.
7. Attach the power cable to the DC power source.

Figure 66: Connecting DC Power Cables



8. Verify that the DC source power cabling is correct. Observe the status of the LED on the power supply. If the power cable is correctly installed and the power supply is functioning normally, the LED on the power supply lights green steadily.

Related Documentation

- Required Tools and Parts for Replacing Hardware Components on the SRX3400 Services Gateway on page 112
- Replacing a DC Power Supply on the SRX3400 Services Gateway on page 135

PART 4

Appendixes

APPENDIX A

Safety and Regulatory Compliance Information

This section includes the following topics:

SRX3400 Services Gateway Definition of Safety Warning Levels

This guide uses the following levels of safety warnings:

NOTE: You might find this information helpful in a particular situation or might otherwise overlook it.

CAUTION: You need to observe the specified guidelines to avoid minor injury or discomfort to you or severe damage to the services gateway.

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 vare oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker.

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

¡Atención! Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos

que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes.

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

Related Documentation

- SRX3400 Services Gateway General Safety Guidelines and Warnings on page 145
- Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway on page 149
- SRX3400 Services Gateway Fire Safety Requirements and Fire Suppression Equipment on page 150

SRX3400 Services Gateway General Safety Guidelines and Warnings

The following guidelines help ensure your safety and protect the services gateway 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 this guide. Make sure that only authorized service personnel perform other system services.
- Keep the area around the chassis clear and free from dust before, during, and after installation.
- Keep tools away from areas where people could trip on them.
- Do not wear loose clothing or jewelry, such as rings, bracelets, or chains, which could become caught in the chassis.
- 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 that 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 services gateway only when it is properly grounded.
- Do not open or remove chassis covers or sheet metal parts unless instructions are provided in this guide. 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 services gateway chassis or onto any services gateway component. Such an action could cause electrical shock or could damage the services gateway.
- Avoid touching uninsulated electrical wires or terminals that have not been disconnected from their power source. Such an action could cause electrical shock.

Related Documentation

- SRX3400 Services Gateway Definition of Safety Warning Levels on page 143
- Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway on page 149
- SRX3400 Services Gateway Fire Safety Requirements and Fire Suppression Equipment on page 150

Additional SRX3400 Services Gateway Warnings

This section includes the following topics:

Qualified Personnel Warning

WARNING: **Only trained and qualified personnel should install or replace the services gateway.**

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.

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

Related Documentation

- Restricted Access Area Warning on page 147
- SRX3400 Services Gateway General Safety Guidelines and Warnings on page 145
- SRX3400 Services Gateway Definition of Safety Warning Levels on page 143
- Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway on page 149
- SRX3400 Services Gateway Fire Safety Requirements and Fire Suppression Equipment on page 150

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 possua uma ferramenta, chave e fechadura especial, ou qualquer outra forma de segurança. Esta área é controlada pela autoridade responsável pelo local.

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

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

Related Documentation

- Qualified Personnel Warning on page 146
- SRX3400 Services Gateway General Safety Guidelines and Warnings on page 145
- SRX3400 Services Gateway Definition of Safety Warning Levels on page 143
- Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway on page 149
- SRX3400 Services Gateway Fire Safety Requirements and Fire Suppression Equipment on page 150

Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway

Many services gateway hardware components 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 or ankle strap, and verify that it is in direct contact with your skin.

  CAUTION: For safety, periodically check the resistance value of the ESD strap. The measurement should be in the range of 1 to 10 megaohms.

- When handling any component that is removed from the chassis, verify that the equipment end of your ESD strap is attached to one of the ESD points on the chassis, which are shown in Figure 67 on page 149 and Figure 68 on page 150.

Figure 67: ESD Point on Front of SRX3400 Services Gateway

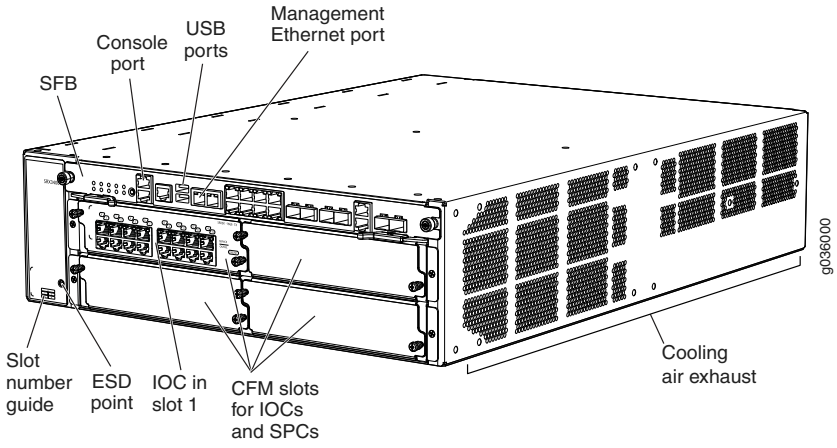
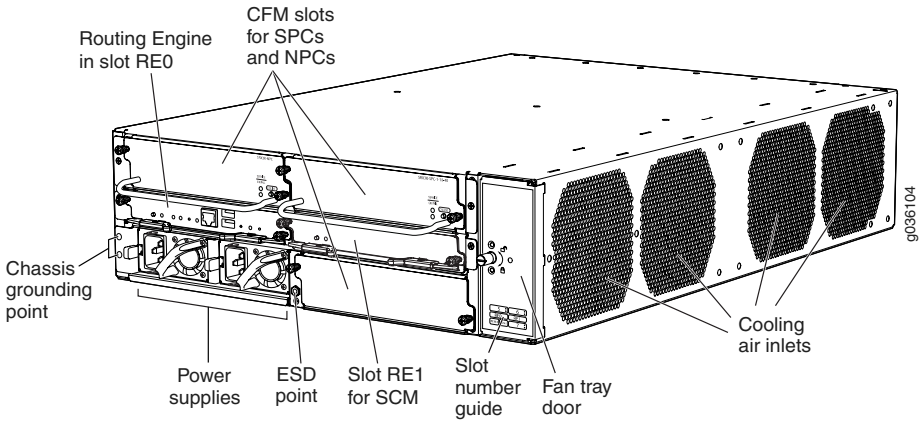
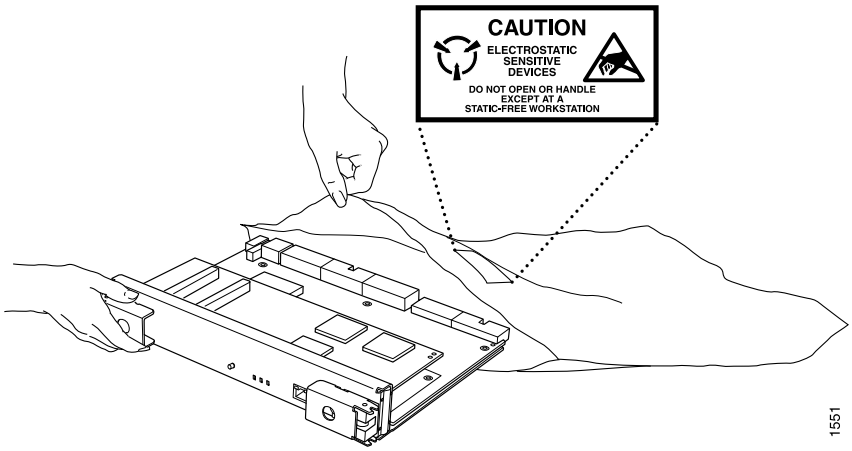


Figure 68: ESD Point on Rear of SRX3400 Services Gateway



- Avoid contact between the component and your clothing. ESD voltages emitted from clothing can still damage components.
- When removing or installing a component, always place it component-side up on an antistatic surface, in an antistatic card rack, or in an electrostatic bag (see Figure 69 on page 150). If you are returning a component, place it in an electrostatic bag before packing it.

Figure 69: Placing a Component into an Electrostatic Bag



Related Documentation

- SRX3400 Services Gateway General Safety Guidelines and Warnings on page 145
- SRX3400 Services Gateway Definition of Safety Warning Levels on page 143
- SRX3400 Services Gateway Fire Safety Requirements and Fire Suppression Equipment on page 150

SRX3400 Services Gateway Fire Safety Requirements and Fire Suppression Equipment

In the event of a fire emergency involving services gateways and other network equipment, the safety of people is the primary concern. 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, 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 installing and operating your equipment.

In the event of an electrical hazard or an electrical fire, first turn power off to the equipment at the source. Then use a Type C fire extinguisher to extinguish the fire. Type C fire extinguishers, which use noncorrosive fire retardants such as carbon dioxide (CO_2) and Halotron, are most effective for suppressing electrical fires. Type C fire extinguishers displace the 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, use this type of inert oxygen displacement extinguisher instead of an extinguisher that leave residues on equipment.

Do not use multipurpose Type ABC chemical fire extinguishers (dry chemical fire extinguishers) near Juniper Networks equipment. The primary ingredient in these fire extinguishers is monoammonium phosphate, which is very sticky and difficult to clean. In addition, in 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 services gateway. 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.

Related Documentation

- SRX3400 Services Gateway General Safety Guidelines and Warnings on page 145
- SRX3400 Services Gateway Definition of Safety Warning Levels on page 143
- Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway on page 149

SRX3400 Services Gateway Installation Safety Guidelines and Warnings

This section includes the following topics:

Chassis Lifting Guidelines

The weight of a fully configured chassis is about 77 lb (35 kg). Observe the following guidelines for lifting and moving the services gateway:

- Before moving the services gateway, read the guidelines in "SRX3400 Services Gateway Chassis Grounding Point" on page 185, "Power Requirements for DC-Powered SRX3400 Services Gateways" on page 188, and "Power Requirements for AC-Powered SRX3400 Services Gateways" on page 193 to verify that the intended site meets the specified power, environmental, and clearance requirements.
- Before lifting or moving the services gateway, disconnect all external cables.
- As when lifting any heavy object, lift most of the weight with your legs rather than your back. Keep your knees bent and your back relatively straight and avoid twisting your body as you lift. Balance the load evenly and be sure that your footing is solid.
- Do not attempt to lift the chassis by the handles on the power supplies or on the common form-factor modules (CFMs). The handles might break off and cause the chassis to fall and inflict injury.

