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Junos® OS

Junos® OS Software Installation and Upgrade Guide

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JUNOS

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

YEAR 2000 NOTICE

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

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About This Guide

Use this guide for information relevant to upgrading Junos OS and related software: software packages, upgrading and downgrading Junos OS releases, system backup and recovery procedures, installing and upgrading firmware, storage media, zero touch provisioning.

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CHAPTER

Junos OS Overview

Junos OS Overview

IN THIS SECTION

Junos OS is the single operating system that powers Juniper's broad portfolio of physical and virtual networking and security products.

Junos OS Overview

IN THIS SECTION

Juniper Networks provides high-performance network devices that create a responsive and trusted environment for accelerating the deployment of services and applications over a single network. The Junos® operating system (Junos OS) is the foundation of these high-performance networks.

Junos OS includes the following architecture variations:

- Junos OS FreeBSD 6 on bare metal. This is Junos OS based on a FreeBSD 6 kernel.
- Junos OS FreeBSD 10 or later on bare metal. This is Junos OS based on an upgraded FreeBSD kernel. Starting with Junos OS Release 15.1, certain hardware platforms run Junos OS with upgraded FreeBSD. Starting in Junos OS Release 16.1, Junos OS with upgraded FreeBSD can run as a guest virtual machine (VM) on a Linux VM host. For more on which platforms run Junos OS with upgraded FreeBSD, search for **Junos kernel upgrade to FreeBSD 10+** in Feature Explorer: Junos kernel upgrade to FreeBSD 10+ .

- Junos OS Evolved. See Introducing Junos® OS Evolved and the Junos® OS Evolved Software Installation and Upgrade Guide for more information about Junos OS Evolved.

Unlike other complex, monolithic software architectures, Junos OS incorporates key design and developmental differences to deliver increased network availability, operational efficiency, and flexibility. The following are key advantages to this approach:

One Operating System

Unlike other network operating systems that share a common name but splinter into many different programs, Junos OS is a single, cohesive operating system that is shared across all network devices and product lines. This allows Juniper Networks engineers to develop software features once and share these features across all product lines simultaneously. Because features are common to a single source, they generally are implemented the same way for all product lines, thus reducing the training required to learn different tools and methods for each product. Because all Juniper Networks products use the same code base, interoperability between products is not an issue.

One Modular Software Architecture

Although individual modules of Junos OS communicate through well-defined interfaces, each module runs in its own protected memory space, preventing one module from disrupting another. This separation enables the independent restart of each module as necessary. This is in contrast to monolithic operating systems where a malfunction in one module can ripple to other modules and cause a full system crash or restart. This modular architecture then provides for high performance, high availability, security, and device scalability not found in other operating systems.

The Junos OS is preinstalled on your Juniper Networks device when you receive it from the factory. Thus, when you first power on the device, all software starts automatically. You simply need to configure the software so that the device can participate in the network.

You can upgrade the device software as new features are added or software problems are fixed. You normally obtain new software by downloading the software installation packages from the Juniper Networks Support Web page onto your device or onto another system on your local network. You then install the software upgrade onto the device.

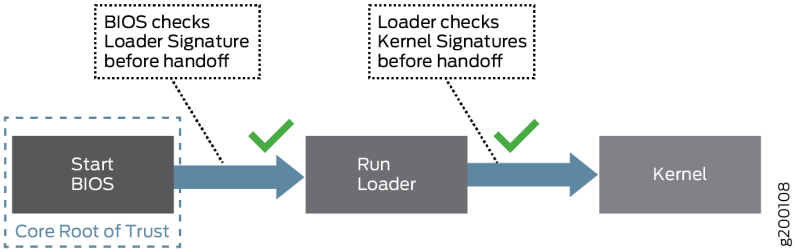
Juniper Networks routing platforms run only binaries supplied by Juniper Networks, and currently do not support third-party binaries. Each Junos OS image includes a digitally signed manifest of executables that are registered with the system only if the signature can be validated. Junos OS will not execute any binary without a registered signature. This feature protects the system against unauthorized software and activity that might compromise the integrity of your device.

Secure Boot

Secure Boot is a significant system security enhancement based on the UEFI standard (see www.uefi.org). It works by safeguarding the BIOS itself from tampering or modification and then maintaining that protection throughout the boot process.

The Secure Boot process begins with Secure Flash, which ensures that unauthorized changes cannot be made to the firmware. Authorized releases of Junos OS carry a digital signature produced by either Juniper Networks directly or one of its authorized partners. At each point of the boot-up process, each component verifies the next link is sound by checking the signature to ensure that the binaries have not been modified. The boot process cannot continue unless the signature is correct. This "chain of trust" continues until the operating system takes control. In this way, overall system security is enhanced, increasing resistance to some firmware-based persistent threats.

Figure 1 shows a simplified version of this “chain of trust.”



Secure Boot requires no actions on your part to implement. It is implemented on supported hardware by default.

For information on which Junos OS releases and hardware support Secure Boot, see Feature Explorer and enter **Secure Boot**.

FIPS 140-2 Security Compliance

For advanced network security, a special version of Junos OS, called Junos-FIPS 140-2, is available. Junos-FIPS 140-2 provides customers with software tools to configure a network of Juniper Networks devices in a FIPS environment. FIPS support includes:

- Upgrade package to convert Junos OS to Junos-FIPS 140-2
- Revised installation and configuration procedures
- Enforced security for remote access
- FIPS user roles (Crypto Officer, User, and Maintenance)
- FIPS-specific system logging and error messages

- IPsec configuration for Routing Engine–to–Routing Engine communication
- Enhanced password creation and encryption

Starting in Junos OS Release 15.1, Junos-FIPS is packaged in a domestic image only: a single Junos OS image supports both domestic and FIPS features. Users that have the FIPS credentials and permission to login can flip between a regular Junos image and FIPS image.

NOTE: Junos-FIPS has special password requirements. FIPS passwords must be between 10 and 20 characters in length. Passwords must use at least three of the five defined character sets (uppercase letters, lowercase letters, digits, punctuation marks, and other special characters). If Junos-FIPS is installed on the device, you cannot configure passwords unless they meet this standard.

2

CHAPTER

System Back Up and Recovery

Backing Up an Installation Using Snapshots (Junos OS)

IN THIS SECTION

The installation process removes all stored files on the device except the juniper.conf and SSH files. Therefore, you should back up your current configuration in case you need to return to the current software installation after running the installation program. You can also recover the configuration file and the Junos OS if required.

Understanding How to Back Up an Installation on Switches

IN THIS SECTION

You can create copies of the software running on a switch using the system snapshot feature. The system snapshot feature takes a “snapshot” of the files currently used to run the switch—the complete contents of the **/config** and **/var** directories, which include the running Junos OS, the active configuration, and the rescue configuration—and copies all of these files into an alternate (internal, meaning internal flash, or an external, meaning USB flash) memory source. You can then use this snapshot to boot the switch at the next boot up or as a backup boot option.

Understanding System Snapshot on QFX Switches

NOTE: On QFX3500 and QFX3600 switches running Enhanced Layer 2 Software, all of the directories that reside in the "/" partition are read only.

NOTE: System snapshot is not supported on QFX10000 switches.

You can only use snapshots to move files to external memory if the switch was booted from internal memory, or to move files to internal memory if the switch was booted from external memory. You cannot create a snapshot in the memory source that booted the switch even if the snapshot is being created on a different partition in the same memory source.

Snapshots are particularly useful for moving files onto USB flash drives. You cannot use the `copy` command or any other file-moving technique to move files from an internal memory source to USB memory on the switch.

System snapshots on the switch have the following limitations:

- You cannot use snapshots to move files to any destination outside of the switch other than an installed external USB flash drive.
- Snapshot commands are always executed on a local switch.

Understanding System Snapshot on EX Series Switches

The switch can boot from either internal flash media or external (USB) flash media. The contents of the snapshot vary depending on whether you create the snapshot on the media that the switch booted from or on the media that it did not boot from.

Snapshots are particularly useful for moving files onto USB flash drives. You cannot use the `copy` command or any other file-moving technique to move files from an internal memory source to USB memory on the switch.

- If you create the snapshot on the media that the switch did not boot from, the following partitions on the boot media are included in the snapshot: **root**, **altroot**, **var**, **var/tmp**, and **config**.

  The **root** partition is the primary boot partition, and the **altroot** partition is the backup boot partition.

- If you create the snapshot on the media that the switch booted from, the root partition that the switch booted from is copied to the alternate root partition. The **var**, **var/tmp**, and **config** partitions are not copied as part of the snapshot because they already exist on the boot media.

The system snapshot feature has the following limitations:

- You cannot use snapshots to move files to any destination outside the switch other than an installed external USB flash drive or switches that are members of the same *Virtual Chassis* as the switch on which you created the snapshot.
- Snapshot commands, like all commands executed on a Virtual Chassis, are executed on the local member switch. If different member switches request the snapshot, the snapshot command is pushed to the Virtual Chasis member creating the snapshot and is executed on that member, and the output is then returned to the switch that initiated the process. For instance, if the command to create an external snapshot on member 3 is entered on member 1, the snapshot of internal memory on member 3 is taken on external memory on member 3. The output of the process is seen on member 1. No files move between the switches.

Creating a Snapshot and Using It to Boot a QFX Series Switch

IN THIS SECTION

The system snapshot feature takes a " snapshot" of the files currently used to run the device— the complete contents of the **/config** directories, which include the running Juniper Networks Junos OS, the active configuration, and the rescue configuration, as well as the host OS— and copies all of these files into an external USB flash drive.

You can use the snapshot to boot the device at the next bootup or as a backup boot option.

The system snapshot feature is especially effective as a bootup option after a partition corruption, as it is the only recovery option that allows you to completely restore the Junos OS and configuration in the event of a corrupted partition on a switch.

NOTE: EX4600 and most QFX Series switches support snapshot via external USB. (EX4650 switches do not support system snapshot.)

NOTE: The following products do not support system snapshot: QFabric and the QFX5110, QFX5200, and QFX10000 switches.

This topic includes the following tasks:

Creating a Snapshot on an External USB Flash Drive and Using It to Boot a QFX Series Switch

A snapshot can be created on an external USB flash drive after a device is booted using files stored in internal memory.

Ensure that you have the following tools and parts available before creating a snapshot on an external USB flash drive:

- An external USB flash drive that meets the device USB port specifications. See USB Port Specifications for the QFX Series.

To create a snapshot on the external USB flash drive and use it to boot the device:

1. Insert the external USB flash drive.
2. Issue the `request system snapshot` command.

```
user@device> request system snapshot
fpc0:
  --------------------------------------------------------------------------
  Starting snapshot to usb (/dev/da0)
  Creating snapshot on the host ..
  Copying bootable disk image from host ..
  Writing to usb (/dev/da0) ..
  Copying 'Host OS' to '/dev/da0s1' .. (this may take a few minutes)
      Copying 'JUNOS' to '/dev/da0s1' .. (this may take a few minutes)
      The following filesystems were archived: / /config Host-OS
```

3. (Optional) Perform this step if you want to boot the device now using the snapshot stored on the external USB flash drive. If you created the snapshot as a backup, do not perform this step.
   - Insert the external USB flash drive.
   - Power cycle the device.

     The external USB flash drive is detected.

- The software prompts you with the following options:

```
Junos Snapshot Installer - (c) Juniper Networks 2013
      Reboot
      Install Junos Snapshot [13.2-20131115_x_132_x51_vjunos.0
                              Boot to host shell [debug]
```

- Select **Install Junos Snapshot** to install the snapshot located on the external USB flash drive to the device.

  The device copies the software from the external USB flash drive, occasionally displaying status messages. When the software is finished being copied from the external USB flash drive to the device, the device then reboots from the internal flash storage on which the software was just installed. When the reboot is complete, the device displays the Junos OS login prompt:

```
root@device#
```

Creating a Snapshot and Using It to Boot a QFX3500 and QFX3600 Series Switch

IN THIS SECTION

The system snapshot feature takes a “snapshot” of the files currently used to run the QFX Series switch —the complete contents of the **/config** and **/var** directories, which include the running Juniper Networks Junos OS, the active configuration, and the rescue configuration—and copies all of these files into an alternate (internal, meaning internal flash, or an external, meaning USB flash) memory source. You can then use these snapshots to boot the switch at the next bootup or as a backup boot option.

The system snapshot feature is especially effective as a bootup option after a partition corruption, as it is the only recovery option that allows you to completely restore the Junos OS and configuration in the event of a corrupted partition.

This topic includes the following tasks:

Creating a Snapshot on a USB Flash Drive and Using It to Boot the Switch

NOTE: Creating a snapshot is not supported on QFX10000 switches.

A snapshot can be created on USB flash memory after a switch is booted using files stored in internal memory.

Ensure that you have the following tools and parts available before creating a snapshot on a USB Flash drive:

- A USB flash drive that meets the QFX Series switch USB port specifications. See USB Port Specifications for the QFX Series.

To create a snapshot on USB flash memory and use it to boot the switch:

1. Place the snapshot into USB flash memory:

```
user@switch> request system snapshot partition
```

NOTE: This example uses the `partition` option. If you have already created a partition for the snapshot, you don't need to use the `partition` option.

2. (Optional) Perform this step if you want to boot the switch now using the snapshot stored on the external USB flash drive. If you created the snapshot as a backup, do not perform this step.
   - To reboot the switch using the most recently created snapshot:

```
user@switch> request system reboot
```

   - To reboot the switch using a snapshot in a specific partition on the USB flash drive:

```
user@switch> request system reboot slice 1
```

Creating a Snapshot on an Internal Flash Drive and Using it to Boot the Switch

A snapshot can be created on internal memory after a switch is booted using files stored in external memory.

To create a snapshot in internal memory and use it to boot the switch:

1. Place the snapshot files in internal memory:

```
user@switch> request system snapshot partition
```

> **NOTE**: This example uses the `partition` option. If you have already created a partition for the snapshot, you don't need to use the `partition` option.

2. (Optional) Perform this step if you want to boot the switch now using the newly created snapshot. If you created the snapshot as a backup, do not perform this step.
   - To reboot the switch using the most recently created snapshot:

```
user@switch> request system reboot
```

   - To reboot the switch using a snapshot in a specific partition in internal memory:

```
user@switch> request system reboot slice 1
```

Creating a Snapshot on the Alternate Slice of the Boot Media

The alternate slice of the boot media contains a backup software image that the switch can boot from if it is unable to boot from the primary slice. When you upgrade software, the new software image gets copied only to the primary slice of the boot media.

To create a snapshot of the currently booted software image on the backup slice of the boot media:

```
user@switch> request system snapshot slice alternate
```

After the system boots up, you will see the following message before the login prompt:

```
WARNING: THIS DEVICE HAS BOOTED FROM THE BACKUP JUNOS IMAGE

It is possible that the primary copy of JUNOS failed to boot up properly, and so this device has booted up from
the backup copy.

Please re-install JUNOS to recover the primary copy in case it has been corrupted.
```

The system will generate an alarm indicating that the switch has booted from the backup slice.

Creating a Snapshot and Using It to Boot an EX Series Switch

IN THIS SECTION

The system snapshot feature takes a “snapshot” of the files currently used to run the switch and copies them to an alternate storage location. You can then use this snapshot to boot the switch at the next bootup or as a backup boot option.

This topic includes the following tasks:

Creating a Snapshot on a USB Flash Drive and Using It to Boot the Switch

You can create a snapshot on USB flash memory after a switch is booted by using files stored in internal memory.

Ensure that you have the following tools and parts available before creating a snapshot on a USB flash drive:

- A USB flash drive that meets the switch USB port specifications. See USB Port Specifications for an EX Series Switch.

To create a snapshot on USB flash memory and use it to boot the switch:

1. Place the snapshot into USB flash memory:

```
user@switch> request system snapshot partition media usb
```

2. (Optional) Perform this step if you want to boot the switch now using the snapshot stored on the USB flash drive.

```
user@switch> request system reboot media usb
```

Creating a Snapshot and Using It to Boot an SRX Series device

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Creating a Snapshot and Using It to Boot an SRX Series Firewall

IN THIS SECTION

This example shows how to configure a boot device.

Requirements

Before you begin, ensure that the backup device has a storage capacity of at least 1 GB. See "Ensuring Sufficient Disk Space for Junos OS Upgrades on SRX Series Firewalls" on page 99.

Overview

IN THIS SECTION

You can configure a boot device to replace the primary boot device on your SRX Series Firewall or to act as a backup boot device. Use either the J-Web user interface or the CLI to take a snapshot of the

configuration currently running on the device, or of the original factory configuration and a rescue configuration, and save it to an alternate medium.

NOTE: For media redundancy, we recommend that you keep a secondary storage medium attached to the SRX Series Firewall and updated at all times.

If the primary storage medium becomes corrupted and no backup medium is in place, you can recover the primary internal media from the TFTP installation.

You can also configure a boot device to store snapshots of software failures for use in troubleshooting.

NOTE: You cannot copy software to the active boot device.

NOTE: After a boot device is created with the default factory configuration, it can operate only in an internal media slot.

This example configures a boot device to back up the currently running and active file system partitions by rebooting from internal media and including only files shipped from the factory.

Topology

Configuration

IN THIS SECTION

Procedure

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy

and paste the commands into the CLI at the `[edit]` hierarchy level, and then enter `commit` from configuration mode.

From operational mode, enter:

```
user@host> request system snapshot partition media internal factory
```

GUI Quick Configuration

Step-by-Step Procedure

To configure a boot device:

1. In the J-Web user interface, select **Maintain>Snapshot**.
2. On the Snapshot page, specify the boot device to copy the snapshot to. From the Target Media list, select the **internal** boot device.
3. Select the Factory check box to copy only default files that were loaded on the internal media when it was shipped from the factory, plus the rescue configuration if one has been set.
4. Select the Partition check box to partition the medium that you are copying the snapshot to. This process is usually necessary for boot devices that do not already have software installed on them.
5. Click **Snapshot**.
6. Click **OK** to check your configuration and save it as a candidate configuration.
7. If you are done configuring the device, click **Commit Options>Commit**.

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

1. To configure a boot device:

```
user@host> request system snapshot partition media internal factory
```

Results

From configuration mode, confirm your configuration by entering the `show system snapshot media internal` command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@host> show system snapshot media internal
```

```
Information for snapshot on       internal (/dev/ad0s1a) (backup)
Creation date: Oct 9 13:30:06 2009
JUNOS version on snapshot:
  junos  : 10.0B3.10-domestic
Information for snapshot on       internal (/dev/ad0s2a) (primary)
Creation date: Jan 6 15:45:35 2010
JUNOS version on snapshot:
  junos  : 10.2-20091229.2-domestic
```

If you are done configuring the device, enter `commit` from configuration mode.

Backing Up the Current Installation on SRX Series Firewalls

IN THIS SECTION

This topic includes the following sections:

Backing Up the Current Installation on SRX5800, SRX5600, and SRX5400 Devices

Back up the current installation so that you can return to the current software installation. The installation process using the installation package (jinstall*, for example) removes all stored files on the device except the juniper.conf and SSH files. Therefore, you should back up your current configuration in case you need to return to the current software installation after running the installation program.

To back up Junos OS on the SRX Series Firewalls, issue the request system snapshot CLI operational command. This command saves the current software installation on the hard disk, external USB storage media device, or solid-state drive (SSD).

When the `request system snapshot` command is issued, the **/root** file system is backed up to **/altroot**, and **/config** is backed up to **/altconfig**. The **/root** and **/config** file systems are on the devices's CompactFlash card, and the **/altroot** and **/altconfig** file systems are on the devices's hard disk or or solid-state drive (SSD). When the backup is completed, the current and backup software installations are identical.

To copy the files to the device's hard disk or solid-state drive (SSD), use the following command:

`user@host>` **request system snapshot media**

Backing Up the Current Installation on SRX300, SRX320, SRX340, SRX345, SRX380, SRX550M, SRX3400, and SRX3600 Devices

On SRX Series Firewalls, you can backup the current Junos OS image and configuration files onto a media (such as a USB or CompactFlash) so that you can retrieve it back if something goes wrong.

To back up the currently running and active file system partitions on the device, use the following command:

`user@host>` **request system snapshot media**

Following options are supported:

- `internal`— Copies the snapshot to internal media.
- `usb`— Copies the snapshot to the USB storage device. This is the default option for SRX300, SRX320, SRX340, SRX345, SRX380, and SRX550M devices.
- `external`— Copies the snapshot to an external storage device. This option is available for the compact flash on the SRX650 Services Gateway only.

Configuring External CompactFlash for SRX650 Devices

Following procedure shows how to backup current installation on an SRX650 device.

The SRX650 Services Gateway includes the following 2 GB CompactFlash (CF) storage device:

- The Services and Routing Engine (SRE) contains a hot-pluggable external CF storage device used to upload and download files.
- The chassis contains an internal CF used to store the operating system.

By default, only the internal CF is enabled and an option to take a snapshot of the configuration from the internal CF to the external CF is not supported. This can be done only by using a USB storage device.

To take a snapshot of the configuration from the external CF:

1. Take a snapshot from the internal CF to a USB storage device using the `request system snapshot media usb` command.
2. Reboot the device from the USB storage device using the `request system reboot media usb` command.
3. Go to the U-boot prompt.
4. Stop at U-boot and set the following variables:

```
set ext.cf.pref 1
   save
   reset
```

5. Once the system is booted from the USB storage device, take a snapshot from the external CF using the `request system snapshot media external` command.

> **NOTE**: Once the snapshot is taken on the external CF, we recommend that you set the `ext.cf.pref` to `0` at the U-boot prompt.

Creating a Snapshot and Using It to Boot an ACX Series Router

IN THIS SECTION

Understanding System Snapshot on an ACX Series Router

The system snapshot feature enables you to create copies of the software running on an ACX Series router. You can use the system snapshot feature to take a “snapshot” of the files currently used to run the router—the complete contents of the root (/) and `/config` directories, which include the running Juniper Networks Juniper operating system (Junos OS) and the active configuration—and copy all of

these files to another media, such as a universal serial bus (USB) storage device, the active slice of a dual-root partitioned router, or the alternate slice of a dual-root partitioned router.

NOTE: Junos OS automatically uses the backup software if the currently running software goes bad. For example, if the da0s1 slice goes bad, Junos OS automatically comes up using the da0s2 slice, and takes a snapshot of the da0s2 slice and copies it to the da0s1 slice if the auto snapshot functionality is configured, which is disabled by default. However, you can also do this manually using the system snapshot feature.

NOTE: In ACX5048 and ACX5096 routers, the system snapshot feature is applicable only when a USB storage device is used.

Typically, you can take a snapshot prior to the upgrade of an image on the dual internal NAND flash device (da0s1 or da0s2), or to remedy a bad image, thereby preventing the bad image from rendering the system useless. A snapshot to another media ensures that the device can boot from the other media in case the system does not boot up from the current image.

You can take a snapshot of the currently running software and configuration on a router in the following situations:

- The router's active slice (for example, da0s1) is updated with a new Junos OS image (using the jinstall package). In such a case, you must update the other slice (da0s2) with the new image.

  NOTE: The active slice can be da0s1 or da0s2.

- The router's active slice (for example, da0s1) is corrupted and the router is rebooted from the backup slice (that is, from da0s2). Therefore, you must restore a new image on the active slice—that is, on da0s1.

- Both slices of the router's dual internal NAND flash device are corrupted and the router continues trying to reboot. In this situation, you can insert a USB storage device, boot the router from that device, and restore the NAND flash device slices—da0s1 and da0s2.

  NOTE: Before you attempt to take a snapshot from the USB storage device, ensure that the USB storage device contains an image of Junos OS from which the router can boot up.

SEE ALSO

request system snapshot (ACX Series)

Example: Taking a Snapshot of the Software and Configuration

IN THIS SECTION

This example includes six scenarios in which you can take a snapshot of the currently running software and configuration on an ACX Series router, prior to the upgrade of an image or to remedy a bad image, thereby preventing the bad image from rendering the system useless.

Taking a Snapshot

Step-by-Step Procedure

Scenario: To take a snapshot from a NAND flash device slice to a USB storage device:

1. Boot up the router from the NAND flash device and make sure that a formatted USB storage device is plugged in to the router's USB port. The USB storage device must be formatted for the root (/) and `/config` directories.

2. Issue the `request system snapshot` command.

```
user@host> request system snapshot
Verifying compatibility of destination media partitions...
Running newfs (254MB) on usb media  / partition (da1s1a)...
Running newfs (47MB) on usb media  /config partition (da1s1e)...
Copying '/dev/da0s2a' to '/dev/da1s1a' .. (this may take a few minutes)
Copying '/dev/da0s2e' to '/dev/da1s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

The root (/) and `/config` directories from the currently mounted NAND flash slice are copied to the USB storage device.

Step-by-Step Procedure

Scenario: To take a snapshot from a NAND flash device slice to a USB storage device with formatting:

1. Boot up the router from the NAND flash device and make sure that a USB storage device is plugged in to the router's USB port.

   NOTE: Formatting a USB storage device deletes all the data on the USB storage device.

2. Issue the `request system snapshot partition` command.

```
user@host> request system snapshot partition
clearing current label...
Partitioning usb media (da1) ...
Partitions on snapshot:

          Partition  Mountpoint  Size    Snapshot argument
              a      /           312MB   root-size
              e      /config     47MB    config-size
              f      /var        620MB   var-size
Running newfs (312MB) on usb media  / partition (da1s1a)...
Running newfs (47MB) on usb media  /config partition (da1s1e)...
Running newfs (620MB) on usb media  /var partition (da1s1f)...
Copying '/dev/da0s2a' to '/dev/da1s1a' .. (this may take a few minutes)
Copying '/dev/da0s2e' to '/dev/da1s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

   After the USB storage device is formatted, the root (/) and `/config` directories from the currently mounted NAND flash slice are copied to the USB storage device.

Step-by-Step Procedure

Scenario: To take a snapshot from the active slice of the NAND flash device to the alternate slice:

1. Boot up the router from the NAND flash device.

2. Issue the `request system snapshot slice alternate` command.

```
user@host> request system snapshot slice alternate
Verifying compatibility of destination media partitions...
Running newfs (439MB) on internal media  / partition (da0s1a)...
```

```
Running newfs (46MB) on internal media  /config partition (da0s1e)...
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
Copying '/dev/da0s2e' to '/dev/da0s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

The root (/) and `/config` directories from the currently mounted NAND flash slice are copied to the other slice.

Step-by-Step Procedure

Scenario: To take a snapshot from an active slice of the NAND flash device to the alternate slice after partitioning:

1. Boot up the router from the NAND flash device.
2. Issue the `request system snapshot partition slice alternate` command.

```
user@host> request system snapshot partition slice alternate
Verifying compatibility of destination media partitions...
Running newfs (439MB) on internal media  / partition (da0s1a)...
Running newfs (46MB) on internal media  /config partition (da0s1e)...
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
Copying '/dev/da0s2e' to '/dev/da0s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

The BSD label (disk partitioning information) for the active flash slice is installed and then the root (/) and `/config` directories from the currently mounted NAND flash slice are copied to the other slice.

Step-by-Step Procedure

Scenario: To take a snapshot from a USB storage device to the active slice of the NAND flash device:

1. Boot up the router from a USB storage device containing the required Junos OS image.
2. Issue the `request system snapshot` command.

```
user@host> request system snapshot
Verifying compatibility of destination media partitions...
Running newfs (439MB) on internal media  / partition (da0s1a)...
Running newfs (46MB) on internal media  /config partition (da0s1e)...
Copying '/dev/da1s1a' to '/dev/da0s1a' .. (this may take a few minutes)
```

```
Copying '/dev/da1s1e' to '/dev/da0s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

The root (/) and `/config` directories from the USB storage device are copied to the active NAND flash slice.

Step-by-Step Procedure

Scenario: To take a snapshot from a USB storage device to the active slice of the NAND flash device after partitioning:

1. Boot up the router from a USB storage device containing the required Junos OS image.
2. Issue the `request system snapshot partition` command.

```
user@host> request system snapshot partition
Verifying compatibility of destination media partitions...
Running newfs (439MB) on internal media  / partition (da0s1a)...
Running newfs (46MB) on internal media  /config partition (da0s1e)...
Copying '/dev/da1s1a' to '/dev/da0s1a' .. (this may take a few minutes)
Copying '/dev/da1s1e' to '/dev/da0s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

The BSD label (disk partitioning information) for the active flash slice is installed and then the root (/) and `/config` directories from the USB storage device are copied to the active NAND flash slice.

Requirements

This example uses the following hardware and software components:

- One ACX Series router
- Junos OS Release 12.2 or later

Overview

In this example, the `request system snapshot` command is used to take a copy of the currently running software and configuration on another media—for example, a universal serial bus (USB) storage device, the active slice (`da0s1` or `da0s2`) of a dual-root partitioned router, or the alternate slice (`da0s1` or `da0s2`) of a dual-root partitioned router. A snapshot to another media ensures that the device can boot from the other media in case the system does not boot up from the current image.

CAUTION: After you run the `request system snapshot` command, you cannot return to the previous version of the software, because the running and backup copies of the software are identical.

SEE ALSO

Understanding System Snapshot on an ACX Series Router

request system snapshot (ACX Series)

Recovery Using an Emergency Boot Device (Junos OS)

IN THIS SECTION

If Junos OS software is damaged on your device, the emergency boot device helps you to recover the software.

Creating an Emergency Boot Device for Routers

If the device's Junos OS software is damaged in some way that prevents Junos OS software from loading completely, you can use the emergency boot device to revive the device. The emergency boot device repartitions the primary disk and reloads a fresh installation of Junos OS software.

Starting in Junos OS Release 15.1, certain hardware platforms run an upgraded FreeBSD kernel (FreeBSD 10.x or later) instead of FreeBSD 6.1.

The procedures outlined in this section discuss how to create an emergency boot device for any ACX Series, M Series, MX Series, T Series, TX Matrix, and TX Matrix Plus router.

To create an emergency boot device:

1. Use FTP to copy the installation media into the router's **/var/tmp** directory.
2. Insert the PC Card into the external PC Card slot or USB storage device into the USB port.
3. In the UNIX shell, navigate to the **/var/tmp** directory:

```
start shell
cd /var/tmp
```

4. Log in as su:

```
su [enter]
password: [enter SU password]
```

5. For Junos OS with upgraded FreeBSD only, expand the image, for example:

```
gzip -d installMedia.img.gz
```

   where *installMedia* refers to the installation media downloaded into the **/var/tmp** directory. For example, for Junos OS with upgraded FreeBSD, the filename might be **junos-install-media-usb-mx-x86-64-16.1R2.11.img.gz**. (To determine which platforms use Junos OS with upgraded FreeBSD, see Release Information for Junos OS with Upgraded FreeBSD.)

6. Issue the following commands:

   - For Junos OS with upgraded FreeBSD:

```
dd if=/dev/zero of=/dev/externalDrive count=20
dd if=installMedia.img of=/dev/externalDrive bs=256k
```

   - For Junos OS:

```
dd if=/dev/zero of=/dev/externalDrive count=20
dd if=installMedia of=/dev/externalDrive bs=64k
```

where:

- *externalDrive*—Refers to the removable media name of the emergency boot device. For example, the removable media name for an emergency boot device on the M120 router is *da0* for both Routing Engines. For the names of the removable media, see the table in "Routing Engines and Storage Media Names (ACX Series, M Series, MX Series, PTX Series, T Series, TX Matrix, TX Matrix Plus, and JCS 1200 Routers)" on page 450.

- *installMedia*—Refers to the installation media downloaded into the **/var/tmp** directory. For example, the filename might be **install-media-9.0R2.10–domestic** for Junos OS or, for Junos OS with upgraded FreeBSD, **junos-install-media-usb-mx-x86-64-16.1R2.11.img** (unzipped). (To determine which platforms use Junos OS with upgraded FreeBSD, see Release Information for Junos OS with Upgraded FreeBSD.)

7. Log out as su:

```
exit
```

Creating an Emergency Boot Device for QFX Series Switches

Before you begin, you need to download the installation media image for your device and Junos OS release from https://www.juniper.net/customers/support/ .

If Junos OS on the device is damaged in some way that prevents the software from loading properly, you can use an emergency boot device to repartition the primary disk and load a fresh installation of Junos OS. Use the following procedure to create an emergency boot device.

NOTE: You can create the emergency boot device on another Juniper Networks device, or any laptop or desktop PC that supports Linux. The steps you take to create the emergency boot device vary, depending on the device.

To create an emergency boot device:

1. Use FTP to copy the installation media image into the **/var/tmp** directory on the device.
2. Insert a USB storage device into the USB port.

3. From the CLI, start the shell:

```
user@device> start shell
%
```

4. Use the gunzip command to unzip the image file.
5. Switch to the root account using the su command:

```
% su
Password: password
```

> **NOTE**: The password is the root password for the device. If you logged in to the device as the root user, you do not need to perform this step.

6. Enter the following command on the device:

```
root@device% dd if=/var/tmp/filename of=/dev/da0 bs=1m
```

The device writes the installation media image to the USB storage device:

```
root@device% dd if=install-media-qfx-5e-15.1X53-D30.5-domestic.img of=/dev/da0 bs=1m
1399+0 records in
1399+0 records out
1466957824 bytes transferred in 394.081902 secs (3722469 bytes/sec)
```

7. Log out of the shell:

```
root@device% exit
% exit
user@device>
```

Recovering the Installation Using an Emergency Boot Device on QFX Series Switches

If Junos OS on your device is damaged in some way that prevents the software from loading correctly, you may need to perform a recovery installation using an emergency boot device (for example, a USB flash drive) to restore the default factory installation. Once you have recovered the software, you need to restore the device configuration. You can either create a new configuration as you did when the device was shipped from the factory, or if you saved the previous configuration, you can simply restore that file to the device.

If at all possible, you should try to perform the following steps before you perform the recovery installation:

1. Ensure that you have an emergency boot device to use during the installation. See "Creating an Emergency Boot Device for QFX Series Switches" on page 28 for information on how to create an emergency boot device.

2. Copy the existing configuration in the file **/config/juniper.conf.gz** from the device to a remote system, such as a server, or to an emergency boot device. For extra safety, you can also copy the backup configurations (the files named **/config/juniper.conf.*n***, where *n* is a number from 0 through 9) to a remote system or to an emergency boot device.

   You can use the system snapshot feature to complete this step. The system snapshot feature takes a "snapshot" of the files currently used to run the QFX Series switch—the complete contents of the **/config** and **/var** directories, which include the running Junos OS, the active configuration, and the rescue configuration—and copies all of these files into a memory source. See "Creating a Snapshot and Using It to Boot a QFX Series Switch" on page 9.

   NOTE: System snapshot is not supported on QFX10000 and QFX5200 switches.

   CAUTION: The recovery installation process completely overwrites the entire contents of the internal flash storage.

3. Copy any other stored files to a remote system as desired.

To reinstall Junos OS:

1. Connect to the device's console port (either directly or through a console server).

2. Insert the emergency boot device into the QFX Series switch.

3. Reboot or power cycle the device.
4. As soon as the device reboots, keep pressing **Esc** until the boot options menu opens.

```
Press Esc for boot options
...
Intel(R) Xeon(R) CPU  @ 2.50GHz                                    2.50 GHz
V0018.8                                                          16384 MB RAM
 Continue
 Boot Manager
 Device Manager
 Boot From File
 Setup Utility
```

> **NOTE**: You might have to reboot or power cycle the device more than once if you miss hitting **Esc** to open the boot options menu.

5. In the boot options menu, select **Boot Manager**.
6. In the Boot Manager menu, select the emergency boot device. In this example, the emergency boot device is the USB device.

> **NOTE**: In later releases, the Boot Manager menu might display two different entries for the same USB recovery device. Select the **EFI USB Device** entry.

```
┌──────────────────────────────────────────────────────────────────────┐
│                              Boot Manager                            │
└──────────────────────────────────────────────────────────────────────┘
Boot Option Menu

 SSD0 : ATP M.2 2242
 IBA GE Slot 0101 v1350
 IBA GE Slot 0102 v1350
 USB : General Udisk
 SSD1 : ATP M.2 2242
 IBA GE Slot 0103 v1350
 EFI HDD Device (ATP M.2 2242)
 Internal EFI Shell
```

The Juniper Linux Installer or GNU GRUB menu opens. The menu and options may differ slightly depending on the platform and release.

7. If you have Junos OS software from the factory installed on the emergency boot device, the software prompts you with the following options:

```
Juniper Linux Installer - (c) Juniper Networks 2014
            Reboot
            Install Juniper Linux Platform
            Boot to host shell [debug]
```

Select **Install Juniper Linux Platform** to install the Junos OS software from the emergency boot device.

> **NOTE**: Depending on the platform and release, you may see different entries such as **Install Juniper Linux**, **Install Juniper Linux Platform**, or **Install Juniper Linux with secure boot support**.

8. The device copies the software from the emergency boot device, occasionally displaying status messages. Copying the software can take up to 12 minutes.

9. After the software is copied to the device, the device reboots from the internal flash storage on which the software was just installed.

> **NOTE**: If the Boot Manager menu includes both SSD drive and EFI HDD Device entries, manually select the **EFI HDD Device** option.

When the reboot is complete, the device displays the Junos OS login prompt:

```
root@switch#
```

10. Create a new configuration as you did when the device was shipped from the factory, or restore the previously saved configuration file to the device.

11. Remove the emergency boot device.

Performing a Recovery Installation

If the device's software is corrupted or otherwise damaged, you may need to perform a recovery installation, using the emergency boot device to restore the default factory installation. Once you have recovered the software, you will need to restore the router or switch's configuration. You can either create a new configuration as you did when the device was shipped from the factory, or if you saved the device's previous configuration, you can simply restore that file to the system.

Depending on the situation, you should try to perform the following steps before you perform the recovery installation:

1. Ensure you have an emergency recovery disk to use during the installation. When the router or switch is first shipped, an emergency recovery disk is provided with it. For instructions on creating an emergency boot device, see "Creating an Emergency Boot Device for Routers" on page 26
2. Copy the existing configuration in the file **/config/juniper.conf.gz** from the device to a remote system. For extra safety, you can also copy the backup configurations (the files named **/config/juniper.conf.*n***, where *n* is a number from 0 through 9).

   CAUTION: The recovery installation process completely overwrites the entire contents of the fixed storage media.

3. Copy any other stored files to a remote system as desired.

To reinstall Junos OS:

1. Insert the removable media emergency boot device into the device.

   NOTE: You can store a configuration on installation media such as a PC Card or USB stick.

2. Reboot the device.

   If the CLI is still active, issue the **request system reboot** command from command mode to reboot the device.

   If the CLI is not working, manually power off the device using the main power switch, wait 10 seconds, and then power the device back on.

3. When the software prompts you with the following question, type **y**:

NOTE: Introduced in Junos OS Release 15.1, Junos OS with upgraded FreeBSD does not display the following warning. To determine which platforms use Junos OS with upgraded FreeBSD, see Release Information for Junos OS with Upgraded FreeBSD.

```
WARNING: The installation will erase the contents of your disk. Do you wish to continue (y/
n)? y
```

The device copies the software from the removable media emergency boot device onto your system, occasionally displaying status messages. Copying the software can take up to 45 minutes, depending on the device. When the process is complete, the router boots into Amnesiac state and the login prompt is displayed.

4. Remove the removable media emergency boot device.
5. Log in as root on the device's console port and issue the **request system reboot** command from command mode to reboot the device.

   The device reboots from the boot device on which the software was just installed. When the reboot is complete, the device displays the login prompt.
6. Create a new configuration as you did when the device was shipped from the factory, or restore a previously saved configuration file to the system. For more information, see *Configuring Junos OS for the First Time on a Device with a Single Routing Engine*, *Configuring Junos OS for the First Time on a Device with Dual Routing Engines*, and "Restoring a Saved Configuration" on page 40.

Rescue and Recovery of Configuration File (Junos OS)

IN THIS SECTION

In the event of software failure, a rescue configuration helps to load a known working configuration. No need to remember the rollback number; if you saved a configuration, you can use it anytime when needed.

Saving and Reverting a Rescue Configuration File

IN THIS SECTION

Saving a Rescue Configuration File

IN THIS SECTION

A rescue configuration file is helpful in the event that your device's configuration file has been misconfigured. A rescue configuration allows you to define a known working configuration or a configuration with a known state that you can roll back to at any time. This alleviates the necessity of having to remember the rollback number with the rollback command. You can restore the device to this rescue configuration to bring the device back online. If you save this file off the device, the rescue configuration can also be used to restore your device in the event of a software failure.

As of Junos OS Release 16.1, for devices running Junos OS with upgraded FreeBSD, provided you have saved a rescue configuration on the device, there is an automatic device recovery mode that goes into action should the system fail to activate the current configuration (amnesiac mode).

NOTE: To determine which platforms run Junos OS with upgraded FreeBSD, see Feature Explorer, enter `freebsd`, and select `Junos kernel upgrade to FreeBSD 10+`.

You can identify that the device has recovered automatically from amnesiac mode by the following:

- The syslog `UI_DEVICE_IN_RECOVERY_MODE` is generated, which indicates that there was a problem in the normal boot time commit and that Junos OS has activated the rescue configuration as the device's configuration.
- The CLI displays the banner `Device is running in Recovery Mode` in both operational and configuration modes.

This topic covers the following procedures:

Saving a Rescue Configuration

To save a current device configuration as a rescue configuration file:

1. Edit the configuration file on the device to reflect the base configuration you wish to use.
2. In the CLI operational mode, save this edited base configuration as the rescue configuration file:

```
user@host> request system configuration rescue save
```

The rescue configuration file is automatically saved under **/config** directory as **rescue.conf.gz**.

Validating the Rescue Configuration

You can verify that the syntax of a configuration file is correct and check for commit check errors by using the `test configuration` *`filename`* command.

To verify if a rescue configuration file is correct:

- Issue the `test configuration` *`filename`* command from the CLI operational mode.

```
user@host> test configuration /config/rescue.conf.gz
configuration check succeeds
```

If the configuration contains any syntax or commit check errors, a message is displayed to indicate the line number and column number in which the error was found. This command only accepts text files.

Copying the Configuration to a Remote Server

This task is optional but recommended.

To copy the rescue configuration to a remote server:

1. Start the device shell.

```
user@host> start shell
```

2. Go to the **/config** directory and list the rescue configuration file..

```
% cd /config
% ls -lrt rescue.conf.gz
-rw-r-----  1 root  wheel  1483 Dec 14 10:50 rescue.conf.gz
```

3. FTP the configuration file to the remote host.

```
% ftp host2
Name: username
Password: password
User user logged in.
ftp> cd /var/tmp
ftp> lcd /config
ftp> bin
ftp> put rescue.conf.gz
local: rescue.conf.gz remote: rescue.conf.gz

Transfer complete.
ftp> bye
Goodbye.
```

Rolling Back to Troubleshoot the Failed Configuration

Your rescue configuration is probably not exactly the configuration you want or need on your system. Therefore, you will want to examine the failures that occurred when you tried to activate the current configuration and make corrective actions.

To correct the failed configuration:

1. Log in to the device through the management IP (or the console if permitted).

2. Load the failed configuration.

```
user@host# rollback 1
```

   If you are doing this step right after the recovery mode, `rollback 1` will be the configuration that cause the amnesiac mode.

3. Make corrections to the configuration.
4. Do a commit check.

```
user@host# commit check
```

5. If there are other corrections to make, make them.
6. Commit the configuration.

Rolling Back to the Rescue Configuration

Not all platforms run Junos OS with updated FreeBSD. Those that do not or are releases earlier than Junos OS Release 16.1, do not have the automatic recovery mode. You will need to rollback to rescue configuration manually to bring the device back to normal running mode.

To roll back to the rescue configuration:

1. Log in to the device through the console.
2. Issue the `rollback rescue` command from the configuration mode of the CLI.

```
user@host# rollback rescue
```

```
load complete
```

3. Commit the configuration.

```
user@host# commit
```

4. Fix the failed configuration. See "Rolling Back to Troubleshoot the Failed Configuration" on page 37.

Deleting an Existing Rescue Configuration

To delete an existing rescue configuration:

- Issue the `request system configuration rescue delete` command:

```
user@host> request system configuration rescue delete
```

Reverting to the Rescue Configuration

If someone inadvertently commits a configuration that denies management access to a device and the console port is not accessible, you can overwrite the invalid configuration and replace it with the rescue configuration. The rescue configuration is a previously committed, valid configuration.

To revert the switch to the rescue configuration:

1. Enter the `load override` command.

```
[edit]
user@host# load override filename
```

2. Commit your changes.

```
[edit]
user@host# commit filename
```

Copy Backup Configurations and Restore Saved Configurations

IN THIS SECTION

Copy Backup Configurations to the Router

To copy backup configurations to the router, follow these steps:

1. To copy the existing configuration and any backup configurations back onto the router, use the `file copy` command. Place the files in the **/var/tmp** directory.

```
user@host>  file copy var/tmp/filename
```

2. Load and activate the desired configuration:

```
user@host> configure
[edit]
user@host# load merge/config/filename or load replace/config/
filename
[edit]
user@host# commit
```

Restoring a Saved Configuration

IN THIS SECTION

To restore a saved configuration, perform the following tasks:

Copy Saved Files to the Router

To copy the saved configuration to the router:

1. Log in to the console as `root`. There is no password.

```
Escape character is '^]'.
[Enter]
router (ttyd0)

login: root
Password: [Enter]
```

Initially, access to the router is limited to the console port after a recovery installation. Access through the management ports and interfaces is set in the configuration. For information about accessing the router through the console port, see the administration guide for your particular router.

2. Start the CLI:

```
# cli
```

3. Copy the configuration file on the remote server to the router's **/var/tmp** directory:

```
root@host> ftp remote-server
user: username
password: password
ftp> bin
Type set to I.
ftp> get /path/file
ftp> bye
Goodbye.
```

Loading and Committing the Configuration File

Once the saved configuration file is copied to the router, you load and commit the file:

1. Start the CLI configuration mode.

```
user@host> configure
Entering configuration mode

[edit]
user@host#
```

2. Load the file into the current configuration. You should override the existing file.

```
user@host#
load override /var/tmp/filename
load complete
```

3. Commit the file.

```
user@host# commit
commit complete
```

4. Exit the CLI configuration mode.

```
user@host# exit
user@host>
```

5. Back up Junos OS.

   After you have installed the software on the router, committed the configuration, and are satisfied that the new configuration is successfully running, issue the `request system snapshot` command to back up the new software to the **/altconfig** file system. If you do not issue the `request system snapshot` command, the configuration on the alternate boot drive will be out of sync with the configuration on the primary boot drive.

   The `request system snapshot` command causes the root file system to be backed up to **/altroot**, and **/config** to be backed up to **/altconfig**. The root and **/config** file systems are on the router's CompactFlash card, and the **/altroot** and **/altconfig** file systems are on the router's hard disk or solid-state drive (SSD).

Reverting to the Default Factory Configuration by Using the request system zeroize Command

The `request system zeroize` command is a standard Junos OS operational mode command that removes all configuration information and resets all key values. The operation unlinks all user-created data files, including customized configuration and log files, from their directories. The device then reboots and reverts to the factory-default configuration.

To completely erase user-created data so that it is unrecoverable, use the `request system zeroize media` command.

CAUTION: Before issuing `request system zeroize`, use the `request system snapshot` command to back up the files currently used to run the device to a secondary device.

To revert to the factory-default configuration by using the `request system zeroize` command:

1. Remove the device from the chassis cluster.
2. Disable the chassis cluster on the device.
3. Reboot the device.
4. Enter the `request system zeroize` command.

```
user@host> request system zeroize
warning: System will be rebooted and may not boot without configuration
Erase all data, including configuration and log files? [yes,no] (yes)
```

5. Type **yes** to remove configuration and log files and revert to the factory default configuration.
6. Complete the initial configuration of the device.

SEE ALSO

request system zeroize (Junos OS) | **818**

Recovery of Junos OS

IN THIS SECTION

In case of failed software installation or a failure after installing Junos OS, such as the CLI not working, you can recover the failed software. You can recover the software by installing Junos OS and remove the existing Junos OS image to install a new image.

Recovering from a Failed Software Installation for Switches

IN THIS SECTION

Problem

Description

If the Junos OS appears to have been installed but the CLI does not work, or if the device has no software installed, you can use this recovery installation procedure to install the Junos OS.

Solution

If a Junos OS image already exists on the switch, you can either install the new Junos OS package in a separate partition, in which case both Junos OS images remain on the switch, or you can remove the existing Junos OS image before you start the new installation process.

NOTE: QFX5100, QFX5200, EX4600, QFX10000, and OCX Series switches do not have a separate partition to reinstall a Junos OS image.

A recovery image is created automatically on these switches. If a previously-running switch is powered on and unable to boot using a Junos OS image, you can boot the switch using the recovery Junos OS image by selecting an option in the “Select a recovery image” menu.

We suggest creating a system snapshot on your switch onto the external USB flash drive, and using the snapshot for recovery purposes. The system snapshot feature takes a “snapshot” of the files currently used to run the device—the complete contents of the **/config** directories, which include the running Juniper Networks Junos OS, the active configuration, and the rescue configuration, as well as the host OS—and copies all of these files into an external USB flash drive. See Creating a Snapshot and Using It to Boot a QFX3500 and QFX3600 Series Switch or Creating a Snapshot and Using It to Boot a QFX Series Switch.

System snapshot is not supported on QFX5200 and QFX10000 switches.

To perform a recovery installation:

1. Power on the switch. The loader script starts.
2. After the message **Loading /boot/defaults/loader.conf** appears, you are prompted with the following message:

   ```
   Hit [Enter] to boot immediately, or space bar for command prompt.
   ```

   Press the Spacebar to enter the manual loader. The `loader>` prompt appears.

   > **NOTE**: The loader prompt does not appear on QFX5100, QFX5200, EX4600, QFX10000, and OCX Series switches.
   > On QFX5100, QFX5200, EX4600, QFX10000, and OCX Series switches only, a recovery image is automatically saved if a previously-running switch is powered on and unable to boot using a Junos OS image.
   >
   > The “Select a recovery image” menu appears on the console when one of these switches is booted and unable to load a version of Junos OS. Follow the instructions in the “Select a recovery image” menu to load the recovery version of Junos OS for one of these switches.
   >
   > You can ignore the remainder of this procedure if you are using a QFX5100, QFX5200, EX4600, QFX10000, or OCX Series switch.

3. Enter the following command:

   ```
   loader> install [--format]  [--external] source
   ```

   where:

   - `format`—Enables you to erase the installation media before installing the installation package. If you do not include this option, the system installs the new Junos OS in a different partition from that of the most recently installed Junos OS.
   - `external`—Installs the installation package onto external media (a USB stick, for example).
   - *source*—Represents the name and location of the Junos OS package, either on a server on the network or as a file on an external media, as shown in the following two examples:
     - Network address of the server and the path on the server; for example, **tftp://192.0.2.0/junos/jinstall-qfx-5e-flex-15.1X53-D30.5-domestic-signed.tgz**
     - Junos OS package on a USB device (commonly stored in the root drive as the only file), for example, **file://jinstall-qfx-5e-flex-15.1X53-D30.5-domestic-signed.tgz**).

   The installation now proceeds normally and ends with a login prompt.

SEE ALSO

- Creating a Snapshot and Using It to Boot a QFX3500 and QFX3600 Series Switch
- Creating a Snapshot and Using It to Boot a QFX Series Switch

Recovering Junos OS on a Device Running Junos OS with Upgraded FreeBSD

Starting in Junos OS Release 15.1 or later, certain hardware platforms run an upgraded FreeBSD kernel (FreeBSD 10.x or later) instead of FreeBSD 6.1. Juniper Networks devices that run Junos OS with upgraded FreeBSD have two separate volumes:

- **dev/gpt/junos** (**/junos** for short) volume that is used to run Junos OS and to store the configuration and log files
- **dev/gpt/oam** (**/oam** for short), an Operations, Administration, and Maintenance (OAM) volume that is used to store a complete backup of Junos OS and the configuration.

In case of damage to the device's software or failure of the **/junos** volume, you can use the backed up software and configuration stored in the **/oam** volume to boot the system and restore Junos OS with the recovery configuration. To perform this reboot and restore the configuration, the **/oam** volume must have all of the information required to provide the system with a running configuration. This information is provided by the recovery snapshot, created using the `request system snapshot recovery` command.

NOTE: You need console access to perform the following procedure to recover Junos OS.

To recover Junos OS by using the recovery snapshot stored in the **/oam** volume:

1. Power off the device, such as a router or a switch, by pressing the power button on the front panel.
2. Connect and configure the management device, such as a PC or a laptop, as follows:
   a. Turn off the power to the management device.
   b. Plug one end of the Ethernet rollover cable supplied with the device into the RJ-45–to–DB-9 serial port adapter supplied with the device.
   c. Plug the RJ-45–to–DB-9 serial port adapter into the serial port on the management device.
   d. Connect the other end of the Ethernet rollover cable to the console port on the device.
   e. Turn on the power to the management device.

f. On the management device, start your asynchronous terminal emulation application (such as Microsoft Windows Hyperterminal) and select the appropriate communication (COM) port to use (for example, COM1).

g. Configure the port settings as follows:

- Bits per second: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

3. Power on the device by pressing the power button on the front panel.

   Verify that the **POWER** LED on the front panel turns green.

   The terminal emulation screen on your management device displays the boot sequence of the device.

4. Access the Junos Main Menu.

- In releases before Junos OS Release 17.3, the Junos Main Menu appears for 3 seconds on startup before automatically booting the **/junos** volume. Press any key within the 3-second window to stop the automatic boot sequence and display the Junos Main Menu.

> **NOTE**: The Junos Main Menu will appear every time you reboot the router while connected to the console.

- Starting in Junos OS Release 17.3, press Ctrl+c within the 3-second window to stop the automatic boot sequence and display the Junos Main Menu.