Related Documentation

- SRX3400 Services Gateway General Safety Guidelines and Warnings on page 145
- Installation Instructions Warning on page 152
- Rack-Mounting Requirements and Warnings on page 153
- Ramp Warning on page 157

Installation Instructions Warning

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

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

Varoitus Lue asennusohjeet ennen järjestelmän yhdistämistä virtalähteeseen.

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.

Related Documentation

- SRX3400 Services Gateway General Safety Guidelines and Warnings on page 145
- Chassis Lifting Guidelines on page 152
- Rack-Mounting Requirements and Warnings on page 153
- Ramp Warning on page 157

Rack-Mounting Requirements and Warnings

Ensure that the equipment rack into which the services gateway is installed is evenly and securely supported to avoid the hazardous condition that could result from uneven mechanical loading.

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

- The services gateway must be installed into a rack that is secured to the building structure.
- The services gateway should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting the services gateway in 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 devices, install the stabilizers before mounting or servicing the services gateway 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 services gateway moet in een stellage worden geïnstalleerd die aan een bouwsel is verankerd.
- Dit toestel dient onderaan in het rek gemonteerd te worden als het toestel het enige in het rek is.
- Wanneer u dit toestel in een gedeeltelijk gevuld rek monteert, dient u het rek van onderen naar boven te laden met het zwaarste onderdeel onderaan in het rek.
- Als het rek voorzien is van stabiliseringshulpmiddelen, dient u de stabilisatoren te monteren voordat u het toestel in het rek monteert of het daar een servicebeurt geeft.

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

- Juniper Networks services gateway 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 services gateway 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 services gateway 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 services gateway 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 services gateway 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 services gateway deverá ser instalado numa prateleira fixa à estrutura do edificio.
- Esta unidade deverá ser montada na parte inferior da estante, caso seja esta a única unidade a ser montada.
- Ao montar esta unidade numa estante parcialmente ocupada, coloque os itens mais pesados na parte inferior da estante, arrumando-os de baixo para cima.
- Se a estante possuir um dispositivo de estabilização, instale-o antes de montar ou reparar a unidade.

¡Atención! Para evitar lesiones durante el montaje de este equipo sobre un bastidor, o posteriormente 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 services gateway 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 services gateway 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.

Related Documentation

- SRX3400 Services Gateway General Safety Guidelines and Warnings on page 145

- Chassis Lifting Guidelines on page 152
- Installation Instructions Warning on page 152
- Ramp Warning on page 157

Ramp Warning

WARNING: When installing the services gateway, 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

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

Related Documentation

- SRX3400 Services Gateway General Safety Guidelines and Warnings on page 145
- Chassis Lifting Guidelines on page 152
- Installation Instructions Warning on page 152
- Rack-Mounting Requirements and Warnings on page 153

SRX3400 Services Gateway Laser and LED Safety Guidelines and Warnings

This section includes the following topics:

- General Laser Safety Guidelines on page 158
- Class 1 Laser Product Warning on page 158
- Class 1 LED Product Warning on page 159
- Laser Beam Warning on page 159
- Radiation from Open Port Apertures Warning on page 160

General Laser Safety Guidelines

When working around the services gateway, 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.

Related Documentation

- Class 1 Laser Product Warning on page 158
- Class 1 LED Product Warning on page 159
- Laser Beam Warning on page 159
- Radiation from Open Port Apertures Warning on page 160

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.

Related Documentation

- General Laser Safety Guidelines on page 158
- Class 1 LED Product Warning on page 159
- Laser Beam Warning on page 159

- Radiation from Open Port Apertures Warning on page 160

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.

Related Documentation

- General Laser Safety Guidelines on page 158
- Class 1 Laser Product Warning on page 158
- Laser Beam Warning on page 159
- Radiation from Open Port Apertures Warning on page 160

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.

Related Documentation

- General Laser Safety Guidelines on page 158
- Class 1 Laser Product Warning on page 158
- Class 1 LED Product Warning on page 159
- Radiation from Open Port Apertures Warning on page 160

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 emiteres fra portens åpning når det ikke er tilkoblet en fiberkabel.

Aviso Dada a possibilidade de emissão de radiação invisível através do orifício da via de acesso, quando esta não tiver nenhum cabo de fibra conectado, deverá evitar 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.

Varning! Osynlig strålning kan avges från en portöppning utan ansluten fiberkabel och du bör därför undvika att bli utsatt för strålning genom att inte stirra in i oskyddade öppningar.

Related Documentation

- General Laser Safety Guidelines on page 158
- Class 1 Laser Product Warning on page 158
- Class 1 LED Product Warning on page 159
- Laser Beam Warning on page 159

SRX3400 Services Gateway Maintenance and Operational Safety Guidelines and Warnings

This section includes the following topics:

Battery Handling Warning

WARNING: Replacing the battery incorrectly might result in an explosion. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Waarschuwing Er is ontploffingsgevaar als de batterij verkeerd vervangen wordt. Vervang de batterij slechts met hetzelfde of een equivalent type dat door de fabrikant aanbevolen is. Gebruikte batterijen dienen overeenkomstig fabrieksvoorschriften weggeworpen te worden.

Varoitus Räjähdyksen vaara, jos akku on vaihdettu väärään akkuun. Käytä vaihtamiseen ainoastaan saman- tai vastaavantyyppistä akkua, joka on valmistajan suosittelema. Hävitä käytetyt akut valmistajan ohjeiden mukaan.

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.

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.

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.

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.

Varning! Explosionsfara vid felaktigt batteribyte. Ersätt endast batteriet med samma batterityp som rekommenderas av tillverkaren eller motsvarande. Följ tillverkarens anvisningar vid kassering av använda batterier.

Related Documentation

- Jewelry Removal Warning on page 162
- Lightning Activity Warning on page 164
- Operating Temperature Warning on page 165
- Product Disposal Warning on page 166

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 weld the metal object to the terminals.

Waarschuwing Alvorens aan apparatuur te werken die met elektrische leidingen is verbonden, sieraden (inclusief ringen, kettingen en horloges) verwijderen. Metalen voorwerpen worden warm wanneer ze met stroom en aarde zijn verbonden, en kunnen ernstige brandwonden veroorzaken of het metalen voorwerp aan de aansluitklemmen lassen.

Varoitus Ennen kuin työskentelet voimavirtajohtoihin kytkettyjen laitteiden parissa, ota pois kaikki korut (sormukset, kaulakorut ja kellot mukaan lukien). Metalliesineet kuumenevat, kun ne ovat yhteydessä sähkövirran ja maan kanssa, ja ne voivat aiheuttaa vakavia palovammoja tai hitsata metalliesineet kiinni liitäntänapoihin.

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 ringer, halskjeder og klokker) før du skal arbeide på utstyr som er koblet til kraftledninger. Metallgjenstander som er koblet til kraftledninger og jord blir svært varme og kan forårsake alvorlige brannskader eller smelte fast til polene.

Aviso Antes de trabalhar em equipamento que esteja ligado a linhas de corrente, retire todas as jóias que estiver a usar (incluindo anéis, fios e relógios). Os objectos metálicos aquecerão em contacto com a corrente e em contacto com a ligação à terra, podendo causar queimaduras graves ou ficarem soldados aos terminais.

¡Atención! Antes de operar sobre equipos conectados a líneas de alimentación, quitarse las joyas (incluidos anillos, collares y relojes). Los objetos de metal se calientan cuando se conectan a la alimentación y a tierra, lo que puede ocasionar quemaduras graves o que los objetos metálicos queden soldados a los bornes.

Varning! Tag av alla smycken (inklusive ringar, halsband och armbandsur) innan du arbetar på utrustning som är kopplad till kraftledningar. Metallobjekt hettas upp när de kopplas ihop med ström och jord och kan förorsaka allvarliga brännskador; metallobjekt kan också sammansvetsas med kontakterna.

Related Documentation

- Battery Handling Warning on page 161
- Lightning Activity Warning on page 164
- Operating Temperature Warning on page 165
- Product Disposal Warning on page 166

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.

Varning! Vid åska skall du aldrig utföra arbete på systemet eller ansluta eller koppla loss kablar.

Related Documentation

- Battery Handling Warning on page 161
- Jewelry Removal Warning on page 162

Operating Temperature Warning

WARNING: To prevent the services gateway from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 104°F (40°C). To prevent airflow restriction, allow at least 6 in. (15.2 cm) of clearance around the ventilation openings.

Waarschuwing Om te voorkomen dat welke services gateway van de Juniper Networks services gateway 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 services gateway-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 services gateway, 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 services gateway der services gateway 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 services gateway, 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 services gateway 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 services gateway, não utilize este equipamento numa área que exceda a temperatura máxima recomendada de 40°C. Para evitar a restrição à

circulação de ar, deixe pelo menos um espaço de 15,2 cm à volta das aberturas de ventilação.

¡Atención! Para impedir que un encaminador de la serie Juniper Networks services gateway se recaliente, no lo haga funcionar en un área en la que se supere la temperatura ambiente máxima recomendada de 40ºC. Para impedir la restricción de la entrada de aire, deje un espacio mínimo de 15,2 cm alrededor de las aperturas para ventilación.

Varning! Förhindra att en Juniper Networks services gateway överhettas genom att inte använda den i ett område där den maximalt rekommenderade omgivningstemperaturen på 40ºC överskrids. Förhindra att luftcirkulationen inskränks genom att se till att det finns fritt utrymme på minst 15,2 cm omkring ventilationsöppningarna.

Related Documentation

- Battery Handling Warning on page 161
- Jewelry Removal Warning on page 162
- Lightning Activity Warning on page 164
- Product Disposal Warning on page 166

Product Disposal Warning

WARNING: Disposal of this product 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

Varning! Slutlig kassering av denna produkt bör skötas i enlighet med landets alla lagar och föreskrifter.

Related Documentation

- Battery Handling Warning on page 161
- Jewelry Removal Warning on page 162
- Lightning Activity Warning on page 164
- Operating Temperature Warning on page 165

SRX3400 Services Gateway Electrical Safety Guidelines and Warnings

This section includes the following topics:

In Case of 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 services gateway.
3. If possible, send another person to get medical aid. Otherwise, assess the condition of the victim, then call for help.

Related Documentation

- General Electrical Safety Guidelines and Warnings on page 167
- DC Power Electrical Safety Guidelines and Warnings on page 172
- SRX3400 Services Gateway Agency Approvals on page 178

General Electrical Safety Guidelines and Warnings

- Install the services gateway in compliance with the following local, national, or international electrical codes:
  - United States—National Fire Protection Association (NFPA 70), United States National Electrical Code
  - Canada—Canadian Electrical Code, Part 1, CSA C22.1

  - Other countries—International Electromechanical Commission (IEC) 60364, Part 1 through Part 7
  - Evaluated to the TN power system
- 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.
- 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 services gateway within marked electrical ratings and product usage instructions.
- For the services gateway and peripheral equipment to function safely and correctly, use the cables and connectors specified for the attached peripheral equipment, and make certain they are in good condition.

Grounded Equipment Warning

WARNING: The services gateway is intended to be grounded. Ensure that the services gateway is connected to earth ground during normal use.

Waarschuwing Deze apparatuur hoort geaard te worden Zorg dat de host-computer tijdens normaal gebruik met aarde is verbonden.

Varoitus Tämä laitteisto on tarkoitettu maadoitettavaksi. Varmista, että isäntälaite on yhdistetty maahan normaalikäytön aikana.

Attention Cet équipement doit être relié à la terre. S'assurer que l'appareil hôte est relié à la terre lors de l'utilisation normale.

Warnung Dieses Gerät muß geerdet werden. Stellen Sie sicher, daß das Host-Gerät während des normalen Betriebs an Erde gelegt ist.

Avvertenza Questa apparecchiatura deve essere collegata a massa. Accertarsi che il dispositivo host sia collegato alla massa di terra durante il normale utilizzo.

Advarsel Dette utstyret skal jordes. Forviss deg om vertsterminalen er jordet ved normalt bruk.

Aviso Este equipamento deverá estar ligado à terra. Certifique-se que o host se encontra ligado à terra durante a sua utilização normal.

¡Atención! Este equipo debe conectarse a tierra. Asegurarse de que el equipo principal esté conectado a tierra durante el uso normal.

Varning! Denna utrustning är avsedd att jordas. Se till att värdenheten är jordad vid normal användning.

Midplane Energy Hazard Warning

WARNING: High levels of electrical energy are distributed across the services gateway midplane. Be careful not to contact the midplane connectors, or any component connected to the midplane, with any metallic object while servicing components installed in the services gateway.

Multiple Power Supplies Disconnection Warning

WARNING: The services gateway 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.

Varning! Denna enhet har mer än en strömförsörjningsanslutning; alla anslutningar måste vara helt avlägsnade innan strömtillförseln till enheten är fullständigt bruten.

Power Disconnection Warning

WARNING: Before working on the services gateway or near power supplies, unplug the power cord from an AC-powered services gateway; switch off the power at the circuit breaker on a DC-powered services gateway.

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; voor gelijkstroom toestellen dient u de stroom uit te schakelen bij de stroomverbreker.

Varoitus Kytke irti vaihtovirtalaitteiden virtajohto ja katkaise tasavirtalaitteiden virta suojakytkimellä, 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; couper l'alimentation des unités en courant continu au niveau du disjoncteur.

Warnung Bevor Sie an einem Chassis oder in der Nähe von Netzgeräten arbeiten, ziehen Sie bei Wechselstromeinheiten das Netzkabel ab bzw. schalten Sie bei Gleichstromeinheiten den Strom am Unterbrecher ab.

Avvertenza Prima di lavorare su un telaio o intorno ad alimentatori, scollegare il cavo di alimentazione sulle unità CA; scollegare l'alimentazione all'interruttore automatico sulle unità CC.

Advarsel Før det utføres arbeid på kabinettet eller det arbeides i nærheten av strømforsyningsenheter, skal strømledningen trekkes ut p vekselstrømsenheter og strømmen kobles fra ved strømbryteren på likestrømsenheter.

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; desligue a corrente no disjuntor nas unidades de corrente contínua.

¡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); cortar la alimentación desde el interruptor automático en los equipos de corriente continua (CC).

Varning! Innan du arbetar med ett chassi eller nära strömförsörjningsenheter skall du för växelströmsenheter dra ur nätsladden och för likströmsenheter bryta strömmen vid överspänningsskyddet.

TN Power Warning

WARNING: The services gateway is designed to work with TN power systems.

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.

Copper Conductors Warning

WARNING: Use copper conductors only.

Waarschuwing Gebruik alleen koperen geleiders.

Varoitus Käytä vain kuparijohtimia.

Attention Utilisez uniquement des conducteurs en cuivre.

Warnung Verwenden Sie ausschließlich Kupferleiter.

Avvertenza Usate unicamente dei conduttori di rame.

Advarsel Bruk bare kobberledninger.

Aviso Utilize apenas fios condutores de cobre.

¡Atención! Emplee sólo conductores de cobre.

Varning! Använd endast ledare av koppar.

Related Documentation

- In Case of Electrical Accident on page 167
- DC Power Electrical Safety Guidelines and Warnings on page 172
- SRX3400 Services Gateway Agency Approvals on page 178

DC Power Electrical Safety Guidelines and Warnings

When working with DC-powered equipment, observe the following guidelines and warnings:

- DC Power Electrical Safety Guidelines
- DC Power Disconnection Warning
- DC Power Grounding Requirements and Warning
- DC Power Wiring Sequence Warning
- DC Power Wiring Terminations Warning

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, vérifier que le circuit en courant continu n'est plus sous tension. Pour en être sûr, localiser le disjoncteur situé sur le panneau de service du circuit en courant continu, placer le disjoncteur en position fermée (OFF) et, à l'aide d'un ruban adhésif, bloquer la poignée du disjoncteur en position OFF.

Warnung Vor Ausführung der folgenden Vorgänge ist sicherzustellen, daß die Gleichstromschaltung keinen Strom erhält. Um sicherzustellen, daß sämtlicher Strom abgestellt ist, machen Sie auf der Schalttafel den

Unterbrecher für die Gleichstromschaltung ausfindig, stellen Sie den Unterbrecher auf AUS, und kleben Sie den Schaltergriff des Unterbrechers mit Klebeband in der AUS-Stellung fest.

Avvertenza Prima di svolgere una qualsiasi delle procedure seguenti, verificare che il circuito CC non sia alimentato. Per verificare che tutta l'alimentazione sia scollegata (OFF), individuare l'interruttore automatico sul quadro strumenti che alimenta il circuito CC, mettere l'interruttore in posizione OFF e fissarlo con nastro adesivo in tale posizione.

Advarsel Før noen av disse prosedyrene utføres, kontroller at strømmen er frakoblet likestrømkretsen. Sørg for at all strøm er slått AV. Dette gjøres ved å lokalisere strømbryteren på brytertavlen som betjener likestrømkretsen, slå strømbryteren AV og teipe bryterhåndtaket på strømbryteren i AV-stilling.

Aviso Antes de executar um dos seguintes procedimentos, certifique-se que desligou a fonte de alimentação de energia do circuito de corrente contínua. Para se assegurar que toda a corrente foi DESLIGADA, localize o disjuntor no painel que serve o circuito de corrente contínua e coloque-o na posição OFF (Desligado), segurando nessa posição a manivela do interruptor do disjuntor com fita isoladora.

¡Atención! Antes de proceder con los siguientes pasos, comprobar que la alimentación del circuito de corriente continua (CC) esté cortada (OFF). Para asegurarse de que toda la alimentación esté cortada (OFF), localizar el interruptor automático en el panel que alimenta al circuito de corriente continua, cambiar el interruptor automático a la posición de Apagado (OFF), y sujetar con cinta la palanca del interruptor automático en posición de Apagado (OFF).

Varning! Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten. Kontrollera att all strömförsörjning är BRUTEN genom att slå AV det överspänningsskydd som skyddar likströmskretsen och tejpa fast överspänningsskyddets omkopplare i FRÅN-läget.

DC Power Grounding Requirements and Warning

An insulated grounding conductor that is identical in size to the grounded and ungrounded branch circuit supply conductors, but is identifiable by green and yellow stripes, is installed as part of the branch circuit that supplies the 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.

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 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 yhdistettava kytkentajarjestys on maajohto maajohtoon, +RTN varten +RTN, -48 V varten – 48 V. Oikea irrotettava kytkentajarjestys on -48 V varten – 48 V, +RTN varten +RTN, maajohto maajohtoon.

Attention Câblez l'approvisionnement d'alimentation CC En utilisant les crochets appropriés à l'extrémité de câblage. En reliant la puissance, l'ordre approprié de câblage est rectifié pour rectifier, +RTN à +RTN, puis -48 V à -48 V. En débranchant la puissance, l'ordre approprié de câblage est -48 V à -48 V, +RTN à +RTN, a alors rectifié pour rectifier. Notez que le fil de masse devrait toujours être relié d'abord et débranché pour la dernière fois. Notez que le fil de masse devrait toujours être relié d'abord et débranché pour la dernière fois.

Warnung Die Stromzufuhr ist nur mit geeigneten Ringösen an das DC Netzteil anzuschliessen. Die richtige Anschlusssequenz ist: Erdanschluss zu Erdanschluss, +RTN zu +RTN und dann -48V zu -48V. Die richtige Sequenz zum Abtrennen der Stromversorgung ist -48V zu -48V, +RTN zu +RTN und dann Erdanschluss zu Erdanschluss. Es ist zu beachten dass der Erdanschluss immer zuerst angeschlossen und als letztes abgetrennt wird.