```
Main Menu

1.  Boot [J]unos volume
2.  Boot Junos volume in [S]afe mode

3.  [R]eboot

4.  [B]oot menu
5.  [M]ore options

Choice:
```

5. At the Choice: prompt in Junos Main Menu, enter **B** or **4** to choose `4. [B]oot menu` :

```
Boot Menu

1. Boot [P]revious installed Junos packages
2. Boot Junos in [S]ingle user mode
3. Boot from [R]ecovery snapshot

4. Boot from [U]SB

5. Boot to [O]AM shell

6. Snapshot [B]oot menu

7. [M]ain menu

Choice:
```

6. At the Choice: prompt in Boot Menu, enter **R** or **3** to choose the `3. Boot from [R]ecovery snapshot` option. The device reboots into recovery mode. The following sample output shows the messages displayed on the terminal when you recover Junos OS on an EX2300 switch.

```
Booting from recovery snapshot ...
-
/boot/junos/boot/os-kernel/kernel data=0xe8c000 syms=[0x4+0x6b020+0x4+0x72cfe]
/boot/junos/boot/os-kernel/ex2300-48mp.dtb size=0x18b8
/boot/junos/boot/os-kernel/ex2300.dtb size=0x1e67
/boot/junos/boot/junos-modules/fips_core.ko text=0x13bc data=0x275+0x7
syms=[0x4+0x7a0+0x4+0x518]
loading required module 'netstack'
/boot/junos/boot/netstack/netstack.ko text=0x910a3c data=0x3ae2f+0x10dded
syms=[0x4+0xf0570+0x4+0xdc394]
loading required module 'crypto'

[...Output truncated...]

/var/pdb/profile_db
initialized

Profile database initialized
realpath: /dev/dumpdev: No such file or directory
```

```
/etc/rc: WARNING: Dump device does not exist.  Savecore not run.
Prefetching /usr/sbin/rpd ...
Prefetching /usr/sbin/lacpd ...
Prefetching /usr/sbin/chassisd ...
mkdir: /packages/sets/active: Read-only file system
Starting jlaunchhelperd.
sysctl: unknown oid 'kern.rtc_retries'
Starting
cron.

Fri Jun 22 01:25:20 PDT
2018

FreeBSD/arm (device-name)
(ttyu0)
login:
```

7. Log in to the device and verify that the software is properly restored.

```
[...Output truncated...]
login: root

--- JUNOS 18.1-20180125.0 built 2018-01-25 20:34:55 UTC

root@:RE:0%
```

How to Recover Junos OS with Upgraded FreeBSD

IN THIS SECTION

Ways to Recover Junos OS with Upgraded FreeBSD Without the Use of the CLI

IN THIS SECTION

If a device running Junos OS with upgraded FreeBSD has a damaged operating system or configuration that prevents the system from booting normally, or you need to recover the root password, the CLI is unavailable to you. But you can access and use the Junos Main Menu and Boot Menu. These menus have options such as booting from a USB device or a previously installed version of Junos OS, or using CLI Recovery mode to change you root password.

Boot from the /junos Volume

Juniper Networks devices that run Junos OS with upgraded FreeBSD have two separate volumes:

- **dev/gpt/junos** (**/junos** for short) volume that is used to run Junos OS and to store the configuration and log files
- **dev/gpt/oam** (**/oam** for short), an Operations, Administration, and Maintenance (OAM) volume that is used to store a complete backup of Junos OS and the configuration.

If a device running Junos OS with upgraded FreeBSD has a damaged operating system or configuration, preventing the system from booting normally, you can still boot from the **/junos** volume without using

the CLI command `request system reboot`. Access the Junos Main Menu. Booting the **/junos** volume is the first option on the Junos Main Menu.

Boot from Safe Mode

Safe mode is a diagnostic mode of a computer's operating system that has reduced functionality, making the task of isolating problems easier since many non-core components are disabled. In Junos OS with upgraded FreeBSD, safe mode boots the entire Junos OS and FreeBSD but with a few kernel features disabled.

One other difference between normal mode and safe mode is that for EX3400 devices, symmetric multiprocessing (SMP) in normal mode uses a dual core, whereas in safe mode, it uses a single core.

An installation that has a major problem (such as disk corruption or the installation of poorly configured software) that prevents the operating system from booting into its normal operating mode may boot in safe mode and allow you to diagnose the problem.

Booting from Safe Mode is the second option on the Junos Main Menu.

Boot from a Previously Installed Release of Junos OS with Upgraded FreeBSD

With devices running Junos OS with upgraded Freebsd, you can boot from a previous release of the OS, provided there was a previous image on the device and it is still there. Previous image files can be found in the **/packages/sets/previous** directory. Some platforms do not keep an older image due to storage space limitations (for example, EX2300 and EX3400 do not have a **/packages/sets/previous** directory).

The following is sample output from an EX9200 switch, showing the previous image:

```
root@:/ # ls -al /packages/sets/previous/
total 20
drwxr-xr-x  4 root  wheel  1536 Mar 30 15:45 .
drwxrwxrwx  4 root  wheel   512 Mar 30 18:47 ..
drwxr-xr-x  2 root  wheel   512 Mar 30 15:45 boot
lrwxr-xr-x  1 root  wheel    66 Mar 30 15:44 jail-runtime -> /packages/db/jail-runtime-
x86-32-20171012.356211_builder_stable_10
lrwxr-xr-x  1 root  wheel    62 Mar 30 15:44 jdocs -> /packages/db/jdocs-
x86-32-20171121.225603_builder_junos_161_r6
lrwxr-xr-x  1 root  wheel    63 Mar 30 15:44 jpfe-X -> /packages/db/jpfe-X-
x86-32-20171121.225603_builder_junos_161_r6

...
```

To see if there are previous packages on the device, do one of the following:

- From a UNIX shell, issue the `ls /packages/sets/previous` command.
- From the CLI operational mode, use the `file list /packages/sets/previous` command.

Booting from a previously installed release of Junos OS with upgraded FreeBSD is the first option on the Boot Menu.

System boots the previous Junos OS with upgraded FreeBSD image. If there is no previous image, system boots from the currently installed image.

Boot into Single-User Mode

Single-user mode is a mode in which a multi-user computer operating system boots into a single superuser. It is mainly used for maintenance of multi-user environments.

For devices running Junos OS with upgraded FreeBSD, single-user mode puts you in a shell with a prompt. There is limited support and password recovery is not possible using this option. But you can do few file operations.

Booting into single-user mode is the second option on the Boot Menu..

Boot from a Recovery Snapshot

A recovery snapshot for devices running Junos OS with upgraded FreeBSD is taken with the `request system snapshot recovery` command. Recovery snapshots are full copies of the packages and configuration taken at the time the snapshot command is issued.

Booting from a recovery snapshot is the third option on the Boot Menu.

Boot from a USB Device

If you want to boot from a USB device, you must connect the USB device to the router or switch. Then select the **Boot from [U]SB** option on the Boot Menu. If no USB device is connected, you will see a message `No USB media found`.

> **NOTE**: On Linux-based platforms (**jinstall-host*** images) where Junos OS with upgraded FreeBSD runs as a guest virtual machine (VM), the boot from USB option is supported through the BIOS Boot Manager. After rebooting, press **ESC** to open the boot options menu and select the **Boot Manager** option.

Boot to the OAM Shell

The Boot to the OAM Shell option is similar to the single-user mode except that you are put into the oam shell or volume. The compact flash drive is the /oam volume and stores recovery snapshot backup information. In case of failure of the /junos volume, the /oam volume can be used to boot the system.

Booting to the oam shell is the fifth option on the Boot Menu.

CLI Recovery Mode

If you choose the CLI Recovery Mode option, you end up at a `root>` prompt. Enter `configure` at the prompt to enter the configuration CLI mode. From there you can change the root password to recover your access to the device (see Recovering the Root Password on Routers).

The CLI Recovery Mode is the second option on the Options Menu.

Check File System

The check file system option lets you make sure there are no issues or corrupted files. The system boots from the OAM volume to perform disk checks. This is the third option on the Options Menu.

Enable/Disable Verbose Boot

Choosing the fourth option on the Options Menu either enables verbose boot, which lets you see the whole boot scroll by, or disables verbose boot.

Boot Prompt

The Boot Prompt option displays an OK prompt from which you can type one of the following commands:

- `menu`—Takes you back to the Junos Main Menu.
- `boot-junos`—Boots the device to the current version of Junos OS.
- `reboot`—Reboots the system.

You can also type `?` at the OK prompt to see several other available commands. The boot prompt option is the fifth option on the Options Menu.

How to Access the Junos Main Menu, Boot Menu, and Options Menu

IN THIS SECTION

If a device running Junos OS with upgraded FreeBSD has a damaged operating system or configuration, preventing the system from booting normally, you can still boot using an option on the Junos Main Menu, Boot Menu, or Options Menu. The following procedures show you how to access these menus.

How to Access the Junos Main Menu

You access the Junos Main Menu by interrupting the reboot of a device.

NOTE: You need console access (either direct access to console or via a console server) to perform the following procedure.

You can either perform the entire procedure or power-cycle the device and start the procedure from Step 4. (You can also perform these reboots by rebooting the device via the CLI if that is available.)

To boot a device running Junos OS with upgraded FreeBSD without using the CLI:

1. Power off the device, such as a router or a switch, by pressing the power button on the front panel.
2. Connect and configure the management device, such as a PC or a laptop, as follows:
   a. Turn off the power to the management device.
   b. Plug one end of the Ethernet rollover cable supplied with the device into the RJ-45–to–DB-9 serial port adapter supplied with the device.
   c. Plug the RJ-45–to–DB-9 serial port adapter into the serial port on the management device.
   d. Connect the other end of the Ethernet rollover cable to the console port on the device.
   e. Turn on the power to the management device.

f. On the management device, start your asynchronous terminal emulation application (such as Microsoft Windows Hyperterminal) and select the appropriate communication (COM) port to use (for example, COM1).

g. Configure the port settings as follows:

- Bits per second: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

3. Power on the device by pressing the power button on the front panel.

   Verify that the **POWER** LED on the front panel turns green.

   The terminal emulation screen on your management device displays the boot sequence of the device.

4. Access the Junos Main Menu.

   Do one of the following

- Prior to Junos OS Release 17.3, the Junos Main Menu appears for three seconds on startup before automatically booting from the **/junos** volume. Press any key within the three-second interval to stop the automatic boot sequence and display the Junos Main Menu.
- Starting in Junos OS Release 17.3, press Ctrl+c at the following part in the reboot:

```
FreeBSD/x86 bootstrap loader, Revision 1.1
(builder@feyrith.juniper.net, Sun Feb  4 13:06:24 PST 2018)
/
Autoboot in 1 seconds... (press Ctrl-C to interrupt)
```

The Junos Main Menu is displayed:

```
Main Menu

1.  Boot [J]unos volume
2.  Boot Junos volume in [S]afe mode

3.  [R]eboot

4.  [B]oot menu
5.  [M]ore options
```

```
Choice:
```

5. At the `Choice:` prompt in the Junos Main Menu, enter the number representing the option you want to use. Alternatively, you can enter the letter in square brackets to choose an option.

How to Access the Boot Menu

The Boot Menu is one of two menus you can access from the Junos Main Menu.

NOTE: You need console access to perform the following procedure.

You must first access the Junos Main Menu. See "How to Access the Junos Main Menu, Boot Menu, and Options Menu" on page 54.

To access the Boot Menu:

1. At the `Choice:` prompt in the Junos Main Menu, enter **4** or **B** to choose `4. [B]oot menu`.

   The Boot Menu is displayed.

```
Boot Menu

1. Boot [P]revious installed Junos packages
2. Boot Junos in [S]ingle user mode
3. Boot from [R]ecovery snapshot

4. Boot from [U]SB

5. Boot to [O]AM shell

6. Snapshot [B]oot menu

7. [M]ain menu

Choice:
```

2. At the `Choice:` prompt in the Boot Menu, enter the number representing the option you want to use. Alternatively, you can enter the letter in square brackets to choose an option.

How to Access the Options Menu

The Options Menu is one of two menus you can access from the Junos Main Menu.

NOTE: You need console access to perform the following procedure.

You must first access the Junos Main Menu. See "How to Access the Junos Main Menu, Boot Menu, and Options Menu" on page 54.

To access the Options Menu:

1. At the `Choice:` prompt in the Junos Main Menu, enter **5** or **M** to choose `5. [M]ore options`.

   The Options Menu is displayed.

```
Options Menu 4

1.  Recover [J]unos volume
2.  Recovery mode - [C]LI

3.  Check [F]ile system

4.  Enable [V]erbose boot

5.  [B]oot prompt

6.  [M]ain menu

Choice:
```

2. At the `Choice:` prompt in the Options Menu, enter the number representing the option you want to use. Alternatively, you can enter the letter in square brackets to choose an option.

Autorecovery of Configuration, Licenses, and Disk Information on SRX Series Devices

IN THIS SECTION

Autorecovery helps to detect and recover information on disk partitioning, configuration, and licenses in the event of disk becomes corrupted.

NOTE: In devices running FreeBSD Release 12 or later, you cannot back up data with the autorecovery feature. Instead, back up data using snapshots. To learn if your device is running FreeBSD Release 12 or later, issue the `show version` command and look for the `fbsd_builder_stable` string in the module names. If the string includes the number 12 or later, your device is running FreeBSD Release 12 or later.

Overview

The autorecovery feature is supported on dual-partitioned SRX Series Firewalls. With this feature, information on disk partitioning, configuration, and licenses is recovered automatically in the event it becomes corrupted.

Autorecovery provides the following functions:

- Detect corruption in disk partitioning during system bootup and attempt to recover partitions automatically
- Detect corruption in the Junos OS rescue configuration during system bootup and attempt to recover the rescue configuration automatically
- Detect corruption in Junos OS licenses during system bootup and attempt to recover licenses automatically

How Autorecovery Works

The feature works in the following ways:

- The feature provides the `request system autorecovery state save` command, which backs up important data such as disk partitioning information, licenses, and Junos OS rescue configuration.
- Once the backup copies are saved, they are used to check the integrity of the working copies of the data on every bootup.
- The working copies are automatically recovered if any corruption is detected.

How to Use Autorecovery

You use autorecovery in the following ways:

- Prepare the router for deployment with the necessary licenses and configuration.
- After you finalize the state, execute the `request system autorecovery state save` command to back up the state.
- After you save the state, integrity check and recovery actions (if any) occur automatically on every bootup.
- If subsequent maintenance activities change the state of the router by adding licenses or updating the configuration, you need to execute the `request system autorecovery state save` command again to update the saved state.
- Execute the `show system autorecovery state` command any time to view the status of the saved information and the integrity check status of each saved item.
- Execute the `request system autorecovery state clear` command to delete all backed up data and disable autorecovery, if required.

Data That Is Backed Up in an Autorecovery

The following data is backed up during the autorecovery process:

- Rescue configuration (regenerated from the current configuration)
- License keys

- BSD lables (disk-partitioning information)

Data is backed up only when you execute the `request system autorecovery state save` command. Disk-partitioning information is backed up automatically from factory defaults (for new systems), on installation from the boot loader, and on snapshot creation.

Troubleshooting Alarms

Table 1 on page 60 lists types of autorecovery alarms, descriptions, and required actions.

Table 1: Autorecovery Alarms

Alarm	Alarm Type	Description	Action Required
Autorecovery information needs to be saved	Minor	This alarm indicates: • Unsaved data needs to be saved, or saved data contains problems and another save is required.	• Ensure that the system has all required licenses and configuration. • Execute the `request system autorecovery state save` command.
Autorecovery has recovered corrupted information	Minor	This alarm indicates: • Boot time integrity check failed for certain items; however, the items have been recovered successfully.	• No action is required. • Alarm is cleared on next bootup.
Autorecovery was unable to recover data completely	Major	This alarm indicates: • Boot time integrity check failed for certain items, which could not be recovered successfully.	• The system might be experiencing a fatal malfunction.

Considerations

- Devices must have dual-root partitioning for autorecovery to work.

- The `request system configuration rescue save` command regenerates the rescue configuration from the current Junos OS configuration and then saves it. Therefore, executing the `save` command overwrites any existing rescue configuration.
- In general, the saved contents of the rescue configuration are not updated automatically. If you add licenses, you must execute the `request system autorecovery state save` command again.

NOTE: The rescue configuration is backed up. If **/config** is corrupted, the system boots from the rescue configuration.

RELATED DOCUMENTATION

Creating a Snapshot and Using It to Boot an SRX Series Firewall | **15**

Example: Installing Junos OS Upgrade Packages on SRX Series Firewalls | **254**

Reverting the Junos OS Software Image Back to the Previous Version | **263**

3

CHAPTER

Installing, Upgrading, and Downgrading Software

Software Installation and Upgrade Overview (Junos OS)

IN THIS SECTION

A Juniper Networks device is delivered with Junos OS preinstalled. As new features and software fixes become available, you must upgrade your software to use them. Before the upgrade, back up the configuration files.

Software Installation and Upgrade Overview (Junos OS)

IN THIS SECTION

A Juniper Networks device is delivered with Junos OS preinstalled. When you power on the device, it starts (boots) using the installed software. As new features and software fixes become available, you must upgrade your software to use them.

You upgrade (or downgrade) the version of the operating system on a device by copying a software installation package to your device or other system on your local network and then using the CLI to

install the new software on the device. You then reboot the device, which boots from the newly installed software.

Before installing software, back up the system, select the software installation package you require, and download it from the Juniper Networks downloads page. If you encounter any difficulties during software installation, you can use the recovery installation procedure to install the operating system on the device. After a successful upgrade, back up the new existing configuration to a secondary device.

The first step is to determine which version of software to upgrade to. For more information about software versions, see Junos Software Versions - Suggested Releases to Consider and Evaluate.

NOTE: Before installing software on a device that has one or more custom YANG data models added to it, back up and remove the configuration data corresponding to the custom YANG data models from the active configuration. For more information see "Managing YANG Packages and Configurations During a Software Upgrade or Downgrade" on page 119.

To understand more about Junos OS Software Licensing, see the Juniper Licensing Guide. Please refer to the product Data Sheets accessible from Products & Services for details, or contact your Juniper Account Team or Juniper Partner.

- For features on EX Series Switches that require license, see Understanding Software Licenses for EX Series Switches
- For features on M Series Routers that require license, see Software Features That Require Licenses on M Series Routers Only
- For features on M Series, MX Series, and T Series Routers that require license, see Software Features That Require Licenses on M Series, MX Series, and T Series Routers
- For features on MX Series Routers that require license, see Software Features That Require Licenses on MX Series Routers Only
- For features on QFX Series Switches that require license, see Software Features That Require Licenses on the QFX Series.
- For features on SRX Series Firewalls that require license, see Software Feature Licenses for SRX Series Devices.

The following subsections introduce the overall considerations in installing the software:

Types of Junos OS Installation

The three types of installations used to upgrade or downgrade your device are standard installation, category change, and recovery. The standard installation is the standard method of upgrading and

downgrading the software. Use a category change installation when you are moving from one software category to another; for example, if you are changing the device from using the standard Junos OS to the Junos-FIPS category. Perform a recovery installation when the software on the device is damaged or otherwise unable to accommodate a software upgrade or downgrade.

Standard Installation

A standard installation is the typical method used to upgrade or downgrade software on the server. This method uses the installation package that matches the installation package already installed on the system. For information on the different installation packages available, see "Junos OS Installation Package Names" on page 70.

Category Change Installation

The category change installation process is used to move from one category of Junos OS to another on the same router; for example, moving from a Junos OS standard installation on a router to a Junos-FIPS installation. When moving from one installation category to another, you need to be aware of the restrictions regarding this change.

> **NOTE**: Juniper Networks does not support using the `request system software rollback` command to restore a different installation category on the device. When installing a different Junos OS category on a device, once the installation is complete, you should execute a `request system snapshot` command to delete the backup installation from the system.

Recovery Installation

A recovery installation is performed to repair a device with damaged software or a condition that prevents the upgrade, downgrade, or change in installation category of the software.

Backing Up the Current System's Files

Creating a backup of the current system on your device has the following advantages:

- The device can boot from a backup and come back online in case of failure or corruption of the primary boot device in the event of power failure during an upgrade.
- Your active configuration files and log files are retained.
- The device can recover from a known, stable environment in case of an unsuccessful upgrade.

During a successful upgrade, the upgrade package completely reinstalls the existing operating system. It retains only the **juniper.conf** and SSH files. Other information is removed. Therefore, you should back up your existing configuration in case you need to return to it after running the installation program.

You can create copies of the software running on a device using the system snapshot feature. The system snapshot feature takes a "snapshot" of the files currently used to run the device—the complete

contents of the **/config** and **/var** directories, which include the running software, the active configuration, and the rescue configuration—and copies all of these files into an alternate (internal, meaning internal flash, or an external, meaning USB flash) memory source. You can then use this snapshot to boot the device at the next boot up or as a backup boot option. When the backup is completed, the existing and backup software installations are identical.

> **NOTE**: Snapshots taken with the `request system snapshot` command in a Junos OS with upgraded FreeBSD system are not the same as those snapshots taken with the `request system snapshot` command in a Junos OS (as in legacy Junos OS) system. To back up your Junos OS with upgraded FreeBSD system devices, use the `request system snapshot recovery` command.

When the correct snapshot command is issued, the **/root** file system is backed up to **/altroot**, and **/config** is backed up to **/altconfig**. The **/root** and **/config** file systems are on the devices's CompactFlash card, and the **/altroot** and **/altconfig** file systems are on the devices's hard disk or or solid-state drive (SSD).

Determining Software Installation Package

All software releases are delivered in signed packages that contain digital signatures to ensure official Juniper Networks software. To see which software packages are currently running on the device and to get information about these packages, use the `show version` operational mode command at the top level of the command-line interface (CLI).

> **NOTE**: The `show version` command does not show the software edition installed, only the release number of the software.

You can either download software to the **/var/tmp** directory of your device, or install it directly from the downloads page.

For more information about signed software packages, see the "Junos OS Installation Package Names" on page 70.

Connecting to the Console

We recommend that you upgrade all individual software packages using an out-of-band connection from the console or management Ethernet interface, because in-band connections can be lost during the upgrade process.

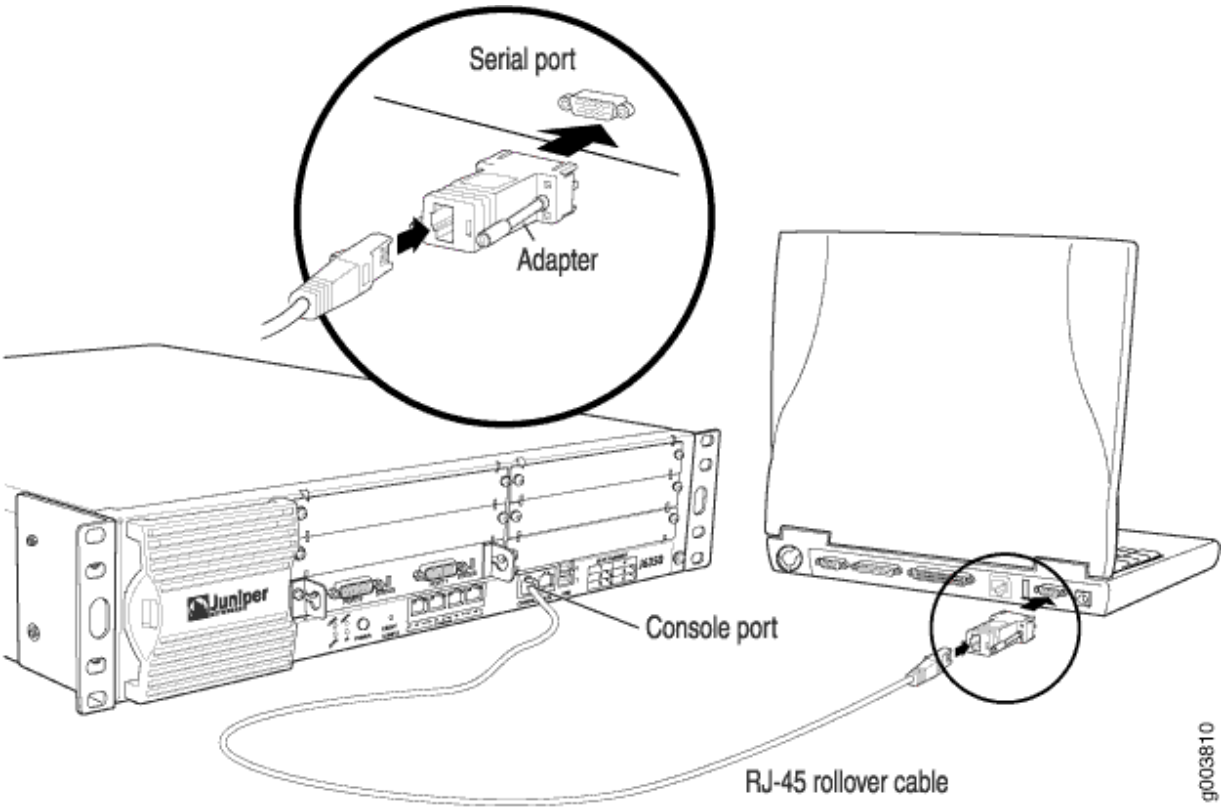
Console ports allow root access to the Junos operating system (Junos OS) devices through a terminal or laptop interface, regardless of the state of the Junos OS device, unless it is completely powered off. By

connecting to the console port, you can access the root level of the Junos OS device without using the network to which the device might or might not be connected. This creates a secondary path to the Junos OS device without relying on the network.

Using the terminal interface provides a technician sitting in a Network Operations Center a long distance away the ability to restore a Junos OS device or perform an initialization configuration securely, using a modem, even if the primary network has failed. Without a connection to the console port, a technician would have to visit the site to perform repairs or initialization. A remote connection to the Junos OS device through a modem requires the cable and connector (provided in the device accessory box), plus a DB-9 to DB-25 (or similar) adapter for your modem, which you must purchase separately. For more information about connecting to the console port, see the administration guide for your particular device.

To configure the device initially, you must connect a terminal or laptop computer to the device through the console port, as shown in Figure 1 on page 68.

Figure 1: Connecting to the Console Port on a Juniper Networks Device



Validating the Installation Package with the Current Configuration

When you upgrade or downgrade software, we recommend that you include the **validate** option with the `request system software add` command to check that the candidate software is compatible with the current configuration. By default, when you add a package with a different release number, the validation check is done automatically.

Direct validation of the running configuration does not work for upgrading to Junos OS with upgraded FreeBSD from Junos OS based on older versions of the FreeBSD kernel. Therefore, when upgrading or downgrading between Junos OS and Junos OS with upgraded FreeBSD, you might have to validate on a different host.

If you do not want to validate when upgrading, you must specify the `no-validate` option.

Dual-Root and Single-Root Partitioning (SRX Series Only)

SRX Series Firewalls that ship from the factory with Junos OS Release 10.0 or later are formatted with the dual-root partitioning scheme.

NOTE: Junos OS Release 12.1X45 and later do not support single-root partitioning.

NOTE: SRX100, SRX110, SRX210, SRX220, and SRX240 devices with 2 GB RAM cannot be upgraded to any Junos OS 12.1X46 Release after 12.1X46-D65. Attempting to upgrade to this release on devices with 2 GB RAM will trigger the following error: **ERROR: Unsupported platform for 12.1X46 releases after 12.1X46-D65**

Existing SRX Series Firewalls that are running Junos OS Release 9.6 or earlier use the single-root partitioning scheme. While upgrading these devices to Junos OS Release 10.0 or later, you can choose to format the storage media with dual-root partitioning (strongly recommended) or retain the existing single-root partitioning.

Certain Junos OS upgrade methods format the internal media before installation, whereas other methods do not. To install Junos OS Release 10.0 or later with the dual-root partitioning scheme, you must use an upgrade method that formats the internal media before installation.

NOTE: If you are upgrading to Junos OS Release 10.0 without transitioning to dual-root partitioning, use the conventional CLI and J-Web user interface installation methods.

These upgrade methods format the internal media before installation:

- Installation from the boot loader using a TFTP server
- Installation from the boot loader using a USB storage device
- Installation from the CLI using the `partition` option (available in Junos OS Release 10.0)
- Installation using the J-Web user interface

These upgrade methods retain the existing partitioning scheme:

- Installation using the CLI
- Installation using the J-Web user interface

CAUTION: Upgrade methods that format the internal media before installation wipe out the existing contents of the media. Only the current configuration is preserved. Any important data must be backed up before starting the process.

NOTE: Once the media has been formatted with the dual-root partitioning scheme, you can use conventional CLI or J-Web user interface installation methods, which retain the existing partitioning and contents of the media, for subsequent upgrades.

Junos OS Installation Package Names

IN THIS SECTION

The installation package is used to upgrade or downgrade from one release to another. When installed, the installation package completely reinstalls the software, rebuilds the Junos OS file system, and can erase system logs and other auxiliary information from the previous installation. The installation package does, however, retain the configuration files from the previous installation.

A Junos OS installation package can have one of the following general patterns:

- ***prefix*-*platform*-*product*-*architecture*-*application-binary-interface*-*release*-*edition*.*extension*** (for installing with the `request system software add` command)
- ***prefix*-media-*media-keyword*-*platform*-*architecture*-*application-binary-interface*-*release*-*edition*.*extension*** (for images installed from the USB drive or the loader prompt)
- ***prefix*-flex-*release*-*edition*.*extension*** (for enhanced automation variants of Junos OS)

Table 2: Descriptions of Junos OS Package Name Fields

Field Name	Description
prefix	Package name prefix. Different products use different prefixes. These prefixes are explained later in this chapter.
host	Host is included in the package name when the platform is Linux based; this prefix indicates the image includes the host software as well as Junos OS.
media *media-keyword*	A media keyword is included in the package name when the software image cannot be installed using the `request system software add` command. Values for the media keyword include the following: • `usb` for images you install from a USB drive • `net` for images you install from the loader prompt
platform	(Optional) Name of the product series, such as `mx` or `ptx`.
product	(Optional) Model number or product variant, such as `5e` for the QFX Series switches.
architecture	(Optional) CPU architecture of the platform. For example, `x86` for Intel CPUs or `arm` for Advanced RISC Machines CPUs.
application-binary-interface	(Included when *architecture* is part of the name.) Indicates the “word length” of the CPU architecture. Values include 32 for 32-bit architectures and 64 for 64-bit architectures.
release	Release number. The format of the release number is explained later in this chapter.

Table 2: Descriptions of Junos OS Package Name Fields *(Continued)*

Field Name	Description
edition	Edition of the software package. Software editions are explained later in this chapter.

The software is delivered in signed packages that contain digital signatures, Secure Hash Algorithm (SHA-1), and Message Digest 5 (MD5) checksums. A package is installed only if the checksum within it matches the hash recorded in its corresponding file. Which checksum is used depends on the software version:

- Digital signatures are used when you upgrade or downgrade between Junos OS Release 7.0 and a later version.
- The SHA-1 checksum is used when you upgrade or downgrade between Junos OS Release 6.4 and a later version.
- The MD5 checksum is used when you upgrade or downgrade between Junos OS Release 6.3 or earlier and a later version.

Starting in 2015, the word **signed** appears less frequently after the edition in the filename. But you might still see it in software installation packages. Whether **signed** appears or not, all Junos OS images from Junos OS Release 15.1 on are signed for validation.

Extensions are **tgz**, **gz**, **img**, **iso**, etc.

Junos OS Installation Packages Prefixes

The first part of the installation package filename is a combination of a standard prefix and product designation. Table 2 lists a variety of Junos OS package name prefixes.

Starting in Junos OS Release 15.1, certain hardware platforms run a Junos OS based on an upgraded FreeBSD kernel, greater than FreeBSD 10.x (hereafter called Junos OS with upgraded FreeBSD). Table 2 also indicates the prefixes used for the different platforms running Junos OS with upgraded FreesBSD. For more information about upgrading or downgrading to Junos OS with upgraded FreeBSD, see "Upgrading and Downgrading to Junos with Upgraded FreeBSD" on page 294.

Except where indicated in the table, you install these packages using the `request system software add` CLI command.

Table 3: Installation Package Prefixes

Installation Package Prefix	Description
jinstall*	Junos OS for M Series, MX Series, T Series, TX Matrix, and TX Matrix Plus routers.
jinstall64*	64-bit Junos OS for the JCS1200 Route Reflector, TX Matrix Plus routers with 3D SIBs, and PTX Series Packet Transport Routers.
jinstall-ex*	Junos OS for the EX Series Ethernet Switch portfolio.
jinstall-host-acx5k*	Junos OS with upgraded FreeBSD for the ACX5000 Series routers, which are Linux based; this prefix indicates the image includes the host as well as Junos OS. For example, **jinstall-host-acx5k-17.2R1.13-signed.tgz**.
jinstall-host-ex*	Junos OS with upgraded FreeBSD for EX4600, which is Linux based; this prefix indicates the image includes the host as well as Junos OS. For example, **jinstall-host-ex-4600-17.2R1.13-signed.tgz**.
jinstall-host-nfx-2*	Junos OS with upgraded FreeBSD for NFX2xx platforms that are Linux based; this prefix indicates the image includes the host software and Junos OS. For example, **jinstall-host-nfx-2-flex-x86-32-17.2R1.13-secure-signed.tgz**. See Junos OS Releases Supported on NFX Series Hardware for a list of which platforms use the nfx-2 package.
jinstall-host-nfx-3*	Junos OS with upgraded FreeBSD for NFX platforms that are Linux based; this prefix indicates the image includes the host software and Junos OS. For example, **jinstall-host-nfx-3-x86-64-22.4R1.10-secure-signed.tgz**. See Junos OS Releases Supported on NFX Series Hardware for a list of which platforms use the nfx-3 package.
jinstall-host-ocx*	Junos OS with upgraded FreeBSD for OCX platforms that are Linux based; this prefix indicates the image includes the host software as well as Junos OS.
jinstall-host-ptx*	Junos OS with upgraded FreeBSD for PTX platforms that are Linux based; this prefix indicates the image includes the host software as well as Junos OS.

Table 3: Installation Package Prefixes *(Continued)*

Installation Package Prefix	Description
jinstall-host-qfx*	Junos OS with upgraded FreeBSD for QFX platforms that are Linux based; this prefix indicates the image includes the host software as well as Junos OS. For example, **jinstall-host-qfx-5e-x86-64-17.2R1.13.tgz.tgz** is a package name for Junos OS on the QFX5100.
jinstall-ocx-flex*	OCX Series switches.
jinstall-ppc*	Junos OS for the ACX Series, MX5, MX10, MX40, MX80, and MX104 routers.
junos-arm*	Junos OS with Upgraded FreeBSD for EX2300 and EX3400 switches. For example, **junos-arm-32-15.1X53-D50.2.tgz**.
junos-arm-media-*media-keyword**	Junos OS with Upgraded FreeBSD for EX2300 and EX3400 switches. You install these images using a method other than the `request system software add` command at the CLI prompt, such as installing from a USB drive or a loader prompt. The media keyword can be one of the following: • `usb` for images you install from a USB drive • `net` for images you install from the loader prompt For example, **junos-install-media-usb-arm-32-15.1X53-D50.2.img** or **junos-install-media-net-arm-32-15.1X53-D50.2.tgz**.
junos-install*	Junos OS with upgraded FreeBSD for EX4100, EX9200, and MX Series routers and SRX Series Firewalls that support Junos OS with upgraded FreeBSD. For example, **junos-install-ex-arm-64-22.2R1.3.tgz** for EX4100, **junos-install-ex92xx-x86-64-17.2R1.13.tgz** for EX9200, **junos-install-mx-x86-32-15.1R1.9.tgz** for MX Series routers, **junos-install-srxsme-octeon-64-23.2R1.14.tgz** for SRX300, SRX320, SRX340, SRX345, and SRX380, and **junos-install-srx5000-x86-64-17.3R1.9.tgz** for SRX5400, SRX5600, or SRX5800.

Table 3: Installation Package Prefixes *(Continued)*

Installation Package Prefix	Description
junos-install-media-*media-keyword**	Junos OS with upgraded FreeBSD for EX4100, EX9200, and MX Series routers and SRX Series Firewalls that support Junos OS with upgraded FreeBSD. You install these images using a method other than the `request system software add` command at the CLI prompt, such as installing from a USB drive or a loader prompt. The media keyword can be one of the following: • `usb` for images you install from a USB drive • `net` for images you install from the loader prompt • `pxe` for images you install using the Preboot Execution Environment (PXE) on the SRX1500, SRX4600, SRX5400, SRX5600, and SRX5800 For example, **junos-install-media-usb-mx-x86-32-15.1R1.9.tgz** for an MX Series router, **junos-install-media-usb-ex-arm-64-22.2R1.3.tgz** for EX4100, **junos-install-media-usb-ex92xx-17.2R1.13.img.gz** for EX9200, **junos-install-media-usb-srxsme-octeon-64-23.2R1.14.tgz** for SRX300, SRX320, SRX340, SRX345, and SRX380, and **junos-install-media-usb-srx5000-x86-64-17.3R1.9.img.gz** for SRX5400, SRX5600, and SRX5800.
junos-srx1k3k*	Junos OS for SRX1400, SRX3400 and SRX3600.
junos-srx5000*	Junos OS for SRX5400, SRX5600, and SRX5800.
junos-srxentedge*	Junos OS for SRX1500.
junos-srxhe-x86*	Junos OS for SRX4600.
junos-srxmr*	Junos OS for SRX4100 and SRX4200.
junos-srxsme*	Junos OS for SRX300, SRX320, SRX340, SRX345, SRX380, and SRX550M.
junos-vmhost-install*	Junos OS with upgraded FreeBSD for devices that use VM Host. You use the `request vmhost software add` CLI command to install these images. For more information about VM Host installation, see "Installing, Upgrading, Backing Up, and Recovery of VM Host" on page 356.

Table 3: Installation Package Prefixes *(Continued)*

Installation Package Prefix	Description
junos-vmhost-install-media-*media-keyword**	Junos OS with upgraded FreeBSD for devices that use VM Host. You install these images using the Preboot Execution Environment (PXE) boot server or the USB drive, and not the `request vmhost software add` CLI command. The media keyword can be one of the following: • `usb` for images you install from a USB drive • `net` for images you install from the Preboot Execution Environment (PXE) boot server For more information about this installation method, see "Copying VM Host Installation Package to the PXE Boot Server" on page 362 or "Creating an Emergency Boot Device for Routing Engines with VM Host Support" on page 365.

SEE ALSO

show version

Junos OS Release Numbers

The release number represents a particular revision of the software that runs on a Juniper Networks routing platform, for example, Junos OS Release 14.1,14.2, 15.1, or 17.1. Each release has certain new features that complement the software processes that support Internet routing protocols, control the device's interfaces and the device chassis itself, and allow device system management. On the Juniper Networks Support web page, you download software for a particular release number.

In this example, we dissect the format of the software release number to show what it indicates. The generalized format is as follows:

Given the format of

1. ***m.nZb.s***

The software release number 17.2R1.13, for example, maps to this format as follows:

- *m* is the main release number of the product, for example, 17.
- *n* is the minor release number of the product, for example, 2.
- *Z* is the type of software release, for example, R for FRS or maintenance release.

For types of software releases, see Table 3.

- *b* is the build number of the product, for example, 1, indicating the FRS rather than a maintenance release..
- *s* is the spin number of the product, for example, 13.

Table 4: Software Release Types

Release Type	Description
R	First revenue ship (FRS) or maintenance release software. R1 is FRS. R2 onward are maintenance releases.
F	Feature velocity release. Feature velocity releases are only in Junos OS Release 15.1.
B	Beta release software.
I	Internal release software. These are private software releases for verifying fixes.
S	Service release software, which are released to customers to solve a specific problem—this release will be maintained along with the life span of the underlying release. The service release number is added after the R number, for example, 14.2R3-S4.4. Here S4 represents the 4th service release on top of 14.2R3 and is the 4th re-spin.
X	Special (eXception) release software. X releases follow a numbering system that differs from the standard release numbering. Starting with Junos OS Release 12.1X44-D10, SRX Series Firewalls follow a special naming convention for Junos OS releases. For more information, refer to the Knowledge Base article KB30092 at https://kb.juniper.net/InfoCenter/index?page=home.

NOTE: Prior to Junos OS Release 11.4, the software release number format for service releases was same as other releases. For example, 10.4S4.2 represented the 4th service release and 2nd re-spin of 10.4.

Junos OS Editions

Editions show up in the installation package name after the release number string and before *signed*.

In releases earlier than Junos OS Release 15.1, installation packages came in several major software package categories or editions, such as domestic, worldwide, or Federal Information Processing Standard (FIPS). For those still using packages with names including these terms, here is what they indicate:

- **domestic**—Junos OS for customers in the United States and Canada and for all other customers with a valid encryption agreement. This edition includes high-encryption capabilities such as IPsec and SSH for data leaving the router or switch. Later images use a null, or empty, edition field for this category.
- **limited**—Junos OS for all other customers. This edition does not include any high-encryption capabilities for data leaving the router or switch. Sometimes referred to as the *Export* edition, starting in Junos OS Release 15.1R1, this category is is renamed to the limited edition.
- **fips**—Junos OS that provides advanced network security for customers who need software tools to configure a network of Juniper Networks routers and switches in a Federal Information Processing Standards (FIPS) 140-2 environment. For more information about Junos-FIPS, see FIPS 140-2 Security Compliance. In later images, FIPS, instead of being a separate edition, is an option you select on installation.

Starting with Junos OS 15.1, a simplified edition scheme was started:

- Junos OS with a null (empty) edition field is the standard image for Junos OS.
- **limited**—Version has no cryptographic support and is intended for countries in the Eurasian Customs Union (EACU). These countries have import restrictions on software containing data-plane encryption.

Boot Sequence on Devices with Routing Engines (Junos OS)

IN THIS SECTION

Juniper Networks devices start using the installed Junos OS. Bootable copies of Junos OS are stored in various locations: the internal flash disk, the hard drive, the removable media. The following subsections discuss the order of locations checked for a valid bootable operating system.

Boot Order for Devices

Information about the boot order for the various devices with Routing Engines is given in this section in alphabetical order of the device families.

> **NOTE**: For information about which Routing Engines are supported by each device, see https://www.juniper.net/documentation/en_US/release-independent/ junos/topics/reference/general/routing-engine-m-mx-t-series-support-by-chassis.html.

The ACX Series routers attempt to boot from the storage media in the following order:

1. USB storage media device
2. Dual, internal NAND flash device (first da0s1, then da0s2)

The router attempts to boot from the storage media in the following order:

MX80 routers attempt to boot from the storage media in the following order:

1. USB media emergency boot device
2. Dual, internal NAND flash device (first da0, then da1)

MX104 routers attempt to boot from the storage media in the following order:

1. USB storage media device
2. Internal NAND flash device (**da0**)

The M Series and MX Series with a Routing Engine that has a solid-state drive (SSD) attempt to boot from the storage media in the following order:

1. USB media emergency boot device (if present)
2. CompactFlash card
3. Solid-state drive (SSD) in the SSD slot 1 or SSD slot 2 (if present)

The M Series and MX Series (except for the MX80 routers and the MX104 routers) routers with a Routing Engine that has a hard disk attempt to boot from the storage media in the following order:

1. Removable media emergency boot device, such as a PC Card (if present)

2. CompactFlash card (if present)
3. Hard disk

The PTX Series Packet Transport Routers attempt to boot from the storage media in the following order:

1. USB media emergency boot device
2. CompactFlash card
3. Solid-state drive (SSD) in the Disk 1 slot (if present)
4. Storage media available on the LAN

The T Series and TX Matrix routers with a Routing Engine that has a hard disk attempt to boot from the storage media in the following order:

1. Removable media emergency boot device, such as a PC Card (if present)
2. CompactFlash card (if present)
3. Hard disk

The T Series routers with a Routing Engine that has a solid-state drive (SSD), and TX Matrix Plus routers attempt to boot from the storage media in the following order:

1. USB media emergency boot device
2. CompactFlash card (if present)
3. Solid-state drive (SSD) in the Disk 1 slot (if present)

> **NOTE**: The Disk 2 slot is not currently supported.

4. Storage media available on the LAN

Booting from an Alternate Boot Device

> **NOTE**: Do not insert an emergency boot device during normal operations. The router does not operate normally when it is booted from an emergency boot device.

If the router boots from an alternate boot device, Junos OS displays a message indicating this when you log in to the router. For example, the following message shows that the software booted from the hard disk (**/dev/ad1s1a**):

```
login: username
Password: password
Last login: date on terminal

--- Junos 8.0 R1 built date
---
--- NOTICE: System is running on alternate media device (/dev/ad2s1a).
```

This situation results when the router detects a problem with the primary boot device—usually the CompactFlash card—that prevents it from booting, and consequently boots from the alternate boot device (the hard disk drive). When this happens, the primary boot device is removed from the list of candidate boot devices. The problem is usually a serious hardware error. We recommend you contact the Juniper Networks Technical Assistance Center (JTAC).

NOTE: On MX104 routers, if the router boots from an alternate boot device, Junos OS does not display any message indicating this when you log in to the router.

When the router boots from the alternate boot device, the software and configuration are only as current as the most recent `request system snapshot` command. However, if the `mirror-flash-on-disk` command was enabled, then the hard disk drive contains a synchronized, mirror image of the compact flash drive and therefore the current software and configuration.

Release History Table

Release	Description
12.1X46	SRX100, SRX110, SRX210, SRX220, and SRX240 devices with 2 GB RAM cannot be upgraded to any Junos OS 12.1X46 Release after 12.1X46-D65. Attempting to upgrade to this release on devices with 2 GB RAM will trigger the following error: **ERROR: Unsupported platform for 12.1X46 releases after 12.1X46-D65**
12.1X45-D10	Junos OS Release 12.1X45 and later do not support single-root partitioning

RELATED DOCUMENTATION

Storage Media and Routing Engines (Junos OS) | 445

Preparing for Software Installation and Upgrade (Junos OS)

IN THIS SECTION

Before you install or upgrade Junos OS, you must ensure some basic checks such as sufficient disk space availability and backing up configurations in place.

Upgrade or Reinstall Junos OS

IN THIS SECTION

Checklist for Reinstalling Junos OS

Table 5 on page 83 provides links and commands for reinstalling Junos OS.

Table 5: Checklist for Reinstalling Junos OS

Tasks	Command or Action
Before You Reinstall Junos OS	
"Log the Software Version Information (Junos OS)" on page 85	`show version | save filename`
"Log the Hardware Version Information (Junos OS)" on page 87	`show chassis hardware | save filename`
"Log the Chassis Environment Information (Junos OS)" on page 88	`show chassis environment | save filename`
"Log the System Boot-Message Information (Junos OS)" on page 89	`show system boot-messages | save filename`
"Log the Active Configuration (Junos OS)" on page 92	`show configuration | save filename`
"Log the Interfaces on the Router (Junos OS)" on page 93	`show interface terse | save filename`

Table 5: Checklist for Reinstalling Junos OS *(Continued)*

Tasks	Command or Action

"Log the BGP, IS-IS, and OSPF Adjacency Information (Junos OS)" on page 94	`show bgp summary | save filename`
	`show isis adjacency brief | save filename`
	`show ospf neighbor brief | save filename`

"Log the System Storage Information (Junos OS)" on page 96	`show system storage | save filename`
Back Up the Currently Running and Active File System	`request system snapshot`
"Reinstall Junos OS" on page 114	Insert your removable medium and reboot the system.
"Reconfigure Junos OS" on page 115	
Configure Host Names, Domain Names, and IP Addresses	Log in as root. Start the CLI. Enter configuration mode: `configure set system host-name host-name set system domain-name domain-name set interfaces fxp0 unit 0 family inet address address/prefix-length set system backup-router address set system name-server address`
Protect Network Security by Configuring the Root Password	`set system root-authentication plain-text-password set system root-authentication encrypted-password password set system root-authentication ssh-rsa key commit exit`
Check Network Connectivity	`ping address`

"Copy Backup Configurations and Restore Saved Configurations" on page 39	`file copy var/tmp configure`
	`[edit] load merge /config/filename or load replace /config/filename`
	`[edit] commit`

After You Reinstall Junos OS	

Table 5: Checklist for Reinstalling Junos OS *(Continued)*

Tasks	Command or Action

Compare Information Logged Before and After the Reinstall	`show version | save filename`
	`show chassis hardware | save filename show chassis environment | save filename`
	`show system boot-messages | save filename show configuration | save filename`
	`show interfaces terse | save filename`
	`show bgp summary show isis adjacency brief show ospf neighbor brief | save filename`
	`show system storage | save filename`

Back Up the New Software	`request system snapshot`

Log the Software Version Information (Junos OS)

IN THIS SECTION

Purpose

The purpose of this action is to log the Junos OS version information.

Action

Use the following Junos OS CLI operational mode command:

```
user@host> show version | save filename
```

Sample Output

```
user@host> show version | save test
Wrote 39 lines of output to ‘test’

user@host> show version
Hostname:  my-router.net
Model: m10
JUNOS Base OS boot [5.0R5]
JUNOS Base OS Software Suite [5.0R5]
JUNOS Kernel Software Suite [5.0R5]
JUNOS Routing Software Suite [5.0R5]
JUNOS Packet Forwarding Engine Support [5.0R5]
JUNOS Crypto Software Suite [5.0R5]
JUNOS Online Documentation [5.0R5]
KERNEL 5.0R5 #0 built by builder on 2002-03-02 05:10:28 UTC
MGD release 5.0R5 built by builder on 2002-03-02 04:45:32 UTC
CLI release 5.0R5 built by builder on 2002-03-02 04:44:22 UTC
CHASSISD release 5.0R5 built by builder on 2002-03-02 04:43:37 UTC
DCD release 5.0R5 built by builder on 2002-03-02 04:42:47 UTC
RPD release 5.0R5 built by builder on 2002-03-02 04:46:17 UTC
SNMPD release 5.0R5 built by builder on 2002-03-02 04:52:26 UTC
MIB2D release 5.0R5 built by builder on 2002-03-02 04:45:37 UTC
APSD release 5.0R5 built by builder on 2002-03-02 04:43:31 UTC
VRRPD release 5.0R5 built by builder on 2002-03-02 04:52:34 UTC
ALARMD release 5.0R5 built by builder on 2002-03-02 04:43:24 UTC
PFED release 5.0R5 built by builder on 2002-03-02 04:46:06 UTC
CRAFTD release 5.0R5 built by builder on 2002-03-02 04:44:30 UTC
SAMPLED release 5.0R5 built by builder on 2002-03-02 04:52:20 UTC
ILMID release 5.0R5 built by builder on 2002-03-02 04:45:21 UTC
BPRELAYD release 5.0R5 built by builder on 2002-03-02 04:42:41 UTC
RMOPD release 5.0R5 built by builder on 2002-03-02 04:46:11 UTC
jkernel-dd release 5.0R5 built by builder on 2002-03-02 04:41:07 UTC
jroute-dd release 5.0R5 built by builder on 2002-03-02 04:41:21 UTC
jdocs-dd release 5.0R5 built by builder on 2002-03-02 04:39:11 UTC
```

Meaning

The sample output shows the hostname, router model, and the different Junos OS packages, processes, and documents.

Log the Hardware Version Information (Junos OS)

IN THIS SECTION

Purpose

You should log hardware version information in the rare event that a router cannot successfully reboot and you cannot obtain the Routing Engine serial number. The Routing Engine serial number is necessary for Juniper Networks Technical Assistance Center (JTAC) to issue a return to manufacturing authorization (RMA). Without the Routing Engine serial number, an onsite technician must be dispatched to issue the RMA.

Action

To log the router chassis hardware version information, use the following Junos OS CLI operational mode command:

```
user@host> show chassis hardware | save filename
```

Sample Output

The output for the M-series routers varies depending on the chassis components of each router. All routers have a chassis, midplanes or backplanes, power supplies, and Flexible PIC Concentrators (FPCs). Refer to the hardware guides for information about the different chassis components.