Avvertenza Mostra la morsettiera dell alimentatore CC. Cablare l'alimentatore CC usando i connettori adatti all'estremità del cablaggio, come illustrato. La corretta sequenza di cablaggio è da massa a massa, da positivo a positivo (da linea ad L) e da negativo a negativo (da neutro a N). Tenere presente che il filo di massa deve sempre venire collegato per primo e scollegato per ultimo.

Advarsel Riktig tilkoples tilkoplingssekvens er jord til jord, +RTN til +RTN, -48 V til – 48 V. Riktig frakoples tilkoplingssekvens er -48 V til – 48 V, +RTN til +RTN, jord til jord.

Aviso Ate con alambre la fuente de potencia cc Usando los terminales apropiados en el extremo del cableado. Al conectar potencia, la secuencia apropiada del cableado se muele para moler, +RTN a +RTN, entonces -48 V a -48 V. Al desconectar potencia, la secuencia apropiada del cableado es -48 V a -48 V, +RTN a +RTN, entonces molió para moler. Observe que el alambre de tierra se debe conectar siempre primero y desconectar por último. Observe que el alambre de tierra se debe conectar siempre primero y desconectar por último.

¡Atención! Wire a fonte de alimentação de DC Usando os talões apropriados 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 johdinliitäntää, esimerkiksi suljettua silmukkaa tai kourumaista liitäntää, jossa on ylöspäin käännetyt kiinnityskorvat. Tällaisten liitäntöjen tulee olla kooltaan johtimiin sopivia ja niiden tulee puristaa yhteen sekä eristeen että johdinosan.

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 occhiello o a forcella con linguette rivolte verso l'alto. I connettori devono avere la misura adatta per il cablaggio e devono serrare sia l'isolante che il conduttore.

Advarsel Hvis det er nødvendig med flertrådede ledninger, brukes godkjente ledningsavslutninger, som for eksempel lukket sløyfe eller spadetype med oppoverbøyde kabelsko. Disse avslutningene skal ha riktig størrelse i forhold til ledningene, og skal klemme sammen både isolasjonen og lederen.

Aviso Quando forem requeridas montagens de instalação eléctrica de cabo torcido, use terminações de cabo aprovadas, tais como, terminações de cabo em circuito fechado e planas com terminais de orelha voltados para cima. Estas terminações de cabo deverão ser do tamanho apropriado para os respectivos cabos, e deverão prender simultaneamente o isolamento e o fio condutor.

¡Atención! Cuando se necesite hilo trenzado, utilizar terminales para cables homologados, tales como las de tipo "bucle cerrado" o "espada", con las lengüetas de conexión vueltas hacia arriba. Estos terminales deberán ser del tamaño apropiado para los cables que se utilicen, y tendrán que sujetar tanto el aislante como el conductor.

Varning! När flertrådiga ledningar krävs måste godkända ledningskontakter användas, t.ex. kabelsko av sluten eller öppen typ med uppåtvänd tapp. Storleken på dessa kontakter måste vara avpassad till ledningarna och måste kunna hålla både isoleringen och ledaren fastklämda.

Related Documentation

- In Case of Electrical Accident on page 167
- General Electrical Safety Guidelines and Warnings on page 167
- SRX3400 Services Gateway Agency Approvals on page 178

SRX3400 Services Gateway Agency Approvals

The services gateway complies with the following standards:

- Safety
  - CSA 60950-1 (2003) Safety of Information Technology Equipment
  - UL 60950-1 (2003) Safety of Information Technology Equipment
  - EN 60950-1 (2001) Safety of Information Technology Equipment
  - IEC 60950-1 (2001) Safety of Information Technology Equipment (with country deviations)
  - EN 60825-1 +A1+A2 (1994) Safety of Laser Products - Part 1: Equipment Classification
- EMC
  - EN 300 386 V1.3.3 (2005) Telecom Network Equipment - EMC requirements
- EMI
  - FCC Part 15 Class A (2007) USA Radiated Emissions
  - EN 55022 Class A (2006) European Radiated Emissions
  - VCCI Class A (2007) Japanese Radiated Emissions
- Immunity
  - EN 55024 +A1+A2 (1998) Information Technology Equipment Immunity Characteristics
  - EN-61000-3-2 (2006) Power Line Harmonics
  - EN-61000-3-3 +A1 +A2 +A3 (1995) Power Line Voltage Fluctuations
  - EN-61000-4-2 +A1 +A2 (1995) Electrostatic Discharge
  - EN-61000-4-3 +A1+A2 (2002) Radiated Immunity
  - EN-61000-4-4 (2004) Electrical Fast Transients
  - EN-61000-4-5 (2006) Surge
  - EN-61000-4-6 (2007) Immunity to Conducted Disturbances
  - EN-61000-4-11 (2004) Voltage Dips and Sags

Related Documentation

- In Case of Electrical Accident on page 167
- General Electrical Safety Guidelines and Warnings on page 167

- DC Power Electrical Safety Guidelines and Warnings on page 172

SRX3400 Services Gateway Compliance Statements for EMC Requirements

This section includes the following topics:

Canada

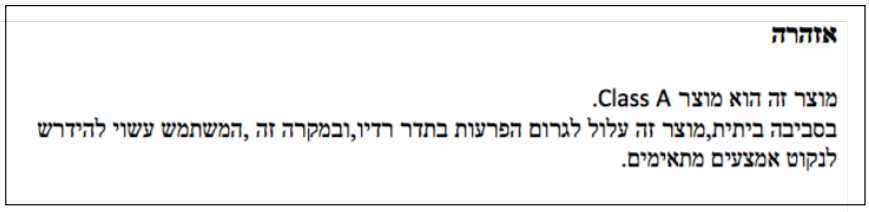
This Class A digital apparatus complies with Canadian ICES-003.

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 may 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

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

The preceding translates as follows:

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this product is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

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

- SRX3400 Services Gateway Agency Approvals on page 178
- In Case of Electrical Accident on page 167
- General Electrical Safety Guidelines and Warnings on page 167
- DC Power Electrical Safety Guidelines and Warnings on page 172

SRX3400 Services Gateway NEBS and ETSI Compliance

SRX3400 Services Gateway NEBS and ETSI Standards

The SRX3400 Services Gateway, when it is installed and configured as described in this section, meets the following NEBS and ETSI standards:

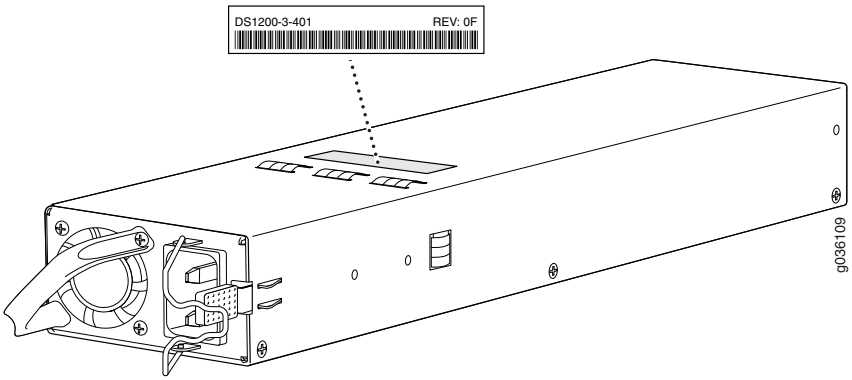
- GR-63-CORE
- ETSI 300019-2-1
- ETSI 300019-2-2
- ETSI 300019-2-3
- GR-1089-CORE

SRX3400 Services Gateway NEBS and ETSI Configuration Requirements

To meet the NEBS and ETSI standards described in "SRX3400 Services Gateway NEBS and ETSI Standards" on page 180, the SRX3400 Services Gateway must be configured as follows:

- The services gateway must be installed in an open two-post or four-post rack, and not in an enclosed cabinet.
- The services gateway must be installed in accordance with the instructions and procedures in this guide.
- The services gateway must be equipped with two power supplies.
- For AC-powered services gateways, both power supplies installed in the services gateway must be Revision 09 or later. You can determine the power supply version numbers by using the **show chassis hardware** command. You can also identify the power supply version by referring to the printed label on the power supply, which shows the version in an alphabetic format. Revision 09 corresponds to "REV 0F," Revision 10 corresponds to "REV 0G," and so on. Figure 70 on page 181 shows the location of the power supply model and revision label.

Figure 70: Power Supply Model and Revision Label (AC Shown, DC Similar)



- For DC-powered services gateways, both power supplies installed in the services gateway must be enhanced DC power supplies. You can determine the power supply type by using the **show chassis hardware** command. You can also identify the power supply type by referring to the printed label on the power supply, as shown in Figure 70 on page 181. Standard DC power supplies are identified on the label as model "DS850DC". Enhanced power supplies are identified as "DS1200DC-3-401."
- The services gateway must not have any two SPCs installed side by side in the CFM slots in the front of the chassis (CFM slots 1 through 4). You can install SPCs side by side in the CFM slots in the rear of the chassis (CFM slots 5 through 7).
- All SFP, SFP+, and XFP transceivers installed in the services gateway must be of extended temperature type. Table 23 on page 181 describes the applicable transceivers available from Juniper Networks.

Table 23: Extended Temperature SFP, SFP+, and XFP Transceivers

SKU	Description
SRX-SFP-1GE-LH-ET	1000BASE-LH SFP optical transceiver
SRX-SFP-1GE-LX-ET	1000BASE-LX SFP optical transceiver
SRX-SFP-1GE-SX-ET	1000BASE-SX SFP optical transceiver

Table 23: Extended Temperature SFP, SFP+, and XFP Transceivers *(continued)*

SKU	Description
SRX-SFP-1GE-T-ET	1000BASE-T SFP copper transceiver
SRX-XFP-10GE-ER-ET	10GBASE-ER XFP optical transceiver
SRX-XFP-10GE-LR-ET	10GBASE-LR XFP optical transceiver
SRX-XFP-10GE-SR-ET	10GBASE-SR XFP optical transceiver
SRX-SFP-10GE-ER	10GBASE-ER SFP+ optical transceiver
SRX-SFP-10GE-LR	10GBASE-LR SFP+ optical transceiver

Related Documentation

- SRX3400 Services Gateway Agency Approvals on page 178
- In Case of Electrical Accident on page 167
- General Electrical Safety Guidelines and Warnings on page 167
- DC Power Electrical Safety Guidelines and Warnings on page 172

APPENDIX B

SRX3400 Services Gateway Environmental Specifications

This section includes the following topic:

SRX3400 Services Gateway Environmental Specifications

Table 24 on page 183 specifies the environmental specifications required for normal services gateway operation. In addition, the site should be as dust-free as possible. For more information, see "Site Preparation Checklist for the SRX3400 Services Gateway" on page 37 and "Routine Maintenance Procedures for the SRX3400 Services Gateway" on page 96.

Table 24: SRX3400 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
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	Tested to meet Telcordia Technologies Zone 4 earthquake requirements
Maximum thermal output	AC power: 3,679 BTU/hour (1079 W) DC power: 3,424 BTU/hour (1004 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.

Related Documentation

- SRX3400 Services Gateway Agency Approvals on page 178
- SRX3400 Services Gateway General Safety Guidelines and Warnings on page 145
- SRX3400 Services Gateway Fire Safety Requirements and Fire Suppression Equipment on page 150
- SRX3400 Services Gateway Definition of Safety Warning Levels on page 143

APPENDIX C

SRX3400 Services Gateway Power Guidelines, Requirements, and Specifications

This section includes the following topics:

SRX3400 Services Gateway Grounding Specifications

This section includes the following topics:

SRX3400 Services Gateway Chassis Grounding Point

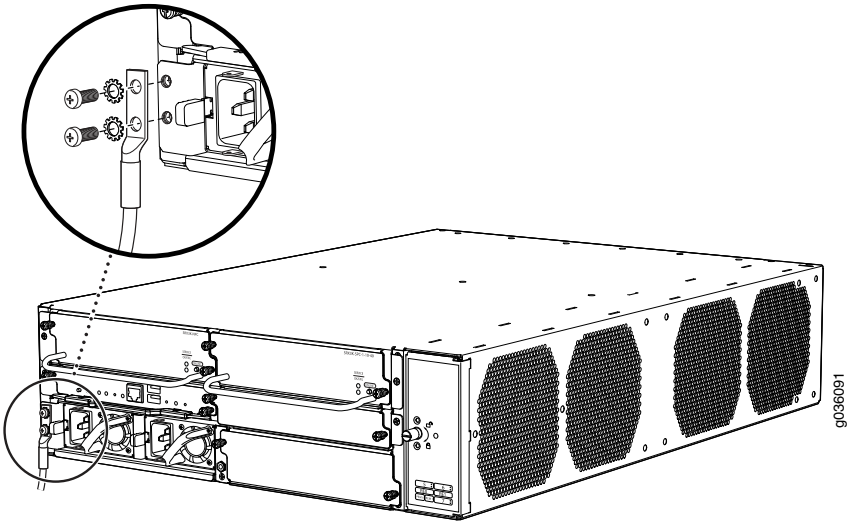
WARNING: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must properly ground the services gateway chassis before connecting power. See "Grounding the SRX3400 Services Gateway" on page 76 for instructions.

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 lower left corner of the back panel. The grounding point consists of two threaded holes spaced 0.625-in. (15.86-mm) apart (Figure 71 on page 186). The grounding point holes fit M5 screws. The accessory box shipped with the services gateway includes the cable lug that attaches to the grounding

cable and two M5 screws used to secure the grounding cable to the services gateway grounding point.

Figure 71: Grounding Point on Rear of SRX3400 Services Gateway



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.

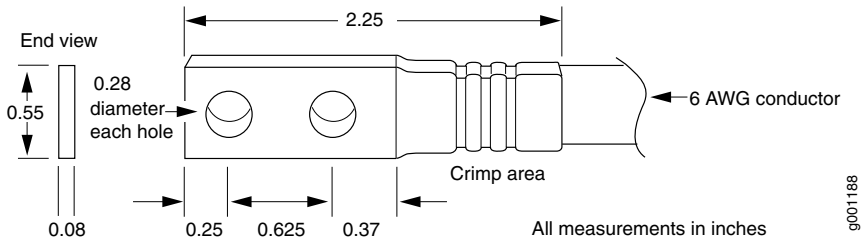
Related Documentation

- Grounding the SRX3400 Services Gateway on page 76
- SRX3400 Services Gateway Grounding-Cable Lug Specification on page 186
- SRX3400 Services Gateway Grounding Cable Specification on page 187

SRX3400 Services Gateway Grounding-Cable Lug Specification

The cable attaches to the grounding cable (see Figure 72 on page 186) and two M5 screws are used to secure the grounding cable to the grounding point.

Figure 72: Grounding Cable Lug



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

Related Documentation

- SRX3400 Services Gateway Chassis Grounding Point on page 185
- SRX3400 Services Gateway Grounding Cable Specification on page 187

SRX3400 Services Gateway Grounding Cable Specification

The grounding cable that you provide must meet the specifications in Table 25 on page 187.

Table 25: Grounding Cable Specifications

Cable Type	Quantity and Specification
Grounding	One 10-AWG (5.3 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 SRX3400 Services Gateway" on page 76 for instructions.

Related Documentation

- SRX3400 Services Gateway Chassis Grounding Point on page 185
- SRX3400 Services Gateway Grounding-Cable Lug Specification on page 186

SRX3400 Services Gateway DC Power Specifications and Requirements

This section includes the following topics:

SRX3400 Services Gateway DC Power System Electrical Specifications

Table 26 on page 188 lists the DC power system electrical specifications.

Table 26: DC Power System Electrical Specifications

Item	Specification
DC input voltage	Operating range: –40.5 to –72 VDC
DC system current rating	22.2 A @ -48 VDC
Maximum DC input power	1063 W

Related Documentation

- SRX3400 Services Gateway DC Power Supply Electrical Specifications on page 28
- Power Requirements for DC-Powered SRX3400 Services Gateways on page 188
- SRX3400 Services Gateway DC Power Cable Specifications on page 190

SRX3400 Services Gateway DC Power Supply Electrical Specifications

Table 27 on page 188 lists the electrical specifications for the two types of services gateway DC power supply.

Table 27: DC Power Supply Electrical Specifications

Item	Standard DC Power Supply	Enhanced DC Power Supply
Maximum output power	850 W	1200 W
DC input voltage	–40.5 to –72 VDC	–40.5 to –72 VDC
DC input current rating	22.2 A @ -48 VDC	31.3 A @ -48 VDC

The DC power supplies in **PEM0** and **PEM1** must be powered by dedicated power feeds derived from feed A, and the DC power supplies in **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.

Related Documentation

- SRX3400 Services Gateway DC Power System Electrical Specifications on page 187
- Power Requirements for DC-Powered SRX3400 Services Gateways on page 188
- SRX3400 Services Gateway DC Power Cable Specifications on page 190

Power Requirements for DC-Powered SRX3400 Services Gateways

NOTE: If you plan to operate a maximally configured DC-powered services gateway, we recommend that you provision 30 A @ -48 VDC for the system.

If you do not plan to provision 30 A @ -48 VDC for the system, you can use the information in Table 28 on page 189 and Table 29 on page 189 to calculate the power consumption @ -48 VDC, and thermal output for various hardware configurations.

Table 28 on page 189 lists the power requirements for base DC-powered services gateways operating under typical voltage conditions.

Table 28: DC-Powered Base System Requirements

DC Power Supply Configuration	Power Requirement, (Watts)
Nonredundant configuration includes DC power supply, midplane, SFB, Routing Engine, and fan tray.	288 W (approximate)
Redundant configuration includes two DC power supplies, midplane, SFB, Routing Engine, and fan tray.	310 W (approximate)

NOTE: The power requirement values shown in Table 28 on page 189 are for a lightly loaded system. For a heavily loaded system, the contribution of the base system to the overall system power requirement is lower, because the power supply efficiency improves as the load increases. For a heavily loaded system, both the redundant and nonredundant base systems contribute approximately 288 W to the overall system power requirement.

Table 29 on page 189 lists the power requirements for various hardware components when the services gateway is operating under typical voltage conditions.

Table 29: Component DC Power Requirements

Component	Power Requirement (Watts)	48V Input Power Requirement at 80% Power Supply Efficiency
Routing Engine	53 W	66 W
SPC	118 W	148 W
NPC	64 W	80 W
SCM	35 W	44 W
NP-IOC	52 W	65 W
IOC (max)	40 W	50 W
IOC (min)	52 W	65 W

Use the information in Table 28 on page 189 and Table 29 on page 189 to calculate power consumption for various hardware configurations, input current from a different source voltage, and thermal output, as shown in the following examples. These examples use maximum values per IOC.