```
user@host> show chassis hardware | save test
Wrote 43 lines of output to ‘test’

user@host> show chassis hardware
Item             Version  Part number  Serial number     Description
Chassis                                101               M160
Midplane         REV 02   710-001245   S/N AB4107
```

```
FPM CMB          REV 01   710-001642   S/N AA2911
FPM Display      REV 01   710-001647   S/N AA2999
CIP              REV 02   710-001593   S/N AA9563
PEM 0            Rev 01   740-001243   S/N KJ35769       DC
PEM 1            Rev 01   740-001243   S/N KJ35765       DC
PCG 0            REV 01   710-001568   S/N AA9794
PCG 1            REV 01   710-001568   S/N AA9804
Host 1                                 da000004f8d57001  teknor
MCS 1            REV 03   710-001226   S/N AA9777
SFM 0 SPP        REV 04   710-001228   S/N AA2975
SFM 0 SPR        REV 02   710-001224   S/N AA9838        Internet Processor I
SFM 1 SPP        REV 04   710-001228   S/N AA2860
SFM 1 SPR        REV 01   710-001224   S/N AB0139        Internet Processor I
FPC 0            REV 03   710-001255   S/N AA9806        FPC Type 1
  CPU            REV 02   710-001217   S/N AA9590
  PIC 1          REV 05   750-000616   S/N AA1527        1x OC-12 ATM, MM
  PIC 2          REV 05   750-000616   S/N AA1535        1x OC-12 ATM, MM
  PIC 3          REV 01   750-000616   S/N AA1519        1x OC-12 ATM, MM
FPC 1            REV 02   710-001611   S/N AA9523        FPC Type 2
  CPU            REV 02   710-001217   S/N AA9571
  PIC 0          REV 03   750-001900   S/N AA9626        1x STM-16 SDH, SMIR
  PIC 1          REV 01   710-002381   S/N AD3633        2x G/E, 1000 BASE-SX
FPC 2                                                   FPC Type OC192
  CPU            REV 03   710-001217   S/N AB3329
  PIC 0          REV 01                                 1x OC-192 SM SR-2
```

Meaning

The sample output shows the hardware inventory for an M160 router with a chassis serial number of 101. For each component, the output shows the version number, part number, serial number, and description.

Log the Chassis Environment Information (Junos OS)

IN THIS SECTION

Action

To log the router chassis environment information, use the following Junos OS CLI operational mode command:

```
user@host> show chassis environment | save filename
```

Sample Output

The following example shows output from the `show chassis environment` command for an M5 router:

```
user@m5-host> show chassis environment | save test
Wrote 14 lines of output to 'test'

user@m5-host> show chassis environment
Class Item                  Status     Measurement
Power Power Supply A        OK
      Power Supply B        OK
Temp  FPC Slot 0            OK         32 degrees C / 89 degrees F
      FEB                   OK         31 degrees C / 87 degrees F
      PS Intake             OK         26 degrees C / 78 degrees F
      PS Exhaust            OK         31 degrees C / 87 degrees F
Fans  Left Fan 1            OK         Spinning at normal speed
      Left Fan 2            OK         Spinning at normal speed
      Left Fan 3            OK         Spinning at normal speed
      Left Fan 4            OK         Spinning at normal speed
```

Meaning

The sample output shows the environmental information about the router chassis, including the temperature and information about the fans, power supplies, and Routing Engine.

Log the System Boot-Message Information (Junos OS)

IN THIS SECTION

- Meaning | 92

Action

To log the system boot-message information, use the following Junos OS CLI operational mode command:

```
user@host> show system boot-messages | save filename
```

Sample Output

```
user@host> show system boot-messages | save test
Wrote 80 lines of output to ‘test’

user@host> show system boot-messages
Copyright (c) 1992-1998 FreeBSD Inc.
Copyright (c) 1996-2000 Juniper Networks, Inc.
All rights reserved.
Copyright (c) 1982, 1986, 1989, 1991, 1993
        The Regents of the University of California.  All rights reserved.

JUNOS 4.1-20000216-Zf8469 #0: 2000-02-16 12:57:28 UTC
    tlim@device1.example.com:/p/build/20000216-0905/4.1/release_kernel/sys/compile/GENERIC
CPU: Pentium Pro (332.55-MHz 686-class CPU)
  Origin = "GenuineIntel"  Id = 0x66a  Stepping=10

Features=0x183f9ff<FPU,VME,DE,PSE,TSC,MSR,PAE,MCE,CX8,SEP,MTRR,PGE,MCA,CMOV,<b16>,<b17>,MMX,<b24>
>
Teknor CPU Card Recognized
real memory  = 805306368 (786432K bytes)
avail memory = 786280448 (767852K bytes)
Probing for devices on PCI bus 0:
chip0 <generic PCI bridge (vendor=8086 device=7192 subclass=0)> rev 3 class 60000 on pci0:0:0
chip1 <Intel 82371AB PCI-ISA bridge> rev 1 class 60100 on pci0:7:0
chip2 <Intel 82371AB IDE interface> rev 1 class 10180 on pci0:7:1
chip3 <Intel 82371AB USB interface> rev 1 class c0300 int d irq 11 on pci0:7:2
smb0 <Intel 82371AB SMB controller> rev 1 class 68000 on pci0:7:3
```

```
pcic0 <TI PCI-1131 PCI-CardBus Bridge> rev 1 class 60700 int a irq 15 on pci0:13:0
TI1131 PCI Config Reg: [pci only][FUNC0 pci int]
pcic1 <TI PCI-1131 PCI-CardBus Bridge> rev 1 class 60700 int b irq 12 on pci0:13:1
TI1131 PCI Config Reg: [pci only][FUNC1 pci int]
fxp0 <Intel EtherExpress Pro 10/100B Ethernet> rev 8 class 20000 int a irq 12 on pci0:16:0
chip4 <generic PCI bridge (vendor=1011 device=0022 subclass=4)> rev 4 class 60400 on pci0:17:0
fxp1 <Intel EtherExpress Pro 10/100B Ethernet> rev 8 class 20000 int a irq 10 on pci0:19:0
Probing for devices on PCI bus 1:mcs0 <Miscellaneous Control Subsystem> rev 12 class ff0000 int
a irq 12 on pci1:13:0
fxp2 <Intel EtherExpress Pro 10/100B Ethernet> rev 8 class 20000 int a irq 10 on pci1:14:0
Probing for devices on the ISA bus:
sc0 at 0x60-0x6f irq 1 on motherboard
sc0: EGA color <16 virtual consoles, flags=0x0>
ed0 not found at 0x300
ed1 not found at 0x280
ed2 not found at 0x340
psm0 not found at 0x60
sio0 at 0x3f8-0x3ff irq 4 flags 0x20010 on isa
sio0: type 16550A, console
sio1 at 0x3e8-0x3ef irq 5 flags 0x20000 on isa
sio1: type 16550A
sio2 at 0x2f8-0x2ff irq 3 flags 0x20000 on isa
sio2: type 16550A
pcic0 at 0x3e0-0x3e1 on isa
PC-Card ctlr(0) TI PCI-1131 [CardBus bridge mode] (5 mem & 2 I/O windows)
pcic0: slot 0 controller I/O address 0x3e0
npx0 flags 0x1 on motherboard
npx0: INT 16 interface
fdc0: direction bit not set
fdc0: cmd 3 failed at out byte 1 of 3
fdc0 not found at 0x3f0
wdc0 at 0x1f0-0x1f7 irq 14 on isa
wdc0: unit 0 (wd0): <SunDisk SDCFB-80>, single-sector-i/o
wd0: 76MB (156672 sectors), 612 cyls, 8 heads, 32 S/T, 512 B/S
wdc0: unit 1 (wd1): <IBM-DCXA-210000>
wd1: 8063MB (16514064 sectors), 16383 cyls, 16 heads, 63 S/T, 512 B/S
wdc1 not found at 0x170
wdc2 not found at 0x180
ep0 not found at 0x300
fxp0: Ethernet address 00:a0:a5:12:05:5a
fxp1: Ethernet address 00:a0:a5:12:05:59
fxp2: Ethernet address 02:00:00:00:00:01
swapon: adding /dev/wd1s1b as swap device
```

```
Automatic reboot in progress...
/dev/rwd0s1a: clean, 16599 free (95 frags, 2063 blocks, 0.1% fragmentation)
/dev/rwd0s1e: clean, 9233 free (9 frags, 1153 blocks, 0.1% fragmentation)
/dev/rwd0s1a: clean, 16599 free (95 frags, 2063 blocks, 0.1% fragmentation)
/dev/rwd1s1f: clean, 4301055 free (335 frags, 537590 blocks, 0.0% fragmentation)
```

Meaning

The sample output shows the initial messages generated by the system kernel upon boot. This is the content of the **/var/run/dmesg.boot** file.

Log the Active Configuration (Junos OS)

IN THIS SECTION

Action

To log the active configuration on the router, use the following Junos OS CLI operational mode command:

```
user@host> show configuration | save filename
```

Sample Output

```
user@host> show configuration | save test
Wrote 4076 lines of output to ‘test’

user@host> show configuration
system {
host-name lab8;
domain-name device1.example.com;
backup-router 10.1.1.254;
```

```
    time-zone America/Los_Angeles;
default-address-selection;
    dump-on-panic;
name-server {
[...Output truncated...]
```

Meaning

The sample output shows the configuration currently running on the router, which is the last committed configuration.

Log the Interfaces on the Router (Junos OS)

IN THIS SECTION

Action

To log the interfaces on the router, use the following Junos OS CLI operational mode command:

```
user@host> show interface terse | save filename
```

Sample Output

```
user@host> show interfaces terse | save test
Wrote 81 lines of output to ‘test’

user@host> show interfaces terse
Interface       Admin Link Proto Local             Remote
at-1/3/0        up    up
at-1/3/0.0      up    up   inet  203.0.113.1           --> 203.0.113.2
                           iso
fxp0            up    up
```

```
fxp0.0          up    up   inet  10.168.5.59/24
gre             down  up
ipip            down  up
lo0             up    up
lo0.0           up    up   inet  127.0.0.1         --> 0/0
                           iso 47.0005.80ff.f800.0000.0108.0001.1921.6800.5059.00
so-1/2/0        up    down
so-1/2/1        down  down
so-1/2/2        down  down
so-1/2/3        down  down
so-2/0/0        up    up
so-2/0/0.0      up    up   inet  192.2.3.4           --> 192.2.3.5
                           iso
[...Output truncated...]
```

Meaning

The sample output displays summary information about the physical and logical interfaces on the router.

Log the BGP, IS-IS, and OSPF Adjacency Information (Junos OS)

IN THIS SECTION

Purpose

The following commands log useful information about Border Gateway Protocol (BGP), Intermediate System-to-Intermediate System (IS-IS), and Open Shortest Path First (OSPF) protocols. If you have other protocols installed, such as Multiprotocol Label Switching (MPLS), Resource Reservation Protocol (RSVP), or Protocol Independent Multicast (PIM), you also might log summary information for them.

Action

To log the protocol peer information, use the following Junos OS CLI operational mode commands:

```
user@host> show bgp summary | save filename
user@host> show isis adjacency brief | save filename
user@host>  show ospf neighbor brief | save filename
```

Sample Output 1

```
user@host> show bgp summary | save test
Wrote 45 lines of output to ‘test’

user@host> show bgp summary
Groups: 1 Peers: 1 Down peers: 0
Table          Tot Paths  Act Paths Suppressed    History Damp State    Pending
inet.0                 4          4          0          0          0          0
Peer               AS      InPkt     OutPkt    OutQ   Flaps Last Up/Dwn State|#Active/Received/
Damped..
9.9.3.1             2       2627       2628       0       0    21:50:12 4/4/0
0/0/0
```

Sample Output 2

```
user@host> show isis adjacency brief | save test
Wrote 7 lines of output to ‘test’

user@host> show isis adjacency brief
IS-IS adjacency database:
Interface  System         L State        Hold (secs) SNPA
so-1/0/0.0 1921.6800.5067 2 Up                   13
so-1/1/0.0 1921.6800.5067 2 Up                   25
so-1/2/0.0 1921.6800.5067 2 Up                   20
so-1/3/0.0 1921.6800.5067 2 Up                   19
so-2/0/0.0 1921.6800.5066 2 Up                   19
so-2/1/0.0 1921.6800.5066 2 Up                   17
so-2/2/0.0 1921.6800.5066 2 Up                   20
so-2/3/0.0 1921.6800.5066 2 Up                   20
so-5/0/0.0 ranier         2 Up                   17
```

Sample Output 3

```
user@host> show ospf neighbor brief | save test
Wrote 10 lines of output to ‘test’

user@host> show ospf neighbor brief
  Address          Intf              State     ID               Pri  Dead
10.168.254.225   fxp3.0            2Way      10.250.240.32    128   36
10.168.254.230   fxp3.0            Full      10.250.240.8     128   38
10.168.254.229   fxp3.0            Full      10.250.240.35    128   33
10.1.1.129       fxp2.0            Full      10.250.240.12    128   37
10.1.1.131       fxp2.0            Full      10.250.240.11    128   38
10.1.2.1         fxp1.0            Full      10.250.240.9     128   32
10.1.2.81        fxp0.0            Full      10.250.240.10    128   33
```

Meaning

Sample output 1 displays summary information about BGP and its neighbors. Sample output 2 displays information about IS-IS neighbors. Sample output 3 displays information about all OSPF neighbors.

Log the System Storage Information (Junos OS)

IN THIS SECTION

Action

To log the system storage statistics for the amount of free disk space in the router’s file system, use the following Junos OS CLI operational mode command:

```
user@host> show system storage | save filename
```

Sample Output

```
user@host> show system storage | save test
Wrote 14 lines of output to 'test'

user@host> show system storage
Filesystem  1K-blocks     Used    Avail Capacity  Mounted on
/dev/ad0s1a     65687    26700    33733    44%    /
devfs              16       16        0   100%    /dev/
/dev/vn1         9310     9310        0   100%    /packages/mnt/jbase
/dev/vn2         8442     8442        0   100%    /packages/mnt/jkernel-5.0R5.1
/dev/vn3        11486    11486        0   100%    /packages/mnt/jpfe-5.0R5.1
/dev/vn4         5742     5742        0   100%    /packages/mnt/jroute-5.0R5.1
/dev/vn5         1488     1488        0   100%    /packages/mnt/jcrypto-5.0R5.1
/dev/vn6          792      792        0   100%    /packages/mnt/jdocs-5.0R5.1
mfs:2373      1015815        3   934547     0%    /tmp
/dev/ad0s1e     25263       11    23231     0%    /config
procfs              4        4        0   100%    /proc
/dev/ad1s1f   9825963  1811085  7228801    20%    /var
```

Meaning

The sample output displays statistics about the amount of free disk space in the router's file system. Values are displayed in 1024-byte (1-KB) blocks.

Validating the Configuration Image Before Upgrading or Downgrading the Software (Junos OS)

Here are some validation guidelines to keep in mind:

- Validation is set to on by default. You do not need to configure it or issue any command to start it on a switch that supports image validation. You can disable validation (the procedure is given below) and then re-enable it.
- Validation slows down the upgrade or downgrade process by as much as 7 minutes.
- Image validation is supported only on the **jinstall** package.
- If you invoke validation from an image that does not support validation, the new image is loaded but validation does not occur.

- Validation does not work in a *downgrade* to an image that does not support validation if your system is configured for graceful routing switchover (GRES) or if you run image loading without nonstop software upgrade (NSSU). See the procedure below for steps to use validation in this type of scenario.

If you upgrade or downgrade the Junos OS image on a switch that supports configuration image validation (see Feature Explorer for feature support per EX Series switch), the system validates that the existing configuration is compatible with the new image before the actual upgrade or downgrade commences.

Benefits of image validation—If validation fails, the new image is not loaded, and an error message provides information about the failure. If you upgrade or downgrade the software on a system that does not support validation, configuration incompatibilities between the existing and new image or insufficient memory to load the new image might cause the system to lose its current configuration or go offline.

To disable validation, re-enable or invoke validation manually, or use validation when downgrading to an image that does not support it:

- To disable validation, issue `request system software add image-name reboot no-validate` command.
- To re-enable or invoke validation manually, choose one of the following methods:
  - Issue `request system software add image-name`.
  - Issue `request system software nonstop-upgrade image-name`.
  - Issue `request system software validate` to run just configuration validation.
- To use validation when downgrading to an image that does not support it, choose one of the following methods:
  - Remove the graceful-switchover configuration and then issue the `request system software add image-name reboot` command.
  - Use NSSU by issuing the `request system software nonstop-upgrade image-name` command.

Ensuring Sufficient Disk Space for Junos OS Upgrades on SRX Series Firewalls

IN THIS SECTION

Before you begin upgrading Junos OS on an SRX Series Firewall, perform the following tasks:

Verifying Available Disk Space on SRX Series Devices

The amount of free disk space necessary to upgrade a device with a new version of Junos OS can vary from one release to another. Check the Junos OS software version you are installing to determine the free disk space requirements.

If the amount of free disk space on a device is insufficient for installing Junos OS, you might receive a warning similar to the following messages, that the /var filesystem is low on free disk space:

WARNING: The /var filesystem is low on free disk space.

WARNING: This package requires 1075136k free, but there is only 666502k available.

To determine the amount of free disk space on the device, issue the `show system storage detail` command. The command output displays statistics about the amount of free disk space in the device file systems.

A sample of the `show system storage detail` command output is shown below:

```
user@host> show system storage detail

Filesystem           1024-blocks       Used      Avail   Capacity   Mounted on
/dev/da0s2a          300196          154410     121772        56%  /
devfs                        1               1          0       100%  /dev
/dev/md0             409000          409000          0       100%  /junos
/cf                  300196          154410     121772        56%  /junos/cf
devfs                        1               1          0       100%  /junos/dev/
procfs                       4               4          0       100%  /proc
/dev/bo0s3e              25004              52      22952         0%  /config
/dev/bo0s3f          350628          178450     144128        55%  /cf/var
/dev/md1             171860           16804     141308        11%  /mfs
```

```
/cf/var/jail         350628          178450     144128        55%  /jail/var
/cf/var/log          350628          178450     144128        55%  /jail/var/log
devfs                     1               1          0       100%  /jail/dev
/dev/md2              40172               4      36956         0%  /mfs/var/run/utm
/dev/md3               1884             138       1596         8%  /jail/mfs
```

Cleaning Up the System File Storage Space

When the system file storage space on the device is full, rebooting the device does not solve the problem. The following error message is displayed during a typical operation on the device after the file storage space is full.

```
user@host% cli
user@host> configure/var: write failed, filesystem is full
```

You can clean up the file storage on the device by deleting system files using the `request system storage cleanup` command as shown in following procedure:

1. Request to delete system files on the device.

   ```
   user@host> request system storage cleanup
   ```

   The list of files to be deleted is displayed.

   ```
   List of files to delete:

            Size Date         Name
       11B Oct 28 23:40 /var/jail/tmp/alarmd.ts
     92.4K Jan 11 17:12 /var/log/chassisd.0.gz
     92.4K Jan 11 06:06 /var/log/chassisd.1.gz
     92.5K Jan 10 19:00 /var/log/chassisd.2.gz
     92.5K Jan 10 07:53 /var/log/chassisd.3.gz
     92.2K Jan 10 15:00 /var/log/hostlogs/auth.log.1.gz
     92.2K Jan  1 18:45 /var/log/hostlogs/auth.log.2.gz
     92.1K Jan  4 17:30 /var/log/hostlogs/auth.log.3.gz
     92.2K Jan  1 18:45 /var/log/hostlogs/auth.log.4.gz
     79.0K Jan 12 01:59 /var/log/hostlogs/daemon.log.1.gz
     78.8K Jan 11 23:15 /var/log/hostlogs/daemon.log.2.gz
     78.7K Jan 11 20:30 /var/log/hostlogs/daemon.log.3.gz
     79.1K Jan 11 17:44 /var/log/hostlogs/daemon.log.4.gz
     59.1K Jan 11 21:59 /var/log/hostlogs/debug.1.gz
   ```

```
  59.2K Jan 11 17:44 /var/log/hostlogs/debug.2.gz
  59.2K Jan 11 13:29 /var/log/hostlogs/debug.3.gz
  59.3K Jan 11 09:14 /var/log/hostlogs/debug.4.gz
 186.6K Oct 20 16:31 /var/log/hostlogs/kern.log.1.gz
 238.3K Jan 11 23:15 /var/log/hostlogs/lcmd.log.1.gz
 238.4K Jan 11 17:30 /var/log/hostlogs/lcmd.log.2.gz
 238.6K Jan 11 11:45 /var/log/hostlogs/lcmd.log.3.gz
 238.5K Jan 11 06:00 /var/log/hostlogs/lcmd.log.4.gz
 372.5K Jan 11 17:00 /var/log/hostlogs/syslog.1.gz
 372.5K Jan 11 04:45 /var/log/hostlogs/syslog.2.gz
 371.9K Jan 10 16:30 /var/log/hostlogs/syslog.3.gz
 372.7K Jan 10 04:15 /var/log/hostlogs/syslog.4.gz
  10.1K Jan 12 02:03 /var/log/messages.0.gz
  55.1K Jan  6 21:25 /var/log/messages.1.gz
  81.5K Dec  1 21:30 /var/log/messages.2.gz

Delete these files ? [yes,no] (no)
```

2. Enter the option `yes` to proceed with deleting of the files.

Verifying Junos OS and Boot Loader Software Versions on an EX Series Switch

IN THIS SECTION

Before or after upgrading or downgrading Junos OS, you might need to verify the Junos OS version. You might also need to verify the boot loader software version if you are upgrading to or downgrading from a release that supports resilient dual-root partitions (Junos OS Release 10.4R3 and later).

This topic includes:

Verifying the Number of Partitions and File System Mountings

IN THIS SECTION

Purpose

Between Junos OS Release 10.4R2 and Release 10.4R3, upgrades were made to further increase resiliency of root partitions, which required reformatting the disk from three partitions to four partitions. If your switch is running Release 10.4R2 or earlier, it has three partitions, and if it is running Release 10.4R3 or later, it has four partitions.

Action

Verify how many partitions the disk has, as well as where each file system is mounted, by using the following command:

```
user@switch> show system storage
fpc0:
--------------------------------------------------------------------
Filesystem  Size  Used  Avail  Capacity Mounted on
/dev/da0s1a 184M  124M    45M     73%    /
devfs       1.0K  1.0K    0B      100%  /dev
/dev/md0     37M   37M    0B      100%  /packages/mnt/jbase
/dev/md1     18M   18M    0B      100%  /packages/mnt/jcrypto-
ex-10.4I20110121_0509_hbRPSRLI15184421081
/dev/md2    6.1M  6.1M    0B      100%  /packages/mnt/jdocs-
ex-10.4I20110121_0509_hbRPSRLI15184421081
/dev/md3    154M  154M    0B      100%  /packages/mnt/jkernel-
ex-10.4I20110121_0509_hbRPSRLI15184421081
/dev/md4     23M   23M    0B      100%  /packages/mnt/jpfe-
ex42x-10.4I20110121_0509_hbRPSRLI15184421081
/dev/md5     46M   46M    0B      100%  /packages/mnt/jroute-
ex-10.4I20110121_0509_hbRPSRLI15184421081
/dev/md6     28M   28M    0B      100% /packages/mnt/jswitch-
```

```
ex-10.4I20110121_0509_hbRPSRLI15184421081
/dev/md7     22M   22M    0B      100%  /packages/mnt/jweb-
ex-10.4I20110121_0509_hbRPSRLI15184421081
/dev/md8     126M  10.0K 116M       0%  /tmp
/dev/da0s3e  123M   632K  112M     1%  /var
/dev/da0s3d  369M    20K  339M     0%  /var/tmp
/dev/da0s4d   62M    62K   57M     0%  /config
/dev/md9     118M   12M   96M     11%  /var/rundb
procfs       4.0K  4.0K    0B    100%  /proc
/var/jail/etc 123M  632K 112M      1%  /packages/mnt/jweb-
ex-10.4I20110121_0509_hbRPSRLI15184421081/jail/var/etc
/var/jail/run 123M   632K 112M    1%  /packages/mnt/jweb-
ex-10.4I20110121_0509_hbRPSRLI15184421081/jail/var/run
/var/jail/tmp 123M   632K 112M    1%  /packages/mnt/jweb-
ex-10.4I20110121_0509_hbRPSRLI15184421081/jail/var/tmp
/var/tmp      369M    20K 339M    0%  /packages/mnt/jweb-
ex-10.4I20110121_0509_hbRPSRLI15184421081/jail/var/tmp/uploads
devfs         1.0K   1.0K   0B  100%  /packages/mnt/jweb-
ex-10.4I20110121_0509_hbRPSRLI15184421081/jail/dev
```

Meaning

The presence of the partition name containing `s4d` indicates that there is a fourth slice. If this were a three-slice partition scheme, in place of `s1a`, `s3e`, `s3d`, and `s4d`, you would see `s1a`, `s1f`, `s2a`, `s2f`, `s3d`, and `s3e`, and you would not see `s4d`.

Verifying the Loader Software Version

IN THIS SECTION

Purpose

For the special case of upgrading from Junos OS Release 10.4R2 or earlier to Release 10.4R3 or later, you must upgrade the loader software.

Action

For EX Series switches except EX8200 switches:

```
user@switch> show chassis firmware
Part                    Type       Version
FPC 0                   uboot      U-Boot 1.1.6 (Jan  3 2011 - 16:14:58) 1.0.0
                        loader     FreeBSD/PowerPC U-Boot bootstrap loader 2.4
```

For EX8200 switches:

```
user@switch> show chassis firmware
Part                    Type       Version
FPC 0                   uboot      U-Boot 1.1.6 (Jan  3 2011 - 16:14:58) 3.5.0
                        loader     FreeBSD/PowerPC U-Boot bootstrap loader 2.4
```

Meaning

For EX Series switches other than EX8200 switches, with Junos OS Release 10.4R3 or later installed:

- If there is version information following the timestamp for `U-Boot` (`1.0.0` in the preceding example), then the loader software does not require upgrading.
- If there is no version number following the timestamp for `U-boot`, then the loader software requires upgrading.

> **NOTE**: If the software version is Release 10.4R2 or earlier, no version number is displayed following the timestamp for `U-boot`, regardless of the loader software version installed. If you do not know whether you have installed the new loader software, we recommend that you upgrade the loader software when you upgrade the software version.

For EX8200 switches, if the version number following the timestamp for `U-Boot` is earlier than `3.5.0`, you must upgrade the loader software when you upgrade the software version.

Verifying Which Root Partition Is Active

IN THIS SECTION

Purpose

Switches running Release 10.4R3 or later have resilient dual-root partition functionality, which includes the ability to boot transparently from the inactive partition if the system fails to boot from the primary root partition.

You can verify which root partition is active using the following command:

Action

```
user@switch> show system storage partitions
fpc0:
--------------------------------------------------------------------------
Boot Media: internal (da0)
Active Partition: da0s1a
Backup Partition: da0s2a
Currently booted from: active (da0s1a)
Partitions information:
  Partition  Size   Mountpoint
  s1a        184M   /
  s2a        184M   altroot
  s3d        369M   /var/tmp
  s3e        123M   /var
  s4d        62M    /config
  s4e               unused (backup config)
```

Meaning

The `Currently booted from:` field shows which root partition is active.

Verifying the Junos OS Version in Each Root Partition

IN THIS SECTION

Purpose

Each switch contains two root partitions. We recommend that you copy the same Junos OS version in each partition when you upgrade. In Junos OS Release 10.4R2 and earlier, you might choose to have different Junos OS release versions in each partition. You might have different versions during a software upgrade and before you have finished verifying the new software installation. To enable a smooth reboot if corruption is found in the primary root file system, ensure that the identical Junos OS images are in each root partition. For Release 10.4R2 and earlier, you must manually reboot the switch from the backup root partition. However, for Release 10.4R3 and later, the switch reboots automatically from the backup root partition if it fails to reboot from the active root partition.

Action

Verify whether both root partitions contain the same image by using the following command:

```
user@switch> show system snapshot media internal
Information for snapshot on       internal (/dev/da0s1a) (backup)
Creation date: Jan 11 03:02:59 2012
JUNOS version on snapshot:
  jbase  : ex-12.2I20120305_2240_user
  jcrypto-ex: 12.2I20120305_2240_user
  jdocs-ex: 12.2I20120305_2240_user
  jroute-ex: 12.2I20120305_2240_user
  jswitch-ex: 12.2I20120305_2240_user
  jweb-ex: 12.2I20120305_2240_user
Information for snapshot on       internal (/dev/da0s2a) (primary)
Creation date: Mar 6 02:24:08 2012
JUNOS version on snapshot:
  jbase  : ex-12.2I20120305_2240_user
  jcrypto-ex: 12.2I20120305_2240_user
```

```
jdocs-ex: 12.2I20120305_2240_user
jroute-ex: 12.2I20120305_2240_user
jswitch-ex: 12.2I20120305_2240_user
jweb-ex: 12.2I20120305_2240_user
```

Meaning

The command shows which Junos OS version is installed on each media partition. Verify that the same version is installed on both partitions.

RELATED DOCUMENTATION

Configuring Dual-Root Partitions | 422

Access Juniper Support

IN THIS SECTION

Existing Users—How to Log In

This topic provides an overview on how you can access the enterprise-hub environment for accessing the software package downloads and support tools.

If you are an existing user with an active Juniper Networks® profile, contact Global support. The global support team sends an access token to your registered e-mail ID.

New Users—How to Create an Account

To register as a new user, use the User Registration link and perform the following steps to create a new account:

1. Create a user account by providing your e-mail address on the Create User Account page.
   After you submit your e-mail ID, you will receive a confirmation e-mail with a link to proceed with the account setup process.

2. Click the link to open the **Account Setup** page and complete all the required account setup activities.

   The **Email Address** field already contains the e-mail address you provided in Step 1. This e-mail ID also acts as your user ID for this account.

   > **NOTE**: You cannot create an account by using a public domain e-mail address such as @gmail.com or @yahoo.com. If you use a public domain address, you will receive an alert declining your account status. Change your e-mail address before you click **Next** to proceed.

3. If you are not an existing Juniper customer or partner and the system does not recognize your email domain, you can select one of the following options:

   - Individual Email
   - Group Email

   Hover over the question mark icons next to each option for a brief description.

4. Click **Next** to proceed.
   Your account creation is successful.
5. After your account is active, contact Global support. The global support team sends an access token to your registered e-mail ID.

SEE ALSO

> https://www.juniper.net/documentation/us/en/software/crpd/crpd-deployment/topics/task/crpd-linux-server-install.html

Downloading Software (Junos OS)

IN THIS SECTION

Downloading Software Using a Browser (Junos OS)

You download the software package you need from the Juniper Networks Downloads page at https://support.juniper.net/support/downloads/.

> **NOTE**: To access the download section, you must have a service contract and an access account. If you require assistance in acquiring an account, refer to the instructions on how to "Access Juniper Support" on page 107 and fill out the registration form found on the Juniper Networks website: https://userregistration.juniper.net/entitlement/setupAccountInfo.do.

To download the software image:

1. Using a Web browser, navigate to https://support.juniper.net/support/downloads/.

   The Download Results page appears.

2. Find the software package that you want to download and click the item in the Downloads column.

   A login screen appears.

3. Log in with your username and password.

4. On the Download Software page that appears, the following options are available:

   - If you want to download the software on your local host, click the **CLICK HERE** link and save the file to your system. If you want to place the file on a remote system, you must make sure that the file can be accessible by the router, switch, or services gateway by using HTTP, FTP, or SCP. Proceed with the installation. See "Downloading Software (Junos OS)" on page 108 for more details.

   - If you want to download the software on your device, use the following procedure to download and install the software on the device.

     a. Click **Copy** to copy the generated URL to the clipboard.

     > **NOTE**: The URL string generated remains active only for 15 minutes.

     b. Log in to your device.

     c. In operational mode, enter the `file copy "URL" destination` command.

     In the command, paste the copied URL string (for ***URL***) and then enter **/var/tmp** (as the destination on your hard disk).

Example:

```
user@host> file copy "URL" /var/tmp
```

NOTE: Ensure that the URL string is enclosed within quotation marks. Also ensure that there is sufficient free space available on the device.

The software image is downloaded on your device.

d. (Optional) Validate the software image by using the `request system software validate` *package-name* command.

Example:

```
user@host> request system software validate /var/tmp/junos-install-mx-
x86-32-17.3R1.10.tgz
```

For more details, see request system software validate.

e. Install the software by using the `request system software add` *package-name* command.

Example:

```
user@host> request system software add /var/tmp/junos-install-mx-x86-32-17.3R1.10.tgz
```

Your software is installed on the device.

Downloading Software Using the Command-Line Interface (Junos OS)

Download the software package you need from the Juniper Networks Downloads page athttps://support.juniper.net/support/downloads/, and place the package on a local system. You can then transfer the downloaded package to the device using either the router or switch command-line interface, or the local system command-line interface.

NOTE: To access the download section, you must have a service contract and an access account. If you need help obtaining an account, complete the registration form at the Juniper Networks website: https://userregistration.juniper.net/entitlement/setupAccountInfo.do.

Before you transfer the software package, ensure that the FTP service is enabled on the device.

Enable the FTP service using the `set system services ftp` command:

```
user@host# set system services ftp
```

To transfer the software package using the device command-line interface:

1. From the router or switch command line, initiate an FTP session with the local system (host) where the package is located by using the `ftp` command:

   ```
   user@host> ftp host
   ```

   host is the hostname or address of the local system.
2. Log in with your customer support–supplied username and password:

   ```
   User Name: username
   331 Password required for username.
   Password: password
   ```

   After your credentials are validated, the FTP session opens.
3. Navigate to the software package location on the local system, and transfer the package by using the `get` command:

   ```
   user@host> get installation-package
   ```

   Following is an example of an *installation-package* name: **junos-install-mx-x86-32-17.3R1.10.tgz**
4. Close the FTP session by using the `bye` command:

   ```
   user@host> bye
   Goodbye
   ```

To transfer the package by using the local system command-line interface:

1. From the local system command line, initiate an FTP session with the device using the `ftp` command:

   ```
   user@host> ftp host
   ```

   host is the hostname or address of the router or switch.

2. Log in with your customer support–supplied username and password:

```
User Name: username
331 Password required for username.
Password: password
```

After your credentials are validated, the FTP session opens.

3. Navigate to the software package location on the local system, and transfer the package by using the `put` command:

```
user@host> put installation-package
```

Following is an example of an *installation-package* name: **junos-install-mx-x86-32-17.3R1.10.tgz**

4. Close the FTP session by using the `bye` command:

```
user@host> bye
Goodbye
```

Downloading Software Using Download Manager (SRX Series Only)

This download manager feature facilitates download of large files over low-bandwidth links. It enables you to download large Junos OS packages over low-bandwidth/flaky links so that the system can be upgraded. This feature allows you to download multiple files while monitoring their status and progress individually. It takes automatic action when required and displays status information when requested.

The download manager is supported on SRX300, SRX320, SRX340, SRX345, and SRX380 devices.

Be aware of the following considerations when using the download manager:

- When no download limit is specified for a specific download or for all downloads, a download uses all available network bandwidth.
- Because the download limit that you set indicates an average bandwidth limit, it is possible that certain bursts might exceed the specified limit.
- When a download from an HTTP server fails, the server returns an HTML page. Occasionally, the error page is not recognized as an error page and is downloaded in place of the Junos image file.
- Remote server logins and passwords are stored by the download manager for the duration of a download. To encrypt these credentials provided along with the login keyword, define an encryption

key with the `request system set-encryption-key` command. Any changes to encryption settings while download is in progress can cause the download to fail.

- A download command issued on a particular node in a *chassis cluster* takes place only on that node and is not propagated to the other nodes in the cluster. Downloads on different nodes are completely independent of each other. In the event of a failover, a download continues only if the server remains reachable from the node from which the command was issued. If the server is no longer reachable on that node, the download stops and returns an error.

NOTE: The download manager supports only the FTP and HTTP protocols.

The download manager acts as a substitute for the FTP utility. You can use the download manager CLI commands for all the functions where you previously used the FTP utility.

Before you begin, you must have the following:

- An FTP or HTTP server with a Junos OS image
- A server that is reachable from the device being upgraded

To download the Junos OS image to your device:

1. Use the `request system download start` command (set a bandwidth limit, if required). The file is saved to the **/var/tmp** directory on your device.

   You can continue to use the device while the download runs in the background.
2. To verify that the file has been downloaded, use the `show system download` command. The command displays the state as "completed" when the downloaded file is ready to be installed.
3. To install the downloaded image file from the **/var/tmp** directory, use the `request system software add` command.
4. If you encounter any problem with a download, use the `show system download` *id* command to obtain details about the download.

Table 2 lists the output fields for the `show system download` command. Use this information to diagnose problems. Output fields are listed in the approximate order in which they appear.

Table 6: show system download Output Fields

Output Field	Description
Status	State of the download.

Table 6: show system download Output Fields *(Continued)*

Output Field	Description
Creation Time	Time the `start` command was issued.
Scheduled Time	Time the download was scheduled to start.
Start Time	Time the download actually started (if it has already started).
Retry Time	Time for next retry (if the download is in the error state).
Error Count	Number of times an error was encountered by this download.
Retries Left	Number of times the system will retry the download automatically before stopping.
Most Recent Error	Message indicating the cause of the most recent error.

Reinstall Junos OS

IN THIS SECTION

Action

To reinstall Junos OS, follow these steps:

1. Insert the removable medium (boot floppy) into the router.
2. Reboot the router, either by power-cycling it or by issuing the `request system reboot` command from the CLI.

3. At the following prompt, type **y**:

```
WARNING: The installation will erase the contents of your disk. Do you wish to continue (y/n)?
```

   The router copies the software from the removable medium onto your system, occasionally displaying status messages. This can take up to 10 minutes.

4. Remove the removable medium when prompted.

   The router reboots from the primary boot device on which the software is installed. When the reboot is complete, the router displays the login prompt.

Reconfigure Junos OS

IN THIS SECTION

After you have reinstalled the software, you must copy the router's configuration files back to the router. (You also can configure the router from scratch, as described in *Junos System Basics Configuration Guide*) However, before you can copy the configuration files, you must establish network connectivity.

To reconfigure the software, follow these steps:

Configure Host Names, Domain Names, and IP Addresses (Junos OS)

To configure the machine name, domain name, and various addresses, follow these steps:

1. Log in as `root`. There is no password.

2. Start the CLI:

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

3. Enter configuration mode:

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

4. Configure the name of the machine. If the name includes spaces, enclose the entire name in quotation marks (" "):

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

5. Configure the machine's domain name:

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

6. Configure the IP address and prefix length for the router's management Ethernet interface:

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

7. Configure the IP address of a default router. This system is called the backup router because it is used only while the routing protocol process is not running.

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

8. Configure the IP address of a Domain Name Server (DNS) server:

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

Protect Network Security by Configuring the Root Password

Configure the root password on your Juniper Networks device to help prevent unauthorized users from making changes to your network. The root user (also referred to as superuser) has unrestricted access

and full permissions within the system, so it is crucial that you protect this account by setting a strong password when setting up a new device.

After you initially power on a new device, you log in as the user `root` with no password. The software requires you to configure the root password before it accepts a commit operation.

To set the root password, you have three options:

- Enter a plain-text password that the software encrypts.
- Enter a password that is already encrypted.
- Enter a Secure Shell (SSH) public key string.

Among these options, using a pre-encrypted password or an SSH public key string is the most secure. If you use one of these methods, then the plain-text version of your password will never be transferred over the Internet, protecting it from being intercepted by a man-in-the-middle attack.

BEST PRACTICE: Optionally, instead of configuring the root password at the `[edit system]` hierarchy level, you can use a configuration group to strengthen security.

To set the root password:

1. Use one of these methods to configure the root password:
   - To enter a plain-text password that the system encrypts for you:

     ```
     [edit groups global system]
     root@# set root-authentication plain-text-password
     New Password: type password here
     Retype new password: retype password here
     ```

     As you enter a plain-text password into the CLI, the device software hides it from view and encrypts it immediately. You don't have to configure the software to encrypt the password. In the resulting configuration, the encrypted password is marked as `## SECRET-DATA` so that it cannot be seen.

   - To enter a password that is already encrypted:

     CAUTION: Do not use the `encrypted-password` option unless the password is *already* encrypted and you are entering that encrypted password.

If you accidentally configure the `encrypted-password` option with a plain-text password or with blank quotation marks (" "), you will not be able to log in to the device as the root user. You will then need to complete the root password recovery process.

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

- To enter an SSH public key string:

```
[edit groups global system]
root@# set root-authentication (ssh-ecdsa | ssh-rsa key)
```

2. If you used a configuration group, replace the *group-name* variable with the configuration group's name.

```
[edit]
root@# set apply-groups group-name
```

3. Commit the changes.

```
root@# commit
```

Check Network Connectivity (Junos OS)

IN THIS SECTION

Purpose

Establish that the router has network connectivity.

Action

To check that the router has network connectivity, issue a `ping` command to a system on the network:

```
root@> ping address
```

If there is no response, verify that there is a route to the *address* using the `show route` command. If the address is outside your `fxp0` subnet, add a static route. Once the backup configuration is loaded and committed, the static route is no longer needed and should be deleted.

Release History Table

Release	Description
18.3R1	Starting in Junos OS Release 18.3R1, the ssh-dss and ssh-dsa hostkey algorithms are deprecated—rather than immediately removed—to provide backward compatibility and a chance to bring your configuration into compliance with the new configuration.

RELATED DOCUMENTATION

Troubleshooting Software Installation on EX Series Switches | 584

Troubleshooting a Switch That Has Booted from the Backup Junos OS Image | 590

Managing YANG Packages and Configurations During a Software Upgrade or Downgrade

IN THIS SECTION

Certain devices running Junos OS enable you to load custom YANG modules on the device to add data models that are not natively supported by Junos OS. When you add, update, or delete a YANG data

model, Junos OS rebuilds its schema and then validates the active configuration against the updated schema.

When you upgrade or downgrade Junos OS, by default, the system validates the software package or bundle against the current configuration. During the installation, the schema for custom YANG data models is not available. As a result, if the active configuration contains dependencies on these models, the software validation fails, which causes the upgrade or downgrade to fail.

In addition, devices that are running Junos OS based on FreeBSD version 6 remove custom YANG packages from the device during the software installation process. For this Junos OS variant, if the active configuration contains dependencies on custom YANG data models, the software installation fails even if you do not validate the software against the configuration, because the configuration data cannot be validated during the initial boot-time commit.

For these reasons, before you upgrade or downgrade the Junos OS image on a device that has one or more custom YANG modules added to it, you must remove all configuration data corresponding to the custom YANG data models from the active configuration. After the software installation is complete, add the YANG packages and corresponding configuration data back to the device, if appropriate. The tasks are outlined in this topic.

NOTE: You do not need to delete configuration data corresponding to OpenConfig packages before upgrading or downgrading Junos OS.

Backing up and Deleting the Configuration Data

If the configuration contains dependencies on custom YANG data models:

1. If you plan to restore the configuration data that corresponds to the nonnative YANG data models after the software is updated, save a copy of either the entire configuration or the configuration data corresponding to the YANG data models, as appropriate.
   - To save the entire configuration:

     ```
     user@host> show configuration | save (filename | url)
     ```

   - To save configuration data under a specific hierarchy level:

     ```
     user@host> show configuration path-to-yang-statement-hierarchy | save (filename | url)
     ```

2. In configuration mode, delete the portions of the configuration that depend on the custom YANG data models.

```
[edit]
user@host# delete path-to-yang-statement-hierarchy
```

3. Commit the changes.

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

4. Prior to performing the software installation, ensure that the saved configuration data and the YANG module and script files are saved to a local or remote location that will preserve the files during the installation and that will be accessible after the installation is complete.

Restoring the YANG Packages and Configuration Data

After the software installation is complete, load the YANG packages onto the device (where required), and restore the configuration data associated with the packages, if appropriate. During a software upgrade or downgrade, devices running Junos OS with upgraded FreeBSD preserve custom YANG packages, whereas devices running Junos OS based on FreeBSD version 6 delete the packages.

1. Load the YANG packages (devices running Junos OS based on FreeBSD version 6 only).

```
user@host> request system yang add package package-name module [modules] deviation-
module [modules] translation-script [scripts] action-script [scripts]
```

2. When the system prompts you to restart the Junos OS CLI, press `Enter` to accept the default value of `yes`.

```
...
WARNING: cli has been replaced by an updated version:
...
Restart cli using the new version ? [yes,no] (yes)

Restarting cli ...
```

NOTE: To prevent CLI-related or configuration database errors, we recommend that you do not perform any CLI operations, change the configuration, or terminate the operation while a device is in the process of adding, updating, or deleting a YANG package and modifying the schema.

3. In configuration mode, load the configuration data associated with the YANG packages.

   For example, to load the configuration data from a file relative to the top level of the configuration statement hierarchy:

```
[edit]
user@host# load merge (filename | url)
```

   NOTE: For more information about loading configuration data, see the *CLI User Guide*.

4. Commit the changes.

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

RELATED DOCUMENTATION

Managing YANG Packages, Modules, and Scripts on Devices Running Junos OS

Installing Software on Routing Devices (Junos OS)

IN THIS SECTION

Routing devices are delivered with Junos OS preinstalled on them. As new features and software fixes become available, you must upgrade Junos OS to use them. You can install software on single and redundant routing engines.

Installing the Software Package on a Router with a Single Routing Engine (Junos OS)

Before you install a new software release on a device, you should back up the current system.

NOTE: Starting in Junos OS release 20.3R1, ACX710 routers support limited images.

To upgrade the software on a router or switch:

1. Install the new software package using the `request system software add` command:

```
user@host> request system software add /var/tmp/installation-package
```

The variable ***installation-package*** is the name of the installation package. Specify the absolute path on the local disk. For package name prefixes, see "Junos OS Installation Package Names" on page 70.

NOTE: (Junos OS only) To install multiple software packages at one time, you can use the `request system software add set` command. For more information on this command, see the `set` option in "request system software add (Junos OS)" on page 741.

CAUTION: Do not include the `re0 | re1` option when you install a package using the `request system software add` command, if the Routing Engine on which the package is located and the Routing Engine on which you want to install the package are the same. In such cases, the package gets deleted after a successful upgrade.

2. Reboot the device to start the new software:

```
user@host>  request system shutdown reboot
Reboot the system ? [yes,no] (no) yes
```

NOTE: You must reboot the device to load the new software release on the device.
To terminate the installation, do not reboot the device. Instead, finish the installation and then issue the `request system software delete` *package-name* command. This is your last chance to stop the installation.

The software is loaded when you reboot the system. Installation can take between 5 and 10 minutes. The device then reboots from the boot device on which the software was just installed. When the reboot is complete, the device displays the login prompt.

While the software is being upgraded, the Routing Engine on which you are performing the installation does not route traffic.

3. Log in and verify the release of the software installed:

   - To verify release for installation of a Junos OS release, use the `show version` command.

```
user@host>  show version
```

SEE ALSO

request system software add (Junos OS) | 741

show version

Installing the Software Package on a Device with Redundant Routing Engines (Junos OS)

IN THIS SECTION

If the device has two Routing Engines, perform a Junos OS installation on each Routing Engine separately to minimize disruption to network operation.

To upgrade redundant Routing Engines, you first install the new Junos OS release on the backup Routing Engine while keeping the currently running software version on the primary Routing Engine. After making sure that the new software version is running correctly on the backup Routing Engine, you switch device control to the backup Routing Engine. Finally, you install the new software on the new backup Routing Engine. For detailed procedures, see the following subsections:

Preparing the Device for the Installation (Junos OS)

Determine if this is the best procedure for upgrading your device:

- If your EX8200 switch is running Junos OS Release 10.4R3 or later, you can upgrade the software packages on both Routing Engines with a single command and with minimal network disruption by using nonstop software upgrade (NSSU) instead of this procedure. See Upgrading Software on an EX6200 or EX8200 Standalone Switch Using Nonstop Software Upgrade (CLI Procedure).
- To upgrade two different Junos OS releases with no disruption on the control plane and with minimal disruption of traffic, you can use In-Service Software Upgrade, see Getting Started with Unified In-Service Software Upgrade for routers and switches, and Upgrading a Chassis Cluster Using In-Service Software Upgrade for SRX Series Firewalls.
- To upgrade the software running on EX Series Ethernet Switches with redundant Routing Engines and all member switches in EX Series Virtual Chassis with a single command, you can use Nonstop Software Upgrade, see *Understanding Nonstop Software Upgrade on EX Series Switches*.
- To upgrade the software package on an EX6200 switch or an EX8200 switch with one installed Routing Engine, see "Installing Software on an EX Series Switch with a Virtual Chassis or Single Routing Engine (CLI Procedure)" on page 136.

WARNING: If graceful Routing Engine switchover (GRES) or nonstop active routing (NSR) is enabled when you initiate a software installation, the software does not install properly. Make sure you deactivate GRES (if it is enabled). By default, NSR is disabled. If NSR is enabled, remove the nonstop-routing statement from the [edit routing-options] hierarchy level to disable it.

To ensure GRES and NSR are disabled:

1. Log in to the primary Routing Engine's console.

   For more information about logging in to the Routing Engine through the console port, see the specific hardware guide for your device.

2. From the CLI operational prompt, enter configuration mode:

```
{master}
user@host> configure
Entering configuration mode

{master} [edit]
user@host#
```

3. Disable nonstop active routing (NSR) (supported on switches running Junos OS Release 10.4 or later):

```
{master}[edit]
user@host# delete routing-options nonstop-routing
```

4. Disable nonstop-bridging if it is enabled:

```
{master}[edit]
user@host# delete protocols layer2-control nonstop-bridging
```

5. Disable Routing Engine redundancy if enabled:

```
{master}[edit]
user@host# (delete | deactivate) chassis redundancy graceful-switchover
```

6. Save the configuration change on both Routing Engines:

```
{master}[edit]
user@host# commit synchronize
re0:
configuration check succeeds
re1:
commit complete
re0:
commit complete
```

NOTE: To ensure the most recent configuration changes are committed before the software upgrade, perform this step even if nonstop active routing and graceful Routing Engine switchover were previously disabled.

7. Exit the CLI configuration mode:

```
[edit]
user@host# exit
```

Installing Software on the Backup Routing Engine (Junos OS)

After the device has been prepared, you first install the new Junos OS release on the backup Routing Engine, while keeping the currently running software version on the primary Routing Engine. This enables the primary Routing Engine to continue operations, minimizing disruption to your network.

Before you start this procedure, decide which software package you need and download it to the **/var/tmp** directory of the primary Routing Engine. For information on which packages to use for which upgrades, see "Junos OS Installation Package Names" on page 70.

To install software on the backup Routing Engine:

1. Log in to the console port on the current primary Routing Engine in slot 0.
2. Install the new software package on the backup Routing Engine (re1) using the `request system software add` command:

```
user@host> request system software add re1 validate /var/tmp/jinstall-9.2R1.8-domestic-
signed.tgz
```

Installation and validation take about 15 minutes.

CAUTION: Do not include the `re0` or `re1` option when you install a package using the `request system software add` command if the Routing Engine on which the package is located and the Routing Engine on which you want to install the package are the same. In such cases, the package gets deleted after a successful upgrade.

For M Series, MX Series, and T Series routers running Junos OS Release 12.2 and later, you can use the `request system software add set` command to install multiple software packages at the same time:

```
user@host> request system software add set re1 /var/tmp/installation-package
```

For more information about the `request system software add set` command, see "request system software add (Junos OS)" on page 741 or the CLI Explorer.

3. Reboot the backup Routing Engine to start the new software:

```
user@host> request system reboot other-routing-engine
Rebooting re1
user@host>
```

You must reboot the device to load the new installation of Junos OS on the device. You can combine steps 2 and 3 by adding **reboot** to the `request system software add` command. But if you do the steps separately, make sure you reboot the Routing Engine you just added system software to.

> **NOTE**: To terminate the installation, do not reboot your device. Instead, finish the installation and then issue the `request system software delete` *`software-package-name`* command. This is your last chance to stop the installation.

All the software is loaded when you reboot the device. Installation can take between 5 and 10 minutes. The device then reboots from the boot device on which the software was just installed. When the reboot is complete, the device displays the login prompt.

While the software is being upgraded, the Routing Engine on which you are performing the installation is not routing traffic.

4. Issue the `show version invoke-on other-routing-engine` command to verify the new software is installed.

```
user@host> show version invoke-on other-routing-engine
re1:
--------------------------------------------------------------------------
Hostname: host1
Model: mx240
Junos: package-name
. . .
user@host>
```

5. (Optional) Add the **jweb** package using the `request system software add` command. Before you can add this package, you must first download the software as you did the installation package. For more information about downloading the **jweb** package, see "Downloading Software (Junos OS)" on page 108.

   The **jweb** installation module adds a router management graphical user interface that you can use to view and configure your router.

Installing Software on the Remaining Routing Engine (Junos OS)

Once the software is installed on the backup Routing Engine, you are ready to switch routing control to the backup Routing Engine, and then upgrade or downgrade the software on the remaining Routing Engine in slot 0.

To install software on the primary Routing Engine:

1. Transfer routing control from the primary to the backup Routing Engine:

```
user@host> request chassis routing-engine master switch
warning: Traffic will be interrupted while the PFE is re-initialized
Toggle mastership between routing engines ? [yes,no] (no) yes

Resolving mastership...
Complete. The other routing engine becomes the master.
```

   For more information about the `request chassis routing-engine master` command, see the CLI Explorer.

2. Verify that the Routing Engine in slot 1 is now the primary Routing Engine:

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

Routing Engine status:
  Slot 0:
    Current state                  Backup
    Election priority              Master (default)

Routing Engine status:
  Slot 1:
    Current state                  Master
    Election priority              Backup (default)
```

3. Install the new software package on the Routing Engine in slot 0 using the `request system software add` command:

```
user@host> request system software add validate re0  /var/tmp/jinstall-9.2R1.8-domestic-
signed.tgz
```

Installation and validation take about 15 minutes.

> **CAUTION**: Do not include the `re0` or `re1` option when you install a package using the `request system software add` command if the Routing Engine on which the package is located and the Routing Engine on which you want to install the package are the same. In such cases, the package gets deleted after a successful upgrade.

For M Series, MX Series, and T Series routers running Junos OS Release 12.2 and later, you can use the `request system software add set` command to install multiple software packages at the same time:

```
user@host> request system software add set re0 /var/tmp/installation-package
```

For more information about the `request system software add set` command, see "request system software add (Junos OS)" on page 741 or the CLI Explorer.

4. Reboot the Routing Engine using the `request system reboot` command:

```
user@host> request system reboot
Reboot the system? [yes, no] (no) yes
```

You must reboot the device to load the new installation of Junos OS on the device. You can combine steps 3 and 4 by adding **reboot** to the `request system software add` command. But if you do the steps separately, make sure you reboot the Routing Engine you just added system software to.

> **NOTE**: To terminate the installation, do not reboot your device. Instead, finish the installation and then issue the `request system software delete` *software-package-name* command. This is your last chance to stop the installation.

The software is loaded when you reboot the system. Installation can take between 5 and 10 minutes. The device then reboots from the boot device on which the software was just installed. When the reboot is complete, the device displays the login prompt.

While the software is being upgraded, the Routing Engine on which you are performing the installation does not route traffic.

5. Log in to the current backup Routing Engine (slot 0) and issue the `show version` command to verify the version of the software installed.

```
user@host> show version
```

6. (Optional) Add the **jweb** package using the `request system software add` command. Before you can add this package, you must first download the software as you did the installation package. For more information about downloading the **jweb** package, see "Downloading Software (Junos OS)" on page 108.

   The **jweb** installation module adds a router management graphical user interface that you can use to view and configure your router.

Finalizing the Installation (Junos OS)

Once the software is installed on both Routing Engines, you return the router back to its original configuration and back up the new installation.

To finalize the redundant Routing Engines upgrade:

1. Restore the configuration that existed before you started this procedure (from Preparing the Device for the Installation (Junos OS)):

```
user@host> configure
[edit]
user@host# rollback 1
```

NOTE: The number on the `rollback` command should match the number of commits you did in preparing the router for the installation. For example, if you did a separate commit for disabling Routing Engine redundancy and disabling nonstop-bridging, you need to use `rollback 2` in this step.

2. Save the configuration change on both Routing Engines:

```
[edit]
user@host# commit synchronize and-quit
```

3. Transfer routing control back to the original primary Routing Engine in slot 0:

```
{backup}
user@host> request chassis routing-engine master switch
warning: Traffic will be interrupted while the PFE is re-initialized
Toggle mastership between routing engines ? [yes,no] (no) yes
Resolving mastership...
Complete. The other routing engine becomes the master.
```

For more information about the `request chassis routing-engine master` command, see the CLI Explorer.

4. Verify that the Routing Engine (slot 0) is indeed the primary Routing Engine:

```
{master}
user@host> show chassis routing-engine

Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)

Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
```

5. After you have installed the new software and are satisfied that it is successfully running, back up the new software on both the primary and the backup Routing Engines.

   - For backing up Junos OS with upgraded FreeBSD, use the `request system snapshot recovery` command. To find which platforms in which releases use Junos OS with upgraded FreeBSD, see Feature Explorer and enter **Junos kernel upgrade to FreeBSD 10+**. For more information, see Changes in Use of Snapshots for Junos OS with Upgraded FreeBSD.

   - For Junos OS, use the `request system snapshot` command:

```
{master}
user@host> request system snapshot
{master}
user@host> request routing-engine login other-routing-engine
{backup}
```

```
user@host-re1> request system snapshot
{backup}
user@host-re1> request routing-engine login other-routing-engine
{master}
user@host>
```

The root file system is backed up to **/altroot**, and **/config** is backed up to **/altconfig**. The root and **/config** file systems are on the router's CompactFlash card, and the **/altroot** and **/altconfig** file systems are on the router' s hard disk or solid-state drive (SSD).

For more information about the `request system snapshot` command, see the CLI Explorer .

NOTE: After you issue the `request system snapshot` command, you cannot return to the previous version of the software because the running copy and backup copy of the software are identical.

RELATED DOCUMENTATION

Understanding Routing Engine Redundancy on Juniper Networks Routers

Repartitioning Routing Engine System Storage to Increase the Swap Partition (Junos OS) | 446

Installing Software on EX Series Switches

IN THIS SECTION

EX Series devices are delivered with pre-installed Junos operating system (Junos OS). Before you start this procedure, decide which software package you need and download it. For information on which packages to use for which upgrades, see "Junos OS and Junos OS Evolved Installation Package Names" on page 70.

Understanding Software Installation on EX Series Switches

IN THIS SECTION

A Juniper Networks EX Series Ethernet Switch is delivered with the Juniper Networks Junos operating system (Junos OS) pre-installed. As new features and software fixes become available, you must upgrade your software to use them. You can also downgrade Junos OS to a previous release.

This topic covers:

Overview of the Software Installation Process

An EX Series switch is delivered with a domestic version of Junos OS pre-installed. When you connect power to the switch, it starts (boots) from the installed software.

You upgrade Junos OS on an EX Series switch by copying a software package to your switch or another system on your local network, then use either the J-Web interface or the command-line interface (CLI) to install the new software package on the switch. Finally, you reboot the switch; it boots from the upgraded software. After a successful upgrade, you should back up the new current configuration to a secondary device. You should following this procedure regardless of whether you are installing a domestic or controlled Junos OS package.

During a successful upgrade, the upgrade package removes all files from **/var/tmp** and completely reinstalls the existing software. It retains configuration files, and similar information, such as secure shell and host keys, from the previous version. The previous software package is preserved in a separate disk

partition, and you can manually revert back to it if necessary. If the software installation fails for any reason, such as loss of power during the installation process, the system returns to the originally active installation when you reboot.

Installing Software on a Virtual Chassis

You can connect individual EX Series switches together to form one unit and manage the unit as a single device, called a *Virtual Chassis*. The Virtual Chassis operates as a single network entity composed of member switches. Each member switch in a Virtual Chassis must be running the same version of Junos OS.

For ease of management, a Virtual Chassis provides flexible methods to upgrade software releases. You can deploy a new software release to all member switches of a Virtual Chassis or to only a particular member switch.

You can also upgrade the software on a Virtual Chassis using nonstop software upgrade (NSSU). NSSU takes advantage of *graceful Routing Engine switchover* (GRES) and *nonstop active routing* (NSR) to ensure no disruption to the control plane during the upgrade. You can minimize disruption to network traffic by defining link aggregation groups (LAGs) such that the member links of each LAG reside on different line cards or on different members. During an NSSU, the line cards and Virtual Chassis members are upgraded one at a time, so that traffic continues to flow through the other line cards or members while that line card or member is being upgraded.

Installing Software Using Automatic Software Download

The automatic software download feature uses the DHCP message exchange process to download and install software packages. Users can define a path to a software package on the DHCP server, and then the DHCP server communicates this path to EX Series switches acting as DHCP clients as part of the DHCP message exchange process. The DHCP clients that have been configured for automatic software download receive these messages and, when the software package name in the DHCP server message is different from that of the software package that booted the DHCP client switch, download and install the software package. See "Upgrading Software by Using Automatic Software Download for Switches" on page 181.

Autoinstalling a Configuration File on an EX2200 or EX3300 Switch from a Disk-on-Key USB Memory Stick

You can use an autoinstallation process to configure the software on an EX2200 or EX3300 switch. You can use a configuration file that is in either text format or XML format. If you want to use an XML-formatted file, you use a Junos Space platform to create the configuration file. You place the configuration file on a Disk-on-Key USB memory stick.

Installing Software on an EX2300, EX3400, or EX4100 Switch

Before installing software on an EX2300,EX3400, or EX4100 switch:

- Ensure that at least 620 MB of disk space is available in the system before downloading the software installation package to the **/var/tmp** directory. Use the command `show system storage` to get details of the available space.
- If the space available is inadequate, use the command `request system storage cleanup`. Additionally, you can manually delete any other log or unwanted files from the **/var/tmp** or **/var/log** directories.

You can now follow the procedure in "Installing Software on an EX Series Switch with a Virtual Chassis or Single Routing Engine (CLI Procedure)" on page 136 to complete the software installation.

NOTE: See the Knowledge Base for more information in regards to storage when upgrading Junos OS on EX2300 and EX3400 switches.

Installing Software on an EX Series Switch with a Virtual Chassis or Single Routing Engine (CLI Procedure)

You can use this procedure to upgrade Junos OS on a single routing engine in any EX Series switch, including all switches that do not support redundant Routing Engines. You can also use this procedure to upgrade software on all EX Series Virtual Chassis, with the exception of the EX8200 Virtual Chassis.

This procedure can be used to upgrade the following switches or Virtual Chassis:

- EX2200 switch
- EX2300 switch
- EX3200 switch
- EX3300 switch
- EX3400 switch
- EX4100 switch
- EX4200 switch
- EX4300 switch
- EX4500 switch

- EX4550 switch
- EX6200 switch (single Routing Engine upgrade only)
- EX8200 switch (single Routing Engine upgrade only)
- All Virtual Chassis except EX8200 Virtual Chassis

To upgrade software on an EX6200 or EX8200 switch running two Routing Engines, see "Installing Software on an EX Series Switch with Redundant Routing Engines (CLI Procedure)" on page 139 or Upgrading Software on an EX6200 or EX8200 Standalone Switch Using Nonstop Software Upgrade (CLI Procedure).

To upgrade software on an EX8200 Virtual Chassis, see Installing Software for All Devices in an EX8200 Virtual Chassis.

To install software upgrades on a switch with a single Routing Engine:

1. Download the software package.
2. (Optional) Back up the current software configuration to a second storage option. See the *Junos OS Installation and Upgrade Guide* for instructions on performing this task.
3. (Optional) Copy the software package to the switch. We recommend that you use FTP to copy the file to the **/var/tmp** directory.

   This step is optional because Junos OS can also be upgraded when the software image is stored at a remote location. These instructions describe the software upgrade process for both scenarios.
4. Install the new package on the switch:

```
user@switch> request system software add package
```

NOTE: .On EX4300-MP devices, you must use the **force-host** option. For example, issue the **request system software add *source* force-host** command.

Replace ***package*** with one of the following paths:

- For a software package in a local directory on the switch—**/var/tmp/*package*.tgz**.
- For a software package on a remote server:
  - **ftp:// *hostname*/ *pathname*/ *package*.tgz**
  - **http:// *hostname*/ *pathname*/ *package*.tgz**

where *package*.tgz is, for example, **jinstall-ex-4200-9.4R1.8-domestic-signed.tgz**.

NOTE: Include the optional **member** option to install the software package on only one member of a Virtual Chassis:

```
user@switch> request system software add source member member-id
```

NOTE: On EX4300-MP devices, you must use the **force-host** option. For example, issue the **request system software add *source* member *member-id* force-host** command.

Other members of the Virtual Chassis are not affected. To install the software on all members of the Virtual Chassis, do not include the `member` option.

NOTE: To terminate the installation, do not reboot your device; instead, finish the installation and then issue the `request system software delete` *package*.tgz command, where *package*.tgz is, for example, **jinstall-ex-4200-10.2R1.8-domestic-signed.tgz**. This is your last chance to stop the installation.

The `request system software delete` *package*.tgz command is not available on EX2300 and EX3400 switches.

5. Reboot to start the new software:

```
user@switch> request system reboot
```

6. After the reboot has completed, log in and verify that the new version of the software is properly installed:

```
user@switch> show version
```

7. To ensure that the resilient dual-root partitions feature operates correctly, execute the following command to copy the new Junos OS image into the alternate root partition:

```
user@switch> request system snapshot slice alternate
```

To update the alternate root partitions on all members of a Virtual Chassis, use this command:

```
user@switch> request system snapshot slice alternate all-members
```

Resilient dual-root partitions allow the switch to boot transparently from the alternate root partition if the system fails to boot from the primary root partition.

NOTE: EX2300 and EX3400 switches have two volumes: **JUNOS** volume and **OAM (recovery)** volume. To store a snapshot (non-recovery) on JUNOS volume, use the command `request system snapshot`. To create snapshot (recovery) on the OAM volume, use the command `request system snapshot recovery`.

Installing Software on an EX Series Switch with Redundant Routing Engines (CLI Procedure)

IN THIS SECTION

You can install software on a switch with redundant Routing Engines in one of two ways:

- Perform an NSSU—An NSSU upgrades both Routing Engines with a single command and with a minimum of network disruption. An NSSU takes advantage of GRES and NSR to ensure no disruption to the control plane. You can minimize disruption to network traffic by defining LAGs such that the member links of each LAG reside on different line cards. The line cards are upgraded one at a time, so that traffic continues to flow through the other line cards while a line card is being upgraded.

  You cannot use NSSU to downgrade the software running on a switch.

  For more information about NSSU, see *Understanding Nonstop Software Upgrade on EX Series Switches*.

- Upgrade each Routing Engine manually—You can perform a Junos OS installation on each Routing Engine separately, starting with the backup Routing Engine. You can use this procedure to downgrade the software running on a switch.

For an EX6200 switch or an EX8200 switch with redundant Routing Engines, you can minimize disruption to network operation during a Junos OS upgrade by upgrading the Routing Engines separately, starting with the backup Routing Engine.

NOTE: If your EX8200 switch is running Junos OS Release 10.4R3 or later, you can upgrade the software packages on both Routing Engines with a single command and with minimal network disruption by using nonstop software upgrade (NSSU) instead of this procedure. See Upgrading Software on an EX6200 or EX8200 Standalone Switch Using Nonstop Software Upgrade (CLI Procedure).

CAUTION: If graceful routing engine switchover (GRES) or nonstop active routing (NSR) is enabled when you initiate a software installation, the software does not install properly. Make sure you disable GRES before you begin the software installation by using the `deactivate chassis redundancy graceful-switchover` command in configuration mode. If GRES is enabled, it will be removed with the redundancy command. By default, NSR is disabled. If NSR is enabled, remove the `nonstop-routing` statement from the `[edit routing-options]` hierarchy level to disable it.

To upgrade the software package on an EX6200 switch or an EX8200 switch with one installed Routing Engine, see "Installing Software on an EX Series Switch with a Virtual Chassis or Single Routing Engine (CLI Procedure)" on page 136.

To upgrade redundant Routing Engines, you first install the new Junos OS release on the backup Routing Engine while keeping the currently running software version on the primary Routing Engine. After making sure that the new software version is running correctly on the backup Routing Engine, you switch device control to the backup Routing Engine. Finally, you install the new software on the new backup Routing Engine.

To upgrade Junos OS on the switch, perform the following tasks:

Preparing the Switch for the Software Installation

Perform the following steps before installing the software:

1. Log in to the primary Routing Engine's console.

   For information on logging in to the Routing Engine through the console port, see *Connecting and Configuring an EX Series Switch (CLI Procedure)*.

2. Enter the Junos OS CLI configuration mode:

   a.

Start the CLI from the shell prompt:

```
user@switch:RE% cli
```

You will see:

```
{master}
user@switch>
```

b. Enter configuration mode:

```
user@switch> configure
```

You will see:

```
{master}[edit]
user@switch#
```

3. Disable nonstop active routing (NSR) (supported on switches running Junos OS Release 10.4 or later):

```
{master}[edit]
user@switch# delete routing-options nonstop-routing
```

4. Disable nonstop bridging:

```
{master}[edit]
user@switch# delete protocols layer2-control nonstop-bridging
```

5. Disable graceful Routing Engine switchover (GRES):

```
{master}[edit]
user@switch# deactivate chassis redundancy graceful-switchover
```

6. Save the configuration change on both Routing Engines:

```
{master}[edit]
user@switch# commit synchronize
```

> **NOTE**: To ensure the most recent configuration changes are committed before the software upgrade, perform this step even if nonstop active routing and graceful Routing Engine switchover were previously disabled.

7. Exit the CLI configuration mode:

```
[edit]
user@switch# exit
```

8. (Optional) Back up the current software configuration to a second storage option. See the *Junos OS Installation and Upgrade Guide* for instructions on performing this task.

Installing Software on the Backup Routing Engine

After you have prepared the switch for software installation, install the software on the backup Routing Engine. During the installation, the primary Routing Engine continues operations, minimizing the disruption to network traffic.

1. Download the software.
2. Copy the software package to the switch. We recommend that you use FTP to copy the file to the **/var/tmp** directory.
3. Log in to the console of the backup Routing Engine.
4. Install the new software package:

```
user@switch> request system software add  /var/tmp/package.tgz
```

where *package*.tgz is, for example, **jinstall-ex-8200-10.2R1.8-domestic-signed.tgz**.

> **NOTE**: To terminate the installation, do not reboot your device; instead, finish the installation and then issue the **request system software delete** *package*.tgz command, where *package*.tgz is, for example, **jinstall-ex-8200-10.2R1.8-domestic-signed.tgz**. This is your last chance to stop the installation.

5. Reboot to start the new software:

```
user@switch> request system reboot
Reboot the system? [yes, no] (no) yes
```

> **NOTE**: You must reboot the switch to load the new installation of the Junos OS.

6. After the reboot has completed, log in and verify the new version of the software is properly installed:

```
user@switch> show version
```

Installing Software on the Default Primary Routing Engine

To transfer control to the backup Routing Engine and then upgrade or downgrade the primary Routing Engine software:

1. Log in to the primary Routing Engine console port.
2. Transfer control to the backup Routing Engine:

> ⚠ **CAUTION**: Because graceful Routing Engine switchover is disabled, this switchover causes all line cards in the switch to reload. All network traffic passing through these line cards is lost during the line card reloads.

```
user@switch> request chassis routing-engine master switch
```

3. Verify that the default backup Routing Engine (shown as slot 1 in the command output) is now the primary Routing Engine:

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

You will see:

```
Routing Engine status:
  Slot 0:
```

```
    Current state                  Backup
    Election priority              Master (default)

Routing Engine status:
  Slot 1:
    Current state                  Master
    Election priority              Backup (default)
```

4. Install the new software package:

```
user@switch> request system software add package.tgz
```

5. Reboot the Routing Engine:

```
user@switch> request system reboot
Reboot the system? [yes, no] (no) yes
```

When the reboot completes, the prompt will reappear. Wait for this prompt to reappear before proceeding to the next step.

6. Log in to the default backup Routing Engine (slot 1) through the console port.
7. Re-enable graceful Routing Engine switchover:

```
[edit]
user@switch# activate chassis redundancy graceful-switchover
```

Re-enabling graceful Routing Engine switchover allows any future Routing Engine switchovers to occur without loss of any network traffic.

8. Re-enable nonstop active routing:

```
[edit]
user@switch# set routing-options nonstop-routing
```

NOTE: Automatic commit synchronization is a requirement for nonstop active routing. If you have not yet enabled it, do so with the `set system commit synchronize` command.

9. Save the configuration change:

```
[edit]
user@switch# commit synchronize
```

10. To ensure that the resilient dual-root partitions feature operates correctly, execute the following command to copy the new Junos OS image into the alternate root partition on each Routing Engine:

```
user@switch> request system snapshot slice alternate routing-engine both
```

Resilient dual-root partitions allow the switch to boot transparently from the alternate root partition if the system fails to boot from the primary root partition.

If you want to return routing control to the Routing Engine that was the primary Routing Engine at the beginning of the procedure (the default primary Routing Engine), perform the next task.

Returning Routing Control to the Default Primary Routing Engine (Optional)

The switch can maintain normal operations with the Routing Engine in slot 1 acting as the primary Routing Engine after the software upgrade, so only perform this task if you want to return routing control to the default primary Routing Engine in slot 0.

1. Transfer routing control back to the default primary Routing Engine:

```
user@switch> request chassis routing-engine master switch
```

2. Verify that the default primary Routing Engine (slot 0) is indeed the primary Routing Engine:

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

You will see:

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)

Routing Engine status:
  Slot 1:
```

```
    Current state                   Backup
    Election priority               Backup (default)
```

Upgrading the Loader Software on the Line Cards in a Standalone EX8200 Switch or an EX8200 Virtual Chassis

You are almost never required to upgrade the loader software on the line cards in an EX8200 switch.

Upgrading the loader software version for a line card is not a requirement to complete any software upgrade. In rare cases, a line card might go offline immediately after a software upgrade because the loader software version on the line card requires an upgrade to become compatible with the upgraded Junos OS. You can upgrade the loader software on the line cards as a best practice to avoid this problem and other less severe issues.

The loader software on any line card in an EX8200 switch is updated using the same loader software package that upgrades the EX8200 Routing Engine loader software. The line card software loader contains two banks, each with a single loader software version. This procedure is used to upgrade the loader software for both banks of a line card in a standalone EX8200 switch or an EX8200 Virtual Chassis.

To upgrade the loader software on the line cards in a standalone EX8200 switch or an EX8200 Virtual Chassis:

NOTE: If you are upgrading Junos OS, the Routing Engine loader software, and the line card loader software, we recommend that you upgrade in this order: Junos OS, line card loader software, Routing Engine loader software.

1. Determine the version of the loader software for the line cards:

```
user@switch> show chassis firmware

Part              Type       Version
FPC 6             U-Boot     U-Boot 1.1.6 (Jan 13 2009 - 06:55:22) 2.3.0
                  loader     FreeBSD/PowerPC U-Boot bootstrap loader 2.2
FPC 7             U-Boot     U-Boot 1.1.6 (Jan 13 2009 - 06:55:22) 2.3.0
                  loader     FreeBSD/PowerPC U-Boot bootstrap loader 2.2
Routing Engine 0  U-Boot     U-Boot 1.1.6 (Mar 11 2011 - 04:29:01) 3.5.0
                  loader     FreeBSD/PowerPC U-Boot bootstrap loader 2.4
```

```
Routing Engine 1  U-Boot     U-Boot 1.1.6 (Mar 11 2011 - 04:29:01) 2.3.0
                  loader     FreeBSD/PowerPC U-Boot bootstrap loader 2.4
```

NOTE: On an EX8200 Virtual Chassis, you cannot issue the `show chassis firmware` command on the primary external Routing Engine. You must issue this command on each member switch.

a. From the primary external Routing Engine, start a shell session on the member switch, for example:

```
user@external-routing-engine> request session member 0
```

b. Enter the CLI and issue the `show chassis firmware` command.

c. Repeat these steps for the other member switch.

The loader software version appears after the timestamp (see the `Version` column in the output) for each component. For example, In the example given in this step, look at the first FPC listed (FPC 6). Ignore the U-Boot version number (1.1.6) and find the loader software version number (2.3.0) after the timestamp (U-Boot 1.1.6 (Jan 13 2009 - 06:55:22). The U-Boot version number has nothing to do with the loader software version that you need to determine.

If the loader software version is earlier than 3.5.0 for any FPC, you should consider upgrading the loader software for that line card.

2. Download the loader software package from the Juniper Networks Download page (https://support-www.juniper.net/support/downloads/) and place the software package on an internal software distribution site or in a local directory on the switch. We recommend using **/var/tmp** as the local directory on the switch.

NOTE: To obtain the loader software package, see the Download Software page at https://support-www.juniper.net/support/downloads/. Select the OS type and the release. Then find and click the download image.

A login screen appears.

3. Log in with your user name and password.

4. Disable graceful Routing Engine switchover (GRES) and nonstop active routing (NSR), if enabled. Commit the configuration:

```
user@switch# deactivate chassis redundancy graceful-switchover
user@switch# deactivate routing-options nonstop-routing
user@switch# commit synchronize
```

5. Install the loader package:

```
user@switch> request system software add package
```

Replace *package* with one of the following paths:

- For a software package in the **/var/tmp** directory on the switch or external Routing Engine —**/var/tmp/*package*.tgz**.
- For a software package on a remote server:
  - **ftp://*hostname/pathname/package*.tgz**
  - **http://*hostname/pathname/package*.tgz**

  In the above options, ***package*.tgz** might be, for example, **jloader-ex-8200-11.3*build*-signed.tgz**.

6. Upgrade the loader software.
   - To upgrade the loader software for a line card on a standalone EX8200 switch:

```
user@switch> request system firmware upgrade fpc slot slot-number
Firmware upgrade initiated....
Please wait for ~2mins for upgrade to complete....
```

   - To upgrade the loader software for a line card on an EX8200 member switch in an EX8200 Virtual Chassis:

```
user@switch> request system firmware upgrade fpc slot slot-number member member-id
Firmware upgrade initiated....
Please wait for ~2mins for upgrade to complete....
```

7. Confirm the loader software upgrade:

```
user@switch> show system firmware
Part             Type          Tag Current   Available Status
                                   version   version
FPC 6            U-Boot        0   2.3.0               UPGRADED SUCCESSFULLY
FPC 7            U-Boot        0   2.3.0               OK
Routing Engine 0 RE BIOS       0   3.1.1               OK
Routing Engine 1               0   3.1.1               OK
```

The status is `UPGRADED SUCCESSFULLY` if the boot loader version update process is complete.

The status is `PROGRAMMING` if the boot loader version update process is still in progress.

Do not proceed to the next step until the `show system firmware` output confirms that the loader software upgrade is complete.

8. Restart the line card.

- To restart a line card on a standalone EX8200 switch:

```
user@switch> request chassis fpc restart slot slot-number
```

- To restart a line card on an EX8200 member switch in an EX8200 Virtual Chassis:

```
user@switch> request chassis fpc restart slot slot-number member member-id
```

NOTE: You can monitor the status of the line card restart by using the `show chassis fpc` command.

9. After the line card restart has completed, confirm the loader software version update:

```
user@switch> show chassis firmware
Part             Type          Tag Current   Available Status
                                   version   version
FPC 6            U-Boot        0   3.5.0               OK
FPC 7            U-Boot        0   2.3.0               OK
Routing Engine 0 RE BIOS       0   3.1.1               OK
Routing Engine 1               0   3.1.1               OK
```

The current version has updated to 3.5.0. You have upgraded the loader software for one bank of the line card.

10. Repeat Steps 4 through 7 to upgrade the loader software on the other bank of the line card.

> **NOTE**: A bank switchover occurs automatically as part of the line card restart. Repeating Steps 3 through 6 updates the loader software on the other bank.

11. Repeat Steps 4 through 8 for all other line cards that require a line card loader version upgrade.

SEE ALSO

> Upgrading Software on an EX6200 or EX8200 Standalone Switch Using Nonstop Software Upgrade (CLI Procedure)
>
> *Upgrading Software Using Nonstop Software Upgrade on EX Series Virtual Chassis and Mixed Virtual Chassis (CLI Procedure)*
>
> Troubleshooting an EX8200 Line Card's Failure to Power On

Booting an EX Series Switch Using a Software Package Stored on a USB Flash Drive

There are two methods of getting Junos OS stored on a USB flash drive before using the software to boot the switch. You can pre-install the software onto the USB flash drive before inserting the USB flash drive into the USB port, or you can use the system snapshot feature to copy files from internal switch memory to the USB flash drive.

To move files into USB flash memory by using a system snapshot and use those files to boot the switch, see "Creating a Snapshot and Using It to Boot an EX Series Switch" on page 14. We recommend that you use this method to boot the switch from a USB flash drive if your switch is running properly.

If you need to pre-install the software onto the USB flash drive, you can use the method described in this topic. Pre-installing Junos OS onto a USB flash drive to boot the switch can be done at any time and is particularly useful when the switch boots to the loader prompt because the switch cannot locate the Junos OS in internal flash memory.

Ensure that you have the following tools and parts available to boot the switch from a USB flash drive:

- A USB flash drive that meets the EX Series switch USB port specifications. See USB Port Specifications for an EX Series Switch.

- A computer or other device that you can use to download the software package from the Internet and copy it to the USB flash drive.

To download a Junos OS package onto a USB flash drive before inserting the USB flash drive:

1. Download the Junos OS package that you want to place onto the EX Series switch from the Internet onto the USB flash drive by using your computer or other device.
2. Remove the USB flash drive from the computer or other device.
3. Insert the USB flash drive into the USB port on the switch.
4. This step can be performed only when the prompt for the loader script (`loader>`) is displayed. The loader script starts when the Junos OS loads but the CLI is not working for any reason or if the switch has no software installed.

   Install the software package onto the switch:

   ```
   loader> install source
   ```

   where *source* represents the name and location of the Junos OS package on the USB flash drive. The Junos OS package on a flash drive is commonly stored in the root drive as the only file—for example, **file:///jinstall-ex-4200-9.4R1.5-domestic-signed.tgz**.

SEE ALSO

EX4300 Switches Hardware Overview

Switch Fabric and Routing Engine (SRE) Module in an EX6200 Switch

Switch Fabric and Routing Engine (SRE) Module in an EX8208 Switch

Routing Engine (RE) Module in an EX8216 Switch

RELATED DOCUMENTATION

Upgrading Software on an EX6200 or EX8200 Standalone Switch Using Nonstop Software Upgrade (CLI Procedure)

Troubleshooting Software Installation on EX Series Switches | **584**

Installing Software on MX Series Routers Using a USB Flash Drive

IN THIS SECTION

You can install or upgrade Junos OS on an MX Series router using a USB flash drive.

NOTE: This topic describes overall MX Series router information.
For details about specific MX Series routers, see the Hardware Guide for that device.

To access the Hardware Guide for a specific device, review Junos OS by Product and select the device. A link to the Hardware Guide for the device is displayed, along with links to other device specific guides.

Before you begin, determine which software package you need and download it onto the USB flash drive. For information on which packages to use for which upgrades, see "Junos OS and Junos OS Evolved Installation Package Names" on page 70.

NOTE: This topic describes a standard Junos OS installation and upgrade with a Junos OS installation package.
For information about a Junos OS recovery installation, see "Recovery of Junos OS" on page 44.

For information about upgrading to Junos OS with upgraded FreeBSD, see "Upgrading and Downgrading to Junos with Upgraded FreeBSD" on page 294.

Pre-Installing Junos OS on a USB Flash Drive

A USB flash drive must have Junos OS stored on it before using the software to install on or upgrade the router.

To pre-install the software on a USB flash drive, ensure the following:

- The USB flash drive meets the MX Series router USB port specifications.
- The USB flash drive is empty and formatted as FAT-32.
- The USB flash drive capacity is large enough to accommodate the size of the desired Junos OS package.)
- A computer to download the software package from the download site and copy it to the USB flash drive.

To download a Junos OS package onto a USB flash drive:

1. Insert the USB flash drive into your computer.
2. Navigate to the download site to download the desired Junos OS package to the USB flash drive.

   Recommended download site: MX Series Software Downloads.
3. Choose your router model and version and select a software package to download from the **Install Media** menu.
4. Download the software package.

   (Optional) Rename the software package for identification purposes.
5. Eject the USB flash drive when the download has completed.

Installing Junos OS from a USB Flash Drive

NOTE: As a best practice, save a system snapshot of the installed Junos OS image and configuration files for backup purposes before starting the installation procedure.

For details about saving a system snapshot, see "request system snapshot (Junos OS with FreeBSD Prior to Release 10)" on page 721.

Use the following steps to install a Junos OS package from a USB flash drive.

1. Ensure that the router has been powered off.
2. Insert the USB flash drive into the USB port on the router.

3. Power on the router.

   Powering on the router starts the loader script and checks for a Junos OS package on the USB flash drive.

4. When the install prompt appears, enter **Yes**.
5. When the installation has completed, reboot the router:

```
user@host> request system reboot
```

6. After the reboot has completed, log in and verify that the new version of the software has been properly installed.

```
user@host> show version
```

Upgrading Junos OS using a USB Flash Drive

The procedure to upgrade Junos OS on an MX Series router using a USB flash drive is different than installing Junos OS from a USB flash drive. The install procedure includes booting the device from a USB flashdrive and installing a fresh image of Junos OS without preserving configuration files or data files. The upgrade procedure includes replacing the existing Junos OS with a different version of Junos OS on the device while preserving existing configuration files and data files.

The procedure to upgrade includes:

- Copying the Junos OS package from the USB flash drive to the internal storage of the router.
- Upgrading Junos OS on the router.

NOTE: As a best practice, free up storage space on the device and save a system snapshot of the existing Junos OS image and configuration files for backup purposes before starting the upgrade procedure.

For details to free storage space, see "request system storage cleanup (Junos OS)" on page 798.

For details about saving a system snapshot, see "request system snapshot (Junos OS with FreeBSD Prior to Release 10)" on page 721.

1. On the router, enter the shell as the root user:

```
user@router#> start shell user root

Password:
```

2. List the existing devices on the router.

```
root@router# ls directory name
```

For example:

```
root@router# ls /dev/da*
/dev/da0 /dev/da0s1c /dev/da0s2a /dev/da0s3 /dev/da0s3e
/dev/da0s1 /dev/da0s1f /dev/da0s2c /dev/da0s3c
/dev/da0s1a /dev/da0s2 /dev/da0s2f /dev/da0s3d
```

3. Insert the USB flash drive into the USB port on the router.

The console messages describe the device ID of the USB flash drive.

You can use the results of the **ls *directory name*** command to determine the device ID of the USB flash drive by comparing it to the list of device IDs of the previous step.

> **NOTE**: If the console session is not available while inserting the USB, check the `/var/log` directory for messages related to `da`. For example, use the **show log messages | match da** command to display the messages.

In this example, `/dev/da2s1` is the device ID of the USB flash drive.

```
root@router# router1: TOSHIBA TransMemory, rev 2.00/1.00, addr 3
da2 at router-sim1 bus 1 target 0 lun 0
da2: <TOSHIBA TransMemory 5.00> Removable Direct Access SCSI-0 device
da2: 40.000MB/s transfers
da2: 983MB (2013184 512 byte sectors: 64H 32S/T 983C)

root@router# ls /dev/da*
/dev/da0 /dev/da0s1c /dev/da0s2a /dev/da0s3 /dev/da0s3e
```

```
/dev/da0s1 /dev/da0s1f /dev/da0s2c /dev/da0s3c /dev/da2
/dev/da0s1a /dev/da0s2 /dev/da0s2f /dev/da0s3d /dev/da2s1
```

4. Create a directory for the USB drive to mount to.

   ```
   mkdir /var/tmp/directory name
   ```

   For example:

   ```
   root@router# mkdir /var/tmp/usb
   ```

5. Mount the USB drive to the new directory and check the contents of the directory.

   ```
   mount_msdosfs /dev/usb device ID /var/tmp/ directory name
   ls /var/tmp/ directory name
   ```

   For example:

   ```
   root@router# mount_msdosfs /dev/da2s1 /var/tmp/usb
   root@router# ls /var/tmp/usb
   MX_image.tgz
   ```

6. Copy the Junos OS package from the USB flash drive to the **/var/tmp/** directory of the router's internal storage.

   ```
   cp /var/tmp/directory name/installation-package-name /var/tmp
   ```

   NOTE: Use the **ls *directory name*** command to verify the Junos OS package was copied to the router's internal storage.

   In the example, the MX_image.tgz file on the USB flash drive is copied to the /var/tmp directory on the router.

   ```
   root@router# cp /var/tmp/usb/MX_image.tgz /var/tmp
   root@router# ls /var/tmp
   MX_image.tgz
   ```

7. Unmount the USB flash drive after the Junos OS package has been copied to the router's internal storage.

```
umount /var/tmp/directory name
```

For example:

```
root@router# umount /var/tmp/usb
root@% router1: at uhub0 port 1 (addr 3) disconnected
(da1:router-sim1:1:0:0): lost device
(da1:router-sim1:1:0:0): removing device entry
router1: detached
```

Proceed to the next section to continue upgrading Junos OS.

NOTE: For devices with Routing Engines with VMhost support, you can use the USB device as an emergency boot device. For more information, see "Creating an Emergency Boot Device for Routing Engines with VM Host Support" on page 365. After the `junos-vmhost-install-usb` image is written to the USB drive using the `dd` command, you can boot to the USB using the `request vmhost reboot usb` command.

Installing Software on Routing Devices (Junos OS)

IN THIS SECTION

Routing devices are delivered with Junos OS preinstalled on them. As new features and software fixes become available, you must upgrade Junos OS to use them. You can install software on single and redundant routing engines.

Installing the Software Package on a Router with a Single Routing Engine (Junos OS)

Before you install a new software release on a device, you should back up the current system.

NOTE: Starting in Junos OS release 20.3R1, ACX710 routers support limited images.

To upgrade the software on a router or switch:

1. Install the new software package using the `request system software add` command:

```
user@host> request system software add /var/tmp/installation-package
```

   The variable ***installation-package*** is the name of the installation package. Specify the absolute path on the local disk. For package name prefixes, see "Junos OS Installation Package Names" on page 70.

   NOTE: (Junos OS only) To install multiple software packages at one time, you can use the `request system software add set` command. For more information on this command, see the `set` option in "request system software add (Junos OS)" on page 741.

   CAUTION: Do not include the `re0 | re1` option when you install a package using the `request system software add` command, if the Routing Engine on which the package is located and the Routing Engine on which you want to install the package are the same. In such cases, the package gets deleted after a successful upgrade.

2. Reboot the device to start the new software:

```
user@host>  request system shutdown reboot
Reboot the system ? [yes,no] (no) yes
```

   NOTE: You must reboot the device to load the new software release on the device.
   To terminate the installation, do not reboot the device. Instead, finish the installation and then issue the `request system software delete` *`package-name`* command. This is your last chance to stop the installation.

The software is loaded when you reboot the system. Installation can take between 5 and 10 minutes. The device then reboots from the boot device on which the software was just installed. When the reboot is complete, the device displays the login prompt.

While the software is being upgraded, the Routing Engine on which you are performing the installation does not route traffic.

3. Log in and verify the release of the software installed:

   - To verify release for installation of a Junos OS release, use the `show version` command.

```
user@host>  show version
```

SEE ALSO

request system software add (Junos OS) | **741**

show version

Installing the Software Package on a Device with Redundant Routing Engines (Junos OS)

IN THIS SECTION

If the device has two Routing Engines, perform a Junos OS installation on each Routing Engine separately to minimize disruption to network operation.

To upgrade redundant Routing Engines, you first install the new Junos OS release on the backup Routing Engine while keeping the currently running software version on the primary Routing Engine. After making sure that the new software version is running correctly on the backup Routing Engine, you switch device control to the backup Routing Engine. Finally, you install the new software on the new backup Routing Engine. For detailed procedures, see the following subsections:

Preparing the Device for the Installation (Junos OS)

Determine if this is the best procedure for upgrading your device:

- If your EX8200 switch is running Junos OS Release 10.4R3 or later, you can upgrade the software packages on both Routing Engines with a single command and with minimal network disruption by using nonstop software upgrade (NSSU) instead of this procedure. See Upgrading Software on an EX6200 or EX8200 Standalone Switch Using Nonstop Software Upgrade (CLI Procedure).
- To upgrade two different Junos OS releases with no disruption on the control plane and with minimal disruption of traffic, you can use In-Service Software Upgrade, see Getting Started with Unified In-Service Software Upgrade for routers and switches, and Upgrading a Chassis Cluster Using In-Service Software Upgrade for SRX Series Firewalls.
- To upgrade the software running on EX Series Ethernet Switches with redundant Routing Engines and all member switches in EX Series Virtual Chassis with a single command, you can use Nonstop Software Upgrade, see *Understanding Nonstop Software Upgrade on EX Series Switches*.
- To upgrade the software package on an EX6200 switch or an EX8200 switch with one installed Routing Engine, see "Installing Software on an EX Series Switch with a Virtual Chassis or Single Routing Engine (CLI Procedure)" on page 136.

WARNING: If graceful Routing Engine switchover (GRES) or nonstop active routing (NSR) is enabled when you initiate a software installation, the software does not install properly. Make sure you deactivate GRES (if it is enabled). By default, NSR is disabled. If NSR is enabled, remove the nonstop-routing statement from the [edit routing-options] hierarchy level to disable it.

To ensure GRES and NSR are disabled:

1. Log in to the primary Routing Engine's console.

   For more information about logging in to the Routing Engine through the console port, see the specific hardware guide for your device.

2. From the CLI operational prompt, enter configuration mode:

```
{master}
user@host> configure
Entering configuration mode

{master} [edit]
user@host#
```

3. Disable nonstop active routing (NSR) (supported on switches running Junos OS Release 10.4 or later):

```
{master}[edit]
user@host# delete routing-options nonstop-routing
```

4. Disable nonstop-bridging if it is enabled:

```
{master}[edit]
user@host# delete protocols layer2-control nonstop-bridging
```

5. Disable Routing Engine redundancy if enabled:

```
{master}[edit]
user@host# (delete | deactivate) chassis redundancy graceful-switchover
```

6. Save the configuration change on both Routing Engines:

```
{master}[edit]
user@host# commit synchronize
re0:
configuration check succeeds
re1:
commit complete
re0:
commit complete
```

NOTE: To ensure the most recent configuration changes are committed before the software upgrade, perform this step even if nonstop active routing and graceful Routing Engine switchover were previously disabled.

7. Exit the CLI configuration mode:

```
[edit]
user@host# exit
```

Installing Software on the Backup Routing Engine (Junos OS)

After the device has been prepared, you first install the new Junos OS release on the backup Routing Engine, while keeping the currently running software version on the primary Routing Engine. This enables the primary Routing Engine to continue operations, minimizing disruption to your network.

Before you start this procedure, decide which software package you need and download it to the **/var/tmp** directory of the primary Routing Engine. For information on which packages to use for which upgrades, see "Junos OS Installation Package Names" on page 70.

To install software on the backup Routing Engine:

1. Log in to the console port on the current primary Routing Engine in slot 0.
2. Install the new software package on the backup Routing Engine (re1) using the `request system software add` command:

```
user@host> request system software add re1 validate /var/tmp/jinstall-9.2R1.8-domestic-signed.tgz
```

Installation and validation take about 15 minutes.

> **CAUTION**: Do not include the `re0` or `re1` option when you install a package using the `request system software add` command if the Routing Engine on which the package is located and the Routing Engine on which you want to install the package are the same. In such cases, the package gets deleted after a successful upgrade.

For M Series, MX Series, and T Series routers running Junos OS Release 12.2 and later, you can use the `request system software add set` command to install multiple software packages at the same time:

```
user@host> request system software add set re1 /var/tmp/installation-package
```

For more information about the `request system software add set` command, see "request system software add (Junos OS)" on page 741 or the CLI Explorer.

3. Reboot the backup Routing Engine to start the new software:

```
user@host> request system reboot other-routing-engine
Rebooting re1
user@host>
```

You must reboot the device to load the new installation of Junos OS on the device. You can combine steps 2 and 3 by adding **reboot** to the `request system software add` command. But if you do the steps separately, make sure you reboot the Routing Engine you just added system software to.

> **NOTE**: To terminate the installation, do not reboot your device. Instead, finish the installation and then issue the `request system software delete` *`software-package-name`* command. This is your last chance to stop the installation.

All the software is loaded when you reboot the device. Installation can take between 5 and 10 minutes. The device then reboots from the boot device on which the software was just installed. When the reboot is complete, the device displays the login prompt.

While the software is being upgraded, the Routing Engine on which you are performing the installation is not routing traffic.

4. Issue the `show version invoke-on other-routing-engine` command to verify the new software is installed.

```
user@host> show version invoke-on other-routing-engine
re1:
--------------------------------------------------------------------------
Hostname: host1
Model: mx240
Junos: package-name
. . .
user@host>
```

5. (Optional) Add the **jweb** package using the `request system software add` command. Before you can add this package, you must first download the software as you did the installation package. For more information about downloading the **jweb** package, see "Downloading Software (Junos OS)" on page 108.

   The **jweb** installation module adds a router management graphical user interface that you can use to view and configure your router.

Installing Software on the Remaining Routing Engine (Junos OS)

Once the software is installed on the backup Routing Engine, you are ready to switch routing control to the backup Routing Engine, and then upgrade or downgrade the software on the remaining Routing Engine in slot 0.

To install software on the primary Routing Engine:

1. Transfer routing control from the primary to the backup Routing Engine:

```
user@host> request chassis routing-engine master switch
warning: Traffic will be interrupted while the PFE is re-initialized
Toggle mastership between routing engines ? [yes,no] (no) yes

Resolving mastership...
Complete. The other routing engine becomes the master.
```

   For more information about the `request chassis routing-engine master` command, see the CLI Explorer.

2. Verify that the Routing Engine in slot 1 is now the primary Routing Engine:

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

Routing Engine status:
  Slot 0:
    Current state                  Backup
    Election priority              Master (default)

Routing Engine status:
  Slot 1:
    Current state                  Master
    Election priority              Backup (default)
```

3. Install the new software package on the Routing Engine in slot 0 using the `request system software add` command:

```
user@host> request system software add validate re0  /var/tmp/jinstall-9.2R1.8-domestic-
signed.tgz
```

   Installation and validation take about 15 minutes.

   CAUTION: Do not include the `re0` or `re1` option when you install a package using the `request system software add` command if the Routing Engine on which the package is located and the Routing Engine on which you want to install the package are the same. In such cases, the package gets deleted after a successful upgrade.

For M Series, MX Series, and T Series routers running Junos OS Release 12.2 and later, you can use the `request system software add set` command to install multiple software packages at the same time:

```
user@host> request system software add set re0 /var/tmp/installation-package
```

For more information about the `request system software add set` command, see "request system software add (Junos OS)" on page 741 or the CLI Explorer.

4. Reboot the Routing Engine using the `request system reboot` command:

```
user@host> request system reboot
Reboot the system? [yes, no] (no) yes
```

You must reboot the device to load the new installation of Junos OS on the device. You can combine steps 3 and 4 by adding **reboot** to the `request system software add` command. But if you do the steps separately, make sure you reboot the Routing Engine you just added system software to.

> **NOTE**: To terminate the installation, do not reboot your device. Instead, finish the installation and then issue the `request system software delete` *`software-package-name`* command. This is your last chance to stop the installation.

The software is loaded when you reboot the system. Installation can take between 5 and 10 minutes. The device then reboots from the boot device on which the software was just installed. When the reboot is complete, the device displays the login prompt.

While the software is being upgraded, the Routing Engine on which you are performing the installation does not route traffic.

5. Log in to the current backup Routing Engine (slot 0) and issue the `show version` command to verify the version of the software installed.

```
user@host> show version
```

6. (Optional) Add the **jweb** package using the `request system software add` command. Before you can add this package, you must first download the software as you did the installation package. For more information about downloading the **jweb** package, see "Downloading Software (Junos OS)" on page 108.

The **jweb** installation module adds a router management graphical user interface that you can use to view and configure your router.

Finalizing the Installation (Junos OS)

Once the software is installed on both Routing Engines, you return the router back to its original configuration and back up the new installation.

To finalize the redundant Routing Engines upgrade:

1. Restore the configuration that existed before you started this procedure (from Preparing the Device for the Installation (Junos OS)):

```
user@host> configure
[edit]
user@host# rollback 1
```

> **NOTE**: The number on the `rollback` command should match the number of commits you did in preparing the router for the installation. For example, if you did a separate commit for disabling Routing Engine redundancy and disabling nonstop-bridging, you need to use `rollback 2` in this step.

2. Save the configuration change on both Routing Engines:

```
[edit]
user@host# commit synchronize and-quit
```

3. Transfer routing control back to the original primary Routing Engine in slot 0:

```
{backup}
user@host> request chassis routing-engine master switch
warning: Traffic will be interrupted while the PFE is re-initialized
Toggle mastership between routing engines ? [yes,no] (no) yes
Resolving mastership...
Complete. The other routing engine becomes the master.
```

   For more information about the `request chassis routing-engine master` command, see the CLI Explorer.