- Minimum DC-powered configuration:

  Base services gateway (nonredundant) + 1 SPC + 1 NPC =
  288 W + 148 W + 80W = 516 W @ -48 VDC = 10.7 A

- Maximum DC-powered configuration:

  Base services gateway (redundant) + 4 SPCs + 1 NPC + 1 SCM =
  288 W + 4(148) W + 80 W + 44 W =
  288 W + 592 W + 80 W + 44 W = 1004 W @ -48 VDC = 20.9 A

- Input current from a DC source other than -48 VDC (based on maximum configuration; applies to DC power supply only):

  (–54 VDC input) * (input current X) = (-48 VDC input) * (input current Y)
  54 * X = 48 * 20.9 A
  X = (48 * 20.9)/54 = 18.6 A

- Thermal output for maximally configured DC-powered services gateway:

  Watts DC * 3.41 = BTU/hr
  1004 * 3.41 = 3424 BTU/hr

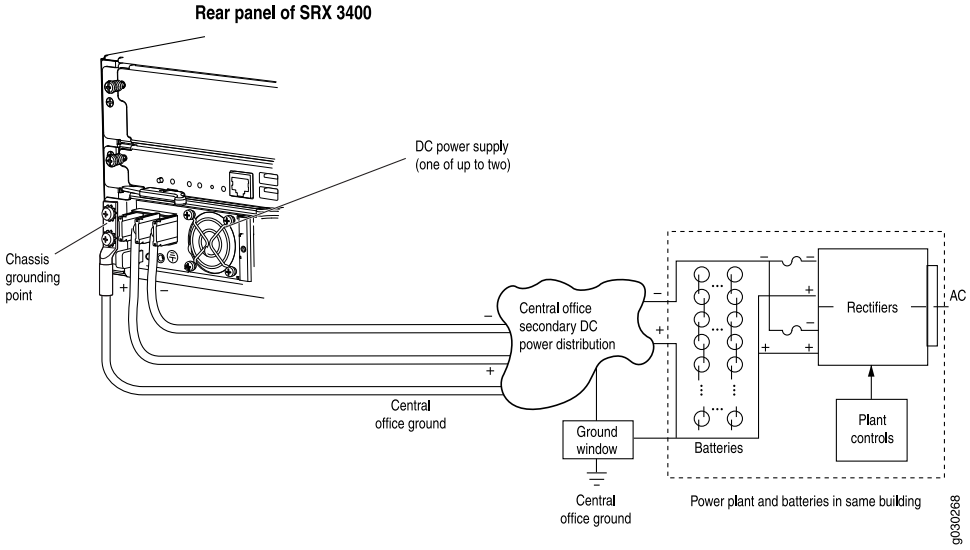
Related Documentation

- SRX3400 Services Gateway DC Power System Electrical Specifications on page 187
- SRX3400 Services Gateway DC Power Supply Electrical Specifications on page 28
- SRX3400 Services Gateway DC Power Cable Specifications on page 190

SRX3400 Services Gateway DC Power Cable Specifications

Figure 73 on page 191 shows a typical DC source cabling arrangement.

Figure 73: Typical DC Source Cabling to the SRX3400 Services Gateway



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

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

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

For other electrical safety information, see "General Electrical Safety Guidelines and Warnings" on page 167.

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

For a description of the DC power supply, see "SRX3400 Services Gateway DC Power Supply Overview" on page 27. For instructions on connecting the DC power and grounding cables during initial installation, see "Connecting the SRX3400 Services Gateway to a DC Power Source" on page 79. For instructions on replacing a DC power cable, see "Replacing DC Power Supply Cables on the SRX3400 Services Gateway" on page 138.

Table 30 on page 192 summarizes the specifications for the power cables, which you must supply.

Table 30: DC Power Cable Specifications

Cable Type	Quantity and Specification
Power	Eight 6-AWG (13.3 mm^2), minimum 60ºC wire, or as permitted by the local code

Related Documentation

- SRX3400 Services Gateway DC Power System Electrical Specifications on page 187
- SRX3400 Services Gateway DC Power Supply Electrical Specifications on page 28
- Power Requirements for DC-Powered SRX3400 Services Gateways on page 188

SRX3400 Services Gateway AC Power Specifications and Requirements

This section includes the following topics:

- SRX3400 Services Gateway AC Power System Electrical Specifications on page 192
- SRX3400 Services Gateway AC Power Supply Electrical Specifications on page 192
- Power Requirements for AC-Powered SRX3400 Services Gateways on page 193
- SRX3400 Services Gateway AC Power Cord Specifications on page 195

SRX3400 Services Gateway AC Power System Electrical Specifications

Table 31 on page 192 lists the AC power system electrical specifications.

Table 31: AC Power System Specifications

Item	Specification
AC input voltage	Operating range: 100-127 V / 200-240 V
AC input line frequency	50 / 60 Hz
AC system current rating	12 A @ 100 V
Maximum AC input power	1175 W @ 100 V

Related Documentation

- SRX3400 Services Gateway AC Power Supply Electrical Specifications on page 26
- Power Requirements for AC-Powered SRX3400 Services Gateways on page 193
- SRX3400 Services Gateway AC Power Cord Specifications on page 195

SRX3400 Services Gateway AC Power Supply Electrical Specifications

Table 32 on page 193 lists the electrical specifications for the services gateway AC power supply.

Table 32: AC Power Supply Electrical Specifications

Item	Specification
Maximum output power	1000 W (110 VAC input)
	1200 W (220 VAC input)
AC input voltage	Operating range: 100-127 V / 200-240 V
AC input line frequency	50 / 60 Hz
AC input current rating	12.0 A @ 100-127 V / 7 A @ 200-240 V

Related Documentation

- SRX3400 Services Gateway AC Power System Electrical Specifications on page 192
- Power Requirements for AC-Powered SRX3400 Services Gateways on page 193
- SRX3400 Services Gateway AC Power Cord Specifications on page 195

Power Requirements for AC-Powered SRX3400 Services Gateways

NOTE: If you plan to operate a maximally configured AC-powered services gateway, we recommend that you provision 6 A @ 240 VAC (or 14 A @ 100 VAC) for the system.

If you do not plan to provision 6 A @ 240 VAC (or 14 A @ 100 VAC) for the system, you can use the information in Table 33 on page 193 and Table 34 on page 194 to calculate power consumption for various hardware configurations, and thermal output.

Table 33 on page 193 lists the power requirements for base AC-powered services gateways operating under typical voltage conditions. It includes the efficiency for the AC power supplies.

Table 33: Base System AC Power Requirements

Component	Power Requirement (Watts)
Nonredundant configuration includes AC power supply, midplane, SFB, Routing Engine, and the fan tray.	271 W (approximate)
Redundant configuration includes two AC power supplies, midplane, SFB, Routing Engine, and the fan tray.	310 W (approximate)

NOTE: The power requirement values shown in Table 33 on page 193 are for a lightly loaded system. For a heavily loaded system, the contribution of the base system to the overall system power requirement is lower, because the power supply efficiency improves as the load increases. For a heavily loaded system, both the redundant and nonredundant base systems contribute approximately 271 W to the overall system power requirement.

Table 34 on page 194 lists the power requirements for various hardware components when the services gateway is operating under typical voltage conditions.

Table 34: Component AC Power Requirements

Component	Power Requirement (Watts)	AC Input Power Requirement at 85% Power Supply Efficiency
Routing Engine	53 W	62 W
SPC	118 W	139 W
NPC	64 W	75 W
SCM	35 W	41 W
NP-IOC	52 W	61 W
IOC (min)	40 W	47 W
IOC (max)	52 W	61 W

Use the information in Table 33 on page 193 and Table 34 on page 194 to calculate power consumption for various hardware configurations, input current from a different source voltage, and thermal output, as shown in the following examples. These examples use maximum values per IOC.

Typical power consumption for AC-powered services gateways:

- Minimum AC-powered configuration:

  Base services gateway (nonredundant) + 1 SPC + 1 NPC =
  271 W + 139 W + 75 W = 485 W

- Maximum AC-powered configuration:

  Base services gateway (redundant) + 4 SPCs + 2 NPC + 1 IOC (max) + 1 SCM =
  271 W + 4(139) W + 2(75) W + 61 W + 41 W =
  271 W + 556 W + 150 W + 61 W + 41 W = 1079 W

- Typical system thermal output (based on maximally configured AC-powered services gateway @ 110 V input):

  Watts * 3.41 = BTU/hr
  1079 W * 3.41 = 3679 BTU/hr

Related Documentation

- SRX3400 Services Gateway AC Power System Electrical Specifications on page 192
- SRX3400 Services Gateway AC Power Supply Electrical Specifications on page 192
- SRX3400 Services Gateway AC Power Cord Specifications on page 195

SRX3400 Services Gateway AC Power Cord Specifications

Each AC power supply has a single AC appliance inlet located on the power supply that requires a dedicated AC power feed and a dedicated 15 A (250 VAC) circuit breaker. 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 them separately using the model number shown in Table 35 on page 195. The services gateway uses detachable AC power cords with C19 appliance couplers at the female end as described by International Electrotechnical Commission (IEC) standard 60320. The plug at the male end of the power cord fits into the power source receptacle that is standard for your geographical location.

Table 35 on page 195 provides specifications and Figure 74 on page 196 depicts the plug on the AC power cord available for each country or region.

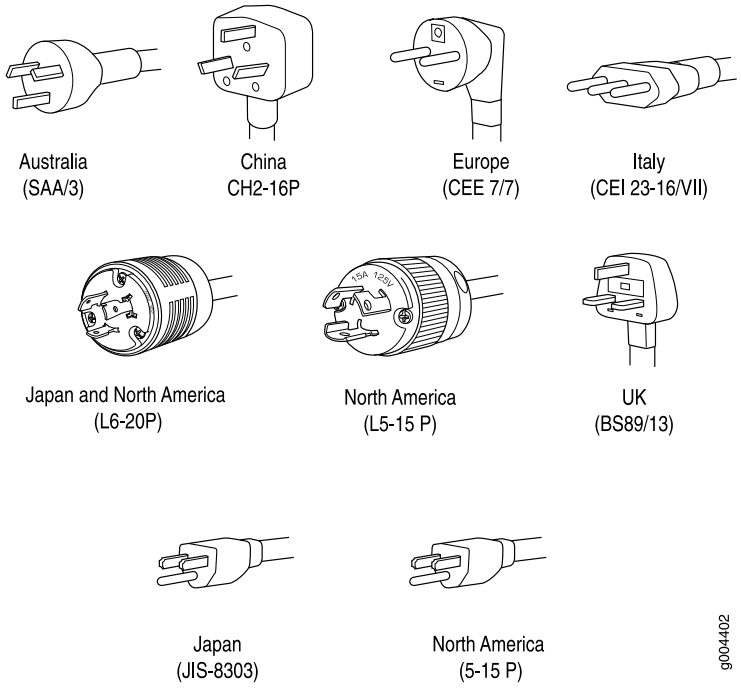
Table 35: AC Power Cord Specifications

Country	Model Number	Electrical Specification	Plug Type
Australia/New Zealand	CBL-PWR-C19S-152-AU	C19 at 70-80 mm, 15 A/250 V, 2.5 m, Straight	SAA/3/15
China	CBL-PWR-C19S-162-CH	C19, 16 A/250 V, 2.5 m, Straight	CH2-16P
Continental Europe (except Denmark, Italy, Switzerland, and United Kingdom)	CBL-PWR-C19S-162-EU	C19, 16 A/250 V, 2.5 m, Straight	CEE 7/7
Italy	CBL-PWR-C19S-162-IT	C19 at 70-80 mm, 16 A/250 V, 2.5 m, Straight	CEI 23-16/VII
Japan	CBL-PWR-C19S-151-US15	C19 at 70-80 mm, 15 A/125 V, 2.5 m, Straight	NEMA 5-15P
	CBL-PWR-C19S-162-JP	C19 at 70-80 mm, 16 A/250 V, 2.5 m, Straight	NEMA 6-20P
	CBL-PWR-C19S-162-JPL	C19 at 70-80 mm, 16 A/250 V, 2.5 m, Straight, Locking Plug	NEMA L6-20P