4. Verify that the Routing Engine (slot 0) is indeed the primary Routing Engine:

```
{master}
user@host> show chassis routing-engine
```

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)

Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
```

5. After you have installed the new software and are satisfied that it is successfully running, back up the new software on both the primary and the backup Routing Engines.

   - For backing up Junos OS with upgraded FreeBSD, use the `request system snapshot recovery` command. To find which platforms in which releases use Junos OS with upgraded FreeBSD, see Feature Explorer and enter **Junos kernel upgrade to FreeBSD 10+**. For more information, see Changes in Use of Snapshots for Junos OS with Upgraded FreeBSD.

   - For Junos OS, use the `request system snapshot` command:

```
{master}
user@host> request system snapshot
{master}
user@host> request routing-engine login other-routing-engine
{backup}
user@host-re1> request system snapshot
{backup}
user@host-re1> request routing-engine login other-routing-engine
{master}
user@host>
```

   The root file system is backed up to **/altroot**, and **/config** is backed up to **/altconfig**. The root and **/config** file systems are on the router's CompactFlash card, and the **/altroot** and **/altconfig** file systems are on the router' s hard disk or solid-state drive (SSD).

   For more information about the `request system snapshot` command, see the CLI Explorer .

   NOTE: After you issue the `request system snapshot` command, you cannot return to the previous version of the software because the running copy and backup copy of the software are identical.

RELATED DOCUMENTATION

- Understanding Routing Engine Redundancy on Juniper Networks Routers
- Repartitioning Routing Engine System Storage to Increase the Swap Partition (Junos OS) | **446**

RELATED DOCUMENTATION

- Recovery Using an Emergency Boot Device (Junos OS) | **26**
- https://support.juniper.net/support/downloads/

Installing Software on QFX Series Devices (Junos OS)

IN THIS SECTION

QFX Series devices are delivered with the Junos operating system (Junos OS) preinstalled. Before you start this procedure, decide which software package you need and download it. For information on which packages to use for which upgrades, see "Junos OS Installation Package Names" on page 70.

Installing Software Packages on QFX Series Devices (Junos OS)

IN THIS SECTION

We recommend that you connect to the console port while installing the installation package so you can respond to any required user input and detect any errors that may occur.

Before you install the new installation package, back up your current configuration files because the upgrade process removes all of the stored files on the switch.

To back up your current configuration files, enter the save command:

```
user@switch# save filename
```

Executing this command saves a copy of your configuration files to a remote location such as an external USB device.

Installation procedures are in the following subsections:

Installing the Software on QFX10002-60C Switches

This section explains how to upgrade the software, which includes both the host OS and the Junos OS. This upgrade requires that you use a VM host package—for example, a **junos-vmhost-install-*x*.tgz** .

During a software upgrade, the alternate partition of the SSD is upgraded, which will become primary partition after a reboot. If there is a boot failure on the primary SSD, the switch can boot using the snapshot available on the alternate SSD.

NOTE: The QFX10002-60C switch supports only the 64-bit version of Junos OS.

NOTE: If you have important files in directories other than /config and /var, copy the files to a secure location before upgrading. The files under /config and /var (except /var/etc) are preserved after the upgrade.

To upgrade the software, you can use the following methods:

1. If the installation package resides locally on the switch, issue the **request vmhost software add** ***<pathname><source>*** command.

   For example:

   ```
   user@switch> request vmhost software add /var/tmp/junos-vmhost-install-qfx-x86-64-18.1R1.9.tgz
   ```

   If the Install Package resides remotely from the switch, issue the **request vmhost software add** ***<pathname><source>*** command.

   For example:

   ```
   user@switch> request vmhost software add ftp://ftpserver/directory/junos-vmhost-install-qfx-x86-64-18.1R1.9.tgz
   ```

2. After the reboot has finished, verify that the new version of software has been properly installed by issuing the `show version` command.

   ```
   user@switch> show version
   ```

Installing a Standard Software Package on QFX5000 and EX4600 Switches

NOTE: Before you install the software, back up any critical files in **/var/home**. For more information regarding how to back up critical files, contact Customer Support at https://www.juniper.net/support.

NOTE: On QFX5100 and EX4600 switches, the Host OS is not upgraded automatically, so you must use the `force-host` option if you want the Junos OS and Host OS versions to be the same. However, pay attention to these notes regarding Junos OS and Host OS versions:

- The Junos OS and Host OS versions do not need to be the same.
- During an ISSU, the Host OS cannot be upgraded.
- Upgrading the Host OS is not required for every software upgrade, as noted above.

If you are downgrading from Junos OS Release 14.1X53-D40 to any release earlier than 14.1X53-D40, you must use the `force-host` option or else the switch will issue core dumps.

NOTE: The QFX5100 and EX4600 standalone SKUs and non-mixed Virtual Chassis, support software images with the package filenames in the yyy-qfx-5-zzz (non-TVP architecture) format, for all Junos OS releases **up to** Junos OS Release **21.4**. They **do not** support software images with the package filenames in the yyy-qfx-5e-zzz (TVP architecture) format.

1. If the installation package resides locally on the switch, issue the **request system software add** ***<pathname><source>*** **reboot** command.

   For example:

   ```
   user@switch> request system software add /var/tmp/jinstall-host-qfx-5-17.2R1.n-signed.tgz
   reboot
   ```

   If the Install Package resides remotely, issue the **request system software add** ***<pathname><source>*** **reboot** command.

   For example:

   ```
   user@switch> request system software add ftp://ftpserver/directory/jinstall-host-
   qfx-5-17.2R1.n-signed.tgz reboot
   ```

2. After the reboot has finished, verify that the new version of software has been properly installed by executing the `show version` command.

   ```
   user@switch> show version
   ```

Installing a Standard Software Package on QFX10002 Switches

NOTE: Before you install the software, back up any critical files in **/var/home**. For more information regarding how to back up critical files, contact Customer Support at https://www.juniper.net/support.

NOTE: If you want to downgrade from Junos OS Release 15.1X53-D60 to a previous release, pay attention to these caveats:

Table 7: Caveats for Downgrading from Junos OS Release 15.1X53-D60 to Previous Software Releases

Junos OS Software Releases	Using the CLI	Using a USB Stick
15.1X53-D33	Yes, but the configuration is lost, and there is no workaround. We recommend that you save the configuration to an external location, such as a remote server, and then load the configuration after you have successfully downgraded.	Yes, but the configuration is lost, and there is no workaround. We recommend that you save the configuration to an external location, such as a remote server, and then load the configuration after you have successfully downgraded.
15.1X53-D32	Yes, but the configuration is lost, and there is no workaround. We recommend that you save the configuration to an external location, such as a remote server, and then load the configuration after you have successfully downgraded. **NOTE**: You must downgrade to Junos OS Release 15.1X53-D33 before you downgrade to Junos OS Release 15.1X53-D30.	Yes, but the configuration is lost, and there is no workaround. We recommend that you save the configuration to an external location, such as a remote server, and then load the configuration after you have successfully downgraded. **NOTE**: You must downgrade to Junos OS Release 15.1X53-D33 before you downgrade to Junos OS Release 15.1X53-D32.
15.1X53-D30	No	Yes, but the configuration is lost, and there is no workaround. We recommend that you save the configuration to an external location, such as a remote server, and then load the configuration after you have successfully downgraded. **NOTE**: You must downgrade to Junos OS Release 15.1X53-D33 before you downgrade to Junos OS Release 15.1X53-D30.

Table 7: Caveats for Downgrading from Junos OS Release 15.1X53-D60 to Previous Software Releases *(Continued)*

Junos OS Software Releases	Using the CLI	Using a USB Stick
Releases prior to 15.1X53-D30	No	Yes, but the configuration is lost, and there is no workaround. We recommend that you save the configuration to an external location, such as a remote server, and then load the configuration after you have successfully downgraded. **NOTE**: You must downgrade to Junos OS Release 15.1X53-D33 before you downgrade to Junos OS Release 15.1X53-D30.

1. Install the software in one of two ways:
   - If the installation package resides locally on the switch, issue the **request system software add *<pathname><source>* reboot** command.

     For example:

     ```
     user@switch> request system software add /var/tmp/jinstall-host-qfx-10-17.2R1.n-secure-signed.tgz reboot
     ```

   - If the Install Package resides remotely, issue the **request system software add *<pathname><source>* reboot** command.

     For example:

     ```
     user@switch> request system software add ftp://ftpserver/directory/jinstall-host-qfx-10-17.2R1.n-secure-signed.tgz reboot
     ```

2. After the reboot has finished, verify that the new version of software has been properly installed by issuing the `show version` command.

   ```
   user@switch> show version
   ```

Upgrading Software from Junos OS Release 15.1X53-D3X to Junos OS Release 15.1X53-D60, 15.1X53-D61.7, 15.1X53-D62, and 15.1X53-D63 on QFX10008 and QFX10016 Switches

NOTE: Before you install the software, back up any critical files in **/var/home**. For more information regarding how to back up critical files, contact Customer Support at https://www.juniper.net/support.

NOTE: If you want to downgrade from Junos OS Release 15.1X53-D60 to a previous release, pay attention to these caveats:

Table 8: Caveats for Downgrading from Junos OS Release 15.1X53-D60 to Previous Software Releases

Junos OS Software Releases	Using the CLI	Using a USB Stick
15.1X53-D33	Yes, but the configuration is lost, and there is no workaround. We recommend that you save the configuration to an external location, such as a remote server, and then load the configuration after you have successfully downgraded.	Yes, but the configuration is lost, and there is no workaround. We recommend that you save the configuration to an external location, such as a remote server, and then load the configuration after you have successfully downgraded.
15.1X53-D32	Yes, but the configuration is lost, and there is no workaround. We recommend that you save the configuration to an external location, such as a remote server, and then load the configuration after you have successfully downgraded. **NOTE**: You must downgrade to Junos OS Release 15.1X53-D33 before you downgrade to Junos OS Release 15.1X53-D30.	Yes, but the configuration is lost, and there is no workaround. We recommend that you save the configuration to an external location, such as a remote server, and then load the configuration after you have successfully downgraded. **NOTE**: You must downgrade to Junos OS Release 15.1X53-D33 before you downgrade to Junos OS Release 15.1X53-D32.

Table 8: Caveats for Downgrading from Junos OS Release 15.1X53-D60 to Previous Software Releases *(Continued)*

Junos OS Software Releases	Using the CLI	Using a USB Stick
15.1X53-D30	No	Yes, but the configuration is lost, and there is no workaround. We recommend that you save the configuration to an external location, such as a remote server, and then load the configuration after you have successfully downgraded. **NOTE**: You must downgrade to Junos OS Release 15.1X53-D33 before you downgrade to Junos OS Release 15.1X53-D30.
Releases prior to 15.1X53-D30	No	Yes, but the configuration is lost, and there is no workaround. We recommend that you save the configuration to an external location, such as a remote server, and then load the configuration after you have successfully downgraded. **NOTE**: You must downgrade to Junos OS Release 15.1X53-D33 before you downgrade to Junos OS Release 15.1X53-D30.

The switch contains two routing engines, so you will need to install the software on each routing engine (re0 and re1).

1. To install the software on re0:

   If the installation package resides locally on the switch, issue the **request system software add *<pathname><source>*** command.

```
user@switch> request system software add /var/tmp/jinstall-host-qfx-10-m-15.1X53-D60.4-secure-domestic-signed.tgz re0
```

If the Install Package resides remotely from the switch, issue the **request system software add** ***<pathname><source>*** **re0** command.

For example:

```
user@switch> request system software add ftp://ftpserver/directory/jinstall-host-qfx-10-
m-15.1X53-D60.4-secure-domestic-signed.tgz re0
```

2. To install the software on re1:

   If the installation package resides locally on the switch, issue the **request system software add** ***<pathname><source>*** command.

```
user@switch> request system software add /var/tmp/jinstall-host-qfx-10-m-15.1X53-D60.4-secure-
domestic-signed.tgz re1
```

   If the Install Package resides remotely from the switch, issue the **request system software add** ***<pathname><source>*** **re1** command.

   For example:

```
user@switch> request system software add ftp://ftpserver/directory/jinstall-host-qfx-10-
m-15.1X53-D60.4-secure-domestic-signed.tgz re1
```

3. Reboot both routing engines.

   For example:

```
user@switch> request system reboot both-routing-engines
```

4. After the reboot has finished, verify that the new version of software has been properly installed by executing the `show version` command.

```
user@switch> show version
```

Installing a Software Package on QFX10008 and QFX10016 Switches

IN THIS SECTION

Because the switch has two Routing Engines, perform a Junos OS installation on each Routing Engine separately to avoid disrupting network operation.

NOTE: Before you install the software, back up any critical files in **/var/home**. For more information regarding how to back up critical files, contact Customer Support at https://www.juniper.net/support.

CAUTION: If graceful Routing Engine switchover (GRES), nonstop bridging (NSB), or nonstop active routing (NSR) is enabled when you initiate a software installation, the software does not install properly. Make sure you issue the CLI `delete chassis redundancy` command when prompted. If GRES is enabled, it will be removed with the `redundancy` command. By default, NSR is disabled. If NSR is enabled, remove the nonstop-routing statement from the `[edit routing-options]` hierarchy level to disable it.

To upgrade the software, perform the following tasks:

Preparing the Switch for Installation (Junos OS)

Perform the following steps before installing the software:

1. Log in to the primary Routing Engine's console.

   For more information about logging in to the Routing Engine through the console port, see the specific hardware guide for your switch.

2. From the command line, enter configuration mode:

```
user@switch> configure
```

3. Disable Routing Engine redundancy:

```
user@switch# delete chassis redundancy
```

4. Disable nonstop-bridging:

```
user@switch# delete protocols layer2-control nonstop-bridging
```

5. Save the configuration change on both Routing Engines:

```
user@switch# commit synchronize
```

6. Exit the CLI configuration mode:

```
user@switch# exit
```

Installing Software on the Backup Routing Engine (Junos OS)

After the switch has been prepared, you first install the new Junos OS release on the backup Routing Engine, while keeping the currently running software version on the primary Routing Engine. This enables the primary Routing Engine to continue operations, minimizing disruption to your network.

After making sure that the new software version is running correctly on the backup Routing Engine, you are ready to switch routing control to the backup Routing Engine, and then upgrade or downgrade the software version on the other Routing Engine.

1. Log in to the console port on the other Routing Engine (currently the backup).

   For more information about logging in to the Routing Engine through the console port, see the specific hardware guide for your switch.

2. Install the new software package using the `request system software add` command:

```
user@switch> request system software add validate /var/tmp/jinstall-host-qfx-10-17.2R1.n-
secure-signed.tgz
```

   For more information about the `request system software add` command, see the CLI Explorer.

3. Reboot the switch to start the new software using the `request system reboot` command:

```
user@switch> request system reboot
```

> **NOTE**: You must reboot the switch to load the new installation of Junos OS on the switch. To terminate the installation, do not reboot your switch. Instead, finish the installation and then issue the `request system software delete <package-name>` command. This is your last chance to stop the installation.

All the software is loaded when you reboot the switch. Installation can take between 5 and 10 minutes. The switch then reboots from the boot device on which the software was just installed. When the reboot is complete, the switch displays the login prompt.

While the software is being upgraded, the Routing Engine on which you are performing the installation is not sending traffic.

4. Log in and issue the `show version` command to verify the version of the software installed.

```
user@switch> show version
```

Installing Software on the Primary Routing Engine (Junos OS)

Once the software is installed on the backup Routing Engine, you are ready to switch routing control to the backup Routing Engine, and then upgrade or downgrade the primary Routing Engine software:

1. Log in to the primary Routing Engine console port.

   For more information about logging in to the Routing Engine through the console port, see the specific hardware guide for your switch.

2. Transfer routing control to the backup Routing Engine:

```
user@switch> request chassis routing-engine master switch
```

   For more information about the `request chassis routing-engine master` command, see the CLI Explorer.

3. Verify that the backup Routing Engine (slot 1) is the primary Routing Engine:

```
user@switch> show chassis routing-engine
Routing Engine status:
  Slot 0:
    Current state                  Backup
    Election priority              Master (default)
```

```
Routing Engine status:
  Slot 1:
    Current state                Master
    Election priority            Backup (default)
```

4. Install the new software package using the `request system software add` command:

```
user@switch> request system software add validate /var/tmp/jinstall-host-qfx-10-17.2R1.n-secure-signed.tgz
```

For more information about the `request system software add` command, see the CLI Explorer.

5. Reboot the Routing Engine using the `request system reboot` command:

```
user@switch> request system reboot
```

NOTE: You must reboot to load the new installation of Junos OS on the switch.
To terminate the installation, do not reboot your system. Instead, finish the installation and then issue the `request system software delete jinstall` *<package-name>* command. This is your last chance to stop the installation.

The software is loaded when you reboot the system. Installation can take between 5 and 10 minutes. The switch then reboots from the boot device on which the software was just installed. When the reboot is complete, the switch displays the login prompt.

While the software is being upgraded, the Routing Engine on which you are performing the installation does not send traffic.

6. Log in and issue the `show version` command to verify the version of the software installed.

7. Transfer routing control back to the primary Routing Engine:

```
user@switch> request chassis routing-engine master switch
```

For more information about the `request chassis routing-engine master` command, see the CLI Explorer.

8. Verify that the primary Routing Engine (slot 0) is indeed the primary Routing Engine:

```
user@switch> show chassis routing-engine
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)

outing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
```

Upgrading Software by Using Automatic Software Download for Switches (Junos OS)

IN THIS SECTION

The automatic software download feature uses the Dynamic Host Configuration Protocol (DHCP) message exchange process to download and install software packages. You configure the automatic software download feature on switches that act as DHCP clients. You must enable automatic software download on a switch before the software upgrade can occur.

You configure a path to a software package file on the DHCP server. The server communicates the path to the software package file through DHCP server messages.

If you enable automatic software download, the DHCP client switch compares the software package name in the DHCP server message with the name of the software package that booted the switch. If the software packages are different, the DHCP client switch downloads and installs the software package specified in the DHCP server message.

Complete the following tasks in order:

Configuring DHCP Services for the Switch (Junos OS)

Before you upgrade software by using automatic software download, ensure that you have configured DHCP services for the switch, including configuring a path to a boot server and a boot file.

To configure a path to a boot server and a boot file:

1. Configure the name of the boot server advertised to DHCP clients. The client uses a boot file located on the boot server to complete DHCP setup. This configuration is equivalent to DHCP option 66:

```
[edit system services dhcp]
user@switch# set boot-server (address | hostname)
```

2. Set the boot file advertised to DHCP clients. After the client receives an IP address and the boot file location from the DHCP server, the client uses the boot image stored in the boot file to complete the DHCP setup. This configuration is equivalent to DHCP option 67:

```
[edit system services dhcp]
user@switch# set boot-file filename
```

Enabling Automatic Software Download on a Switch (Junos OS)

To enable automatic software download on a switch that acts as a DHCP client:

```
[edit chassis]
user@switch# set auto-image-upgrade
```

After automatic software download is enabled on your DHCP client switch and after DHCP services are enabled on your network, an automatic software download can occur at any time as part of the DHCP message exchange process.

If an automatic software download occurs, you see the following message on the switch:

```
Auto-image upgrade started
On successful installation system will reboot automatically
```

The switch reboots automatically to complete the upgrade.

Verifying That Automatic Software Download Is Working Correctly (Junos OS)

IN THIS SECTION

Purpose

Verify that the automatic software download feature is working correctly.

Action

Use the `show system services dhcp client` *`interface-name`* command to verify that the automatic software download feature has been used to install a software package.

```
user@switch> show system services dhcp client ge-0/0/1.0
 Logical Interface Name       ge-0/0/1.0
  Hardware address        00:0a:12:00:12:12
  Client Status           bound
  Vendor Identifier       ether
  Server Address          10.1.1.1
  Address obtained        10.1.1.89
  Lease Obtained at       2009-08-20 18:13:04 PST
  Lease Expires at        2009-08-22 18:13:04 PST

DHCP Options :
  Name: name-server, Value: [ 10.209.194.131, 203.0.113.2, 203.0.113.3 ]
  Name: server-identifier, Value: 10.1.1.1
  Name: router, Value: [ 10.1.1.80 ]
  Name: boot-image,
  Value: jinstall-ex-4200-9.6R1.5-domestic-signed.tgz
  Name: boot-image-location,
  Value: 10.1.1.25:/bootfiles/
```

Meaning

The output from this command shows the name and location of the software package under DHCP options when automatic software download was last used to install a software package. The sample output in DHCP options shows that the last DHCP server message to arrive on the DHCP client had a boot server address of 10.1.1.1 and a boot file named **jinstall-ex-4200-9.6R1.5-domestic-signed.tgz**. If automatic software download was enabled on this client switch during the last DHCP message exchange, these values were used by the switch to upgrade the software.

RELATED DOCUMENTATION

Configuring a DHCP Server on Switches

Upgrading Jloader Software on QFX Series Devices

IN THIS SECTION

Jloader software contains a boot loader (Uboot), which is used to bring up QFX Series devices and load the Junos OS from the flash memory of these devices. You can upgrade Jloader software on QFX3500 switches, QFX3500 and QFX3600 Node devices, and QFX3600-I and QFX3008-I Interconnect devices.

NOTE: Before you upgrade the Jloader software, see Table 9 on page 185, Table 10 on page 185, and Table 11 on page 186 to make sure that you are upgrading to the right version of Jloader software for the Junos OS software release running on your QFX3500 switches, or Node devices and Interconnect devices in your QFabric system.

See Table 12 on page 186 to see which Uboot software versions are available and the filenames of the Jloader software packages.

Table 9: Junos OS and Jloader Software Compatibility Matrix for the QFX3500 Switch and QFX3500 Node Device

Junos OS Software Version	1.1.2	1.1.4	1.1.5	1.1.8
11.3R1 and later (QFX3500 switch)	Supported	Supported	Not supported	Supported and recommended
11.3X30.6 and later (QFX3500 Node device)	Supported	Supported	Not supported	Supported and recommended
12.1X49-D1 and later (QFX3500 switch)	Supported	Supported	Not supported	Supported and recommended
12.2X50-D1 and later (QFX3500 switch and QFX3500 Node device)	Supported	Supported	Not supported	Supported and recommended

NOTE: An en dash means that the item is not applicable.

Table 10: Junos OS and Jloader Software Compatibility Matrix for the QFX3008-I Interconnect Device

Junos OS Software Version	1.1.2	1.1.4	1.1.5	1.1.8
11.3X30.9 and later (QFX3008-I Interconnect device)	Supported	Supported	Not supported	Supported and recommended
11.3X30.6 and later (QFX3008-I Interconnect device)	Supported	Supported	Not supported	Supported and recommended
12.2X50-D10.3 and later (QFX3008-I Interconnect device)	Supported	Supported	Not supported	Supported and recommended

NOTE: An en dash means that the item is not applicable.

Table 11: Junos OS and Jloader Software Compatibility Matrix for the QFX3600-I Interconnect Device and QFX3600 Node Device

Junos OS Software Version	1.1.2	1.1.4	1.1.5	1.1.8
12.2X50-D10.3 and later (QFX3600-I Interconnect Device and QFX3600 Node Device)	-	-	Supported	Supported and recommended
12.2X50-D20 and later (QFX3600 switch)	-	-	Supported	Supported and recommended

Table 12: Uboot Software Release and Jloader Software Compatibility Matrix

Uboot Software Release Number	Jloader Software Package Name
1.1.2	jloader-qfx-11.3X30.9-signed.tgz
1.1.4 (11.3R3 and 11.3R2 releases only. Not supported on 11.3R1)	jloader-qfx-11.3I20120127_0733_dc-builder-signed.tgz
1.1.4 (12.1R1 release and later)	jloader-qfx-12.1-20120125_pr.0-signed.tgz
1.1.5 (12.2X50-D10.3 and later)	jloader-qfx-12.2X50.D10.3-signed.tgz
1.1.8 (13.1X50-D15.1 and later)	jloader-qfx-13.3-20130831_pr_branch_qfd.0.tgz

Jloader Software Version 1.1.4 Guidelines

Jloader Release 1.1.4 is compatible with Junos OS Release 11.3R3 and 11.3R2, and Junos OS Release 12.1R1 and later. Jloader Release 1.1.4 is not compatible with Junos OS Release 11.3R1. The Jloader software package names are different for versions 1.1.4 (Junos OS 11.3R3 and 11.3R2) and 1.1.4 (Junos OS 12.2R1 release and later), but the binaries are the same. Because the binaries are the same, you can upgrade or downgrade to any Junos OS release.

- If you have Junos OS Release 11.3 installed and want to upgrade the Jloader software from version 1.1.2 to version 1.1.4, you need to upgrade using the **jloader-qfx-11.3I20120127_0733_dc-builder-signed.tgz** software package.
- If you have Junos OS Release 11.3R2 installed and want to upgrade to Junos OS Release 12.1, you do not need to upgrade the Jloader Release and can continue to use Jloader Release 1.1.2.
- If you have Junos OS Release 12.1 installed and want to upgrade the Jloader software from version 1.1.2 to version 1.1.4, you need to upgrade using the **jloader-qfx-12.1-20120125_pr.0-signed.tgz** software package.
- If you upgrade to Junos OS Release 12.1, you can upgrade to Jloader Release 1.1.4 using the **jloader-qfx-12.1-20120125_pr.0-signed.tgz** software package.

Upgrading Jloader Software on a QFX3500 Switch

The Jloader software for a QFX3500 switch resides in two flash memory banks. At any time, one bank acts as the primary bank, and the QFX3500 switch boots from it. The other bank is the backup bank—if the QFX3500 switch cannot boot from the primary bank, it boots from the backup bank. When you upgrade the Jloader software, the upgraded software is installed in the backup bank, which then becomes the new primary bank. Thus the primary and backup banks alternate each time you upgrade the Jloader software, with the primary bank containing the most recently installed version of the software, and the backup bank containing the previous version. To upgrade the Jloader software on a QFX3500 switch, you must perform the upgrade twice: once for each bank. Each upgrade requires that you to reboot the QFX3500 switch.

NOTE: If you are running Junos OS Release 11.3R1 or Junos OS Release 11.3R2, you must use the `no-validate` option when you issue the `request system software add` command to upgrade the Jloader software. Otherwise, the installation will fail and you receive a configuration error. The `no-validate` option is not required for Junos OS Release 11.3R3 and later.

NOTE: After you upgrade the Jloader software on the first bank, the software package is deleted after you reboot. Make sure that you have either downloaded the Jloader software package to either a remote site or in a local directory on the switch, such as the **/var/tmp** directory on the QFX3500 device.

1. In a browser, go to https://support.juniper.net.

   The Junos Platforms Download Software page appears.
2. In the QFX Series section of the Junos Platforms Download Software download page, select the QFX Series platform software you want to download.

3. Select the number of the software version that you want to download.
4. Read the End User License Agreement, click the **I agree** radio button, and then click **Proceed**.
5. Open or save the **jloader-qfx-*version*-signed.tgz** file either to a local system or to a remote location. If you are saving the installation package to a remote system, make sure that you can access it using HTTP, TFTP, FTP, or scp.
6. Log in to the QFX3500 switch and enter the shell. We recommend using a console connection.
7. Determine the version of the Jloader software package installed on the switch.

   For example:

```
root@switch% ls
gres-tp krt_gencfg_filter.txt
jloader-qfx-11.3-20110510.0-signed.tgz
```

8. Determine the version of the Uboot software that is running in the bank:

   For example:

```
root@switch% kenv | grep boot.version

boot.version="1.0.7"
```

9. Enter the CLI and install the Jloader software package.
   - To install a Jloader software package that is located in the **/var/tmp** directory, issue the **request system software add /var/tmp/jloader-qfx-version.tgz no-validate** command:

     For example:

```
user@switch> request system software add /var/tmp/jloader-qfx-11.3-20110510.0-signed.tgz
no-validate
```

     You see the following messages during the installation:

```
Verified jloader-qfx-11.3-20110510.0.tgz signed by PackageProduction_11_3_0
Adding jloader-qfx...
Installation in progress, please wait...
Mounted jloader-qfx package on /dev/md8...
Verified manifest signed by PackageProduction_11_3_0
Verified jloader-qfx-11.3-20110510.0 signed by PackageProduction_11_3_0
Registering jloader-qfx as unsupported
```

```
Installation finished successfully.
Please reboot to activate the package
Saving package file in /var/sw/pkg/jloader-qfx-11.3-20110510.0-signed.tgz ...
Saving state for rollback ...

juniper@qfx3500>
```

- To install a Jloader software package located on a remote server using FTP, issue the **request system software add /ftp://hostname/pathname/jloader-qfx-version-signed.tgz no-validate** command.

  For example:

```
user@switch> request system software add /ftp://hostname/pathname/jloader-
qfx-11.3-20110510.0-signed.tgz no-validate
```

- To install a Jloader software package located on a remote server using HTTP, issue the **request system software add /http://hostname/pathname/jloader-qfx-** *version*-**signed.tgz no-validate** command.

  For example:

```
user@switch> request system software add /http://hostname/pathname/jloader-
qfx-11.3-20110510.0-signed.tgz no-validate
```

10. When prompted, reboot the Control Board by issuing the **request system reboot** command.

    For example:

```
user@switch> request system reboot
Reboot the system ? [yes,no] (no) yes
```

11. Enter the shell and verify that the version of the Uboot software in the primary bank is the version you just installed.

    For example:

```
root@switch% kenv | grep boot.version

boot.version="1.1.1"
```

12. To install the Jloader software package on the current backup bank, repeat Step 10 through Step 14.

Upgrading Jloader Software on a QFabric System

This procedure explains how to upgrade the Jloader software on your Node devices and Interconnect devices. The example shows how to upgrade the Jloader Release 1.1.1 to 1.1.2 on a Node device with the serial number BBAK1186.

NOTE: Before you upgrade the Jloader software, make sure you have the serial numbers of the Node devices, Interconnect devices, and Control Boards in the Interconnect devices you want to upgrade.

1. Issue the **show chassis hardware node-device ?** command to view the serial numbers of the Node devices.

   For example:

```
user@qfabric> show chassis hardware node-device ?

  <node-device>        Node device identifier
  BBAK1186             Node device
  BBAK3149             Node device
  BBAK3177             Node device
  BBAK8063             Node device
  BBAK8799             Node device
  P2443-C              Node device
  P2515-C              Node device
  P3708-C              Node device
  P3885-C              Node device
  P3916-C              Node device
  node0                Node device
  node1                Node device
  node2                Node device
  node3                Node device
  node4                Node device
  node5                Node device
  node6                Node device
  node7                Node device
  node8                Node device
```

   An example of a Node device serial number is BBAK1186.

2. Issue the **show chassis hardware interconnect-device ?** command to view the serial numbers of the Interconnect devices.

   For example:

```
user@qfabric> show chassis hardware interconnect-device ?

Possible completions:
  interconnect-device  Interconnect device identifier
  IC-F1052             Interconnect device
  IC-F3947             Interconnect device
```

   The Interconnect device serial numbers are IC-F1052 and IC-F3947.

3. Issue the **show chassis hardware interconnect-device *name*** command to view the serial numbers of the Control Boards in the Interconnect device.

   For example:

```
user@qfabric> show chassis hardware interconnect-device IC-F3947

Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis          REV 10                F3947             QFXC08-3008
Midplane         REV 10   750-035835   F3947-C           QFX Midplane
CB 0             REV 14   750-035855   ZJ9432            QFX Chassis Control Board
  Routing Engine 0        BUILTIN      BUILTIN           QFX Routing Engine
CB 1             REV 14   750-035855   ZJ9404            QFX Chassis Control Board
```

   The Control Board serial numbers are ZJ9432 and ZJ9404.

4. Issue the **show chassis firmware node-device *name*** command to see which version of Uboot software you have installed on your Node device.

   For example:

```
user@qfabric> show chassis firmware node-device BBAK1186

Part                    Type       Version
node4                   U-Boot     1.1.6 (May 10 2011 - 04:52:59) 1.1.1
                        loader     FreeBSD/MIPS U-Boot bootstrap loader 0.1
```

   The Uboot software version is 1.1.1. The loader software version appears after the timestamp for U-Boot 1.1.6.

5. Issue the **show chassis firmware interconnect-device *name*** command to see which version of Uboot software you have installed on the Routing Engines located on the Control Boards of the Interconnect device.

   For example:

```
user@qfabric> show chassis firmware interconnect-device IC-F3947

Part                    Type       Version
Routing Engine 0        U-Boot     U-Boot 1.1.6 (Jan 27 2012 - 03:24:34) 1.1.4
                        loader     FreeBSD/MIPS U-Boot bootstrap loader 0.1
Routing Engine 1        U-Boot     U-Boot 1.1.6 (Jan 27 2012 - 03:24:34) 1.1.4
                        loader     FreeBSD/MIPS U-Boot bootstrap loader 0.1
```

   The Uboot software version is 1.1.4. The loader software version appears after the timestamp for U-Boot 1.1.6.

6. In a browser, go to https://support.juniper.net.

   The Downloads page appears.

7. Select the product you want software for.

8. Find and click the file you want to download.

   A login screen appears.

9. Enter your username and password, and press **Enter**.

10. Read the End User License Agreement, click the **I agree** radio button, and then click **Proceed**.

11. Open or save the **jloader-qfx-*version*-signed.tgz** file either to a local system or to a remote location. If you are saving the installation package to a remote system, make sure that you can access it using HTTP, TFTP, FTP, or scp.

12. Retrieve the software from the location in which you downloaded it. To do this, issue the **request system software download */path/package-name*** command.

    For example:

```
user@qfabric> request system software download ftp://server/files/jloader-qfx-11.3X30.9-
signed.tgz
```

13. Log in to the Director device as root and enter the shell to verify that you have downloaded the Jloader software package. We recommend using a console connection. The software package is copied from where you downloaded it and is placed locally on the QFabric system in the **/pbdata/packages** directory.

For example:

```
[root@dg0] # pwd
/pbdata/packages
[root@dg0] # ls
jloader-qfx-11.3X30.9-signed.tgz
```

14. Before you copy over the Jloader software package to the Node device or Interconnect device, determine the directory that matches the serial number of the Node device or Interconnect device that you want to upgrade. View the remote logs and the Node device and Interconnect device serial numbers by issuing the **ls /pdbata/export/rlogs** command at the command line of the Director device before you copy the software package over to the device.

> **NOTE**: The **/pbdata/export/rlogs/*node-device-serial-ID*** and **/pbdata/export/rlogs/*interconnect-device-serial-ID*** directories on the Director device are NFS mounted as the **/tftpboot/logfiles** directories on the Node device and Interconnect device. These directories are created for all Node devices and Interconnect devices in a QFabric system. The Jloader files are stored in the **/tftpboot/logfiles** directories for each Node device and Interconnect device.

For example:

```
[root@dg0 tmp] # ls /pdbata/export/rlogs
02de4930-828b-11e1-a319-00e081c57938  c9898afe-828b-11e1-956c-00e081c57938
04103b2a-29d5-e011-bf8a-0e6bdf3aa1e6  eeba4aac-828b-11e1-85e2-00e081c57938
1e2739e0-828b-11e1-bf74-00e081c57938  F1052
8d8a978c-828b-11e1-a833-00e081c57938  F3947
ad55b89e-828b-11e1-b70e-00e081c57938  P2443-C
BBAK1186                              P2515-C
BBAK3149                              P3708-C
BBAK3177                              P3885-C
BBAK8063                              P3916-C
BBAK8799
```

BBAK1186 is the serial number of the Node device that needs to be upgraded.

15. Copy the Jloader software package from the **/var/tmp** directory to the **/pbdata/export/rlogs/BBAK1186** directory.

For example:

```
[root@dg0 tmp] # cp jloader-qfx-11.3X30.9-signed.tgz /pbdata/export/rlogs/BBAK1186
```

16. Confirm that the Jloader software package you copied over is in the **/pbdata/export/rlogs/BBAK1186** directory.

    For example:

```
[root@dg0 tmp] # ls /pbdata/export/rlogs/BBAK1186
jloader-qfx-11.3X30.9-signed.tgz
```

17. Issue the **/root/dns.dump** command to find out the internal IP addresses of the Node device or Interconnect device.

```
[root@dg0 tmp] # /root/dns.dump
; <<>> DiG 9.3.6-P1-RedHat-9.3.6-4.P1.el5 <<>> -t axfr pkg.test.device.net @169.254.0.1
;; global options:  printcmd
pkg.test.device.net.   600     IN      SOA     ns.pkg.test.device.net.
mail.pkg.test.device.net. 152 3600 600 7200 3600
pkg.test.device.net.   600     IN      NS      ns.pkg.test.device.net.
pkg.test.device.net.   600     IN      A       169.254.0.1
pkg.test.device.net.   600     IN      MX      1 mail.pkg.test.device.net.
dcfnode---DCF-ROOT.pkg.test.device.net. 45 IN A 169.254.192.17
dcfnode---DRE-0.pkg.test.device.net. 45 IN A   169.254.3.3
dcfnode-8d8a978c-828b-11e1-a833-00e081c57938.pkg.test.device.net. 45 IN A 169.254.128.19
dcfnode-ad55b89e-828b-11e1-b70e-00e081c57938.pkg.test.device.net. 45 IN A 169.254.128.20
dcfnode-BBAK1186.pkg.test.device.net. 45 IN A  169.254.128.14
```

    The internal IP address for BBAK1186 is 169.254.128.14.

18. Upgrade the Jloader software on the Node device or Interconnect device.

    Before you can upgrade the Jloader software, you need to use SSH to log in to the Node device or Interconnect device and verify that the software is in the **/tftpboot/logfiles** directory.

    a. Use SSH to log in to the Node device or Interconnect device.

       For example:

```
[root@dg0 tmp] # ssh 160.254.128.14
root@169.254.128.14's password:
--- JUNOS 11.3X30.10 built 2012-03-11 22:55:43 UTC
At least one package installed on this device has limited support.
```

```
Run 'file show /etc/notices/unsupported.txt' for details.
root@sng3%
```

b. Verify that the Jloader software package is in the **tftpboot/logfiles** directory of the Node device or Interconnect device.

   For example:

```
root@sng3% ls /tftpboot/logfiles
.index                                jloader-qfx-11.3X30.9-signed.tgz
```

c. Copy the Jloader software package from the **/tftpboot/logfiles** directory to the **/var/tmp** directory of the Node device or Interconnect device.

   For example:

```
root@sng3% cp /tftpboot/logfiles/jloader-qfx-11.3X30.9-signed.tgz /var/tmp
```

d. Verify that the Jloader software package is in the **/var/tmp** directory of the Node device or Interconnect device.

   For example:

```
root@sng3% ls /var/tmp
.snap                                 jloader-qfx-11.3X30.9-signed.tgz        tmp
gres-tp                               krt_gencfg_filter.txt                   vc-
autoupgrade
if-rtsdb                              rtsdb
```

e. Enter CLI mode and issue the **request system software add /var/tmp/jloader-qfx-*version*-signed.tgz** command.

   For example:

```
root@sng3% cli
root@sng3> request system software add /var/tmp/jloader-qfx-11.3X30.9-signed.tgz
Validating on fpc0
Checking compatibility with configuration
Initializing...
Using jbase-11.3X30.10
Verified manifest signed by PackageProduction_11_3_0
Verified jbase-11.3X30.10 signed by PackageProduction_11_3_0
```

```
Using /var/tmp/jloader-qfx-11.3X30.9-signed.tgz
Verified jloader-qfx-11.3X30.9.tgz signed by PackageProduction_11_3_0
Using jloader-qfx-11.3X30.9.tgz
Checking jloader-qfx requirements on /
Verified manifest signed by PackageProduction_11_3_0
Verified jloader-qfx-11.3X30.9 signed by PackageProduction_11_3_0
Using jkernel-qfx-11.3X30.10
Verified manifest signed by PackageProduction_11_3_0
Verified jkernel-qfx-11.3X30.10 signed by PackageProduction_11_3_0
Using jroute-qfx-11.3X30.10
Verified manifest signed by PackageProduction_11_3_0
Verified jroute-qfx-11.3X30.10 signed by PackageProduction_11_3_0
Using jcrypto-qfx-11.3X30.10
Verified manifest signed by PackageProduction_11_3_0
Verified jcrypto-qfx-11.3X30.10 signed by PackageProduction_11_3_0
Using jweb-qfx-11.3X30.10
Verified manifest signed by PackageProduction_11_3_0
Verified jweb-qfx-11.3X30.10 signed by PackageProduction_11_3_0
Using jswitch-qfx-11.3X30.10
Verified manifest signed by PackageProduction_11_3_0
Verified jswitch-qfx-11.3X30.10 signed by PackageProduction_11_3_0
Hardware Database regeneration succeeded
Validating against /config/juniper.conf.gz
mgd: commit complete
Validation succeeded
Done with validate on all chassis

fpc0:
Verified jloader-qfx-11.3X30.9.tgz signed by PackageProduction_11_3_0
Adding jloader-qfx...
Installation in progress, please wait...
Mounted jloader-qfx package on /dev/md10...
Verified manifest signed by PackageProduction_11_3_0
Verified jloader-qfx-11.3X30.9 signed by PackageProduction_11_3_0
######################################
##########################################################################################
##########################################################################################
##############
Installation finished successfully.
Please reboot to activate the package
Saving package file in /var/sw/pkg/jloader-qfx-11.3X30.9-signed.tgz ...
Saving state for rollback ...
```

```
Upgrade has completed successfully.
Reboot is now required.
```

f. Reboot both the Node device and Interconnect device twice, because they each contain two partitions.

   For example:

```
root@sng3> request system reboot
Reboot the system ? [yes,no] (no) yes
Shutdown NOW!
[pid 37663]

root@sng3>

*** FINAL System shutdown message from root@sng3 ***
System going down IMMEDIATELY
```

g. Verify that the Uboot software on the Node device or Interconnect device has been upgraded to the new Uboot software by logging in to the QFabric CLI and issuing either the **show chassis firmware node-device *name*** command or the **show chassis firmware interconnect-device *name*** command.

   For example:

```
user@qfabric> show chassis firmware node-device BBAK1186
Part                    Type       Version
node4                   U-Boot     1.1.6 (Nov 19 2011 - 11:42:07) 1.1.2
                        loader     FreeBSD/MIPS U-Boot bootstrap loader 0.1
```

   The Uboot software version is now 1.1.2. The loader software version appears after the timestamp for U-Boot 1.1.6.

SEE ALSO

Performing a Nonstop Software Upgrade on the QFabric System

Upgrading Software on a QFabric System

Installing Junos OS Software with Junos Automation Enhancements

Before you install software, download the Junos OS jinstall-qfx-5-flex-x.tgz software bundle. For information on downloading and accessing the files, see "Installing Software Packages on QFX Series Devices (Junos OS)" on page 168.

Junos operating system (Junos OS) with Junos Automation Enhancements is a full-featured version of Junos OS with Veriexec disabled, which can only be installed on supported devices.

NOTE: You must install the jinstall-qfx-5-flex-x.tgz software bundle in order to use the automation enhancements.

BEST PRACTICE: Before you install the software, back up any critical files in **/var/home**. For more information regarding how to back up critical files, contact Customer Support at https://www.juniper.net/support.

Install the software:

1. Issue the `request system software add` command with the `validate` option:
   - If the installation package resides locally on the switch, issue the **request system software add validate *pathname source* reboot** command, using the following format:

     ```
     user@switch> request system software add validate /var/tmp/jinstall-qfx-5-flex-x.tgz reboot
     ```

   - If the installation package resides remotely, issue the **request system software add validate *pathname source* reboot** command, using the following format:

     ```
     user@switch> request system software add validate ftp://ftpserver/directory/jinstall-qfx-5-flex-x.tgz reboot
     ```

2. After the reboot has finished, verify that the new version of software has been properly installed by executing the `show version` command.

   ```
   user@switch> show version
   fpc0:
   --------------------------------------------------------------------------
   Hostname: qfx5100-24q-et013
   ```

```
Model: qfx5100-24q-2p
JUNOS Base OS Software Suite [13.2X51-D20]
JUNOS Base OS boot [13.2X51-D20]
JUNOS Crypto Software Suite [13.2X51-D20]
JUNOS Online Documentation [13.2X51-D20]
JUNOS Kernel Software Suite [13.2X51-D20]
JUNOS Packet Forwarding Engine Support (qfx-x86-32) [13.2X51-D20]
JUNOS Routing Software Suite [13.2X51-D20]
JUNOS Enterprise Software Suite [13.2X51-D20]
JUNOS py-base-i386 [13.2X51-D20]
Puppet on Junos [2.7.19_1.junos.i386]
Ruby Interpreter [11.10.4_1.junos.i386]
Chef [11.10.4_1.junos.i386]
junos-ez-stdlib [11.10.4_1.junos.i386]
JUNOS Host Software [13.2X51-D20]
JUNOS for Automation Enhancement
```

NOTE: If you are upgrading a device from standard Junos OS to use Junos Automation Enhancements and you are *not* loading the new factory default configuration, you need to use the following procedure.

1. Edit your existing Junos OS configuration to include the following configuration statements:

```
[edit]
user@switch# set system extensions providers juniper license-type juniper deployment-scope
commercial
user@switch#  set system extensions providers chef license-type juniper deployment-scope
commercial
```

NOTE: The factory default configuration of the QFX5100 switch jinstall-qfx-5-flex-x.tgz software bundle is a Layer 3 configuration, whereas the factory default configuration for QFX5100 switch software bundles is a Layer 2 configuration. Therefore, if you are running the jinstall-qfx-5-flex-x.tgz software bundle on a QFX5100 switch and you use the `load factory-default` command, the resulting factory default configuration is set up for Layer 3 interfaces.

This is the factory default configuration for QFX5100 switch jinstall-qfx-5-flex-x.tgz software bundle:

```
user@switch> show configuration
```

```
system syslog user * any emergency
system syslog file messages any notice
system syslog file messages authorization info
system syslog file interactive-commands interactive-commands any
system extensions providers juniper license-type juniper deployment-scope commercial
system extensions providers chef license-type juniper deployment-scope commercial
system commit factory-settings reset-virtual-chassis-configuration
system commit factory-settings reset-chassis-lcd-menu
system processes app-engine-virtual-machine-management-service traceoptions level notice
system processes app-engine-virtual-machine-management-service traceoptions flag all
interfaces et-0/0/0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/0:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/0:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/0:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/0:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/1:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/1:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/1:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/1:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/2:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/2:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/2:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/2:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/3:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/3:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/3:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/3:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/4 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/4:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/4:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/4:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/4:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/5 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
```

```
interfaces xe-0/0/5:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/5:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/5:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/5:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/6 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/6:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/6:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/6:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/6:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/7 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/7:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/7:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/7:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/7:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/8 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/8:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/8:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/8:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/8:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/9 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/9:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/9:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/9:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/9:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/10 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/10:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/10:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/10:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/10:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/11 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/11:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/11:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/11:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/11:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/12 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/12:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/12:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/12:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/12:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/13 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/13:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/13:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/13:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
```

```
interfaces xe-0/0/13:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/14 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/14:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/14:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/14:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/14:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/15 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/15:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/15:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/15:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/15:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/16 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/16:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/16:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/16:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/16:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/17 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/17:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/17:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/17:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/17:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/18 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/18:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/18:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/18:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/18:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/19 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/19:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/19:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/19:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/19:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/20 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/20:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/20:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/20:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/20:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/21 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/21:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/21:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/21:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/21:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/22 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/22:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
```

```
interfaces xe-0/0/22:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/22:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/22:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/0/23 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/23:0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/23:1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/23:2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces xe-0/0/23:3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/1/0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/1/1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/1/2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/1/3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/2/0 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/2/1 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/2/2 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
interfaces et-0/2/3 unit 0 family inet dhcp vendor-id Juniper-qfx5100-24q-2p
forwarding-options storm-control-profiles default all
protocols lldp interface all
protocols lldp-med interface all
protocols igmp-snooping vlan default
vlans default vlan-id 1
```

SEE ALSO

> *Overview of Junos Automation Enhancements on Devices Running Junos OS with Enhanced Automation*

Personality Upgrade Process

IN THIS SECTION

Understanding the Personality Upgrade Process for a Device

IN THIS SECTION

Personality of a device can be defined as a combination of the purpose of the device and the solution that the device provides. For instance, a switch is a Layer 2 (Data Link Layer) device that is designed to connect two or more networking devices on a network. Most switches (except a few Layer 3 switches) act as bridge devices that receive data packets from a source device, process the data, and forward it to a destination device within the same network. A router, in contrast, connects multiple networks. It is typically a Layer 3 (Network Layer) device because its primary function is to forward packets destined either for its own network or for other networks.

Starting in Junos OS Release 18.2R1, you can upgrade the personality of a device from the installed personality to a new personality without having to upgrade the entire device.

The build image loaded on a device defines the personality of the device. For instance, suppose you purchase a core router such as a PTX10008. The build image loaded on the router indicates its installed personality—that is, PTX10008. You can upgrade its personality and use it as an edge router such as an MX10008, in which case the device personality changes to MX10008. Similarly, you can change the device personality from an MX10008 to a PTX10008. You can also alternate between a switch (for example, QFX10002-60C) and a router (say, PTX10002-60C) by simply upgrading the device personality.

To upgrade the device personality from one device to another, you need certain common hardware components supported by both the devices. In the case of an MX10008 and a PTX10008, the presence of the common Routing and Control Board (RCB)—JNP10K-RE1—and the eight-slot universal chassis—JNP10008—enables you to upgrade from one device to the other seamlessly.

NOTE: When you order a spare JNP10K-RE1 RCB, the image of the MX10008 build is installed on that RCB. The spare JNP10K-RE1 also contains an image of the PTX10008 build at the **/var/tmp** location. You can upgrade an MX10008 router to an PTX10008 by using that image.

Benefits of Personality Upgrade

- Reuse—The same device (universal chassis) can be used as an edge router or a core router or a switch.
- Time-saving—You can quickly deploy the new device personality in the network.
- Lower capital expenditure and operating costs—You can upgrade the device personality instead of purchasing a new device.
- Network Growth management—Upgrading the personality of your device helps you manage the network growth when growth forecasts are discouraging.
- Lower inventory and storage costs for distributors.

Guidelines and Restrictions

This section describes the guidelines to consider when you upgrade the personality of a device:

- If you attempt to upgrade the personality of the device without using the recommended CLI command, the device can become inaccessible and unstable.
- There are no in-built restrictions or checks to validate the image that you plan to install on the device.
- Verify that the installed image supports the required command to upgrade to the new personality. If it does not, upgrade to a later version of the image before you upgrade to the new personality.
- When you upgrade the personality of the device, the configuration present in the device is migrated to the new personality. This is similar to a Junos OS upgrade. Therefore, any configuration that is not supported on the new personality must be deleted before you upgrade the personality. If any unsupported configuration is retained in the device after it reboots with the new image, the device returns to the factory-default configuration.
- Retain the minimum configuration required on the device, so the management interface is accessible.

NOTE: Juniper Networks does not support using the `request vmhost software rollback` command to revert to the previously installed personality.

Supported Personality Upgrades

Table 13 on page 206 displays the various combinations of device personality upgrades that are supported by Junos OS.

Table 13: Supported Personality Upgrades on Junos OS

Installed Personality	New Personality	Initial Junos OS Release	Common HW Component
MX10008	PTX10008	18.2	Routing and Control Board (JNP10K-RE1)
PTX10008	MX10008	18.2	Routing and Control Board (JNP10K-RE1)
QFX10002-60C	PTX10002-60C	18.2	
PTX10002-60C	QFX10002-60C	18.2	
MX10016	PTX10016	18.4	Routing and Control Board (JNP10K-RE1)
PTX10016	MX10016	18.4	Routing and Control Board (JNP10K-RE1)

You can upgrade the personality of the device to a new personality by:

- Using the USB flash drive
- Using the Junos OS CLI
- Using the PXE boot server

Upgrading the Personality of a Device by Using a USB Flash Drive

The build image loaded on the device defines the personality of the device. You can change the personality of the device by upgrading it.

In a USB upgrade, the content of the SSDs are erased and the image is installed from the USB flash drive to both the primary and secondary disks. Based on the image used, the device comes up as a PTX10008 or an MX10008. This is irrespective of the previously installed personality of the device.

NOTE: When you order a spare JNP10K-RE1 RCB, the image of the MX10008 build is installed on that RCB. The spare RCB also contains an image of the PTX10008 build at the **/var/tmp** location. You can upgrade an MX10008 router to an PTX10008 by using that image.

To upgrade the personality of the device by using a USB flash drive:

1. Insert the external USB flash drive. The external flash drive is detected.
2. Reboot the device.

```
user@host# run request vmhost reboot usb
OR
user@host# run request vmhost reboot
```

3. When prompted, unplug the USB flash drive after the system reboots.

NOTE: Juniper Networks does not support using the `request vmhost software rollback` command to revert to the previously installed personality.

Upgrading the Personality of a Device by Using CLI

IN THIS SECTION

The build image loaded on the device defines the personality of the device. You can change the personality of the device by upgrading it.

You can upgrade the personality of the device by using CLI configuration on devices running Junos OS.

NOTE: When you order a spare JNP10K-RE1 RCB, the image of the MX10008 build is installed on that RCB. The spare RCB also contains an image of the PTX10008 build at the **/var/tmp** location. You can upgrade an MX10008 router to an PTX10008 by using that image.

How to Upgrade the Personality of a Device on Junos OS

Use the following CLI procedure to upgrade the personality of a device running Junos OS.

- Verify that the installed image supports the required CLI command to upgrade to the new personality. If it does not, upgrade to a later version of the image before you upgrade to the new personality.
- Delete any configuration that is not supported or is not compatible with the new personality before you upgrade the personality. If any unsupported configuration is retained in the device after it reboots with the new image, the device returns to the factory-default configuration.

To upgrade the device to a new personality by using the Junos OS CLI:

1. In operational mode, verify the installed personality of the device. If you have purchased an MX10008 device, the installed personality of the device is displayed as `mx10008`. If you have purchased a PTX10008 device, the installed personality of the device is displayed as `ptx10008`.

```
user@host> show version
```

```
Hostname: host
Model: mx10008
```

```
Hostname: host
Model: ptx10008
```

2. Download the software package or build image from https://www.juniper.net/support/. For information about downloading software packages, see "Downloading Software (Junos OS)" on page 108. Save the software package to the `/var/`*`path`*`/`*`package-name`* directory on the router. For example, you can save the software package to the `/var/tmp` directory.

NOTE: Download the software package specific to the personality you want to upgrade to. The software package for PTX Series routers is different from the software package for MX Series routers.

3. In configuration mode, install the software package by using the `request vmhost software add` *path/package-name* command. Install the software package based on the new personality you want to upgrade to, as follows:

```
user@host# run request vmhost software add /var/tmp/junos-vmhost-install-ptx-x86-64-xyz.tgz
upgrade-to-model ptx10008 no-validate
```

```
user@host# run request vmhost software add /var/tmp/junos-vmhost-install-mx-x86-64-zyx.tgz
upgrade-to-model mx10008 no-validate
```

NOTE: If you do not specify the `no-validate` option, the router displays the following error message: **error: Upgrading to a different model is supported only with no-validate option.**

4. Reboot the router so the new package is loaded.

```
user@host# run request vmhost reboot
```

5. Run the `show version` command to verify that the upgrade is successful. If you have upgraded the personality of the device to an MX10008 device, the new personality of the device is displayed as `mx10008`. If you have upgraded the personality of the device to a PTX10008 device, the new personality of the device is displayed as `ptx10008`.