Table 35: AC Power Cord Specifications *(continued)*

Country	Model Number	Electrical Specification	Plug Type
North America	CBL-PWR-C19S-151-US15	C19 at 70-80 mm, 15 A/125 V, 2.5 m, Straight	NEMA 5-15P
	CBL-PWR-C19S-162-US	C19 at 70-80 mm, 16 A/250 V, 2.5 m, Straight	NEMA 6-20P
	CBL-PWR-C19S-162-JPL	C19 at 70-80 mm, 16 A/250 V, 2.5 m, Straight, Locking Plug	NEMA L6-20P
United Kingdom	CBL-PWR-C19S-132-UK	C19 at 70-80 mm, 13 A/250 V, 2.5 m, Straight	BS89/13

Figure 74: AC Plug Types



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

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 35 on page 195 are in compliance.

For information about the AC power supply, including a description of components, see "SRX3400 Services Gateway AC Power Supply Overview" on page 25. For instructions on connecting the power cord during initial installation, see "Connecting the SRX3400 Services Gateway to an AC Power Source" on page 77. For instructions on replacing the AC power cables, see "Replacing AC Power Supply Cables on the SRX3400 Services Gateway" on page 133.

Related Documentation

- SRX3400 Services Gateway AC Power System Electrical Specifications on page 192
- SRX3400 Services Gateway AC Power Supply Electrical Specifications on page 192
- Power Requirements for AC-Powered SRX3400 Services Gateways on page 193

APPENDIX D

Cable and Wire Guidelines for the SRX3400 Services Gateway Hardware

This section includes the following topics:

SRX3400 Services Gateway Electrical Wiring Guidelines

This section includes the following topics:

Distance Limitations for Signaling for the SRX3400 Services Gateway

Improperly installed wires can emit radio interference. In addition, the potential for damage from lightning strikes increases if wires exceed recommended distances, or if wires pass between buildings. The electromagnetic pulse (EMP) caused by lightning can damage unshielded conductors and destroy electronic devices. If your site has previously experienced such problems, you might want to consult experts in electrical surge suppression and shielding.

Related Documentation

- Radio Frequency Interference for the SRX3400 Services Gateway on page 199
- Electromagnetic Compatibility for the SRX3400 Services Gateway on page 200

Radio Frequency Interference for the SRX3400 Services Gateway

You can reduce or eliminate the emission of radio frequency interference (RFI) from your site wiring by using 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.

Related Documentation
- Distance Limitations for Signaling for the SRX3400 Services Gateway on page 199
- Electromagnetic Compatibility for the SRX3400 Services Gateway on page 200

Electromagnetic Compatibility for the SRX3400 Services Gateway

If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, you might want to seek expert advice. Strong sources of electromagnetic interference (EMI) can destroy the signal drivers and receivers in the services gateway and conduct power surges over the lines into the equipment, resulting in an electrical hazard. It is particularly important to provide a properly grounded and shielded environment and to use electrical surge-suppression devices.

CAUTION: To comply with intrabuilding lightning/surge requirements, intrabuilding wiring must be shielded, and the shield for the wiring must be grounded at both ends.

Related Documentation
- Distance Limitations for Signaling for the SRX3400 Services Gateway on page 199
- Radio Frequency Interference for the SRX3400 Services Gateway on page 199

SRX3400 Services Gateway Network Cable Guidelines

This section includes the following topics:

- Signal Loss in Multimode and Single-Mode Fiber-Optic Cable for the SRX3400 Services Gateway on page 200
- Attenuation and Dispersion in Fiber-Optic Cable for the SRX3400 Services Gateway on page 201
- Calculating the Power Budget for Fiber-Optic Cable for the SRX3400 Services Gateway on page 202
- Calculating the Power Margin for Fiber-Optic Cable for the SRX3400 Services Gateway on page 202

Signal Loss in Multimode and Single-Mode Fiber-Optic Cable for the SRX3400 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.

Related Documentation

- Attenuation and Dispersion in Fiber-Optic Cable for the SRX3400 Services Gateway on page 201
- Calculating the Power Budget for Fiber-Optic Cable for the SRX3400 Services Gateway on page 202
- Calculating the Power Margin for Fiber-Optic Cable for the SRX3400 Services Gateway on page 202

Attenuation and Dispersion in Fiber-Optic Cable for the SRX3400 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.

Related Documentation

- Signal Loss in Multimode and Single-Mode Fiber-Optic Cable for the SRX3400 Services Gateway on page 200

- Calculating the Power Budget for Fiber-Optic Cable for the SRX3400 Services Gateway on page 202
- Calculating the Power Margin for Fiber-Optic Cable for the SRX3400 Services Gateway on page 202

Calculating the Power Budget for Fiber-Optic Cable for the SRX3400 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):

$$P_B = P_T - P_R$$

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

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

Related Documentation

- Signal Loss in Multimode and Single-Mode Fiber-Optic Cable for the SRX3400 Services Gateway on page 200
- Attenuation and Dispersion in Fiber-Optic Cable for the SRX3400 Services Gateway on page 201
- Calculating the Power Margin for Fiber-Optic Cable for the SRX3400 Services Gateway on page 202

Calculating the Power Margin for Fiber-Optic Cable for the SRX3400 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 36 on page 203 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 36: 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 36 on page 203 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 dB – 2 km (1.0 dB/km) – 5 (0.5 dB) – 2 (0.5 dB) – 0.5 dB [HOL] – 1 dB [CRM]

P_M = 13 dB – 2 dB – 2.5 dB – 1 dB – 0.5 dB – 1 dB

P_M = 6 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 36 on page 203 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 dB – 8 km (0.5 dB/km) – 7 (0.5 dB)

P_M = 13 dB – 4 dB – 3.5 dB

P_M = 5.5 dB

In both 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

- Signal Loss in Multimode and Single-Mode Fiber-Optic Cable for the SRX3400 Services Gateway on page 200
- Attenuation and Dispersion in Fiber-Optic Cable for the SRX3400 Services Gateway on page 201
- Calculating the Power Budget for Fiber-Optic Cable for the SRX3400 Services Gateway on page 202

Console Port Cable and Wire Specifications for the SRX3400 Services Gateway

Table 37 on page 204 lists the specifications for the cable that connects a **CONSOLE** port on the Routing Engine to a management console.

Table 37: 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 male

Related Documentation

- Connecting the SRX3400 Services Gateway to a Management Console or an Auxiliary Device on page 72
- SRX3400 Services Gateway Switch Fabric Board on page 14
- SRX3400 Services Gateway Routing Engine on page 23

APPENDIX E

Contacting Customer Support and Returning the SRX3400 Services Gateway Hardware

This section includes the following topics:

Return Procedure for the SRX3400 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 http://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/techpubs/.
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 http://www.juniper.net/support/guidelines.html .

For product problems or technical support issues, open a support case using the Case Manager link at http://www.juniper.net/support/ or call 1-888-314-JTAC (within the United States) or 1-408-745-9500 (outside the United States).

Related Documentation

- Listing the SRX3400 Services Gateway Component Serial Numbers with the CLI on page 206
- Locating the SRX3400 Services Gateway Chassis Serial Number Label on page 207
- Locating the SRX3400 Services Gateway SFB Serial Number Label on page 208

Locating SRX3400 Services Gateway Component Serial Numbers

This section includes the following topics:

Listing the SRX3400 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 list all of the services gateway components and their serial numbers, enter the following command-line interface (CLI) command:

```
user@host> show chassis hardware
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                TV2955            SRX 3400
Midplane                 710-020310                      SRX 3400 Midplane
PEM 0            rev 0A   740-020226   G087D3000901P     AC Power Supply
PEM 1            rev 0A   740-020226   G087D3002A01P     AC Power Supply
CB 0             Rev. 01  750-021914   TV3003            SRX3k RE-12-10
  Routing Engine          BUILTIN      BUILTIN           Routing Engine
  CPP                     BUILTIN      BUILTIN           Central PFE Processor
  Mezz           Rev. 01  710-021035   TV2986            SRX3k HD Mezzanine Card
CB 1             REV 01   750-032474   AAAY7255          SRX3k CRM
FPC 0            Rev. 02  750-021882   TV3420            SRX3k SFB 12GE
```

```
  PIC 0                 BUILTIN      BUILTIN          8x 1GE-TX 4x 1GE-SFP
    Xcvr 8      REV 01  740-013111   8043260          SFP-T
    Xcvr 9      REV 01  740-013111   7303356          SFP-T
    Xcvr 10     REV 01  740-011782   PAQ2K79          SFP-SX
FPC 1                   750-016077   TV3401           SRX3k SPC
  PIC 0                 BUILTIN      BUILTIN          SPU Cp-Flow
FPC 2                   750-020324   TV3672           SRX3k 16xGE TX
  PIC 0                 BUILTIN      BUILTIN          16x 1GE-TX
FPC 4           Rev. 01 750-020317   TV3258           SRX3k 16xGE SFP
  PIC 0                 BUILTIN      BUILTIN          16x 1GE-SFP
    Xcvr 0      REV 01  740-013111   70174029         SFP-T
    Xcvr 4      REV 01  740-011785   P6M0E1P          SFP-LX
    Xcvr 8      REV 01  740-011784   790016D00386     SFP-LH
    Xcvr 10     REV 01  740-011613   AGS07011055      SFP-SX
FPC 6           Rev. 01 750-020321   TV3021           SRX3k 2x10GE XFP
  PIC 0                 BUILTIN      BUILTIN          2x 10GE-XFP
    Xcvr 0      REV 01  740-011571   C728XJ00T        XFP-10G-SR
    Xcvr 1              NON-JNPR     T05L49873        XFP-10G-LR
FPC 10                  750-017866   tv3058           SRX3k NPC
  PIC 0                 BUILTIN      BUILTIN          NPC PIC
FPC 11                  750-017866   tv3086           SRX3k NPC
  PIC 0                 BUILTIN      BUILTIN          NPC PIC
Fan Tray 0      1.0     750-021599   TV2960           SRX 3400 Fan Tray
```

Most components also have a small rectangular serial number ID label attached to the component body.