```
user@host> show version
```

```
Hostname: host
Model: ptx10008
```

```
Hostname: host
Model: mx10008
```

NOTE: Juniper Networks does not support using the `request vmhost software rollback` command to revert to the previously installed personality.

To ensure that all four partitions are upgraded to the same personality, follow these steps:

1. Boot from the solid-state drive (SSD) Disk 2 by using the `request vmhost reboot` command.

   ```
   user@host> request vmhost reboot disk2
   ```

2. Upgrade to the new personality by using the `upgrade-to-model` and `no-validate` options. This command upgrades both partitions on the SSD Disk 1.

   ```
   user@host# run request vmhost software add junos-vmhost-install-x.tgz upgrade-to-model X no-validate reboot
   ```

   If you are upgrading to PTX10008, include the package for the PTX Series routers and replace **X** with *ptx10008* before the `no-validate` option. If you are upgrading to MX10008, include the package for the MX Series routers and replace **X** with *mx10008* before the `no-validate` option.

3. After the device boots up from SSD Disk 1, take a snapshot from SSD Disk 1 to Disk 2.

   ```
   user@host> request vmhost snapshot partition
   ```

   This step ensures that both partitions on Disk 2 are upgraded to the new personality.

After you complete Step 1 through Step 3, all four partitions are upgraded to new personality.

Upgrading the Personality of a Device by Using a PXE Boot Server

The build image loaded on the device defines the personality of the device. You can change the personality of the device by upgrading it.

You can upgrade the personality of a device by using the Preboot Execution Environment (PXE) boot server. A PXE boot prepares a client/server environment to boot devices by using a network interface that is independent of available data storage devices or installed operating systems. The image of the operating system is stored on a TFTP server. You can have a separate PXE boot server for each image.

NOTE: When you order a spare JNP10K-RE1 RCB, the image of the MX10008 build is installed on that RCB. The spare RCB also contains an image of the PTX10008 build at the **/var/tmp** location. You can upgrade an MX10008 router to an PTX10008 by using that image.

To upgrade the personality of a device from the installed personality to the new personality by using the PXE boot server method:

- Copy the image you want installed on the device to the PXE boot server.
- Reboot the device to install the image.

NOTE: If you have already copied the image to the PXE boot server, reboot the device to install the image.

To copy the image you want installed to the PXE boot server and install the image:

1. Copy the downloaded installation media to the **/var/tmp** directory in the PXE boot server.

   For example:

   ```
   scp /volume/build/junos/18.2/release/zyx/ship/junos-vmhost-install-net-x86-64-xyz.tgz
   user@host:/var/tmp/
   ```

2. Log in to the PXE boot server and verify the installation file.

   For example:

   ```
   user@host> ls -lh junos-vmhost-install-net-x86-64-xyz.tgz
   -rw-r--r-- 1 root root 1.8G May 24 00:42 junos-vmhost-install-net-x86-64-xyz.tgz
   ```

3. Extract the **junos-vmhost-install-net** TAR file.

   For example:

   ```
   user@host> tar xvzf junos-vmhost-install-net-x86-64-xyz.tgz  -C /var/tmp
   attributes
   junos-vmhost-install-ptx.tgz
   manifest
   manifest.certs
   manifest.ecerts
   manifest.esig
   ```

```
manifest.sig
package.xml
pkg_add_vmhost.sh
vmhost-install-net-x86_64-xyz.tgz
```

4. Remove the previously installed files, if any, from the **/tftpboot** directory.

```
user@host> rm -f /tftpboot
user@host> mkdir /tftpboot
```

5. Extract the network installation package.

   For example:

```
user@host> tar xvzf  /var/tmp/vmhost-install-net-x86_64-xyz.tgz -C /tftpboot/
./
./vmhost-version.sh
./bootpxe64.efi
./vmhost-version
./grub.cfg
..
...
-rw-rw-r-- 1  930  930  45M Oct 20 01:51 vmhost-install-net-x86_64-xyz.tgz
-rw-rw-r-- 1  930  930    6 Oct 20 01:51 vmhost-version
-rwxrwxr-x 1  930  930  416 Oct 20 01:51 vmhost-version.sh
-rw-r--r-- 1  930  930 6.9M Oct 20 01:51 vmlinuz
```

6. Rename or delete the previously installed root file **system/scripts** from the **/var/install** directory. Create a new **/var/install** directory.

```
user@host>mv /var/install /var/install_old
user@host>mkdir /var/install
```

7. Extract the installation package.

   For example, this sample output is specific to the PTX Series device installation package.

```
user@host>tar xvzf /var/tmp/junos-vmhost-install-ptx.tgz  -C /var/install
./
./vmhost-pkgs-version
./vm/
```

```
./vm/note
./vm/grub.cfg.ngre
./vm/vsmartd-1.0-0.x86_64.rpm
./vm/re_fpga-1.0-0.x86_64.rpm
./vm/veccd-1.0-0.x86_64.rpm
./vmhost-version.sh
./vmhost/
./vmhost/vmhost-x86_64-xyz.img.gz
...
...
./junos/junos-mtre-upgrade.sh
./vmhost-core-x86_64-15.1I20151019_1021_builder.tgz
./junos/
./junos/junos-install-x86-64-xyz.img.gz
```

8. Verify that the **/var/install** folder contains the **attributes** file. If the file does not exist in the specified location, copy the attribute file.

> **NOTE**: The attribute file consists of the personality information of the image. If the attributes file is not present, the device is unable to upgrade to the new personality even when the PXE boot server has the relevant image.

```
user@host> mv /var/tmp/attributes /var/install
```

9. Set permissions for the files in the **/var/install** and **/tftpboot** directories.

```
user@host> chown root:root /tftpboot/*
user@host> chown -R root:root /var/install
user@host> chmod -R a+rwx /var/install
```

10. Exit the PXE boot server.

```
user@host> exit
```

11. After you copy the image to the PXE boot server, to install the image on the device, reboot the device to install the image.

```
user@host> request vmhost reboot network
```

The router boots from the PXE server and installs the image on both the SSDs.

If the device fails to reboot, you can use the USB disk installation option. However, after using USB disk installation, if the router fails to reboot or is not accessible, follow these steps on the console:

1. Power cycle the chassis or remove the RCB (JNP10K-RE1) and plug it back in.
2. Press the **ESC** button to go to the Boot Manager Menu.
3. Select `Boot Manager`, and then press Enter.
4. Select the **ETH00 (xx:xx:xx:xx:xx:xx)** option. A warning message is displayed. At the prompt, select **y** to install the image on both the primary and secondary disks.

```
WARNING: The installation will erase the contents of your disks.
Install vmhost and Junos Software on Primary and Secondary disk [y/n] y
```

5. In operational mode, verify that the upgrade is successful. If you have upgraded the personality of the device to an MX10008, the new personality of the device is `mx10008`. If you have upgraded the personality of the device to a PTX10008, the new personality of the device is `ptx10008`.

```
user@host> show version
Hostname: host
Model: ptx10008
```

```
user@host> show version
Hostname: host
Model: mx10008
```

NOTE: Juniper Networks does not support using the `request vmhost software rollback` command to revert to the previously installed personality.

Release History Table

Release	Description
18.2R1	Starting in Junos OS Release 18.2R1, you can upgrade the personality of a device from the installed personality to a new personality without having to upgrade the entire device.

RELATED DOCUMENTATION

- Upgrading the Personality of QFX10002-60C and PTX10002-60C Switches Using the PXE Boot Server

Upgrading the Personality of QFX10002-60C and PTX10002-60C Devices

IN THIS SECTION

The installed image on your devices determines the personality of the device. Juniper Networks offers benefits of changing the personality of your device. You can install the image of QFX10002-60C in PTX10002-60C device and vice versa. You can install the new personality via Preboot Execution Environment (PXE) boot method boot, USB, CLI, and ZTP.

Upgrading the Personality of QFX10002-60C and PTX10002-60C Devices Using the PXE Boot Server

You can configure your QFX10002-60C device as a PTX10002-60C device or your PTX10002-60C device as a QFX10002-60C device. The image loaded on the device determines the personality of the device. For example, if you have purchased a QFX10002-60C device, the installed personality is a QFX10002-60C device. When you upgrade the QFX10002-60C device to a PTX10002-60C device, the new personality of the device is a PTX10002-60C device. Similarly, if you have purchased a PTX10002-60C device, the installed personality is a PTX10002-60C device and the new personality, if you upgrade, is a QFX10002-60C device.

You can install the new personality on the devices using Preboot Execution Environment (PXE) boot method. A PXE boot prepares a client/server environment to boot devices by using a network interface that is independent of available data storage devices or installed operating systems. The image of the operating system is stored on a TFTP server. You can have separate PXE boot servers for each image.

NOTE: When you upgrade the QFX10002-60C personality to a PTX10002-60C personality, the QFX10002-60C default configuration is deleted, and the PTX10002-60C configuration becomes the default configuration. When you upgrade the PTX10002-60C personality to a QFX10002-60C personality, the PTX10002-60C default configuration is deleted, and the QFX10002-60C configuration becomes the default configuration. Additionally, the software snapshot in the secondary disk is deleted, and the new software snapshot is installed in the secondary disk. For example, if you upgrade the QFX10002-60C personality to a PTX10002-60C personality, the QFX10002-60C snapshot is deleted, and the PTX10002-60C snapshot is installed in the secondary disk.

NOTE: When you order the spare JNP10002-60C-CHAS, it is preloaded with the QFX10002-60C and PTX10002-60C software images in the **/var/tmp** location. If you want to convert a QFX10002-60C device to a PTX10002-60C device, use the PTX10002-60C image. If you want to convert a PTX10002-60C device to QFX10002-60C device, use the QFX10002-60C image.

For example, to upgrade the QFX10002-60C device from the installed personality of QFX10002-60C to the new personality of PTX10002-60C device using the PXE Boot Server Option:

- Copy the image you want installed on the QFX10002-60C device to the PXE Boot Server.
- Reboot the device to install the image.

NOTE: If you have already copied the image to the PXE Boot server, reboot the device to install the image.

To copy the image you want installed to the PXE Boot Server:

1. Copy the downloaded installation media to the **/var/tmp** directory in the PXE boot server.

   For example:

```
scp  /volume/build/junos/18.2/release/zyx/ship/junos-vmhost-install-ptx-x86-64-xyz.tgz
user@host:/var/tmp/
```

2. Log in to the PXE boot server and verify the installation file.

```
user@host> ls -lh junos-vmhost-install-ptx-x86-64-xyz.tgz
-rw-r--r-- 1 root root 1.8G May 24 00:42 junos-vmhost-install-net-x86-64-xyz.tgz
```

3. Extract the **junos-vmhost-install-net** TAR file.

```
user@host> tar  xvzf junos-vmhost-install-ptx-x86-64-xyz.tgz  -C /var/tmp
attributes
junos-vmhost-install-ptx.tgz
manifest
manifest.certs
manifest.ecerts
manifest.esig
manifest.sig
package.xml
pkg_add_vmhost.sh
vmhost-install-net-x86_64-xyz.tgz
```

4. Remove the previously installed files, if any, from the **/tftpboot** directory.

```
user@host> rm -f /tftpboot
user@host>mkdir /tftpboot
```

5. Extract the network installation package.

```
user@host> tar  xvzf  /var/tmp/junos-vmhost-install-ptx-x86-64-xyz.tgz -C /tftpboot/
./
./vmhost-version.sh
./bootpxe64.efi
./vmhost-version
./grub.cfg
..
...
-rw-rw-r-- 1  930  930  45M Oct 20 01:51 vmhost-install-net-x86_64-xyz.tgz
-rw-rw-r-- 1  930  930    6 Oct 20 01:51 vmhost-version
-rwxrwxr-x 1  930  930  416 Oct 20 01:51 vmhost-version.sh
-rw-r--r-- 1  930  930 6.9M Oct 20 01:51 vmlinuz
```

6. Rename or delete the previously installed root file system/scripts from the **/var/install** directory. Create a new **/var/install** directory.

```
user@host> mv /var/install /var/install_old
user@host>mkdir /var/install
```

7. Extract the installation package.

```
user@host> tar xvzf /var/tmp/junos-vmhost-install-ptx-x86-64.tgz  -C /var/install
./
./vmhost-pkgs-version
./vm/
./vm/note
./vm/grub.cfg.ngre
./vm/vsmartd-1.0-0.x86_64.rpm
./vm/re_fpga-1.0-0.x86_64.rpm
./vm/veccd-1.0-0.x86_64.rpm
./vmhost-version.sh
./vmhost/
./vmhost/vmhost-x86_64-xyz.img.gz
...
...
./junos/junos-mtre-upgrade.sh
./vmhost-core-x86_64-15.1I20151019_1021_builder.tgz
./junos/
./junos/junos-install-x86-64-xyz.img.gz
```

8. Verify that the **/var/install** folder contains the **attributes** file. If the file does not exist in the specified location, copy the attribute file.

NOTE: The attribute file consists of the personality information of the image. If the attributes file is not present, the device is unable to upgrade to the new personality even when the PXE boot server has the relevant image.

```
user@host> mv /var/tmp/attributes /var/install
```

9. Set permissions for the files in the **/var/install** and **/tftpboot** directories.

```
user@host> chown root:root /tftpboot/*
user@host> chmod a+rwx /tftpboot/*
user@host> chown -R root:root /var/install
user@host> chmod -R a+rwx /var/install
```

10. Exit the PXE boot server.

```
user@host> exit
```

After you copy the image to the PXE Boot Server, to install the image on the device, reboot the device to install the image. You can use the `request vmhost reboot network` command to install the image. The device boots from the PXE server and installs the image on both the SSDs. However, if the device fails to reboot, you can use the USB disk installation option. If the device fails to reboot or is not accessible, follow these steps:

1. Power cycle the device.
2. Press the **ESC** button to go to the Boot Manager Menu.
3. Select `Boot Manager`, and then press Enter.
4. Select **ETH00 (xx:xx:xx:xx:xx:xx)** option. A warning message is displayed. At the prompt, select **y** to install the image on both the primary and secondary disks.

```
WARNING: The installation will erase the contents of your disks.
Install vmhost and Junos Software on Primary and Secondary disk [y/n]
y
```

5. In operational mode, verify that the upgrade is successful.

```
user@host> show version
Hostname: host
Model: ptx10002-60C
```

NOTE: Juniper Networks does not support using the `request vmhost software rollback` command to revert to the previously installed personality.

Upgrading the Personality of QFX10002-60C and PTX10002-60C Devices Using the USB Option

You can configure your QFX10002-60C device as a PTX10002-60C device or your PTX10002-60C device as a QFX10002-60C device. The image loaded on the device determines the personality of the device. For example, if you have purchased a QFX10002-60C device, the installed personality is a QFX10002-60C device. When you upgrade the QFX10002-60C device to a PTX10002-60C device, the new personality of the device is a PTX10002-60 C device. Similarly, if you have purchased a PTX10002-60C device, the installed personality is a PTX10002-60C device and the new personality, if you upgrade, is a QFX10002-60C device.

In an USB upgrade, the content of the SSDs are erased and the image is installed from the USB to both the primary and secondary disks. Based on the image used, the device comes up as either a QFX10002-60C or a PTX10002-60C device. This is irrespective of the previously installed personality of the JNP10002-60C-CHAS chassis.

NOTE: When you order the spare JNP10002-60C-CHAS, it is preloaded with the QFX10002-60C and PTX10002-60C software images in the **/var/tmp** location. If you want to convert a QFX10002-60C device to a PTX10002-60C device, use the PTX10002-60C image. If you want to convert a PTX10002-60C device to QFX10002-60C device, use the QFX10002-60C image.

For example, to upgrade the QFX10002-60C device from the installed personality of QFX10002-60C to the new personality of PTX10002-60C device using the USB Option:

1. Insert the external USB flash drive. The external flash drive is detected.
2. Reboot the device.

```
user@host# run request vmhost reboot usb
 OR
user@host# run request vmhost reboot
```

3. Unplug the USB flash drive after the system reboots, when prompted.

NOTE: Juniper Networks does not support using the `request vmhost software rollback` command to revert to the previously installed personality.

Upgrading the Personality of QFX10002-60C and PTX10002-60C Devices Using the CLI Option

You can configure your QFX10002-60C device as a PTX10002-60C device or your PTX10002-60C device as a QFX10002-60C device. The image loaded on the device determines the personality of the device. For example, if you have purchased a QFX10002-60C device, the installed personality is a QFX10002-60C device. When you upgrade the QFX10002-60C device to a PTX10002-60C device, the new personality of the device is a PTX10002-60C device. Similarly, if you have purchased a PTX10002-60C device, the installed personality is PTX10002-60C and the new personality, if you upgrade, is a QFX10002-60C device.

NOTE: When you upgrade the QFX10002-60C personality to a PTX10002-60C personality, the QFX10002-60C default configuration is deleted, and the PTX10002-60C configuration becomes the default configuration. When you upgrade the PTX10002-60C personality to a QFX10002-60C personality, the PTX10002-60C default configuration is deleted, and the QFX10002-60C configuration becomes the default configuration. Additionally, the software snapshot in the secondary disk is deleted, and the new software snapshot is installed in the secondary disk. For example, if you upgrade the QFX10002-60C personality to a PTX10002-60C personality, the QFX10002-60C snapshot is deleted, and the PTX10002-60C snapshot is installed in the secondary disk.

NOTE: When you order the spare JNP10002-60C-CHAS, it is preloaded with the QFX10002-60C and PTX10002-60C software images in the **/var/tmp** location. If you want to convert a QFX10002-60C device to a PTX10002-60C device, use the PTX10002-60C image. If you want to convert a PTX10002-60C device to QFX10002-60C device, use the QFX10002-60C image.

- Verify if the installed image supports the required command to upgrade to the new personality. If it does not, upgrade to a later version of the image before you upgrade to the new personality.
- Delete any configuration that is not supported or not compatible with the new personality before you upgrade the personality. If any unsupported configuration is retained in the device after it reboots with the new image, the device returns to the factory-default configuration.

For example, to upgrade the QFX10002-60C device from the installed personality of QFX10002-60C to the new personality of PTX10002-60C device using the CLI Option:

1. In operational mode, verify the installed personality of the device

```
user@host> show version
```

```
Hostname: host
Model: QFX10002-60C
```

2. Download the software package from https://www.juniper.net/support/. For information about downloading software packages, see "Downloading Software (Junos OS)" on page 108. Save the software package to the `/var/path/package-name` directory on the device. For example, you can save the software package to the `/var/tmp` directory.

> **NOTE**: Download the software package specific to the personality you want to upgrade to. The software package for QFX Series devices is different from the software package for the PTX Series devices.

3. In operational mode, install the software package by using the `request vmhost software add path/package-name` command. For example, to install the `junos-vmhost-install-ptx-x86-64-zyx.tgz` package:

```
user@host> request vmhost software add /var/tmp/junos-vmhost-install-ptx-x86-64-zyx.tgz no-validate
```

> **NOTE**: If you do not specify the `no-validate` option, the device displays the following error message **error: Upgrading to a different model is supported only with no-validate option** .

4. Run the `show version` command to verify that the upgrade is successful.

```
user@host> show version
```

```
Hostname: host
Model: ptx10002-60C
```

NOTE: Juniper Networks does not support using the `request vmhost software rollback` command to revert to the previously installed personality.

To ensure that all 4 partitions are upgraded to the same personality, follow these steps:

1. Boot from solid-state drive (SSD) Disk 2 using the `request vmhost reboot` command.

```
user@host> request vmhost reboot disk2
```

2. Upgrade to the new personality using `no-validate` option. This command upgrades both partitions on SSD Disk 1.

```
user@host> request vmhost software add package-name no-validate reboot
```

For example:

```
user@host> request vmhost software add junos-vmhost-install-ptx-x86-64-zyx.tgz no-validate
reboot
```

If you are upgrading to the PTX10002-60C device, include the package for the PTX10002-60C device. If you are upgrading to the QFX10002-60C device, include the package for the QFX10002-60C device.

3. After booting up from SSD1, take a snapshot from SSD1 to SSD2.

```
user@host> request vmhost snapshot partition
```

This ensures that both partitions on SSD2 are upgraded to new personality.

Upgrading the Personality of QFX10002-60C and PTX10002-60C Devices Using Zero Touch Provisioning (ZTP)

You can configure your QFX10002-60C device as a PTX10002-60C device or your PTX10002-60C device as a QFX10002-60C device. The image loaded on the device determines the personality of the device. For example, if you have purchased a QFX10002-60C device, the installed personality is a

QFX10002-60C device. When you upgrade the QFX10002-60C device to a PTX10002-60C device, the new personality of the device is a PTX10002-60C device. Similarly, if you have purchased a PTX10002-60C device, the installed personality is PTX10002-60C and the new personality, if you upgrade, is a QFX10002-60C device.

NOTE: When you upgrade the QFX10002-60C personality to a PTX10002-60C personality, the QFX10002-60C default configuration is deleted, and the PTX10002-60C configuration becomes the default configuration. When you upgrade the PTX10002-60C personality to a QFX10002-60C personality, the PTX10002-60C default configuration is deleted, and the QFX10002-60C configuration becomes the default configuration. If you have provided your own Junos OS configuration, that configuration becomes the default configuration. Additionally, the software snapshot in the secondary disk is deleted, and the new software snapshot is installed in the secondary disk. For example, if you upgrade the QFX10002-60C personality to a PTX10002-60C personality, the QFX10002-60C snapshot is deleted, and the PTX10002-60C snapshot is installed in the secondary disk.

NOTE: When you order the spare JNP10002-60C-CHAS, it is preloaded with the QFX10002-60C and PTX10002-60C software images in the **/var/tmp** location. If you want to convert a QFX10002-60C device to a PTX10002-60C device, use the PTX10002-60C image. If you want to convert a PTX10002-60C device to QFX10002-60C device, use the QFX10002-60C image.

- Verify if the installed image supports the required command to upgrade to the new personality. If it does not, upgrade to a later version of the image before you upgrade to the new personality.
- Delete any configuration that is not supported or not compatible with the new personality before you upgrade the personality. If any unsupported configuration is retained in the device after it reboots with the new image, the device returns to the factory-default configuration.

Before you begin:

- Ensure that the switch or router has access to the following network resources:
  - The DHCP server that provides the location of the software image and configuration files on the network

    Refer to your DHCP server documentation for configuration instructions.
  - The File Transfer Protocol (anonymous FTP), Hypertext Transfer Protocol (HTTP), or Trivial File Transfer Protocol (TFTP) server on which the software image and configuration files are stored

> **NOTE**: Although TFTP is supported, we recommend that you use FTP or HTTP instead, because these transport protocols are more reliable.

> ⚠ **CAUTION**: HTTP URLs are limited to 256 characters in length.

  - A Domain Name System (DNS) server to perform reverse DNS lookup
  - (Optional) An NTP server to perform time synchronization on the network
  - (Optional) A system log (syslog) server to manage system log messages and alerts
- Locate and record the MAC address printed on the switch or router chassis.

> ⚠ **CAUTION**: You cannot commit a configuration while the switch or router is performing the software update process. If you commit a configuration while the switch or router is performing the configuration file autoinstallation process, the process stops, and the configuration file is not downloaded from the network.

For example, to upgrade the QFX10002-60C device from the installed personality of QFX10002-60C to the new personality of PTX10002-60C device using ZTP:

1. In operational mode, verify the installed personality of the device

```
user@host> show version
```

```
Hostname: host
Model: QFX10002-60C
```

2. Boot the device.
3. Make sure the device has the default factory configuration installed.

   Issue the `request vmhost zeroize` command on the device that you want to provision.
4. Download the software package specific to the personality you want to upgrade from https://www.juniper.net/support/.

   The software package for QFX Series devices is different from the software package for the PTX Series devices.
5. Save the software package and the configuration file to the FTP, HTTP, or TFTP server from which the device will download these files.

6. Configure the DHCP server to provide the necessary information to the switch or router.

   Configure IP address assignment.

   You can configure dynamic or static IP address assignment for the management address of the switch or router. To determine the management MAC address for static IP address mapping, add 1 to the last byte of the MAC address of the switch or router, which you noted before you began this procedure.

7. Define the format of the vendor-specific information for DHCP option 43 in the **dhcpd.conf** file.

   Here is an example of an ISC DHCP 4.2 server dhcpd.conf file:

```
option space NEW_OP; option;
 option NEW_OP.image-file-name code 0 = text;
 option NEW_OP.config-file-name code 1 = text;
 option NEW_OP.image-file-type code 2 = text;
 option NEW_OP.transfer-mode  code 3 = text;
 option NEW_OP.alt-image-file-name code 4= text;
 option NEW_OP.jloader-file code 5 = text;
 option NEW_OP-encapsulation code 43 = encapsulate NEW_OP;
```

   NOTE: Starting in Junos OS Release 18.2R1, a new DHCP option is introduced to set the timeout value for the file downloads over FTP. If the `transfer-mode` is set as FTP, the default value for the timeout is automatically set as 120 minutes, that is, in case the FTP session gets interrupted due to loss of connectivity in the middle of a file transfer, it will timeout after 120 minutes and ZTP will attempt to retry the file fetching process. This value can be overridden using the DHCP option as follows:

```
option NEW_OP.ftp-timeout code 7 = text;
option NEW_OP.ftp-timeout “val”;
```

   where “`val`” is the user configurable timeout value in seconds and must be provided within quotes (like, "val”).

8. Configure the following DHCP option 43 suboptions:

   NOTE: DHCP option 43 suboptions 05 through 255 are reserved.

   - Suboption 00: The name of the software image file to install.

NOTE: When the DHCP server cannot use suboption 00, configure the software image filename using suboption 04. If both suboption 00 and suboption 4 are defined, suboption 04 is ignored.

```
option NEW_OP.image-file-name "/dist/images/jinstall-ex-4200-13.2R1.1-domestic-signed.tgz";
```

- Suboption 01: The name of the script or configuration file to install.

```
option NEW_OP.config-file-name "/dist/config/jn-switch35.config";
```

The following list provides the types of scripts and their associated interpreter paths:

- Shell script interpreter path: `#!/bin/sh`
- SLAX script interpreter path: `#!/usr/libexec/ui/cscript`
- Python script interpreter path: `#!/usr/bin/python`

  Unsigned Python scripts are only supported on limited platforms, such as the QFX5100 device. If you try to execute unsigned Python scripts on devices that do not provide support, error messages will be issued.

NOTE: If the file does not contain special characters (`#!`) , ZTP determines that the file is a configuration file and loads the configuration file.

- Suboption 02: The symbolic link to the software image file to install.

```
option NEW_OP.image-file-type "symlink";
```

NOTE: If you do not specify suboption 2, the ZTP process handles the software image as a filename, not a symbolic link.

- Suboption 03: The transfer mode that the switch or router uses to access the TFTP, FTP, or HTTP server. If you select FTP as the transfer mode, Junos OS uses the anonymous FTP login to download files from the FTP server.

```
option NEW_OP.transfer-mode "ftp";
```

NOTE: If suboption 03 is not configured, TFTP becomes the transfer mode by default.

- Suboption 04: The name of the software image file to install.

NOTE: When the DHCP server cannot use suboption 00, configure the image file using suboption 04. If both suboption 00 and suboption 4 are defined, suboption 04 is ignored.

```
option NEW_OP.alt-image-file-name "/dist/images/jinstall-ex-4200-13.2R1.1-domestic-signed.tgz";
```

- Suboption 05: The name of the JLoader image file to install.

```
NEW_OP.jloader-file "jloader-qfx-5-14.1X53-D26-signed.tgz";
```

9. (Mandatory) Configure either option 150 or option 66.

NOTE: You must configure either option 150 or option 66. If you configure both option 150 and option 66, option 150 takes precedence, and option 66 is ignored. Also, make sure you specify an IP address, not a hostname, because name resolution is not supported.

- Configure DHCP option 150 to specify the IP address of the FTP, HTTP, or TFTP server.

```
option option-150 code 150={ip-address};
option option-150 10.100.31.71;
```

- Configure DHCP option 66 to specify the IP address of the FTP, HTTP, or TFTP server.

```
option tftp-server-name "10.100.31.71";
```

10. (Optional) Configure DHCP option 7 to specify one or more system log (syslog) servers.

```
option log-servers 10.100.31.72;
```

11. (Optional) Configure DHCP option 42 to specify one or more NTP servers.

```
option ntp-servers 10.100.31.73;
```

12. (Optional) Configure DHCP option 12 to specify the hostname of the switch or router.

```
option hostname "jn-switch35";
```

The following sample configuration shows the DHCP options you just configured:

```
host jn-switch35 {
    hardware ethernet ac:4b:c8:29:5d:02;
    fixed-address 10.100.31.36;

    option tftp-server-name "10.100.31.71";

    option host-name "jn-switch35";
    option log-servers 10.100.31.72;
    option ntp-servers 10.100.31.73;
    option NEW_OP.image-file-name "/dist/images/jinstall-ex-4200-13.2R1.1-domestic-
signed.tgz";
    option NEW_OP.transfer-mode "ftp";
    option NEW_OP.config-file-name "/dist/config/jn-switch35.config";
    option NEW_OP.jloader-file "jloader-qfx-5-14.1X53-D26-signed.tgz";
}
```

Based on the DHCP options you just configured, the following statements are appended to the Junos OS configuration file (for example, `jn-switch35.config`):

```
system {
    host-name jn-switch35;

    syslog {
        host 10.100.31.72 {
            any any;
```

```
        }
    }
    ntp {
        server 10.100.31.73;
    }
}
```

13. Monitor the ZTP process by looking at the following log files.

> **NOTE**: When SLAX (live operating system based on Linux) scripts are issued, the `op-script.log` and `event-script.log` files are produced.

- /var/log/dhcp_logfile
- /var/log/event-script.log
- /var/log/image_load_log
- /var/log/messages
- /var/log/op-script.log
- /var/log/script_output

You can also monitor the ZTP process by looking at error messages and issuing operational commands. See "Monitoring Zero Touch Provisioning" on page 492 for more information.

14. Run the `show version` command to verify that the upgrade is successful.

```
user@host> show version
```

```
Hostname: host
Model: ptx10002-60C
```

Upgrade the NFX250 Software to NFX250 NextGen Software

IN THIS SECTION

NFX250 NextGen Software Upgrade Overview

Starting in Junos OS Release 19.1R1, the NFX250 devices support the NFX250 NextGen software architecture. This is a re-optimized architecture that enables you to use JCP as the single point of management to manage all the NFX250 components. For more information about the NFX250 NextGen architecture, see NFX250 NextGen Overview.

NOTE: For documentation purposes, NFX250 devices that use the reoptimized architecture are referred to as NFX250 NextGen devices.

You can upgrade the software using a USB or through a CLI. This topic provides information about prerequisites and the procedure to upgrade through a CLI from NFX250 software architecture to NFX250 NextGen software architecture.

NOTE: The upgrade procedure using a USB remains the same for all NFX Series devices.

Prerequisites

To upgrade an NFX250 device, you must meet the following prerequisites:

Device-specific prerequisites

- An NFX250 device with BIOS => CBDE_SFP_00.21_01.01

  To verify the BIOS version:

  ```
  root@jdm> request execute-command "jhost dmidecode -t bios"
  ```

  For the BIOS information, see the `BIOS Information` section in the command output message.

  If the BIOS version is not CBDE_SFP_00.21_01.01, you can upgrade the BIOS:

  1. Download the BIOS from Downloads page.
  2. Copy and save the BIOS image to the **/var/third-party** directory.
  3. From the JDM CLI, access the hypervisor:

     ```
     root@jdm> ssh hypervisor
     ```

  4. Upgrade the BIOS:

     ```
     root@host:~# rpm -ivh /var/third-party/firmware/BIOS RPM package name
     ```

     The system generates the following output:

     ```
     Preparing...             ########################################### [100%]
     1:nfx-2-secure-bios      ########################################### [100%]
     A reboot is required to install the secure BIOS
     Please reboot the system to complete the install
     ```

  5. Reboot the device to load new BIOS.

     a. Exit from hypervisor shell:

        ```
        root@local-node:~# exit
        logout
        Connection to hypervisor closed.
        {master:0}
        root@JDM>
        ```

b. Reboot the device from JDM CLI.

```
{master:0}
root@porter-p2a-sys1> request system reboot
Reboot the system ? [yes,no] (no) yes
```

- An NFX250 NextGen configuration file with minimal or necessary configurations is required for remote management access to the device after migrating to NFX250 NextGen. This file is an input data for the `request system software add clean-install` *package-name* command.

Release-specific prerequisites

The NFX250 software must be compatible with the following releases:

- NFX250 software running Junos OS Release 18.4R2 or later to accept the configuration by using the command:

```
user@host> request system software add clean-install package-name
```

> **CAUTION**: The `clean-install` command removes all contents on the hard disk. To avoid data loss, copy all important files, configuration files (JDM, JCP, vSRX Virtual Firewall, and third-party VNFs), log files, and VNF disk or image file, and save them in a secure location before you upgrade the device.

- Releases prior to 18.4R2 must be upgraded to 18.4R2 or later.

> **CAUTION**: The NFX250 device will crash if you upgrade the NFX250 software image running Junos OS Release prior to 18.4R2 to a release that supports NFX250 NextGen software image.
>
> The NFX250 NextGen configuration must be compatible with the NFX250 NextGen software version. The configuration command syntax is not validated.

NOTE: The NFX250 software architecture and NFX250 NextGen software architecture are different and the configurations are different for both the software.

Upgrade to NFX250 NextGen Software Architecture

Before you upgrade the NFX device:

- Create backup of the configuration files (JDM, JCP, vSRX Virtual Firewall, and third-party VNFs), log files, VNF disk or image file, and other important files stored on the device.
- Check the prerequisites.

To upgrade the NFX250 software architecture to NFX250 NextGen software architecture:

1. Copy the configuration files that are required for in-band and out-of-band management and save it in the **/var/third-party** folder. The configuration file should be of the same format as the file format obtained by running the `show configuration` CLI command.
2. Copy the NFX250 NextGen software image and save it in the **/var/third-party/images** folder.
3. Initiate the software upgrade by using the following command:

   ```
   root@jdm> request system software add clean-install reboot /var/third-party/images/jinstall-image.tgz upgrade-with-config /var/third-party/config-file
   ```

   The device is formatted and the NFX250 NextGen software image is installed. The device loads the configurations and boots up the NFX250 Nextgen software image. You can access the device remotely through the in-band and out-of-band management.
4. The device is now ready for additional configurations and third-party VNF onboarding.

Upgrading the Junos OS on NFX Devices

To upgrade the Junos OS version on NFX150, NFX250 NextGen, and NFX350 devices:

1. Download the software package from the Downloads page to the **/var/public** directory on the NFX device.
2. Verify the Junos OS version that is currently installed on the device. The following sample output for NFX250 NextGen shows that Junos OS Release 22.3R2.12 is installed on the device.

   ```
   user@host> show version
   root@host> show version
   Hostname: host
   Model: nfx250
   ```

```
Junos: 22.3R2.12
JUNOS OS Kernel 64-bit  [20221212.98a33a0_builder_stable_12_223]
JUNOS OS libs [20221212.98a33a0_builder_stable_12_223]
JUNOS OS runtime [20221212.98a33a0_builder_stable_12_223]
JUNOS OS time zone information [20221212.98a33a0_builder_stable_12_223]
JUNOS network stack and utilities [20230223.221505_builder_junos_223_r2]
JUNOS libs [20230223.221505_builder_junos_223_r2]
JUNOS OS libs compat32 [20221212.98a33a0_builder_stable_12_223]
JUNOS OS 32-bit compatibility [20221212.98a33a0_builder_stable_12_223]
JUNOS libs compat32 [20230223.221505_builder_junos_223_r2]
JUNOS runtime [20230223.221505_builder_junos_223_r2]
JUNOS Packet Forwarding Engine Simulation Package [20230223.221505_builder_junos_223_r2]
JUNOS sflow mx [20230223.221505_builder_junos_223_r2]
JUNOS py extensions [20230223.221505_builder_junos_223_r2]
JUNOS py base [20230223.221505_builder_junos_223_r2]
JUNOS OS vmguest [20221212.98a33a0_builder_stable_12_223]
JUNOS OS package [20230213.192558_builder_stable_12]
JUNOS OS crypto [20221212.98a33a0_builder_stable_12_223]
JUNOS OS boot-ve files [20221212.98a33a0_builder_stable_12_223]
JUNOS na telemetry [22.3R2.12]
JUNOS Wireless WAN Module [20230223.221505_builder_junos_223_r2]
```

You can use the `show vmhost version detail` command to view the Junos OS version that is installed on the disk partitions. Note that the NFX150 and NFX250 NextGen have a single disk with two partitions whereas the NFX350 has dual disks that provide four partitions.

Here's a sample output for an NFX250 NextGen device. You'll notice that the primary partition is the active partition.

```
user@host> show vmhost version detail
Partition set     : primary
Software version  : 22.3R2.12
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
                    Host kernel version  : #1 SMP Sun Dec 4 22:30:10 PST 2022

Partition set             : primary
Software version          : 22.3R2.12
Installed/Upgraded at     : Tue Feb 28 10:12:50 UTC 2023
Status                    : Boot success

Partition set             : alternate
Software version          : 22.3R2.12
```

```
Installed/Upgraded at     : Tue Feb 28 10:17:48 UTC 2023
Status                    : Factory installation setup complete, ready for boot
```

3. Upgrade the Junos OS by using the `request vmhost software` command.

```
user@host> request vmhost software add /var/public/jinstall-host-nfx-3-x86-64-22.4R2.1-secure-
signed.tgz
Verified jinstall-host-nfx-3-x86-64-22.4R2.1-secure-signed signed by
PackageProductionECP256_2023 method ECDSA256+SHA256
Pushing Junos image package to the host...
File already present in Host. Skipping pushing the image
Mounting alternate partitions to stage upgrade operation
Installing /var/tmp/preinstall/install-media-nfx-3-junos-22.4R2.1-secure.tgz
Extracting the package ...
Validate linux image...
upgrade_platform: -------------------
upgrade_platform: Parameters passed:
upgrade_platform: silent=0
upgrade_platform: package=/var/tmp/tmp.27UZct4newjunos_cli_upg/jinstall-nfx-3-junos-22.4R2.1-
secure-linux.tgz
upgrade_platform: clean install=0
upgrade_platform: Need reboot after staging=1
upgrade_platform: -------------------
upgrade_platform:
upgrade_platform: Checking input /var/tmp/tmp.27UZct4newjunos_cli_upg/jinstall-nfx-3-
junos-22.4R2.1-secure-linux.tgz ...
upgrade_platform: Input package /var/tmp/tmp.27UZct4newjunos_cli_upg/jinstall-nfx-3-
junos-22.4R2.1-secure-linux.tgz is valid.
Secure Boot is enforced.
ALLOW:usr/secureboot/grub/BOOTX64.EFI
ALLOW:boot/bzImage-intel-x86-64.bin
ALLOW:boot/initramfs.cpio.gz
Setting up Junos host applications for installation ...
Installing Host OS ...
upgrade_platform: -------------------
upgrade_platform: Parameters passed:
upgrade_platform: silent=0
upgrade_platform: package=/var/tmp/tmp.27UZct4newjunos_cli_upg/jinstall-nfx-3-junos-22.4R2.1-
secure-linux.tgz
upgrade_platform: clean install=0
upgrade_platform: Need reboot after staging=0
upgrade_platform: -------------------
```

```
upgrade_platform:
upgrade_platform: Checking input /var/tmp/tmp.27UZct4newjunos_cli_upg/jinstall-nfx-3-
junos-22.4R2.1-secure-linux.tgz ...
upgrade_platform: Input package /var/tmp/tmp.27UZct4newjunos_cli_upg/jinstall-nfx-3-
junos-22.4R2.1-secure-linux.tgz is valid.
Secure Boot is enforced.
ALLOW:usr/secureboot/grub/BOOTX64.EFI
ALLOW:boot/bzImage-intel-x86-64.bin
ALLOW:boot/initramfs.cpio.gz
upgrade_platform: Backing up boot assets..
upgrade_platform: Staging the upgrade package - /var/tmp/tmp.27UZct4newjunos_cli_upg/jinstall-
nfx-3-junos-22.4R2.1-secure-linux.tgz..
upgrade_platform: Checksum verified and OK...
Setting up boot environment ...
Setting up boot environment completed
upgrade_platform: Staging of /var/tmp/tmp.27UZct4newjunos_cli_upg/jinstall-nfx-3-
junos-22.4R2.1-secure-linux.tgz completed
upgrade_platform: System needs *REBOOT* to complete the upgrade

Host OS upgrade staged. Reboot the system to complete installation!
```

If you run the `show vmhost version` command now, you notice that the software version still shows 22.3R2.12. Note that the status of the alternate partition indicates that the new Junos OS version is staged on the alternate partition.

```
root@host> show vmhost version detail | no-more
Partition set     : primary
Software version  : 22.3R2.12
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
                    Host kernel version  : #1 SMP Sun Dec 4 22:30:10 PST 2022
Reboot is pending for a software upgrade

Partition set             : primary
Software version          : 22.3R2.12
Installed/Upgraded at     : Tue Feb 28 10:12:50 UTC 2023
Status                    : Boot success

Partition set             : alternate
Software version          : 22.3R2.12
```

```
Installed/Upgraded at     : Tue Feb 28 10:17:48 UTC 2023
Status                    : Software upgrade staged, boot to partition-set pending
```

4. Reboot the device to load the new version of Junos OS on the device.

```
root@host> request vmhost reboot
Reboot the vmhost ? [yes,no] (no) yes

Initiating vmhost reboot...

root@host> show version
Hostname: host
Model: nfx250_att_ls1_10_t
Junos: 22.4R2.1
JUNOS OS Kernel 64-bit  [20230213.5295c32_builder_stable_12_224]
JUNOS OS libs [20230213.5295c32_builder_stable_12_224]
JUNOS OS runtime [20230213.5295c32_builder_stable_12_224]
JUNOS OS time zone information [20230213.5295c32_builder_stable_12_224]
JUNOS network stack and utilities [20230301.213842_builder_junos_224_r2]
JUNOS libs [20230301.213842_builder_junos_224_r2]
JUNOS OS libs compat32 [20230213.5295c32_builder_stable_12_224]
JUNOS OS 32-bit compatibility [20230213.5295c32_builder_stable_12_224]
JUNOS libs compat32 [20230301.213842_builder_junos_224_r2]
JUNOS runtime [20230301.213842_builder_junos_224_r2]
JUNOS Packet Forwarding Engine Simulation Package [20230301.213842_builder_junos_224_r2]
JUNOS sflow mx [20230301.213842_builder_junos_224_r2]
JUNOS py extensions [20230301.213842_builder_junos_224_r2]
JUNOS py base [20230301.213842_builder_junos_224_r2]
JUNOS OS vmguest [20230213.5295c32_builder_stable_12_224]
JUNOS OS package [20230213.192558_builder_stable_12]
JUNOS OS crypto [20230213.5295c32_builder_stable_12_224]
JUNOS OS boot-ve files [20230213.5295c32_builder_stable_12_224]
JUNOS na telemetry [22.4R2.1]
```

5. After the device reboots, verify the status of the disk partitions. The following output shows that the image on the alternate partition is upgraded. The alternate partition is the active partition now.

```
root@host> show vmhost version detail
Partition set     : alternate
Software version  : 22.4R2.1
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
```

```
                    Host kernel version  : #1 SMP Mon Feb 27 04:48:57 PST 2023

Partition set             : primary
Software version          : 22.3R2.12
Installed/Upgraded at     : Tue Feb 28 10:12:50 UTC 2023
Status                    : Boot success

Partition set             : alternate
Software version          : 22.4R2.1
Installed/Upgraded at     : Tue Mar  7 16:05:24 UTC 2023
Status                    : Boot success
```

To upgrade the release to the same version on all the disk partitions, see Upgrading Dual-Disk Partitions on NFX250 NextGen and NFX350 Devices.

Upgrading Dual-Disk Partitions on NFX250 NextGen and NFX350 Devices

IN THIS SECTION

You can upgrade the disk partitions on NFX250 NextGen and NFX350 devices by using:

- The `request vmhost software add` *`package-name`* command.
- The `request system software add clean-install` *`package-name`* command.

- The `request system zeroize` command.
- The USB image installation method.

Upgrading Disk Partitions Using the request vmhost software add *package-name* Command on an NFX350 Device

When you upgrade the disks using this method, the device retains all the configuration and log information.

To upgrade the disk partitions using the `request vmhost software add` *package-name* command:

1. Verify the initial status of the disks.

```
user@host> show vmhost version detail
Partition set     : primary
Software version  : 21.4I-20220531.0.1918
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
                    Host kernel version  : #1 SMP Mon Nov 29 03:34:19 PST 2021

Partition set             : primary
Software version          : 21.4I-20220531.0.1918
Installed/Upgraded at     : Thu Jun  2 05:09:21 PDT 2022
Status                    : Boot success

Partition set             : alternate
Software version          : 22.3I20220517_0906
Installed/Upgraded at     : Wed May 18 21:45:46 PDT 2022
Status                    : Boot success

Partition set             : second primary
Software version          : 20.4R3.8
Installed/Upgraded at     : Fri Jan  7 00:50:58 PST 2022
Status                    : Factory installation setup complete, ready for boot

Partition set             : second alternate
Software version          : 20.4R3.8
Installed/Upgraded at     : Fri Jan  7 00:51:01 PST 2022
Status                    : Factory installation setup complete, ready for boot
```

2. Upgrade the device with the Junos OS image version that supports the dual disk upgrade.

When prompted for a reboot, type Yes.

```
user@host> request vmhost software add /var/public/jinstall-host-nfx-3-x86-64-21.4R2.8-secure-signed.tgz
```

3. After the device reboots, verify the status of the disk partitions. The output shows that the image on the alternate partition of disk 1 is upgraded. The alternate partition is the active partition now.

```
user@host> show vmhost version detail
Partition set     : alternate
Software version  : 21.4R2.8
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
                    Host kernel version  : #1 SMP Tue Feb 22 01:50:05 PST 2022

Partition set             : primary
Software version          : 21.4I-20220531.0.1918
Installed/Upgraded at     : Thu Jun  2 05:09:21 PDT 2022
Status                    : Boot success

Partition set             : alternate
Software version          : 21.4R2.8
Installed/Upgraded at     : Sun Jul  3 22:38:50 PDT 2022
Status                    : Boot success

Partition set             : second primary
Software version          : 20.4R3.8
Installed/Upgraded at     : Fri Jan  7 00:50:58 PST 2022
Status                    : Factory installation setup complete, ready for boot

Partition set             : second alternate
Software version          : 20.4R3.8
Installed/Upgraded at     : Fri Jan  7 00:51:01 PST 2022
Status                    : Factory installation setup complete, ready for boot
```

4. Upgrade the device again to upgrade the primary partition of disk 1.

When prompted for a reboot, type `Yes`.

```
user@host> request vmhost software add /var/public/jinstall-host-nfx-3-x86-64-21.4R2.8-
secure-signed.tgz
```

5. After the device reboots, verify the status of the disk partitions. The output shows that the image on the primary partition of disk 1 is upgraded. Both the primary and alternate partitions on disk 1 are running the same image. Note that the primary partition is the active partition now.

```
user@host> show vmhost version detail
Partition set     : primary
Software version  : 21.4R2.8
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
                    Host kernel version  : #1 SMP Tue Feb 22 01:50:05 PST 2022

Partition set             : primary
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 00:02:33 PDT 2022
Status                    : Boot success

Partition set             : alternate
Software version          : 21.4R2.8
Installed/Upgraded at     : Sun Jul  3 22:38:50 PDT 2022
Status                    : Boot success

Partition set             : second primary
Software version          : 20.4R3.8
Installed/Upgraded at     : Fri Jan  7 00:50:58 PST 2022
Status                    : Factory installation setup complete, ready for boot

Partition set             : second alternate
Software version          : 20.4R3.8
Installed/Upgraded at     : Fri Jan  7 00:51:01 PST 2022
Status                    : Factory installation setup complete, ready for boot
```

6. To upgrade the secondary disk, switch to the primary partition of disk 2.

NOTE: Before you switch from disk 1 to disk 2, ensure that the required basic configuration (such as management connectivity) is available on disk 2.

```
user@host> request vmhost reboot disk2 primary
```

7. After the device reboots, verify the status of the disk partitions.

```
user@host> show vmhost version detail
Partition set     : second primary
Software version  : 20.4R3.8
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.32_ovp
                    Host kernel version  : #1 SMP Thu Jul 8 23:25:47 PDT 2021

Partition set             : primary
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 07:02:33 UTC 2022
Status                    : Boot success

Partition set             : alternate
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 07:51:48 UTC 2022
Status                    : Boot success

Partition set             : second primary
Software version          : 20.4R3.8
Installed/Upgraded at     : Fri Jan  7 08:50:58 UTC 2022
Status                    : Boot success

Partition set             : second alternate
Software version          : 20.4R3.8
Installed/Upgraded at     : Fri Jan  7 08:51:01 UTC 2022
Status                    : Factory installation setup complete, ready for boot
```

8. Upgrade the device with the Junos OS image version that supports the dual disk upgrade.

```
user@host> request vmhost software add /var/public/jinstall-host-nfx-3-x86-64-21.4R2.8-
secure-signed.tgz
```

9. Verify the status of the disk partitions after the upgrade. The output shows that the image on the alternate partition of disk 2 is upgraded. The alternate partition of disk 2 is the active partition now.

```
user@host> show vmhost version detail
Partition set     : second alternate
Software version  : 21.4R2.8
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
                    Host kernel version  : #1 SMP Tue Feb 22 01:50:05 PST 2022

Partition set             : primary
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 07:02:33 UTC 2022
Status                    : Boot success

Partition set             : alternate
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 07:51:48 UTC 2022
Status                    : Boot success

Partition set             : second primary
Software version          : 20.4R3.8
Installed/Upgraded at     : Fri Jan  7 08:50:58 UTC 2022
Status                    : Boot success

Partition set             : second alternate
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 10:21:55 UTC 2022
Status                    : Boot success
```

10. Upgrade the primary partition on disk 2.

```
user@host> request vmhost software add /var/public/jinstall-host-nfx-3-x86-64-21.4R2.8-
secure-signed.tgz
```

11. Verify the status of the disk partitions after the upgrade. The output shows that the image on the primary partition of disk 2 is upgraded. Both the primary and alternate partitions on disk 2 are running the same image. The primary partition on disk 2 is the active partition now.

```
user@host> show vmhost version detail
Partition set     : second primary
Software version  : 21.4R2.8
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
                    Host kernel version  : #1 SMP Tue Feb 22 01:50:05 PST 2022

Partition set             : primary
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 07:02:33 UTC 2022
Status                    : Boot success

Partition set             : alternate
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 07:51:48 UTC 2022
Status                    : Boot success

Partition set             : second primary
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 11:00:05 UTC 2022
Status                    : Boot success

Partition set             : second alternate
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 10:21:55 UTC 2022
Status                    : Boot success
```

Upgrading Disk Partitions Using the request vmhost software add *package-name* Command on an NFX250 NextGen Device

When you upgrade the disks using this method, the device retains all the configuration and log information.

To upgrade the disk partitions using the `request vmhost software add` *package-name* command:

1. Upgrade the device with the Junos OS image version which supports the dual disk upgrade using the `request vmhost software add` *package-name* command.

   When prompted for a reboot, type `Yes`.

```
user@host> request vmhost software add /var/public/jinstall-host-nfx-3-
x86-64-22.3I-20220428_dev_common.0.0158-secure-signed.tgz
```

2. Verify the status of the disks. The output shows that the image on the alternate partition is upgraded. The alternate partition is the active partition now.

```
user@host> show vmhost version detail
Partition set     : alternate
Software version  : 22.3I-20220428_dev_common.0.0158
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
                    Host kernel version  : #1 SMP Sun Apr 24 23:33:52 PDT 2022

Partition set             : primary
Software version          : 21.1R3.11
Installed/Upgraded at     : Wed Dec 22 02:13:33 PST 2021
Status                    : Boot success

Partition set             : alternate
Software version          : 22.3I-20220428_dev_common.0.0158
Installed/Upgraded at     : Thu Apr 28 20:47:21 PDT 2022
Status                    : Boot success
```

3. Upgrade the device again to upgrade the primary partition.

When prompted for a reboot, type `Yes`.

```
user@host> request vmhost software add /var/public/jinstall-host-nfx-3-
x86-64-22.3I-20220428_dev_common.0.0158-secure-signed.tgz
```

4. After the reboot, verify the status of the disk partitions. The output shows that the image on the primary partition is upgraded. The primary and alternate partitions are now running the same image, Note that the primary partition is the active partition now.

```
user@host> show vmhost version detail
Partition set     : primary
Software version  : 22.3I-20220428_dev_common.0.0158
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
                    Host kernel version  : #1 SMP Sun Apr 24 23:33:52 PDT 2022

Partition set             : primary
Software version          : 22.3I-20220428_dev_common.0.0158
Installed/Upgraded at     : Wed Jul 13 23:56:23 PDT 2022
Status                    : Boot success

Partition set             : alternate
Software version          : 22.3I-20220428_dev_common.0.0158
Installed/Upgraded at     : Thu Apr 28 20:47:21 PDT 2022
Status                    : Boot success
```

Upgrading Disk Partitions Using the clean-install Command

This upgrade method resets all the log and configuration information, and loads the specified image on all the disk partitions.

To upgrade the disk partitions using the `clean-install` command:

1. Verify the initial status of the disks.

```
user@host> show vmhost version detail
Partition set     : primary
Software version  : 21.4R2.8
```

```
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
                    Host kernel version  : #1 SMP Tue Feb 22 01:50:05 PST 2022

Partition set             : primary
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 00:02:33 PDT 2022
Status                    : Boot success

Partition set             : alternate
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 00:51:48 PDT 2022
Status                    : Boot success
Partition set             : second primary
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 04:00:05 PDT 2022
Status                    : Boot success

Partition set             : second alternate
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 03:21:55 PDT 2022
Status                    : Boot success
```

2. Upgrade the device by using the `clean-install` command.

```
user@host> request vmhost software add /var/public/jinstall-host-nfx-3-
x86-64-21.4I-20220531.0.1918-secure-signed.tgz clean-install
```

3. Verify the disk details after the upgrade. The output shows that the image on all the disk partitions is upgraded.

```
user@host> show vmhost version detail
Partition set     : primary
Software version  : 21.4I-20220531.0.1918
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
                    Host kernel version  : #1 SMP Mon Nov 29 03:34:19 PST 2021

Partition set             : primary
Software version          : 21.4I-20220531.0.1918
Installed/Upgraded at     : Tue Jul  5 04:10:39 UTC 2022
Status                    : Boot success
```

```
Partition set             : alternate
Software version          : 21.4I-20220531.0.1918
Installed/Upgraded at     : Tue Jul  5 04:16:37 UTC 2022
Status                    : Factory installation setup complete, ready for boot

Partition set             : second primary
Software version          : 21.4I-20220531.0.1918
Installed/Upgraded at     : Tue Jul  5 04:17:27 UTC 2022
Status                    : Factory installation setup complete, ready for boot

Partition set             : second alternate
Software version          : 21.4I-20220531.0.1918
Installed/Upgraded at     : Tue Jul  5 04:17:24 UTC 2022
Status                    : Factory installation setup complete, ready for boot
```

Upgrading Disk Partitions Using the request system zeroize Command

This upgrade method resets all the log and configuration information, and loads the image running on the current active partition on all the other disk partitions.

To upgrade the disk partitions:

1. Remove all configuration information on the Routing Engines and reset all key values.

```
user@host> request system zeroize
```

2. Verify the disk details. The output shows that the image on all the disk partitions is upgraded.

```
user@host> show vmhost version detail
Partition set     : primary
Software version  : 21.4R2.8
                    Host kernel release  : 4.1.27-rt30-WR8.0.0.34_ovp
                    Host kernel version  : #1 SMP Tue Feb 22 01:50:05 PST 2022

Partition set             : primary
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 00:02:33 PDT 2022
Status                    : Boot success
```

```
Partition set             : alternate
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 00:51:48 PDT 2022
Status                    : Boot success

Partition set             : second primary
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 04:00:05 PDT 2022
Status                    : Boot success

Partition set             : second alternate
Software version          : 21.4R2.8
Installed/Upgraded at     : Mon Jul  4 03:21:55 PDT 2022
Status                    : Boot success
```

Upgrading Disk Partitions Using a USB

For information about upgrading the disk partitions using a USB, see **KB31834**.

Downgrade Instructions for NFX Series Devices Running Junos OS Release 23.1R1

On the NFX150, NFX250 NextGen, and NFX350 devices, you cannot downgrade Junos OS Release 23.1R1 directly to certain releases (listed in the **Target Release** column in Table 14 on page 251). As a workaround, you can perform downgrade as a two-step activity, as described below:

1. Downgrade the Junos OS Release 23.1R1 software to the corresponding intermediate release.
2. Downgrade the software from the intermediate release to the target release.

Table 14 on page 251 lists the target releases and the corresponding intermediate releases.

Table 14: Release Compatibility for Downgrading Junos OS 23.1R1 on NFX Series Devices

Target Release	Intermediate Release
Any 22.4x release earlier than 22.4R2	22.4R2
Any 22.3x release earlier than 22.3R2.	22.3R2
• Any 22.2x release earlier than 22.2R3. • Any 22.1x release or earlier releases.	22.2R3

Installing Software on SRX Series Devices

IN THIS SECTION

SRX Series Firewalls are delivered with the pre-installed Junos operating system (Junos OS). Before you start this procedure, decide which software package you need and download it.

Understanding Junos OS Upgrades for SRX Series Firewalls

IN THIS SECTION

SRX Series Firewalls are delivered with Junos OS pre-installed on them. When you power on a device, it starts (boots) up using its primary boot device. These devices also support secondary boot devices, allowing you to back up your primary boot device and configuration.

As new features and software fixes become available, you must upgrade Junos OS to use them. Before an upgrade, we recommend that you back up your primary boot device.

We've introduced many key security features post Junos OS Release 15.1X49. To upgrade your SRX Series Firewalls from Junos OS Release 15.1X49 to 19.4R3 (SRX Series) and to 20.2R3 (SRX380, SRX1500, and vSRX Virtual Firewall instances), see Upgrade to Junos OS Release 19.4R3 and 20.2R3 for SRX Series.

For SRX300, SRX320, SRX340, SRX345, and SRX340 Firewalls, Junos OS Release 23.2R1 runs FreeBSD Release 12. Prior releases run FreeBSD Release 6.1. If you are upgrading to Junos OS Release 23.2R1 or later, you must use either the procedures outlined in *KB 1 (upgrade)--waiting for assigned number* or the minimal downtime procedure documented in KB17947 (Minimal_Downtime_Upgrade_Branch_Mid PDF file).

Understanding Junos OS Upgrades

On a services gateway, you can configure the primary or secondary boot device with a snapshot of the current configuration, default factory configuration, or rescue configuration. You can also replicate the configuration for use on another device.

If the SRX Series Firewall does not have a secondary boot device configured and the primary boot device becomes corrupted, you can reload the Junos OS package onto the corrupted internal media from a USB flash drive or TFTP server.

Junos OS Upgrade Methods on the SRX Series Firewalls

SRX Series Firewalls that ship from the factory with Junos OS Release 10.0 or later are formatted with the dual-root partitioning scheme.

NOTE: Junos OS Release 12.1X45 and later do not support single root partitioning.

NOTE: SRX100, SRX110, SRX210, SRX220, and SRX240 devices with 2 GB RAM cannot be upgraded to any Junos OS 12.1X46 Release after 12.1X46-D65. Attempting to upgrade to this release on devices with 2 GB RAM will trigger the following error: **ERROR: Unsupported platform for 12.1X46 releases after 12.1X46-D65**

.

NOTE: For SRX300, SRX320, SRX340, SRX345, and SRX380 devices, when the release you want to upgrade or downgrade to uses a different FreeBSD release than the FreeBSD release currently running, you must use the `request system software add` *`package-name`* `partition no-copy no-validate reboot` command to upgrade or downgrade the software. FreeBSD release 6 and FreeBSD release 12 use different partitioning schemas, and so you must specify the additional options on the command. For example, Junos OS Release 23.2R1 runs on FreeBSD release 12 and Junos OS Release 22.4R2 runs on FreeBSD release 6.

Existing SRX Series Firewalls that are running Junos OS Release 9.6 or earlier use the single-root partitioning scheme. While upgrading these devices to Junos OS Release 10.0 or later, you can choose to format the storage media with dual-root partitioning (strongly recommended) or retain the existing single-root partitioning.

Certain Junos OS upgrade methods format the internal media before installation, whereas other methods do not. To install Junos OS Release 10.0 or later with the dual-root partitioning scheme, you must use an upgrade method that formats the internal media before installation.

NOTE: If you are upgrading to Junos OS Release 10.0 without transitioning to dual-root partitioning, use the conventional CLI and J-Web user interface installation methods.

These upgrade methods format the internal media before installation:

- Installation from the boot loader using a TFTP server
- Installation from the boot loader using a USB storage device
- Installation from the CLI using the `partition` option (available in Junos OS Release 10.0)
- Installation using the J-Web user interface

These upgrade methods retain the existing partitioning scheme:

- Installation using the CLI
- Installation using the J-Web user interface

CAUTION: Upgrade methods that format the internal media before installation wipe out the existing contents of the media. Only the current configuration is preserved. Any important data must be backed up before starting the process.

NOTE: Once the media has been formatted with the dual-root partitioning scheme, you can use conventional CLI or J-Web user interface installation methods, which retain the existing partitioning and contents of the media, for subsequent upgrades.

Example: Installing Junos OS Upgrade Packages on SRX Series Firewalls

IN THIS SECTION

This example shows how to install Junos OS upgrades on SRX Series Firewalls.

Requirements

Before you begin:

- Verify the available space on the internal media.
- Download the software package. See Downloads to download the software package for your products.

- Copy the software package to the device if you are installing the software package from a local directory on the device. We recommend that you copy it to the `/var/tmp` directory. To copy the software package to the `/var/tmp` directory, use the following command from the operational mode:

```
user@host> file copy /var/tmp/install/image-name/var/tmp/
```

Example:

```
user@host> file copy /var/tmp/install/junos-srxsme-10.0R2-domestic.tgz /var/tmp/
```

Overview

By default, the `request system software add` *package-name* command uses the validate option to validate the software package against the current configuration as a prerequisite to adding the software package. This validation ensures that the device can reboot successfully after the software package is installed. This is the default behavior when you are adding a software package.

In this example, add the software package (for example: junos-srxsme-10.0R2-domestic.tgz [for SRX Series Firewalls] with the following options:

- `no-copy` option to install the software package but do not save the copies of package files. You must include this option if you do not have enough space on the internal media to perform an upgrade that keeps a copy of the package on the device.
- `reboot` option to reboots the device after installation is completed.

Configuration

IN THIS SECTION

Procedure

GUI Quick Configuration

Step-by-Step Procedure

To install Junos OS upgrades on SRX Series Firewalls:

1. In the J-Web user interface, select **Maintain>Software>Upload Package**.
2. On the Upload Package page, specify the software package to upload. Click **Browse** to navigate to the software package location and select junos-srxsme-10.0R2-domestic.tgz.
3. Select the **Reboot If Required** check box to set the device to reboot automatically when the upgrade is complete.
4. Select the **Do not save backup** check box to bypass saving the backup copy of the current Junos OS package (SRX Series).
5. Click **Upload Package**. The software is activated after the device has rebooted.
6. Click **OK** to check your configuration and save it as a candidate configuration.
7. If you are done configuring the device, click **Commit Options>Commit**.

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

From operational mode, install the new package on the device with the no-copy option, and format and re-partition the media before installation, and reboot the device after installation is completed.

To install Junos OS upgrades on SRX Series Firewalls:

1. From operational mode, install the new package on the device. In this example, the package name is junos-srxsme-10.0R2-domestic.tgz:

```
user@host> request system software add /var/tmp/junos-srxsme-10.0R2-domestic.tgz no-copy
```

NOTE: We recommend that you configure the `no-validate` option only when expressly specified by the Juniper Networks Technical Assistance Center (JTAC).

2. Reboot the device.

```
user@host> request system reboot
```

When the reboot is complete, the device displays the login prompt.

Results

From configuration mode, confirm your configuration by entering the `show system` command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter `commit` from configuration mode.

Verification

IN THIS SECTION

Confirm that the configuration is working properly.

Verifying the Junos OS Upgrade Installation

Purpose

Verify that the Junos OS upgrade was installed.

Action

From operational mode, enter the `show version` command.

Sample Output

command-name

```
user@host> show version
Hostname: srx340-a
Model: srx345
Junos: 18.2R1-S3.2
JUNOS Software Release [18.2R1-S3.2]
```

Meaning

The `show version` command displays the hostname, model number, and the release information loaded on the device.

Example: Installing Junos OS on SRX Series Firewalls Using the Partition Option

IN THIS SECTION

This example shows how to install Junos OS Release 10.0 or later with the `partition` option.

Requirements

Before you begin, back up any important data.

Overview

IN THIS SECTION

This example formats the internal media and installs the new Junos OS image on the media with dual-root partitioning. Reinstall the Release 10.0 or later image from the CLI using the `request system software add` command with the `partition` option. This copies the image to the device, and then reboots the device for installation. The device boots up with the Release 10.0 or later image installed with the dual-root partitioning scheme. When the `partition` option is used, the format and install process is scheduled to

run on the next reboot. Therefore, we recommend that this option be used together with the `reboot` option.

NOTE: The process might take 15 to 20 minutes. The system is not accessible over the network during this time.

⚠ **CAUTION**: Using the `partition` option with the `request system software add` command erases the existing contents of the media. Only the current configuration is preserved. You must back up any important data before starting the process.

NOTE: Partition install is supported on the default media on SRX300, SRX320, SRX340, and SRX345 devices (internal NAND flash) and *not* supported on the alternate media (USB storage key). Partition install is supported on the default media on SRX380 Series devices (internal SSD) and not on alternate media (USB storage key).

NOTE: Partition install is supported on the default media on SRX100, SRX210, and SRX240 devices (internal NAND flash) and on SRX650 devices (internal CF card). Partition install is not supported on the alternate media on SRX100, SRX210, and SRX240 devices (USB storage key) or on SRX650 devices (external CF card or USB storage key).

In this example, add the software package junos-srxsme-10.0R2-domestic.tgz with the following options:

- `no-copy` option to install the software package but do not save the copies of package files. You must include this option if you do not have enough space on the internal media to perform an upgrade that keeps a copy of the package on the device.
- `no-validate` option to bypass the compatibility check with the current configuration before installation starts.
- `partition` option to format and re-partition the media before installation.
- `reboot` option to reboots the device after installation is completed.

Topology

Configuration

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- Procedure | 260

Procedure

CLI Quick Configuration

To install Junos OS Release 10.0 or later with the partition option, enter the following command from operational mode:

```
user@host>request system software add junos-srxsme-10.0R2-domestic.tgz no-copy no-validate
partition reboot
```

GUI Quick Configuration

Step-by-Step Procedure

To install Junos OS Release 10.0 or later with the `partition` option:

1. In the J-Web user interface, select **Maintain>Software>Install Package**.
2. On the Install Package page, specify the FTP or HTTP server, file path, and software package name. Type the full address of the software package location on the FTP or HTTP. Example: **ftp://hostname/pathname/junos-srxsme-xx.0R2-domestic.tgz** or **http://hostname/pathname/junos-srxsme-xx.0R2-domestic.tgz**.

   NOTE: Specify the username and password, if the server requires one.

3. Select the **Reboot If Required** check box to set the device to reboot automatically when the upgrade is complete.
4. Select the **Do not save backup** check box to bypass saving the backup copy of the current Junos OS package.

5. Select the **Format and re-partition the media before installation** check box to format the internal media with dual-root partitioning.

6. Click **Fetch and Install Package**. The software is activated after the device reboots.

   This formats the internal media and installs the new Junos OS image on the media with dual-root partitioning.

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To install Junos OS Release 10.0 or later with the `partition` option:

1. Upgrade the device to Junos OS Release 10.0 or later using the CLI.

2. After the device reboots, upgrade the boot loader to the latest version. See "Preparing the USB Flash Drive to Upgrade Junos OS on SRX Series Devices" on page 266.

3. Reinstall the Release 10.0 or later image.

```
user@host>request system software add junos-srxsme-10.0R2-domestic.tgz no-copy no-validate
partition reboot
Copying package junos-srxsme-10.0R2-domestic.tgz to var/tmp/install
Rebooting ...
```

Results

From configuration mode, confirm your configuration by entering the `show system storage partitions` command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

Sample output on a system with single root partitioning:

```
user@host> show system storage partitions
```

```
Boot Media: internal (da0)

Partitions Information:
  Partition  Size   Mountpoint
      s1a    898M   /
```

```
      s1e    24M    /config
      s1f    61M    /var
```

Sample output on a system with dual-root partitioning:

```
user@host> show system storage partitions
```

```
Boot Media: internal (da0)
Active Partition: da0s2a
Backup Partition: da0s1a
Currently booted from: active (da0s2a)

Partitions Information:
  Partition  Size   Mountpoint
      s1a    293M   altroot
      s2a    293M   /
      s3e    24M    /config
      s3f    342M   /var
      s4a    30M    recovery
```

If you are done configuring the device, enter `commit` from configuration mode.

Verification

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Confirm that the configuration is working properly.

Verifying the Partitioning Scheme Details

Purpose

Verify that the partitioning scheme details on the SRX Series Firewall were configured.

Action

From operational mode, enter the `show system storage partitions` command.

SEE ALSO

Configuring Root Partitions on SRX Series Devices | 426

Reverting the Junos OS Software Image Back to the Previous Version

IN THIS SECTION

This example shows how to downgrade Junos OS on the SRX Series Firewalls.

Requirements

No special configuration beyond device initialization is required before configuring this feature.

Overview

When you upgrade your software, the device creates a backup image of the software that was previously installed in addition to installing the requested software upgrade.

To downgrade the software, you can revert to the previous image using the backup image. You can use this method to downgrade to only the software release that was installed on the device before the current release. To downgrade to an earlier version, follow the procedure for upgrading, using the software image labeled with the appropriate release. This example returns software to the previous Junos OS version.

NOTE: This procedure applies only to downgrading from one Junos OS software release to another or from one Junos OS services release to another.

NOTE: For SRX300, SRX320, SRX340, SRX345, and SRX380 devices, you cannot use the `request system rollback` command to roll back from Junos OS Release 23.2R1 to Junos OS Release 22.4R2, because these releases run different releases of FreeBSD. Instead, you must treat the rollback as a downgrade, and use the `request system software add` *`package-name`* `partition no-copy no-validate reboot` command.

Configuration

IN THIS SECTION

Procedure

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the `[edit]` hierarchy level, and then enter `commit` from configuration mode.

From operational mode, enter:

```
user@host> request system software rollback
request system reboot
```

GUI Quick Configuration

Step-by-Step Procedure

To downgrade Junos OS on SRX Series Firewalls:

1. In the J-Web user interface, select **Maintain>Software>Downgrade**. The image of the previous version (if any) appears on this page.

   NOTE: After you perform this operation, you cannot undo it.

2. Select **Downgrade** to downgrade to the previous version of the software or **Cancel** to cancel the downgrade process.

3. Click **Maintain>Reboot** from the J-Web user interface to reboot the device.

   NOTE: To downgrade to an earlier version, follow the procedure for upgrading, using the software image labeled with the appropriate release.

4. Click **OK** to check your configuration and save it as a candidate configuration.

5. If you are done configuring the device, click **Commit Options>Commit**.

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To downgrade Junos OS on SRX Series Firewalls:

1. From operational mode, return to the previous Junos OS version.

```
user@host> request system software rollback
```

2. Reboot the device.

```
user@host> request system reboot
```

   The device is now running the previous version of Junos OS. To downgrade to an earlier version, follow the procedure for upgrading, using the software image labeled with the appropriate release.

Results

From configuration mode, confirm your configuration by entering the `show system` command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter `commit` from configuration mode.

Verification

IN THIS SECTION

Confirm that the configuration is working properly.

Verifying the Junos OS Downgrade Installation

Purpose

Verify that the Junos OS downgrade was installed.

Action

From operational mode, enter the `show system` command.

Preparing the USB Flash Drive to Upgrade Junos OS on SRX Series Devices

This feature simplifies the upgrading of Junos OS images in cases where there is no console access to an SRX Series Firewall located at a remote site. This functionality allows you to upgrade the Junos OS image with minimum configuration effort by simply copying the image onto a USB flash drive, inserting it into the USB port of the SRX Series Firewall, and performing a few simple steps. You can also use this feature to reformat a boot device and recover an SRX Series Firewall after boot media corruption.

All USB flash drives used on SRX Series Firewalls must have the following features:

- USB 2.0 or later.

- Formatted with a FAT/FAT 32 or MS-DOS file system

NOTE: For the list of recommended USB drives, see Knowledge Base article KB31622.

NOTE: The Junos OS package on a USB device is commonly stored in the root drive as the only file; for example, junos-srxsme-15.1X49-D30.3-domestic.tgz.

⚠ **CAUTION**: Any USB memory product not listed as supported for SRX Series Firewalls has not been tested by Juniper Networks. The use of any unsupported USB memory product could expose your SRX Series Firewall to unpredictable behavior. Juniper Networks Technical Assistance Center (JTAC) can provide only limited support for issues related to unsupported hardware. We strongly recommend that you use only supported USB flash drives.

NOTE: This feature is not supported on chassis clusters.

Before you begin:

- Copy the Junos OS upgrade image and its `autoinstall.conf` file to the USB device.
- Ensure that adequate space is available on the SRX Series Firewall to install the software image.

To prepare the USB flash drive and copy the Junos OS image onto the USB flash drive:

1. Insert the USB flash drive into the USB port of a PC or laptop computer running Windows.
2. From **My Computer**, right-click the drive **Devices with Removable Storage**.
3. Format the drive with the FAT/FAT32 file system.
4. Copy the Junos OS image onto the USB device.

   For the installation process to succeed, copy only one image onto the USB device. Only images named junos-srxsme* are recognized by the system.
5. Check the drive name detected in **My Computer** for the USB device. Open the command prompt window and type:

```
echo “ “ > <drive-name>:\autoinstall.conf
```

For example, if the drive detected is drive F, type `echo " " > F:\autoinstall.conf` at the command prompt. This empty file indicates to the system that the automatic installation of the Junos OS image from the USB device is supported.

6. (Optional) Create a text file named `junos-config.conf` and copy the file to the USB device. For example, the following file supports an automatic configuration update during the installation process:

```
system {
    host-name host-1;
    domain-name example.net;
    domain-search [ abc.example.net example.net device1.example.net];
    root-authentication {
        encrypted-password "$ABC123"; ## SECRET-DATA
    }
    }
    ...
...
    routing-options {
        static {
            route 0.0.0.0/0 next-hop 10.207.31.254;
        }
    }
```

NOTE: The `junos-config.conf` file is optional, and it is not necessary for the automatic installation of the Junos OS image from the USB device. You can use the `junos-config.conf` file for a backup configuration for recovery or if the existing configuration is accidentally deleted.

Installing Junos OS on SRX Series Firewalls Using a USB Flash Drive

For SRX300, SRX320, SRX340, SRX345, and SRX380 devices, when upgrading to or downgrading from Junos OS Release 23.2R1 on your device using a USB flash drive to install the software, after the device reboots, it comes up in Amnesiac state. Therefore, before you install, make sure you have saved the configuration file so that you can more easily re-configure the device.

Also, before upgrading to Junos OS Release 23.2R1 for SRX300, SRX320, SRX340, SRX345, and SRX380 devices, you must first upgrade the loader and U-boot software to version 3.14.

To install the Junos OS image on an SRX Series Firewall using a USB flash drive:

1. Insert the USB flash drive into the USB port of the SRX Series Firewall and observe the LEDs. The LEDs will initially blink amber and then steadily turn amber, indicating that the SRX Series Firewall has detected the Junos OS image.

   If the LEDs do not change to amber, try pressing the **Power** button or turning the device off and then on again. Wait for the LEDs to blink amber.

2. Press the **Reset Config** button on the SRX Series Firewall to initiate the installation process. The LEDs will glow steadily amber during this process.

   NOTE: It is important to press the **Reset Config** button after observing the initial amber LED indication. Waiting for the LEDs to turn steady before pressing the button is not necessary and may cause unnecessary delays.

   When the LEDs glow green, the Junos OS upgrade image has been successfully installed.

   If the USB device is plugged in, the **Reset Config** button always performs as an image upgrade button. Any other functionality of this button is overridden until you remove the USB flash drive.

3. Remove the USB flash drive from the device.

   The SRX Series Firewall restarts automatically and loads the new Junos OS version.

NOTE: On SRX300, SRX320, SRX340, SRX345, SRX380, and SRX550M devices, frequent plug and play of USB keys is not supported. You must wait for the device node creation before removing the USB key.

NOTE: If an installation error occurs, the LEDs turn red, which might indicate that the Junos OS image on the USB flash drive is corrupted. An installation error can also occur if the current configuration on the SRX Series Firewall is not compatible with the new Junos OS version on the USB or if there is not enough space on the SRX Series Firewall to install the image. You must have console access to the SRX Series Firewall to troubleshoot an installation error.

NOTE: You can use the `set system autoinstallation usb disable` command to prevent the automatic installation from the USB device. After using this command, if you insert the USB device into the USB port of the SRX Series Firewall, the installation process does not work.

NOTE: Installing the Junos OS image using a USB flash drive is supported on SRX100, SRX110, SRX210, SRX220, and SRX240 devices.

Upgrading the Boot Loader on SRX Series Firewalls

To upgrade the boot loader to the latest version:

1. Upgrade to Junos OS Release 10.0 or later (with or without dual-root support enabled).

   The Junos OS 10.0 image contains the latest boot loader binaries in this path: `/boot/uboot`, `/boot/loader`.
2. Enter the shell prompt using the `start shell` command.
3. Run the following command from the shell prompt:

   ```
   bootupgrade -u /boot/uboot -l /boot/loader
   ```

   NOTE: You can use the following commands to upgrade U-Boot or perform cyclic redundancy check (CRC):

   - `bootupgrade -s -u` – To upgrade the secondary boot loader.
   - `bootupgrade -c u-boot` – To check CRC of the boot loader.
   - `bootupgrade -s -c u-boot` – To check CRC for the secondary boot loader.
   - `bootupgrade -c loader` – To check CRC for the loader on boot loader.
4. Enter the `show system firmware` command to check whether the upgrade is successful or not.

```
root> show system firmware
Part             Type              Tag Current   Available Status
                                       version   version
FPC 1
PIC 0            MLTE_FW           1   17.2.91   0         OK
Routing Engine 0 RE BIOS           0   3.8       3.6       OK
Routing Engine 0 RE BIOS Backup    1   3.6       3.6       OK
```

5. For the new version to take effect, you should reboot the system after upgrading the boot loader.

You can check the boot loader version number at console output when your device boots up as shown in the following example:

```
scanning bus 0 for devices... 1 USB Device(s) found
       scanning usb for storage devices... 1 Storage Device(s) found

FreeBSD/MIPS U-Boot bootstrap loader, Revision 2.10
```

To verify the (bios) firmware version on the SRX Series Firewall, enter the `show chassis routing-engine bios` command.

```
user@host>  show chassis routing-engine bios
Routing Engine BIOS Version: 1.5
```

Installing Junos OS on SRX Series Firewalls from the Boot Loader Using a TFTP Server

For SRX300, SRX320, SRX340, SRX345, and SRX380 devices, when upgrading to or downgrading from Junos OS Release 23.2R1 on your device using a USB flash drive to install the software, after the device reboots, it comes up in Amnesiac state. Therefore, before you install, make sure you have saved the configuration file so that you can more easily re-configure the device.

Also, before upgrading to Junos OS Release 23.2R1 for SRX300, SRX320, SRX340, SRX345, and SRX380 devices, you must first upgrade the loader and U-boot software to version 3.14.

You can install Junos OS using the Trivial File Transfer Protocol (TFTP) method. The device is shipped with Junos OS loaded on the primary boot device. During Junos OS installation from the loader, the device retrieves the Junos OS package from a TFTP server. The internal media is then formatted, and the Junos OS image is installed.

From the loader installation, you can:

- Install Junos OS on the device for the first time.
- Recover the system from a file system corruption.

NOTE: Installation from a TFTP server can only be performed using the first onboard Ethernet interface.

Installation from the loader-over-TFTP method does not work reliably over slow speeds or large latency networks.

Before you begin, verify that:

- You have access to the TFTP server with the Junos OS package to be installed.
- That the TFTP server supports BOOTP or DHCP. If the TFTP server does not support BOOTP or DHCP, you must set the environment variables before performing the installation from the TFTP server.
- Functional network connectivity exists between the device and the TFTP server over the first onboard Ethernet interface.

To install the Junos OS image on the internal media of the device:

1. To access the U-boot prompt, use the console connection to connect to the device.
2. Reboot the device.

   The following messages appear:

   ```
   Clearing DRAM........ done BIST check passed. Net:   pic init done (err = 0)octeth0 POST Passed
   ```

   After this message appears, you see the following prompt:

   ```
   Press SPACE to abort autoboot in 3 seconds
   ```

3. Press the space bar to stop the autoboot process.

   The => U-boot prompt appears.

4. From the U-boot prompt, configure the environment variables listed in Table 15 on page 272.

   Table 15: Environment Variables Settings

Environment Variables	Description
gatewayip	IP address of the gateway device
ipaddr	IP address of the SRX Series Firewall

Table 15: Environment Variables Settings *(Continued)*

Environment Variables	Description
netmask	network mask
serverip	IP address of the TFTP server

This example shows you how to configure the environment variables:

```
Clearing DRAM........ done
BIST check passed.
Net:   pic init done (err = 0)octeth0
POST Passed
Press SPACE to abort autoboot in 3 seconds
 =>
 => setenv ipaddr 198.51.100.15
 => setenv netmask 255.255.255.0
 => setenv gatewayip 198.51.100.1
=> setenv serverip 203.0.113.2
 => saveenv
```

5. Reboot the system using the `reset` command.
6. To access the loader prompt, use the console connection to connect to the device.
7. Reboot the device.

   The following message appears:

   ```
   Loading /boot/defaults/loader.conf
   ```

   After this message appears, you see the following prompt:

   ```
   Hit [Enter] to boot immediately, or space bar for command prompt.
   ```

8. Press the space bar to access the loader prompt (`loader>`).

   The `loader>` prompt appears. Enter:

   ```
   loader> install tftp://203.0.113.2/junos-srxsme-10.0R2-domestic.tgz
   ```

NOTE: The URL path is relative to the TFTP server's TFTP root directory, where the URL is *tftp://tftp-server-ipaddress/package*.

When this command is executed:

- The Junos OS package is downloaded from the TFTP server.
- The internal media on the system is formatted.
- The Junos OS package is installed on the internal media.

NOTE: The Installation from the loader-over-TFTP method installs Junos OS on the internal CF on SRX100, SRX210, SRX220, and SRX240 devices, whereas on SRX650 devices, this method can install Junos OS on the internal or external CF card.

After Junos OS is installed, the device boots from the internal media. Once the system boots up with Junos OS Release 10.0 or later, you must upgrade the U-boot and boot loader immediately.

CAUTION: When you install Junos OS using the loader-over-TFTP method, the media is formatted. The process attempts to save the current configuration. We recommend that you back up all important information on the device before using this process.

Installing Junos OS on SRX Series Firewalls from the Boot Loader Using a USB Storage Device

For SRX300, SRX320, SRX340, SRX345, and SRX380 devices, when upgrading to or downgrading from Junos OS Release 23.2R1 on your device using a USB flash drive to install the software, after the device reboots, it comes up in Amnesiac state. Therefore, before you install, make sure you have saved the configuration file so that you can more easily re-configure the device.

Also, before upgrading to Junos OS Release 23.2R1 for SRX300, SRX320, SRX340, SRX345, and SRX380 devices, you must first upgrade the loader and U-boot software to version 3.14.

To install Junos OS Release 10.0 or later from the boot loader using a USB storage device:

1. Format a USB storage device in MS-DOS format.
2. Copy the Junos OS image onto the USB storage device.
3. Plug the USB storage device into the SRX Series Firewall.

4. Stop the device at the loader prompt and issue the following command:

```
loader> install file:///<image-path-on-usb>
```

An example of a command is as follows:

```
loader> install file:///junos-srxsme-10.0R2-domestic.tgz
```

This formats the internal media and installs the new Junos OS image on the media with dual-root partitioning.

5. Remove the USB flash drive.

NOTE: On SRX300, SRX320, SRX340, SRX345, SRX380, and SRX550M devices, frequent plug and play of USB keys is not supported. You must wait for the device node creation before removing the USB key.

NOTE: If an installation error occurs, the LEDs turn red, which might indicate that the Junos OS image on the USB flash drive is corrupted. An installation error can also occur if the current configuration on the SRX Series Firewall is not compatible with the new Junos OS version on the USB or if there is not enough space on the SRX Series Firewall to install the image. You must have console access to the SRX Series Firewall to troubleshoot an installation error.

If the USB device is not recognized you may see a message similar to `Target device selected for installation: internal media cannot open package (error 2)`. If you see such a message, power cycle the SRX with the USB stick inserted and try the boot loader install again.

Upgrading the Software of SRX Series Firewalls by Using a PXE Boot Server

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Upgrading the Software of SRX1500 Device

The build image loaded on the device defines the software version of the device. You can change the version of the device by upgrading it.

You can upgrade the software of a device by using the Preboot Execution Environment (PXE) boot server. A PXE boot prepares a client/server environment to boot devices by using a network interface that is independent of available data storage devices or installed operating systems. The image of the operating system is stored on a TFTP server. You can have a separate PXE boot server for each image.

To upgrade the software of a device by using the PXE boot server method:

- Copy the image you want installed on the device to the PXE boot server.
- Reboot the device to install the image. If you have already copied the image to the PXE boot server, reboot the device to install the image.

To copy the image you want installed to the PXE boot server and install the image:

1. Remove the previously installed files, if any, from the **/var/lib/tftpboot/** directory.

```
user@host> rm -f /tftpboot
user@host> mkdir /tftpboot
```

2. Copy the downloaded installation media to the **/var/lib/tftpboot/** directory in the PXE boot server.

   For example:

```
scp /volume/build/junos/20.1/release/zyx/ship/
junos-install-media-pxe-srxentedge-x86-64-20.3I-20200517_dev_common.0.1613.tgz
user@host:/var/lib/tftpboot/
```

3. Log in to the PXE boot server and verify the installation file.

   For example:

```
user@host> ls -lh junos-install-media-pxe-srxentedge-
x86-64-20.3I-20200517_dev_common.0.1613.tgz
```

```
-rw-r--r-- 1 root root 1.8G June 08 00:42 junos-install-media-pxe-srxentedge-
x86-64-20.3I-20200517_dev_common.0.1613.tgz
```

4. Extract the **junos-install-media-pxe-srxentedge** TAR file.

   For example:

```
user@host> tar xvzf junos-install-media-pxe-srxentedge-
x86-64-20.3I-20200517_dev_common.0.1613.tgz -C /var/lib

./initramfs.cpio.gz
./initrd.cpio.gz
./upgrade_platform
./initramfs.cpio.gz.psig
./vmlinuz.psig
./HOST_COMPAT_VERSION
./application-pkg.tgz
./EFI/
./EFI/BOOT/
./EFI/BOOT/BOOTX64.EFI
./EFI/BOOT/grub-root.pub
./EFI/BOOT/grub-trusted.gpg.psig
./EFI/BOOT/grub-trusted.gpg
./linux.checksum
./version.txt
./host-version
./vmlinuz
```

5. Copy the BOOTX64.EFI file to the tftp home folder (**/var/lib/tftpboot/**).

```
user@host> cp EFI/BOOT/BOOTX64.EFI /var/lib/tftpboot/
```

6. Create a secure boot folder at **/var/lib/tftpboot/**.

```
user@host> rm -rf /var/lib/tftpboot/secure-boot
user@host> mkdir /var/lib/tftpboot/secure-boot
```

7. Copy the grub files in the **secure-boot** folder.

```
user@host> cp EFI/BOOT/grub-root.pub secure-boot/
user@host> cp EFI/BOOT/grub-trusted.gpg secure-boot/
user@host> cp EFI/BOOT/grub-trusted.gpg.psig secure-boot/
```

8. Move initrd.cpio.gz and application-pkg.tgz in ftp server folder (**/var/ftp/**).

```
user@host> mv application-pkg.tgz /var/ftp/
user@host> mv initrd.cpio.gz /var/ftp/
```

9. Create grub-startup.cfg in **/var/lib/tftpboot/secure-boot** folder.

```
user@host> cat grub-startup.cfg
insmod search
insmod linux
insmod tftp
insmod reboot
insmod efi_gop
insmod efi_uga
insmod read
insmod chain
insmod boot
insmod font
insmod serial

set timeout=5

menuentry 'PXE image' {
    set net_default_server=192.168.120.1
    echo 'Loading ...'
    linux (tftp)/vmlinuz root=/dev/ram quiet console=ttyS0,9600n8  acpi=ht
libata.force=noncq acpi_enforce_resources=lax  install rootfs=ftp://192.168.120.1/
initrd.cpio.gz  app_pkg=ftp://192.168.120.1/application-pkg.tgz  efi=debug  intel_iommu=on
isolcpus=2,3
    echo 'Loading initial ramdisk ...'
    initrd (tftp)/initramfs.cpio.gz

}
```

10. After you copy the image to the PXE boot server, to install the image on the device, reboot the device to install the image.

```
user@host> request system reboot
```

    The router boots from the PXE server and installs the image on both the SSDs.

If the device fails to reboot, you can use the USB disk installation option. However, after using USB disk installation, if the router fails to reboot or is not accessible, follow these steps on the console:

1. Reboot or power on the device
2. Press the **ESC** button to go to the Boot Manager Menu.
3. Select `Setup Utility`, and then press Enter.
4. Select the boot type as `UEFI Boot Type`, PXE boot capability as `UEFI:IPv4`, first boot device as`PXE on ME` and set network stack as `Enabled`.
5. Click F10
6. In operational mode, verify that the upgrade is successful. If you have upgraded the software of the device to an SRX1500, the new version of the device is `srx1500`.

```
user@host> show version
Hostname: host
Model: srx1500
```

Juniper Networks does not support using the `request system software rollback` command to revert to the previously installed software.

Upgrading the Software of SRX4100 Device

The build image loaded on the device defines the software version of the device. You can change the version of the device by upgrading it.

You can upgrade the software version of a device by using the Preboot Execution Environment (PXE) boot server. A PXE boot prepares a client/server environment to boot devices by using a network interface that is independent of available data storage devices or installed operating systems. The image of the operating system is stored on a TFTP server. You can have a separate PXE boot server for each image.

To upgrade the software version of a device using the PXE boot server method:

- Copy the image you want installed on the device to the PXE boot server.

- Reboot the device to install the image. If you have already copied the image to the PXE boot server, reboot the device to install the image.

To copy the image you want installed to the PXE boot server and install the image:

1. Remove the previously installed files, if any, from the **var/lib/tftpboot/** directory.

```
user@host> rm -f /tftpboot
user@host> mkdir /tftpboot
```

2. Copy the downloaded installation media to the **/var/lib/tftpboot/** directory in the PXE boot server.
   For example:

```
scp /volume/build/junos/20.1/release/zyx/ship/
junos-install-media-pxe-srxmr-x86-64-20.3I-20200520_dev_common.0.1928.tgz
user@host:/var/lib/tftpboot/
```

3. Log in to the PXE boot server and verify the installation file.
   For example:

```
user@host> ls -lh junos-install-media-pxe-srxmr-x86-64-20.3I-20200520_dev_common.0.1928.tgz
-rw-r--r-- 1 root root 1.8G June 08 00:42 junos-install-media-pxe-srxmr-
x86-64-20.3I-20200520_dev_common.0.1928.tgz
```

4. Extract the **junos-install-media-pxe-srxmr** TAR file.
   For example:

```
user@host> tar xvzf junos-install-media-pxe-srxmr-
x86-64-20.3I-20200520_dev_common.0.1928.tgz -C /var/lib

./initramfs.cpio.gz
./initrd.cpio.gz
./upgrade_platform
./initramfs.cpio.gz.psig
./vmlinuz.psig
./HOST_COMPAT_VERSION
./application-pkg.tgz
./EFI/
./EFI/BOOT/
./EFI/BOOT/BOOTX64.EFI
./EFI/BOOT/grub-root.pub
```

```
./EFI/BOOT/grub-trusted.gpg.psig
./EFI/BOOT/grub-trusted.gpg
./linux.checksum
./version.txt
./host-version
./vmlinuz
```

5. Move initrd.cpio.gz and application-pkg.tgz in ftp server folder (**/var/ftp/**).

```
user@host> mv application-pkg.tgz /var/ftp/
user@host> mv initrd.cpio.gz /var/ftp/
```

6. Install syslinux on ftp server.

```
user@host> yum install syslinux
```

7. Copy syslinux files to ftp server.

```
user@host> cp /usr/share/syslinux/menu.c32 /usr/share/syslinux/vesamenu.c32 /usr/share/
syslinux/pxelinux.0 /var/lib/tftpboot/
```

8. Create PXE menu.

```
user@host> mkdir /var/lib/tftpboot/pxelinux.cfg
```

9. Create a new default file at PXE menu.

```
user@host> cat pxelinux.cfg/default
default vesamenu.c32
prompt 0
timeout 800

#display boot.msg

#menu background splash.jpg
menu title Welcome!
menu color border 0 #ffffffff #00000000
menu color sel 7 #ffffffff #ff000000
menu color title 0 #ffffffff #00000000
menu color tabmsg 0 #ffffffff #00000000
```

```
menu color unsel 0 #ffffffff #00000000
menu color hotsel 0 #ff000000 #ffffffff
menu color hotkey 7 #ffffffff #ff000000
menu color scrollbar 0 #ffffffff #00000000

LABEL SRXMR---20.3
        MENU LABEL ^B SRXMR---20.3
        KERNEL vmlinuz
        INITRD initramfs.cpio.gz
        APPEND vm console=ttyS0,9600n8 root=/dev/ram intel_iommu=on acpi=off isolcpus=2,3
libata.force=noncq acpi_enforce_resources=lax install rootfs=ftp://192.168.120.1/
initrd.cpio.gz install app_pkg=ftp://192.168.120.1/application-pkg.tgz
```

10. After you copy the image to the PXE boot server, to install the image on the device, reboot the device to install the image.

```
user@host> request system reboot
```

The router boots from the PXE server and installs the image on both the SSDs.

If the device fails to reboot, you can use the USB disk installation option. However, after using USB disk installation, if the router fails to reboot or is not accessible, follow these steps on the console:

1. Reboot or power on the device
2. Press the **ESC** button to go to the Boot Manager Menu.
3. Select the boot mode as `LEGACY`, boot option 1 as `Network`, and set network stack as `Disabled`.
4. Select save and exit or click F4 to start PXE boot.
5. Select the menu from the screen and click **Enter** to reboot the device.
6. Choose boot option 1 as `Hard Disk`.
7. Select save and exit or click F4.
8. In operational mode, verify that the upgrade is successful. If you have upgraded the version of the device to an SRX4100, the new version of the device is `srx4100`.

```
user@host> show version
Hostname: host
Model: srx4100
```

Juniper Networks does not support using the `request system software rollback` command to revert to the previously installed software version.

Upgrading the Software of SRX4600 Device

The build image loaded on the device defines the software of the device. You can change the software of the device by upgrading it.

You can upgrade the software version of a device by using the Preboot Execution Environment (PXE) boot server. A PXE boot prepares a client/server environment to boot devices by using a network interface that is independent of available data storage devices or installed operating systems. The image of the operating system is stored on a TFTP server. You can have a separate PXE boot server for each image.

To upgrade the software of a device by using the PXE boot server method:

- Copy the image you want installed on the device to the PXE boot server.
- Reboot the device to install the image. If you have already copied the image to the PXE boot server, reboot the device to install the image.

To copy the image you want installed to the PXE boot server and install the image:

1. Remove the previously installed files, if any, from the **/var/lib/tftpboot/** directory.

```
user@host> rm -f /tftpboot
user@host> mkdir /tftpboot
```

2. Copy the downloaded installation media to the **/var/lib/tftpboot/** directory in the PXE boot server.

   For example:

```
scp /volume/build/junos/20.1/release/zyx/ship/
junos-install-media-pxe-srxhe-x86-64-20.3I-20200521_dev_common.0.1013.tgz
user@host:/var/lib/tftpboot/
```

3. Log in to the PXE boot server and verify the installation file.

   For example:

```
user@host> ls -lh junos-install-media-pxe-srxhe-x86-64-20.3I-20200521_dev_common.0.1013.tgz
-rw-r--r-- 1 root root 1.8G June 08 00:42 junos-install-media-pxe-srxhe-
x86-64-20.3I-20200521_dev_common.0.1013.tgz
```

4. Extract the **junos-install-media-pxe-srxhe** TAR file.

For example:

```
user@host> tar xvzf junos-install-media-pxe-srxhe-
x86-64-20.3I-20200521_dev_common.0.1013.tgz -C /var/lib

./initramfs.cpio.gz
./initrd.cpio.gz
./upgrade_platform
./initramfs.cpio.gz.psig
./vmlinuz.psig
./HOST_COMPAT_VERSION
./application-pkg.tgz
./EFI/
./EFI/BOOT/
./EFI/BOOT/BOOTX64.EFI
./EFI/BOOT/grub-root.pub
./EFI/BOOT/grub-trusted.gpg.psig
./EFI/BOOT/grub-trusted.gpg
./linux.checksum
./version.txt
./host-version
./vmlinuz
```

5. Copy the BOOTX64.EFI file to the tftp home folder (**/var/lib/tftpboot/**).

```
user@host> cp EFI/BOOT/BOOTX64.EFI /var/lib/tftpboot/
```

6. Create a secure boot folder at **/var/lib/tftpboot/**.

```
user@host> rm -rf /var/lib/tftpboot/secure-boot
user@host> mkdir /var/lib/tftpboot/secure-boot
```

7. Copy the grub files in the **secure-boot** folder.

```
user@host> cp EFI/BOOT/grub-root.pub secure-boot/
user@host> cp EFI/BOOT/grub-trusted.gpg secure-boot/
user@host> cp EFI/BOOT/grub-trusted.gpg.psig secure-boot/
```

8. Move initrd.cpio.gz and application-pkg.tgz in ftp server folder (**/var/ftp/**)

```
user@host> mv application-pkg.tgz /var/ftp/
user@host> mv initrd.cpio.gz /var/ftp/
```

9. Create grub-startup.cfg in **/var/lib/tftpboot/secure-boot** folder.

```
user@host> cat grub-startup.cfg
insmod search
insmod linux
insmod tftp
insmod reboot
insmod efi_gop
insmod efi_uga
insmod read
insmod chain
insmod boot
insmod font
insmod serial

set timeout=5

menuentry 'PXE image' {
    set net_default_server=192.168.120.1
    echo 'Loading ...'
    linux (tftp)/vmlinuz root=/dev/ram quiet console=ttyS0,9600n8  acpi=ht
libata.force=noncq acpi_enforce_resources=lax  install rootfs=ftp://192.168.120.1/
initrd.cpio.gz  app_pkg=ftp://192.168.120.1/application-pkg.tgz  efi=debug  intel_iommu=on
isolcpus=2,3
    echo 'Loading initial ramdisk ...'
    initrd (tftp)/initramfs.cpio.gz

}
```

10. After you copy the image to the PXE boot server, to install the image on the device, reboot the device to install the image.

```
user@host> request system reboot
```

The router boots from the PXE server and installs the image on both the SSDs.

If the device fails to reboot, you can use the USB disk installation option. However, after using USB disk installation, if the router fails to reboot or is not accessible, follow these steps on the console:

1. Reboot or power on the device
2. Press the **ESC** button to go to the Boot Manager Menu.
3. Select `Setup Utility`, and then press Enter.
4. Select the PXE boot capability as `UEFI:IPv4`, disable `HDD` and enable `ETH00` under **EPI**.
5. Click F10
6. In operational mode, verify that the upgrade is successful. If you have upgraded the software version of the device to an SRX4600, the new version of the device is `srx4600`.

```
user@host> show version
Hostname: host
Model: srx4600
```

Juniper Networks does not support using the `request system software rollback` command to revert to the previously installed software version.

Restarting and Halting SRX Series Firewalls

IN THIS SECTION

This topic includes the following sections:

Rebooting SRX Series Firewalls

IN THIS SECTION

This example shows how to reboot a SRX Series Firewall.

Requirements

Before rebooting the device, save and commit any Junos OS updates.

Overview

This example shows how to reboot a device fifty minutes from when you set the time from the internal media while sending a text message of 'stop' to all system users before the device reboots.

Configuration

IN THIS SECTION

Procedure

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the `[edit]` hierarchy level, and then enter `commit` from configuration mode.

From operational mode, enter:

```
user@host> request system reboot at 5 in 50 media internal message stop
```

GUI Quick Configuration

Step-by-Step Procedure

To reboot a device:

1. In the J-Web user interface, select **Maintain>Reboot**.
2. Select **Reboot in *50* minutes** to reboot the device fifty minutes from the current time.
3. Select the **internal** (for SRX Series Firewalls) boot device from the Reboot From Media list.
4. In the Message box, type **stop** as the message to display to any user on the device before the reboot occurs.
5. Click **Schedule**. The J-Web user interface requests confirmation to perform the reboot.
6. Click **OK** to confirm the operation.
   - If the reboot is scheduled to occur immediately, the device reboots. You cannot access J-Web until the device has restarted and the boot sequence is complete. After the reboot is complete, refresh the browser window to display the J-Web login page.
   - If the reboot is scheduled to occur in the future, the Reboot page displays the time until reboot. You have the option to cancel the request by clicking **Cancel Reboot** on the J-Web user interface Reboot page.
7. Click **OK** to check your configuration and save it as a candidate configuration.
8. If you are done configuring the device, click **Commit Options>Commit**.

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To reboot a device:

1. From operational mode, schedule a reboot of the device to occur fifty minutes from when you set the time from the internal media while sending a text message of 'stop' to all system users before the device reboots.

Enter:

```
user@host> request system reboot at 5 in 50 media internal message stop
```

Results

From configuration mode, confirm your configuration by entering the `show system` command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter `commit` from configuration mode.

Verification

IN THIS SECTION

Confirm that the configuration is working properly.

Verifying the Device Reboot

Purpose

Verify that the device rebooted.

Action

From operational mode, enter the `show system` command.

Halting SRX Series Firewalls

IN THIS SECTION

This example shows how to halt a device.

Requirements

Before halting the device, save and commit any Junos OS updates.

Overview

When the device is halted, all software processes stop and you can access the device through the console port only. Reboot the device by pressing any key on the keyboard.

NOTE: If you cannot connect to the device through the console port, shut down the device by pressing and holding the power button on the front panel until the **POWER** LED turns off. After the device has shut down, you can power on the device by pressing the power button again. The **POWER** LED turns on during startup and remains steadily green when the device is operating normally.

This example shows how to halt the system and stop software processes on the device immediately.

Configuration

IN THIS SECTION

Procedure

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy

and paste the commands into the CLI at the `[edit]` hierarchy level, and then enter `commit` from configuration mode.

From operational mode, enter:

```
user@host> request system halt at now
```

NOTE: The `request system halt` command used for halting the system and stopping software processes on the device is not supported on SRX1500, SRX4100, and SRX4200 devices.

GUI Quick Configuration

Step-by-Step Procedure

To halt a device immediately:

1. In the J-Web user interface, select **Maintain>Reboot**.
2. Select **Halt Immediately**. After the software stops, you can access the device through the console port only.
3. Click **Schedule**. The J-Web user interface requests confirmation to halt.
4. Click **OK** to confirm the operation. If the device halts, all software processes stop and you can access the device through the console port only. Reboot the device by pressing any key on the keyboard.
5. Click **OK** to check your configuration and save it as a candidate configuration.
6. If you are done configuring the device, click **Commit Options>Commit**.

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To halt a device:

1. From operational mode, halt the SRX Series Firewall immediately.