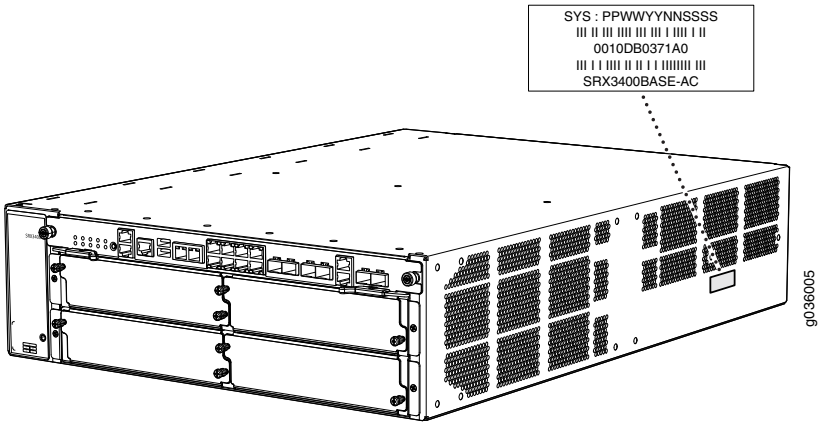
Related Documentation

- Return Procedure for the SRX3400 Services Gateway on page 205
- Locating the SRX3400 Services Gateway Chassis Serial Number Label on page 207
- Locating the SRX3400 Services Gateway SFB Serial Number Label on page 208

Locating the SRX3400 Services Gateway Chassis Serial Number Label

The chassis serial number is located on the side of the chassis (see Figure 75 on page 207).

Figure 75: SRX3400 Services Gateway Chassis Serial Number Label



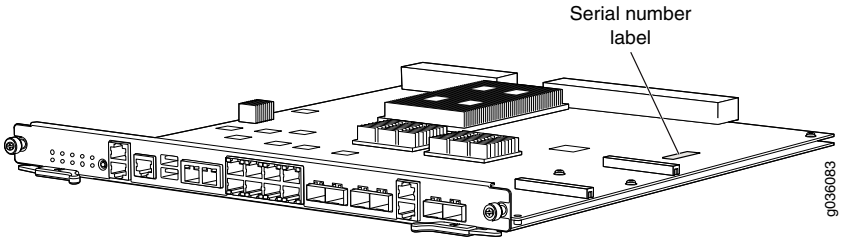
Related Documentation

- Return Procedure for the SRX3400 Services Gateway on page 205
- Listing the SRX3400 Services Gateway Component Serial Numbers with the CLI on page 206

Locating the SRX3400 Services Gateway SFB Serial Number Label

The serial number is located on the right side of the top of the SFB (see Figure 76 on page 208).

Figure 76: SFB Serial Number Label



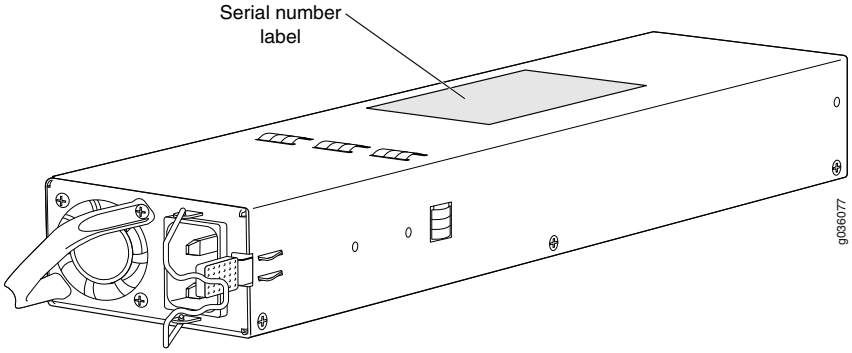
Related Documentation

- Return Procedure for the SRX3400 Services Gateway on page 205
- Listing the SRX3400 Services Gateway Component Serial Numbers with the CLI on page 206

Locating the SRX3400 Services Gateway Power-Supply Serial Number Label

The serial number label for the AC and DC power supplies is located on the top of the power supply (see Figure 77 on page 208).

Figure 77: AC Power Supply Serial Number Label



Related Documentation

- Return Procedure for the SRX3400 Services Gateway on page 205
- Listing the SRX3400 Services Gateway Component Serial Numbers with the CLI on page 206

Contacting Customer Support to Obtain Return Materials Authorization for the SRX3400 Services Gateway

This section includes the following topics:

- Information You Might Need to Supply to JTAC on page 209
- Contacting Customer Support on page 209

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

Related Documentation

- Return Procedure for the SRX3400 Services Gateway on page 205
- Contacting Customer Support on page 209

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 Case Manager link at http://www.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 11-digit case 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.

Related Documentation

- Return Procedure for the SRX3400 Services Gateway on page 205
- Information You Might Need to Supply to JTAC on page 209

Packing an SRX3400 Services Gateway or a Component for Shipment

This section includes the following topics:

- Required Tools and Parts for Packing the SRX3400 Services Gateway on page 210
- Packing the SRX3400 Services Gateway for Shipment on page 210
- Packing SRX3400 Services Gateway Components for Shipment on page 211

Required Tools and Parts for Packing the SRX3400 Services Gateway

To remove the components from the services gateway or to remove the services gateway from a rack, you need the following tools and parts:

- Blank panels to cover empty slots
- Electrostatic bag or antistatic mat for each component
- Electrostatic discharge (ESD) grounding wrist strap
- Flat-blade screwdriver, approximately 1/4 in. (6 mm)
- Phillips (+) screwdrivers, numbers 1 and 2

Related Documentation

- Return Procedure for the SRX3400 Services Gateway on page 205
- Packing the SRX3400 Services Gateway for Shipment on page 210
- Packing SRX3400 Services Gateway Components for Shipment on page 211

Packing the SRX3400 Services Gateway for Shipment

To pack the services gateway for shipment:

1. Retrieve the shipping carton 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. Attach an ESD grounding strap to your bare wrist and connect the strap to the ESD point on the chassis or to an outside ESD point if the services gateway is disconnected from earth ground.
3. On the console or other management device connected to the services gateway, 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.
4. Shut down power to the services gateway by pressing the Power button on the front of the services gateway.
5. Disconnect power from the services gateway.
6. Remove the cables that connect to all external devices.
7. If the services gateway is installed in a rack, have one person support the weight of the services gateway while another person unscrews and removes the mounting screws.
8. Place the services gateway in the shipping carton.
9. Cover the services gateway with an ESD bag, and place the packing foam on top of and around the services gateway.

10. Replace the accessory box on top of the packing foam.
11. Securely tape the box closed.
12. Write the Return Materials Authorization (RMA) number on the exterior of the box to ensure proper tracking.

Related Documentation

- Return Procedure for the SRX3400 Services Gateway on page 205
- Packing SRX3400 Services Gateway Components for Shipment on page 211
- Preventing Electrostatic Discharge Damage to the SRX3400 Services Gateway on page 149

Packing SRX3400 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.**

Related Documentation

- Return Procedure for the SRX3400 Services Gateway on page 205
- Packing the SRX3400 Services Gateway for Shipment on page 210
- Required Tools and Parts for Packing the SRX3400 Services Gateway on page 210

APPENDIX F

Product Recycling

Removing the Battery from the Routing Engine of an SRX3400 Services Gateway for Recycling

The Routing Engine installed in the services gateway contains a CR2032 .3.0-volt lithium battery. The coin-shaped battery is approximately 3/4 in. (19 mm) in diameter. The battery is estimated to last for over 50 years.

Before recycling a Routing Engine or the services gateway chassis, remove the battery from the Routing Engine for recycling.

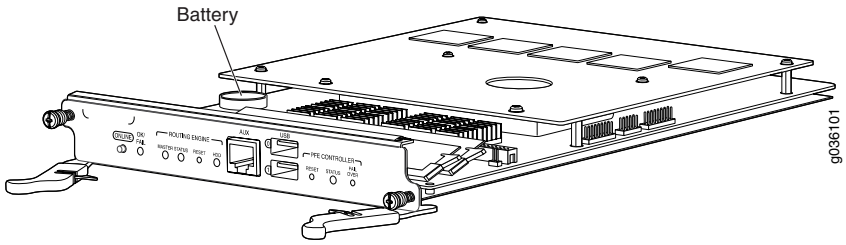
Before you begin to remove the battery:

- Before you remove the Routing Engine, you must power off the services gateway. For instructions, see "Powering Off the SRX3400 Services Gateway" on page 82.
- Ensure that you have the following parts and tools:
  - Phillips (+) screwdriver, number 2
  - Electrostatic discharge (ESD) grounding strap

The Routing Engine is located in the rear slot labeled RE0 on the services gateway. To remove the battery from a Routing Engine in the services gateway (see Figure 78 on page 214), perform the following steps:

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Remove the Routing Engine, as described in "Replacing a Routing Engine on the SRX3400 Services Gateway" on page 120.
3. Locate the coin-shaped CR2032 battery on the left side of the Routing Engine (see Figure 78 on page 214).
4. Remove the battery from its socket.
5. Recycle the battery as required.

Figure 78: Location of CR2032 Battery in a Routing Engine



Related Documentation

- Powering Off the SRX3400 Services Gateway on page 82
- Replacing a Routing Engine on the SRX3400 Services Gateway on page 120

PART 5

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