```
user@host> request system halt at now
```

Results

From configuration mode, confirm your configuration by entering the `show system` command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

If you are done configuring the device, enter `commit` from configuration mode.

Verification

IN THIS SECTION

Confirm that the configuration is working properly.

Verifying the Device Halt

Purpose

Verify that the device halted.

Action

From operational mode, enter the `show system` command.

Bringing Chassis Components Online and Offline on SRX Series Firewalls

You can use the `request chassis` commands to bring chassis components (except Power Entry Modules and fans) online and offline.

To bring chassis components online and offline, enter these `request chassis` commands:

```
user@host> request chassis <fru> slot <slot#> pic <pic#> online
```


```
user@host> request chassis <fru> slot <slot#> pic <pic#> online
```

Where **<*fru*>** in the `request chassis` command can be any of the following (for SRX300, SRX320, SRX340, SRX345, SRX380, and SRX550M devices):

- `fpc`—Changes the Flexible PIC Concentrator (FPC) status.

Where **<*fru*>** in the `request chassis` command can be any of the following (for SRX5800, SRX5600, and SRX5400 devices):

- `cb`—Changes the control board status.
- `fabric`—Changes the fabric status.
- `fpc`—Changes the Flexible PIC Concentrator (FPC) status.
- `fpm`—Changes the craft interface status.
- `pic`—Changes the physical interface card status.
- `routing-engine`—Changes the Routing Engine status.

NOTE: The `request chassis` command is not supported for bringing SPCs online and offline.

Example:

To bring a specific PIC and the corresponding FPC slot online, from operational mode enter the following `request chassis` command:

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

Restarting the Chassis on SRX Series Firewalls

You can restart the chassis using the `restart chassis-control` command with the following options:

- To restart the process gracefully:

  `user@host>` **restart chassis-control gracefully**

- To restart the process immediately:

  `user@host>` **restart chassis-control immediately**

- To restart the process softly:

  `user@host>` **restart chassis-control soft**

Release History Table

Release	Description
23.2R1	For SRX300, SRX320, SRX340, SRX345, and SRX380 devices, when the release you want to upgrade or downgrade to uses a different FreeBSD release than the FreeBSD release currently running, you must use the `request system software add` *`package-name`* `partition no-copy no-validate reboot` command to upgrade or downgrade the software. FreeBSD release 6 and FreeBSD release 12 use different partitioning schemas, and so you must specify the additional options on the command. For example, Junos OS Release 23.2R1 runs on FreeBSD release 12 and Junos OS Release 22.4R2 runs on FreeBSD release 6.
12.1X46	SRX100, SRX110, SRX210, SRX220, and SRX240 devices with 2 GB RAM cannot be upgraded to any Junos OS 12.1X46 Release after 12.1X46-D65. Attempting to upgrade to this release on devices with 2 GB RAM will trigger the following error: **ERROR: Unsupported platform for 12.1X46 releases after 12.1X46-D65**
12.1X45-D10	Junos OS Release 12.1X45 and later do not support single root partitioning

RELATED DOCUMENTATION

- Upgrade to Junos OS Release 19.4R3 and 20.2R3 for SRX Series

Upgrading and Downgrading to Junos with Upgraded FreeBSD

IN THIS SECTION

You can upgrade or downgrade Junos OS with upgraded FreeBSD. You can upgrade Junos OS with upgraded FreeBSD from Junos OS based on FreeBSD 6.1 and upgrade between different releases of Junos OS with upgraded FreeBSD. Before you stage an upgrade between different releases of Junos OS with upgraded FreeBSD, you should install the os-package software to help the upgrade go more smoothly.

NOTE: If you are upgrading or installing Junos OS on a VM host, see "Installing, Upgrading, Backing Up, and Recovery of VM Host" on page 356.

Before You Upgrade, Install os-package

Before you stage an upgrade between different releases of Junos OS with upgraded FreeBSD, you should install the os-package software to help the upgrade go more smoothly. A vast majority of all upgrade problems are due to limitations or bugs in the already running software that is performing the installation, rather than the new software being installed. The os-package software contains the latest version of the package system and is installable on any BSDX version (FreeBSD 10 or later) of Junos OS Release 15.1 or later.

Benefits:

- os-package facilitates the major FreeBSD upgrades (that is, version 10 to version 11 or version 11 to version 12).
- The goal of the os-package is to be backward compatible with all prior BSDx releases of JUNOS.
- os-package is architecture neutral.

You do not need to reboot the device after installing os-package. It takes only a few seconds to add and is immediately available for help with a planned upgrade. When added, the os-package checks the os-kernel for a feature toggle, which indicates that it is safe to reboot with the os-package in the active set. If the toggle is missing, the following warning will be issued:

```
WARNING: do NOT reboot with os-package in 'active' set!
```

NOTE: The os-package is NOT bundled with Junos OS 22.2R1 and older. os-package is needed only when the shipped JUNOS package that is running on a device needs to be updated to facilitate an upgrade. You must install the latest package before every upgrade regardless of

whether the os-package was installed previously on the device. Even when os-package is bundled with Junos OS (Release 22.3R1 and later), you should fetch and install the latest os-package before you upgrade to reduce the likelihood of issues impacting the upgrade.

Before you install os-package:

- Determine which Junos OS releases have BSDx, by platform: Junos kernel upgrade to FreeBSD 10+.
- Once you know which Junos OS BSDx release you have, find the correct os-package for it:
  - Junos OS Release 18.x and later: os-package. (For example, `os-package-20221105.013526_builder_stable_12.tgz`.)
  - Junos OS Release 17.x and earlier: os-package-sha1. (For example, `os-package-sha1-20221105.013526_builder_stable_12.tgz`.)

1. Download the latest copy of os-package for your device and version of Junos OS and save it to the **/var/tmp** folder of the device.

   The original filename of os-package looks similar to this: `os-package-20221105.013526_builder_stable_12.tgz`. You may want to rename the file to have a simpler filename when you download it to the **/var/tmp** folder.

2. Install os-package.

   In this example, the name given to the downloaded package was **/var/tmp/os-package.tgz.**

   ```
   root@juniper> request system software add /var/tmp/os-package.tgz
   ```

   NOTE: It only takes a few seconds to run and does not need a reboot.

   Do not add os-package when there is already a 'pending' set, else you will get no benefit from os-package. Thus, if you see the following notice after adding os-package, you'll need to rollback the software:

   ```
   NOTICE: 'pending' set will be activated at next reboot...

   root@juniper> request system software rollback
   ```

3. If you had to rollback the software in the previous step due to a pending set, you need to repeat steps 1 and 2 to install os-package.

Once os-package has successfully installed, you can proceed to upgrade to a higher version of Junos OS. If the system reboots before you've had a chance to upgrade Junos OS, os-package deactivates itself, and you will have to install os-package again. If you ever want to delete os-package, you can use the `request system software delete os-package` CLI command.

Install Junos OS with Upgraded FreeBSD Over Junos OS with Upgraded FreeBSD of a Different Release

CAUTION: If you do a media install (either USB or network), the system is wiped and re-partitioned completely. Before you begin, if you have important files, copy them from the device to a secure location before upgrading the device.

To install Junos OS with upgraded FreeBSD over Junos OS with upgraded FreeBSD of a different release:

1. Enter the `request system software add` *`package-name`* `validate reboot` command from the operational mode in the CLI:

   NOTE: Because Junos OS Release 21.2R1 runs on FreeBSD 12, which uses system calls not available on FreeBSD 10 or 11, you must include one of the following options instead of the `validate` option on the `request system software add` command when installing the package:

   - `no-validate`
   - `validate-on-host`
   - `validate-on-routing-engine`

   NOTE: The `no-copy` option is enabled by default.

   Use the `validate` and `reboot` options with the `request system software add` command. The command uses the `validate` option by default. We encourage users to validate using the `validate` option when upgrading from Junos OS to Junos OS or from Junos OS with upgraded FreeBSD to Junos OS with upgraded FreeBSD.

   If you leave out the `reboot` option, you can take care of that in a separate reboot step.

   The new Junos OS image is installed on the device.

2. Verify the installation of Junos OS with upgraded FreeBSD.

```
user@host> show version
```

NOTE: The output shows the OS kernel, OS runtime, and other packages installed on the device.

Upgrading Junos OS with Upgraded FreeBSD

IN THIS SECTION

NOTE: If you are upgrading or installing Junos OS on a VM host, see "Installing, Upgrading, Backing Up, and Recovery of VM Host" on page 356.

Starting in Junos OS Release 15.1, certain hardware platforms run an upgraded FreeBSD kernel (FreeBSD 10.x or later) instead of FreeBSD 6.1. The information in this section is about upgrading from Junos OS without upgraded FreeBSD (that is, based on FreeBSD 6.1) to Junos OS with upgraded FreeBSD. It does not address upgrading using ISSU. There are certain limitations to using ISSU when upgrading to Junos OS with upgraded FreeBSD. For more information on using ISSU, see Example: Performing a Unified ISSU.

When you are upgrading to a different release of Junos OS, you usually use the `request system software add validate` command. The `validate` option checks the candidate software against the current configuration of the device to ensure they are compatible. (Validate is the default behavior when the software package being added is a different release.) However, there are circumstances under which you cannot validate the running configuration in this way. One such circumstance is when you are upgrading to Junos OS with upgraded FreeBSD from Junos OS based on FreeBSD 6.1. Another such circumstance is when you are updating between different releases of Junos OS with upgraded FreeBSD, and the newest version of FreeBSD uses system calls that are not available in earlier versions of FreeBSD.

If you are upgrading between releases that cannot use direct validation, you need to specify one of the following on the `request system software add` operational mode command when you upgrade:

- The `no-validate` option—this option does not validate the software package against the current configuration. Therefore, the current configuration might fail once you upgrade the system. Choose this option for the first time you upgrade to the newer version.
- The `validate-on-host` option—this option validates the software package by comparing it to the running configuration on a remote Junos OS host. Be sure to choose a host that you have already upgraded to the newer version of software.
- The `validate-on-routing-engine` option—(for systems with redundant REs) this option validates the software package by comparing it to the running configuration on a Routing Engine in the same chassis. Use this option when you have already upgraded the other Routing Engine to the newer version.

If you are upgrading between releases that cannot use direct validation, another approach would be to validate on a different host. It does not matter where that other host is, as long as you can reach it with NETCONF over SSH (see *Establishing an SSH Connection for a NETCONF Session*). The target system uses the network to contact the other host, run the validation and authentication, and return the result.

The following sections contain two procedures and one matrix. The procedures cover (1) upgrading to Junos OS with upgraded FreeBSD from Junos OS based on FreeBSD 6.1 and (2) upgrading between different releases of Junos OS with upgraded FreeBSD. To determine whether you are upgrading between releases that can use direct validation or not, see "Upgrading Junos OS with Upgraded FreeBSD" on page 298.

NOTE: Before installing software on a device that has one or more custom YANG data models added to it, back up and remove the configuration data corresponding to the custom YANG data models from the active configuration. For more information see "Managing YANG Packages and Configurations During a Software Upgrade or Downgrade" on page 119.

Determine Which Package or Packages to Install

To determine which software package to install to upgrade to Junos OS with upgraded FreeBSD, you will need to consult the Feature Explorer and Table 1. In using Table 1, be aware of the following:

- You can skip no more than two releases when upgrading (or downgrading). That means you can upgrade only to one of the three releases subsequent to your current release. If you want to upgrade across more releases than this, you need to perform multiple upgrades.
- Notice that Table 1 separates its information between security devices and routing or switching devices. This is because security devices have been released on a different release sequence than routing and switching devices, and this in turn determines what constitutes skipping no more than

two releases. Whereas routing and switching platforms have released software in each main release, security platforms have had only the following releases: 17.4, 17.3, 15.1X49, and 12.3X48. Therefore, for example, for a router to upgrade from Release 12.3 to the first release supporting Junos OS with upgraded FreeBSD (Release 15.1) would take multiple upgrades. But for a security device to upgrade from Release 12.3 to the first release supporting Junos OS with upgraded FreeBSD (Release 17.3) would take only one upgrade.

We recommend you upgrade to a 64-bit image of Junos OS with upgraded FreeBSD. In Junos OS releases earlier than 15.1, the partition swap pages are counted as part of the memory file system partition. Using this method leaves 4 GB of memory as the maximum that is theoretically accessible when you are using a 32-bit image. However, when Junos OS with upgraded FreeBSD is run, the system only counts the actual partition size, which leaves around 3.4 GB of available physical address space, or only 3 GB of usable RAM.

To determine which installation package and procedure you require:

1. See the **Junos kernel upgrade to FreeBSD 10+** entry in Feature Explorer.

   Click the link or go to https://pathfinder.juniper.net/feature-explorer/, type **freebsd**, and select **Junos kernel upgrade to FreeBSD 10+**.

   You will see a listing of platforms that run Junos OS with upgraded FreeBSD and the software release it was introduced in. Different platforms first support Junos OS with upgraded FreeBSD in different releases. Use this listing to find which release you need to install for your device to upgrade to Junos OS with FreeBSD.

2. Consult Table 1 to determine the upgrade path to follow.

   - Determine which release your device is currently running.

     Look first at the release sequence and then at the second column and find the release running on your device.

   - Determine which release you need to install.

     The third column will give you the earliest release you need to install for your platform type to be running Junos OS with upgraded FreeBSD.

Table 16: Upgrade Path to Junos OS with the Upgraded FreeBSD

Release Sequence	Current Device's Junos OS Release	Earliest Release Supporting Junos OS with Upgraded FreeBSD	Upgrade Path	Example
Routing and Switching	Earlier than Release 12.3	15.1	Upgrade in multiple steps, skipping no more than two releases in one upgrade.	To upgrade from Release 12.1, upgrade first to Release 13.1, then to Release 14.1, then from there to either Release 15.1 or 16.1.
	12.3 to 13.2	15.1	Upgrade in two steps.	To upgrade from Release 12.3, first upgrade to Release 13.3, then upgrade to Release 15.1. To upgrade from Release 13.2, first upgrade to Release 14.2, then upgrade to Release 15.1.
	13.3 to 14.2	15.1	Upgrade in a single step.	To upgrade from Release 13.3, upgrade directly to Release 15.1. To upgrade from Release 14.2, upgrade directly to either Release 15.1 or 16.1.
Security For instructions on how to upgrade to a release newer than 17.3 or 17.4 for non-branch SRX Series Firewalls, see Upgrade to Junos OS Release for SRX Series. For the SRX300,	12.3 to 17.2	17.3	Upgrade in a single step.	To upgrade from Release 12.3X48, upgrade directly to Release 17.3.
	15.1 to 17.2	17.3	Upgrade in a single step.	To upgrade from Release 15.1X49, upgrade directly to Release 17.3.

Table 16: Upgrade Path to Junos OS with the Upgraded FreeBSD *(Continued)*

Release Sequence	Current Device's Junos OS Release	Earliest Release Supporting Junos OS with Upgraded FreeBSD	Upgrade Path	Example
SRX320, SRX400, SRX420, and SRX380 Firewalls, see *KB1--number to be assigned*.	15.1 to 17.3	17.4	Upgrade in a single step.	To upgrade from Release 15.1x49-D80, upgrade directly to Release 17.4.
	(SRX300, SRX320, SRX400, SRX420, SRX380 only), 22.4R2	23.2R1	Upgrade in a single step.	For upgrade instructions, including for upgrading from releases earlier than 22.4R2, see *KB1--number to be assigned*.

NOTE: You can also downgrade from Junos OS Release with upgraded FreeBSD to Junos OS based on FreeBSD 6.1 as long as the path complies with the Junos OS policy of skipping at most two earlier releases.

3. Download the Junos OS with upgraded FreeBSD package.

   For a table listing the package prefixes, see "Junos OS and Junos OS Evolved Installation Package Names" on page 70. For more on the names of package name , see Changes in Package Names for Junos OS with Upgraded FreeBSD.

4. Continue installing a software package on a device by using one of the following procedures:

   - "Installing the Software Package on a Router with a Single Routing Engine" on page 123
   - "Installing the Software Package on a Device with Redundant Routing Engines" on page 124

Install Junos OS with Upgraded FreeBSD Over Junos OS

Upgrading to Junos OS with upgraded FreeBSD reformats the file system. Only specific files and directories are preserved unless precautions are taken. By default, the upgrade process preserves only the following directories:

- **/config**
- **/etc/localtime**
- **/var/db**
- **/var/etc/master.passwd**
- **/var/etc/inetd.conf**
- **/var/etc/pam.conf**
- **/var/etc/resolv.conf**
- **/var/etc/syslog.conf**
- **/var/etc/localtime**
- **/var/etc/exports**
- **/var/etc/extensions.allow**
- **/var/preserve**
- **/var/tmp/baseline-config.conf**
- **/var/tmp/preinstall_boot_loader.conf**

NOTE: In **/var/db/config**, up to 10 rollback configurations will be saved, depending on the configuration file size.

NOTE: On EX2300 and EX3400 switches, the following directories are not applicable:

- **/etc/localtime**
- **/var/etc/localtime**
- **/var/etc/exports**

- **/var/preserve**
- **/var/tmp/preinstall_boot_loader.conf**

Before you begin, if you have important files in other directories that are not preserved, copy them from the router or switch to a secure location before upgrading the router or switch.

CAUTION: If you do a media install (either USB or network), the system is wiped and re-partitioned completely. Before you begin, if you have important files, copy them from the device to a secure location before upgrading the device.

To install Junos OS with upgraded FreeBSD over plain Junos OS:

1. Enter the `request system software add` *`install-package-name`*`.tgz no-validate` command from the operational mode in the CLI:

   NOTE: The `no-copy` option is enabled by default.

   Use the `no-validate` option with the `request system software add` command. If you leave out the `no-validate` option, the command uses the `validate` option by default, and direct validation of the running configuration does not work for upgrading to Junos OS with upgraded FreeBSD from Junos OS based on older versions of the FreeBSD kernel.

   NOTE: You can also use the `reboot` option along with the `request system software add` command, but it is not recommended to do this in a single step while upgrading from a FreeBSD 6.1 based Junos OS to Junos OS with upgraded FreeBSD.

   NOTE: To validate the current configuration on an upgrade to Junos OS with upgraded FreeBSD from Junos OS, use the "request system software validate on (Junos OS with Upgraded FreeBSD) " on page 795 command.

   ```
   user@host>request system software add /var/tmp/install-package-name.tgz no-validate
   ```

   The new Junos OS image is installed on the device.

2. Reboot the device to start the new software using the `request system reboot` command:

```
user@host>  request system reboot
Reboot the system? [yes, no] (no) yes
```

> **NOTE**: You must reboot the device to load the newly installed version of Junos OS on the device.
>
> To terminate the installation, do not reboot the device. Instead, finish the installation and then issue the `request system software delete` *`install-package-name`*`.tgz` command. This is your last chance to stop the installation (not applicable on EX2300 and EX3400 platforms).

The software is loaded when you reboot the system. Installation can take between 5 and 10 minutes. The device then reboots from the boot device on which the software was just installed. When the reboot is complete, the device displays the login prompt.

While the software is being upgraded, the Routing Engine on which you are performing the installation does not route traffic.

3. Log in and issue the `show version` command to verify the version of the software installed.

> **NOTE**: The output shows the OS kernel, OS runtime, and other packages installed on the device.

RELATED DOCUMENTATION

Establishing an SSH Connection for a NETCONF Session

Downgrading from Junos OS with Upgraded FreeBSD

IN THIS SECTION

Starting in Junos OS Release 15.1, certain hardware platforms run a Junos OS based on an upgraded FreeBSD kernel instead of older versions of FreeBSD. To find which platforms support Junos OS with upgraded FreeBSD, see Feature Explorer, enter **freebsd**, and select **Junos kernel upgrade to FreeBSD 10+**.

This topic discusses the different procedures for downgrading from a release of Junos OS with upgraded FreeBSD. One procedure describes how to downgrade to legacy Junos OS. The other procedures describe how to downgrade to an earlier release of Junos OS with upgraded FreeBSD.

The main difference between the procedures is whether to use the `validate` or `no-validate` option with the `request system software add` command. If you downgrade between two versions of legacy Junos OS, `validate` works. Similarly, if you downgrade from Junos OS with upgraded FreeBSD Release 18.1 or later to Release 17.4 or later, `validate` works. However, there is one set of circumstances in which the `no-validate` option must be used when downgrading between Junos OS with upgraded FreeBSD releases, and that is when you downgrade from a Junos OS with upgraded FreeBSD Release 17.4 or later to a release earlier than 17.4, that is, Junos OS releases 15.1 through 17.3.

Select and perform the procedure that matches your set of circumstances.

Downgrading from Junos OS with Upgraded FreeBSD to Legacy Junos OS

If you have previously upgraded to Junos OS with upgraded FreeBSD, you can downgrade to an earlier version of Junos OS (that is, legacy Junos OS) as long as the downgrade conforms to the Junos OS policy of skipping at most two earlier releases.

NOTE: However, for SRX300, SRX320, SRX340, SRX345, and SRX380 Firewalls, to downgrade, you must first downgrade to Junos OS Release 22.4R2 before downgrading to any other release. Also, if you have chassis clusters, you cannot use the In-Band Cluster Upgrade (ICU) method for this particular downgrade. You can use either the procedures outlined in *KB2 (downgrade)--waiting for assigned number* or the minimal downtime procedure documented in KB17947 (Minimal_Downtime_Upgrade_Branch_Mid PDF file). Because the packaging system and disk partition schema are different in FreeBSD Release 6.1 and FreeBSD Release 12, you must use the `request system software add` *`package-name`* `partition no-copy no-validate reboot` command to downgrade the software.

This example uses the package **/var/tmp/jinstall-13.3R2.7-domestic-signed.tgz** to install legacy Junos OS on the primary Routing Engine (re0).

To downgrade from Junos OS with upgraded FreeBSD to legacy Junos OS:

1. Enter the request system software add *package-name* no-validate reboot command from the operational mode in the CLI.

   Use the no-validate and reboot options with the request system software add command. If you leave out the no-validate option, the command uses the validate option by default, and direct validation of running configuration does not work for downgrading to legacy Junos OS from Junos OS with upgraded FreeBSD.

   If you leave out the reboot option, you can take care of that in a separate reboot step.

   The following example uses the re0 option:

```
user@host> request system software add /var/tmp/jinstall-13.3R2.7-domestic-signed.tgz re0 no-
validate reboot
THIS IS A SIGNED PACKAGE Saving the config files ...
NOTICE: uncommitted changes have been saved in
/var/db/config/juniper.conf.pre-install Rebooting. Please wait ...
shutdown: [pid 11001] Shutdown NOW! *** FINAL System shutdown message
from root@host *** System going down IMMEDIATELY Shutdown NOW! System
shutdown time has arrived\x07\x07 users@host> Connection to
device1.example.com closed by remote host. Connection to
device1.example.com closed. ... user@router> show version
Hostname: host
Model: mx240
Junos: 13.3R2.7
JUNOS Base OS boot [13.3R2.7]
JUNOS Base OS Software Suite [13.3R2.7]
JUNOS Kernel Software Suite [13.3R2.7]
JUNOS Crypto Software Suite [13.3R2.7]
JUNOS Packet Forwarding Engine Support (M/T/EX Common) [13.3R2.7]
JUNOS Packet Forwarding Engine Support (MX Common) [13.3R2.7]
JUNOS Online Documentation [13.3R2.7]
JUNOS Services AACL Container package [13.3R2.7]
...
```

2. Verify the downgrade of the software package.

```
user@host> show version
```

The output shows the OS kernel, OS runtime, and other packages installed on the device.

Downgrading from Junos OS with Upgraded FreeBSD Release 17.4 or Later to Release 15.1 Through 17.3

This procedure is applicable when downgrading from Junos OS with Upgraded FreeBSD Release 17.4 or later to an earlier release of Junos OS with Upgraded FreeBSD.

NOTE: If you have important files in other directories, copy them from the router or switch to a secure location before upgrading the router or switch.

To downgrade from Junos OS with upgraded FreeBSD Release 17.4 or later to a Release 15.1 through 17.3:

1. Enter the `request system software add` *`package-name`* `no-validate reboot` command from the operational mode in the CLI:

   Use the `no-validate` and `reboot` options with the `request system software add` command. If you leave out the `no-validate` option, the command uses the `validate` option by default, and direct validation of running configuration does not work for downgrading to an earlier release of Junos OS with upgraded FreeBSD from Junos OS with upgraded FreeBSD Release 17.4 or later.

   If you leave out the `reboot` option, you can take care of that in a separate reboot step.

   The new Junos OS image is installed on the device.
2. Verify the installation of Junos OS with upgraded FreeBSD:

   ```
   user@host> show version
   ```

   The output shows the OS kernel, OS runtime, and other packages installed on the device.

Downgrading from Junos OS with Upgraded FreeBSD Release 17.3 or Earlier to Release 15.1 Through 17.2

This procedure is applicable when downgrading from Junos OS with Upgraded FreeBSD Releases 17.3 through 15.1 to an earlier release of Junos OS with Upgraded FreeBSD.

NOTE: If you have important files in other directories, copy them from the router or switch to a secure location before upgrading the router or switch.

To downgrade from Junos OS with upgraded FreeBSD Release 17.3 or earlier to an earlier release of Junos OS with upgraded FreeBSD:

1. Enter the `request system software add` *`package-name`* `validate reboot` command from the operational mode in the CLI:

   Use the `validate` and `reboot` options with the `request system software add` command. The command uses the `validate` option by default. If you leave out the `reboot` option, you can take care of that in a separate reboot step.

   The new Junos OS image is installed on the device.
2. Verify the installation of Junos OS with upgraded FreeBSD:

   ```
   user@host> show version
   ```

   The output shows the OS kernel, OS runtime, and other packages installed on the device.

Downgrading from Junos OS with Upgraded FreeBSD Release 18.1 or Later to Release 17.4 or Later

This procedure is applicable when downgrading from Junos OS with Upgraded FreeBSD Releases 18.1 or later to a Junos OS with Upgraded FreeBSD Release 17.4 or later.

NOTE: If you have important files in other directories, copy them from the router or switch to a secure location before upgrading the router or switch.

To downgrade from Junos OS with upgraded FreeBSD Release 18.1 or later to Junos OS with Upgraded FreeBSD Release 17.4 or later:

1. Enter the `request system software add` *`package-name`* `validate reboot` command from the operational mode in the CLI:

   Use the `validate` and `reboot` options with the `request system software add` command. The command uses the `validate` option by default. If you leave out the `reboot` option, you can take care of that in a separate reboot step.

   The new Junos OS image is installed on the device.
2. Verify the installation of Junos OS with upgraded FreeBSD:

   ```
   user@host> show version
   ```

   The output shows the OS kernel, OS runtime, and other packages installed on the device.

RELATED DOCUMENTATION

request system snapshot (Junos OS with Upgraded FreeBSD) | 735

request system reboot (Junos OS with Upgraded FreeBSD) | 708

Installing Software on ACX Series Routers (Junos OS)

IN THIS SECTION

ACX Series routers are delivered with preinstalled Junos operating system (Junos OS). Before you start this procedure, decide which software package you need and download it. For information on which packages to use for which upgrades, see "Junos OS Installation Package Names" on page 70.

Installing Junos OS Using a USB Storage Device on ACX Series Routers

To install the Junos OS image on ACX Series routers using a USB storage device, you must have access to the USB port physically and you must also have console access. Perform the following steps to install the Junos OS image:

1. Insert the USB storage device that has a valid installation image into the USB port.
2. Reboot the router by either pressing the power button on the chassis or switching off and turning on the power button behind the Routing Engine, or by entering the `request system reboot` command from the CLI. The system LED starts blinking in green.

   On the console, a message is displayed stating that your flash memory device (NAND Flash device) will be formatted and you will lose all the data. You are prompted to confirm the formatting of the flash memory device.
3. Press **y** to confirm and proceed with the formatting process. The flash memory device is formatted and the image is installed on both the partitions.

After the installation is completed, a message is displayed on the console prompting you to eject the USB storage device and to press **Enter** to reboot the device.

4. After you remove the USB port and press **Enter**, the reboot begins. After the router is rebooted, the new Junos OS version is loaded and functional. The LED glows steadily in green.

NOTE: If an installation error occurs, the LEDs turn red. You must have console access to the router to troubleshoot an installation error.

Installing Junos OS Upgrades from a Remote Server on ACX Series Routers

You can use the CLI to install Junos OS packages that are downloaded with FTP or HTTP from the specified location on internal media, such as the NAND Flash device.

Before you begin:

- Verify the available space on the NAND Flash device.
- Download the Junos OS package.

To install Junos OS upgrades from a remote server, enter the following command from operational mode:

```
user@host> request system software add junos-juniper-12.2R1.9-domestic.tgz no-copy no-validate
reboot
```

The new Junos OS image is installed on the router and the device is rebooted.

NOTE: On ACX5048 and ACX5096 routers, use the `force-host` option to force installing the latest version of the Host OS.

```
user@host> request system software jinstall-acx5k-15.1X54-D20.6-domestic-signed.tgz force-
host add validate reboot
```

RELATED DOCUMENTATION

Configuring Root Partitions on ACX Series Routers | 434

Installing and Recovering Software Using the Open Network Install Environment (ONIE)

IN THIS SECTION

ONIE, the open network install environment from Cumulus Networks, is a network OS installer that installs Junos OS and third party applications on a switch. Juniper Network switches come pre-installed with ONIE. When you turn on a switch, the ONIE discovery and execution (ODE) application locates the management Ethernet interface and the Junos OS software package, which can be found either locally on the switch or on the network using HTTP, FTP, or TFTP. After the switch discovers and downloads

the Junos OS software package, the switch installs the Junos OS software, reboots, and then boots from Junos OS. Junos OS then becomes the default software image.

NOTE: If you want to use the Junos OS CLI to install software, see "Installing Software Packages on QFX Series Devices (Junos OS)" on page 168.

Upgrading involves these tasks:

Understanding the Open Network Install Environment

When you log into the switch with ONIE, you see the install boot menu:

- Juniper Linux (This is a default menu option.)
- Juniper Linux Debug
- Juniper Linux Recovery
- Go to ONIE Loader
  - ONIE: Install OS (This is a default menu option.)
  - ONIE: Rescue
  - ONIE: Uninstall OS
  - ONIE: Update ONIE
  - ONIE: Embed ONIE

You can use the following commands to install and uninstall Junos OS and start and stop the ONIE ODE application:

- **onie-nos-install**

  Installs Junos OS from any URL, such as http://, ftp://, and file://.

- **onie-uninstaller**

  Uninstalls Junos OS.

- **onie-discovery-start**

The discovery process starts automatically. However, if you stop the discovery process by issuing the **onie-discovery-stop** command, you can restart the discovery process by issuing the **onie-discovery-start** command.

- **onie-discovery-stop**

  Stops the discovery process. To restart the discovery process, issue the **onie-discovery-start** command.

Downloading Software Files with a Browser

You download the software package from the Juniper Networks Downloads page at https://support.juniper.net.

> **NOTE**: To access the download site, you must have a service contract with Juniper Networks and an access account. If you need help obtaining an account, complete the registration form at the Juniper Networks website https://www.juniper.net/registration/Register.jsp.

To download a software package:

1. Using a Web browser, navigate to the https://support.juniper.net.
2. Either click **View all products>** and select the product you are downloading software for, or type the product name.
3. Find the package you want and click the item in the Downloads column.

   A login screen appears.
4. Enter your name and password and press Enter.
5. Read the End User License Agreement, click the **I agree** radio button, and then click **Proceed**.
6. Save the Junos OS software image file to your computer.

   The Junos OS software image file name is presented in the *prefix-release-edition-signed.extension* format. For example, the image name for Junos OS Release 15.1X53-D10 on QFX10000 series switch is **jinstall-qfx-10-f-15.1X53-D10.7-domestic-signed**.

   See "Junos OS Installation Package Names" on page 70 for additional information on image file naming.
7. Open or save the installation package either to the local system in the **var/tmp** directory or to a remote location. If you are copying the installation package to a remote system, make sure that you can access it using HTTP, TFTP, FTP, or SCP.

Connecting to the Console Port

We recommend that you connect to the console port while installing the installation package so you can respond to any required user input and detect any errors that might occur.

Backing Up the Current Configuration Files

Before you install the new installation package, we strongly recommend that you back up your current configuration files because the upgrade process removes all of the stored files on the switch.

To back up your current configuration files, enter the `save` command:

```
user@switch# save filename
```

Executing this command saves a copy of your configuration files to a remote location such as an external USB device.

Uninstalling the Existing Version of Junos OS

The switch comes preinstalled with a version of Junos OS that is to be used with the Junos OS CLI. However, if you want to use ONIE to install Junos OS, you need to uninstall the existing Junos OS and reinstall the Junos OS image that has a .bin extension—for example, jnpr-qfx-5e-jdm-onie-updater-15.1-20150819_ups.4.bin file.

To uninstall your existing Junos OS version:

1. Select **Go to ONIE Loader** from the GNU GRUB menu.
2. Select **ONIE: Uninstall OS** from the GNU GRUB menu.

   The Junos OS is uninstalled, and the switch reboots.

   By default, the ONIE discovery and execution (ODE) application attempts to discover and fetch an image from a configured DCHP or webserver and the management IP address of the switch and the IP address of the default gateway. If you want to manually configure static addressing for the management IP address of the switch, issue `onie-discovery-stop` command at the ONIE prompt, and then manually configure the management IP address and IP address of the default gateway.

For example:

```
ONIE:/ # onie-discovery-stop
ONIE:/ # ifconfig eth0 10.204.32.96 netmask 255.255.254.0

ONIE:/ # route add default gw 10.204.47.254
```

To restart the ONIE discovery and execution (ODE) application, issue the `onie-discovery-start` command.

For example:

```
ONIE:/ # onie-discovery-start
```

Installing a Junos OS Software Package That Resides on a Webserver or DHCP Server with DHCP Options Configured

To install a Junos OS software package residing on a webserver or DHCP server:

1. Copy the software image with the filename `onie-installer` to the **var/www/html** directory of the webserver or DHCP server.
2. Configure the DHCP option 114 in the DHCP server to redirect to the webserver to fetch the Junos OS software image.
3. Uninstall the preinstalled Junos OS version.
   - Select **Go to ONIE Loader** from the GNU GRUB menu.
   - Select **ONIE: Uninstall OS** from the GNU GRUB menu.

   The Junos OS is uninstalled, and the switch reboots.
4. Configure DHCP option 114 and other DHCP options as necessary.

   Here is a sample Windows Open DHCP server configuration with DHCP option 114 configured.

```
#Following are range-specific DHCP options.
   #You can copy more option names from [GLOBAL_OPTIONS]
   IP=10.204.42.250
   SubnetMask=255.255.240.0
```

```
   Router=10.204.47.254
   114="http://10.207.66.147/onie-installer"
```

Here is a sample boot initialization log, showing the options you just configured:

```
Info: Trying DHCPv4 on interface: eth0
ONIE: Using DHCPv4 addr: eth0: 10.204.42.250 / 255.255.240.0
ONIE: Starting ONIE Service Discovery
Info: Fetching http://10.207.66.147/onie-installer ...
ONIE: Executing installer: http://10.207.66.147/onie-installer  <<<<<<---- automatically
redirects to web sever to fetch Junos OS image.
Verifying image checksum ... OK.
Preparing image archive ... OK.
Installing Juniper NOS...
```

The log shows that the installation process has fetched the Junos OS software image from the DHCP server and is installing the Junos OS software.

The switch reboots and the GNU GRUB menu is displayed.

Installing Junos OS Software Using Secure Copy Protocol (SCP)

To install Junos OS software using SCP:

1. Uninstall the preinstalled Junos OS version.
   - Select **Go to ONIE Loader** from the GNU GRUB menu.
   - Select **ONIE: Uninstall OS** from the GNU GRUB menu.

   The Junos OS is uninstalled, and the switch reboots.

   By default, the ONIE discovery and execution (ODE) application attempts to discover and fetch an image from a configured webserver. If you do not have DHCP configured, you will need to stop the ONIE discovery and execution (ODE) application and manually configure static addressing for the management IP address of the switch,

   For example:

```
ONIE:/ # onie-discovery-stop
ONIE:/ # ifconfig eth0 10.204.32.96 netmask 255.255.254.0
```

```
ONIE:/ # route add default gw 10.204.47.254
```

2. Use SCP to copy the Junos OS image from a server or other location to the **/var/tmp** directory on the switch.

   For example:

```
user@server scp jnpr-qfx-5e-jdm-onie-updater-15.1-20150819_ups.4.bin
root@10.204.32.196:/var/tmp/
```

3. Issue the **onie-nos-install** command in the **/var/tmp** directory to install Junos OS software.

```
ONIE:/var/tmp # onie-nos-install file:///var/tmp/jnpr-qfx-5e-jdm-onie-
updater-15.1-20150819_ups.4.bin
```

   The switch reboots and displays the GNU GRUB menu.

Installing Junos OS Software Using FTP or TFTP Without a Webserver

To install Junos OS software using FTP or TFTP:

1. Uninstall the preinstalled Junos OS version.
   - Select **Go to ONIE Loader** from the GNU GRUB menu.
   - Select **ONIE: Uninstall OS** from the GNU GRUB menu.

   The Junos OS is uninstalled, and the switch reboots.

   By default, the ONIE discovery and execution (ODE) application attempts to discover and fetch an image from a configured webserver. If you do not have DHCP configured, you will need to stop the ONIE discovery and execution (ODE) application and manually configure static addressing for the management IP address of the switch,

   For example:

```
ONIE:/ # onie-discovery-stop
ONIE:/ # ifconfig eth0 10.204.32.96 netmask 255.255.254.0

ONIE:/ # route add default gw 10.204.47.254
```

2. Copy the Junos OS image to an FTP or TFTP directory.
3. Issue the **onie-nos-install** command at the ONIE prompt to install the Junos OS software.

   If you are using FTP:

```
ONIE:/ # onie-nos-install ftp://<username>:<password>@10.209.152.22/jnpr-qfx-5e-jdm-onie-updater-15.1-20150819_ups.4.bin
```

   If you are using TFTP:

> **NOTE**: The software image should be located in the **/tftp/boot** directory.

```
ONIE:/ # onie-nos-install tftp://10.207.66.147/jnpr-qfx-5e-jdm-onie-updater-15.1-20150819_ups.4.bin
```

   The switch reboots and displays the GNU GRUB menu.

Installing Junos OS Software Using DHCP Server with No DHCP Options Configured

Use this installation method if you cannot modify or set the DHCP options on your DHCP server.

To install the Junos OS software using a DHCP server with no DHCP options configured:

1. Copy the software image with the filename `jnpr-qfx-5e-jdm-onie-updater-15.1-20150819_ups.4.bin` to the **var/www/html** directory of the webserver or DHCP server.
2. Uninstall the preinstalled Junos OS version.
   - Select **Go to ONIE Loader** from the GNU GRUB menu.
   - Select **ONIE: Uninstall OS** from the GNU GRUB menu.

   The Junos OS is uninstalled, and the switch reboots.
3. Issue the `onie-nos-install` command at the ONIE prompt to install the Junos OS software.

   For example:

```
ONIE:/ # onie-nos-install http://10.207.66.147/jnpr-qfx-5e-jdm-onie-updater-15.1-20150819_ups.4.bin
```

Here is sample log with the options you just configured:

```
ONIE:/ # ifconfig
eth0      Link encap:Ethernet  HWaddr 94:DE:80:AA:F2:E1
          inet addr:10.204.42.250  Bcast:10.204.47.255  Mask:255.255.240.0  <<<---- -->
Received IP address from DHCP server, but auto redirected to web server. Installation will
not happen because DHCP option (114) is not configured.

          inet6 addr: fe80::96de:80ff:feaa:f2e1/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:444 errors:0 dropped:0 overruns:0 frame:0
          TX packets:17 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:48170 (47.0 KiB)  TX bytes:2678 (2.6 KiB)
          Memory:80180000-801a0000
```

This log shows that the installation process has fetched the Junos OS software image from the webserver and is installing the Junos OS software.

```
Stopping: discover... done.
Info: Fetching http://10.207.66.147/jinstall-qfx-10-f-15.1X53-D10.7-domestic-signed.tgz  ...
Connecting to 10.207.66.147 (10.207.66.147:80)
installer            100% |*******************************|   464M  0:00:00 ETA
ONIE: Executing installer: http://10.207.66.147/jnpr-qfx-5e-jdm-onie-
updater-15.1-20150819_ups.4.bin
Verifying image checksum ... OK.
Preparing image archive ... OK.
Installing Juniper NOS...
```

The switch reboots and the GNU GRUB menu is displayed.

Installing Junos OS Software Using Webserver Without DHCP Configured

Use this installation method if you do not have a DHCP server.

To install the Junos OS software using a webserver without DHCP configured:

1. Because the switch comes preinstalled with the Junos OS to be used with the Junos OS CLI, you need to uninstall this version of software before you can install the Junos OS image to be used with ONIE.

   - Select **Go to ONIE Loader** from the GNU GRUB menu.
   - Select **ONIE: Uninstall OS** from the GNU GRUB menu.

   The Junos OS is uninstalled, and the switch reboots.
2. Select **ONIE: Uninstall OS** from the GNU GRUB menu.

   The Junos OS is uninstalled, and the switch reboots.

   By default, the ONIE discovery and execution (ODE) application attempts to discover and fetch an image from a configured webserver. Because you do not have DHCP configured, you will need to stop the ONIE discovery and execution (ODE) application and manually configure static addressing for the management IP address of the switch.

   For example:

```
ONIE:/ # onie-discovery-stop
ONIE:/ # ifconfig eth0 10.204.32.96 netmask 255.255.254.0

ONIE:/ # route add default gw 10.204.47.254
```

3. Copy the software image to the **var/www/html** directory of the webserver.
4. Issue the `onie-nos-install` command at the ONIE prompt to install the Junos OS software.

   For example:

```
ONIE:/ # onie-nos-install http://10.204.35.100/jnpr-qfx-5e-jdm-onie-
updater-15.1-20150819_ups.4.bin
```

   Here is sample log:

```
Stopping: discover... done.
Info: Fetching http://10.204.35.100/jnpr-qfx-5e-jdm-onie-updater-15.1-20150819_ups.4.bin  ...
Connecting to 10.204.35.100 (10.204.35.100:80)
installer            100% |*******************************|   464M  0:00:00 ETA
ONIE: Executing installer: http://10.204.35.100/jnpr-qfx-5e-jdm-onie-
updater-15.1-20150819_ups.4.bin
Verifying image checksum ... OK.
```

```
Preparing image archive ... OK.
Installing Juniper NOS...
```

The log shows that the installation process has fetched the Junos OS software image from the webserver and is installing the Junos OS software.

The switch reboots and the GNU GRUB menu is displayed.

Installing Junos OS Software Using USB Media

ONIE installation from a Junos OS image stored on USB media is not currently supported.

Use another procedure from this document to install ONIE.

Verifying Software Installation

IN THIS SECTION

Purpose

Verify that the software was installed successfully on the switch.

Action

To verify that the software was properly installed, issue the `show version` command.

```
user@switch > show version
```

Troubleshooting Boot Problems

IN THIS SECTION

Problem

Description

Junos OS does not boot.

Solution

If Junos OS does not boot, and the console displays the Yocto GNU Linux shell instead, it could mean that you have booted in the Juniper Linux Debug mode. If you see an error message that says, **"[Error] Does not seem to be an QFX10002."** could mean that the EEPROM does not contain vendor-specific information. To verify the vendor-specific information, perform an ONIE: Rescue installation, and then verify the contents of the **/var/run/*.dat** file.

1. Select **ONIE: Rescue** from the GNU GRUB menu.
2. Issue the **onie-syseeprom** at the ONIE prompt.

   For example:

```
ONIE:/ # onie-syseeprom
TlvInfo Header:
   Id String:    TlvInfo
   Version:      1
   Total Length: 315
TLV Name             Code Len Value
-------------------- ---- --- -----
Base MAC Address     0x24   6 54:2A:A2:FB:DC:00
MAC Addresses        0x2A   2 256
Product Name         0x21  23 QFX10000-ÿÿÿÿÿÿÿ
Serial Number        0x23  12 116G1EC00032
```

```
Part Number          0x22  16 1AES48S6Q.A2Gÿÿÿ
Device Version       0x26   1 1
Manufacture Date     0x25  19 01/13/2015 21:40:30
Vendor Name          0x2D  20 JUNIPER NETWORKS INC
Manufacturer         0x2B  14 JUNIPER NETWORKS INC
Vendor Extension     0xFD  48  0x00 0x00 0x7C 0x82 0x01 0x00 0x41 0x32 0xFF 0xFF 0xFF 0xFF
0xFF 0xFF 0x0F
Vendor Extension     0xFD  62  0x00 0x00 0x0A 0x4C 0x51 0x06 0x52 0x45 0x56 0x20 0x30 0x31
0x52 0x0C 0x3F
Platform Name        0x28  37 x86_64-alpha_networks_snx60a0_486f-r0
Loader Version       0x29  23 master-201412161452.0.1
CRC-32               0xFE   4 0xB88C8885
Checksum is valid.
```

From the output, you can see that the vendor-specific information confirms that it is for Juniper Networks.

Creating an Emergency Boot Device

Before you begin, you need to have the jnpr-qfx-5e-jdm-onie-updater-15.1-20150819_ups.4.bin version of ONIE software.

If the Open Network Install Environment (ONIE) software is damaged or corrupted in some way, or the switch went into rescue mode, you can use an emergency boot device to repartition the primary disk and load a fresh installation of ONIE. Use the following procedure to create an emergency boot device.

NOTE: In the following procedure, we assume that you are creating the emergency boot device on a switch. You can create the emergency boot device on any PC or laptop that supports Linux.

To create an emergency boot device:

1. Insert the USB device into the front USB port of the switch.

   Make sure the USB device is at least 1GB.
2. Issue the following command from the directory on the switch in which the ISO file is located:

```
ONIE:/ # jnpr-qfx-5e-jdm-onie-updater-15.1-20150819_ups.4.bin of=<usb-detected-drive> bs=1M
```

You can also issue the **dd** command using the full path to where the ISO file is located.

For example, if the ISO file is located in the **/var/tmp/** directory:

```
ONIE:/ # dd if=/var/tmp/jnpr-qfx-5e-jdm-onie-updater-15.1-20150819_ups.4.bin of=<usb-detected-drive> bs=1M
```

The switch writes the installation media image to the USB device:

3. Remove the USB device from the USB port of the switch.

Performing a Recovery Installation

In the event that the Open Network Install Environment (ONIE) is corrupted, the switch goes into rescue mode, or you need to reinstall ONIE software for any reason, you need to perform a recovery installation.

NOTE: All Junos OS partitions are destroyed during a recovery installation.

NOTE: Before you can perform a recovery installation, make sure you have an emergency boot device loaded with ONIE software.

1. Insert the emergency boot device into the device.
2. Power cycle the device.
3. Press the **ESC** button to go into the Boot Manager menu.
4. Select **Boot Manager**, and then press **Enter**.
5. Select **Unigen PQS1000** under **Legacy USB**, and then press **Enter**.
6. Select **ONIE: Embed ONIE** from the **ONIE Installer** menu, and then press **Enter**.

   The recovery installation proceeds using the emergency boot device.
7. Remove the emergency boot device.
8. Verify that the ONIE software was installed by looking at the installation log file.

For example:

```
Info: Found static url: file:///lib/onie/onie-updater
ONIE: Executing installer: file:///lib/onie/onie-updater
Verifying image checksum ... OK.
Preparing image archive ... OK.
ONIE: Version       : master-201412161452.0.1
```

Installation log files are displayed automatically during the installation process, but if you want to verify installation log files at a different time, you can find them in the in the **/var/log/** directory. To view an installation log file, issue the **tail -f /var/log/onie.log** command.

9. Issue the **parted /dev/sda print** command to verify that the ONIE partitions have been created.

   For example:

```
ONIE:/ # parted /dev/sda print
Model: ATA TS8GHSD630 (scsi)
Disk /dev/sda: 8012MB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start   End     Size    File system  Name       Flags
 1      1049kB  3146kB  2097kB               GRUB-BOOT  hidden, bios_grub
 2      3146kB  137MB   134MB   ext4         ONIE-BOOT  hidden
```

RELATED DOCUMENTATION

Installing Software Packages on QFX Series Devices (Junos OS) | **168**

Upgrading Software by Using Automatic Software Download for Switches (Junos OS) | **181**

DHCP Server Configuration

Overview of Upgrading to 64-bit Junos OS

IN THIS SECTION

Just like any other operating system, the 64-bit version of Junos OS can address more memory than the 32-bit version of Junos OS. In order to support larger Routing Engine memory sizes, an upgrade from the 32-bit to the 64-bit Junos OS running on the Routing Engine hardware is necessary.

The in-service software upgrade (ISSU) procedure is not supported while upgrading from the 32-bit version of Junos OS to the 64-bit version of Junos OS. The upgrade process involves some downtime, so traffic will be affected.

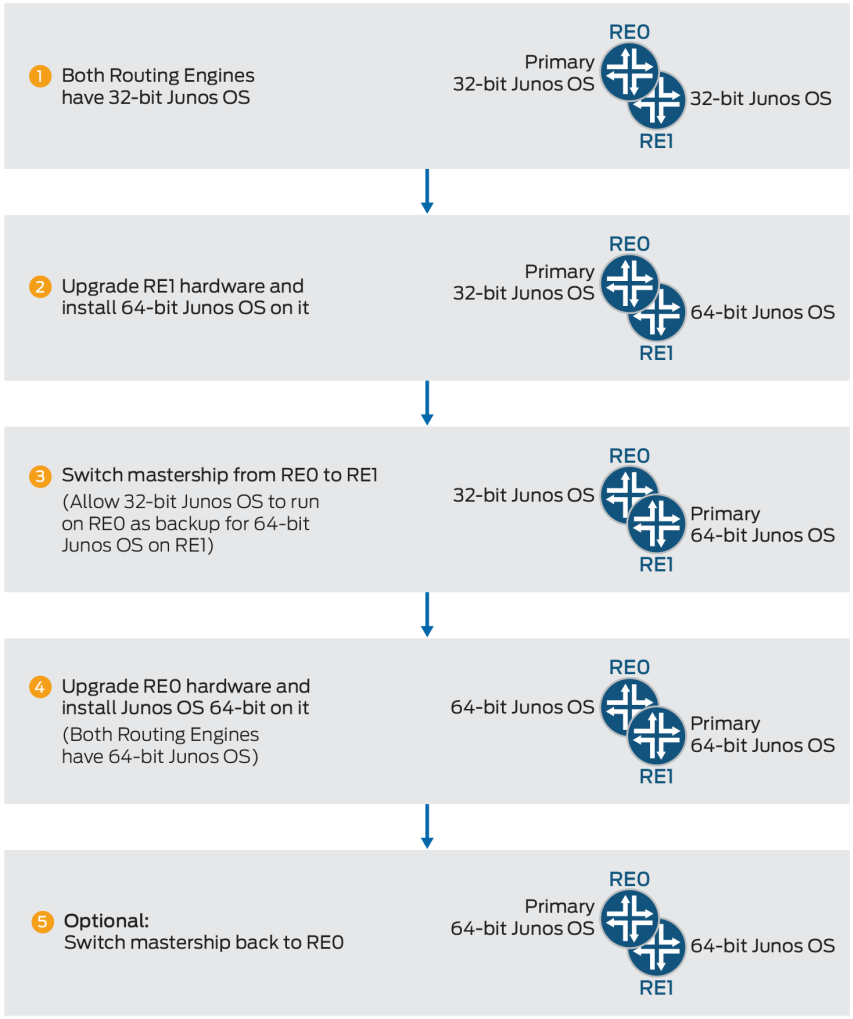
If you are starting with 32-bit Junos OS running on Routing Engines that are not 64-bit capable, there are two parts of the upgrade: upgrading the hardware and upgrading the software. This topic provides an overview of the upgrade tasks and the order in which they must be performed. For more detailed information about replacing the Routing Engines, see the hardware guide for your router.

The following upgrade scenarios are covered in this overview:

Upgrading Redundant Routing Engines from 32-bit to 64-bit Junos OS

For a diagram ot this procedure, see Figure 2 on page 328. For the purposes of this procedure, slot 0 has the primary Routing Engine initially.

Figure 2: Upgrading to 64-bit Junos OS with Redundant Routing Engines



To upgrade redundant Routing Engines from 32-bit Junos OS to 64-bit Junos OS:

1. If the backup Routing Engine in slot 1 is not 64-bit capable, replace it with a 64-bit capable Routing Engine.

   NOTE: The 64-bit version of Junos OS is not supported on every Routing Engine. To determine whether your router and Routing Engine support a 64-bit version of Junos OS, see Supported Routing Engines by Router.

   For instructions on replacing a Routing Engine, see the hardware guide for your router.

2. Log in to the primary Routing Engine in slot 0, and prepare the router for software package upgrade.

   See "Installing the Software Package on a Device with Redundant Routing Engines" on page 124.

3. Install 64-bit Junos OS on the backup Routing Engine in slot 1.

   CAUTION: Mixing 32-bit Junos OS and 64-bit Junos OS can only be done temporarily. It is not supported for normal operations.

   See "Installing the Software Package on a Device with Redundant Routing Engines" on page 124.

4. Switch primary role from slot 0 to slot 1.

   ```
   user@host> request chassis routing-engine master switch
   ```

   Now the Routing Engine in slot 1 is the primary Routing Engine.

5. If the Routing Engine in slot 0 is not 64-bit capable, replace it with a 64-bit capable Routing Engine.

   NOTE: The 64-bit version of Junos OS is not supported on every Routing Engine. To determine whether your router and Routing Engine support a 64-bit version of Junos OS, see Supported Routing Engines by Router.

   For instructions on replacing a Routing Engine, see the hardware guide for your router.

6. Install 64-bit Junos OS on the Routing Engine in slot 0.

   See "Installing the Software Package on a Device with Redundant Routing Engines" on page 124.

7. (Optional) Switch primary role from slot 1 to slot 0.

   ```
   user@host> request chassis routing-engine master switch
   ```

8. Finalize the installation.

   See "Installing the Software Package on a Device with Redundant Routing Engines" on page 124. This includes synchronization of the configuration on the Routing Engines.

Upgrading a Single Routing Engine from 32-bit to 64-bit Junos OS Using One Slot

To upgrade a single Routing Engine, from 32-bit to 64-bit Junos using one slot:

1. If the Routing Engine is not 64-bit capable, replace it with a 64-bit capable Routing Engine.

> **NOTE**: The 64-bit version of Junos OS is not supported on every Routing Engine. To determine whether your router and Routing Engine support a 64-bit version of Junos OS, see Supported Routing Engines by Router.

For instructions on replacing a Routing Engine, see the hardware guide for your router.

2. Install 64-bit Junos OS on the Routing Engine using the `no-validate` option.

```
user@host> request system software add /var/tmp/software-package no-validate
```

For more details on installing software on a single router, see "Installing the Software Package on a Router with a Single Routing Engine" on page 123.

3. Reboot.

```
user@host> request system reboot
```

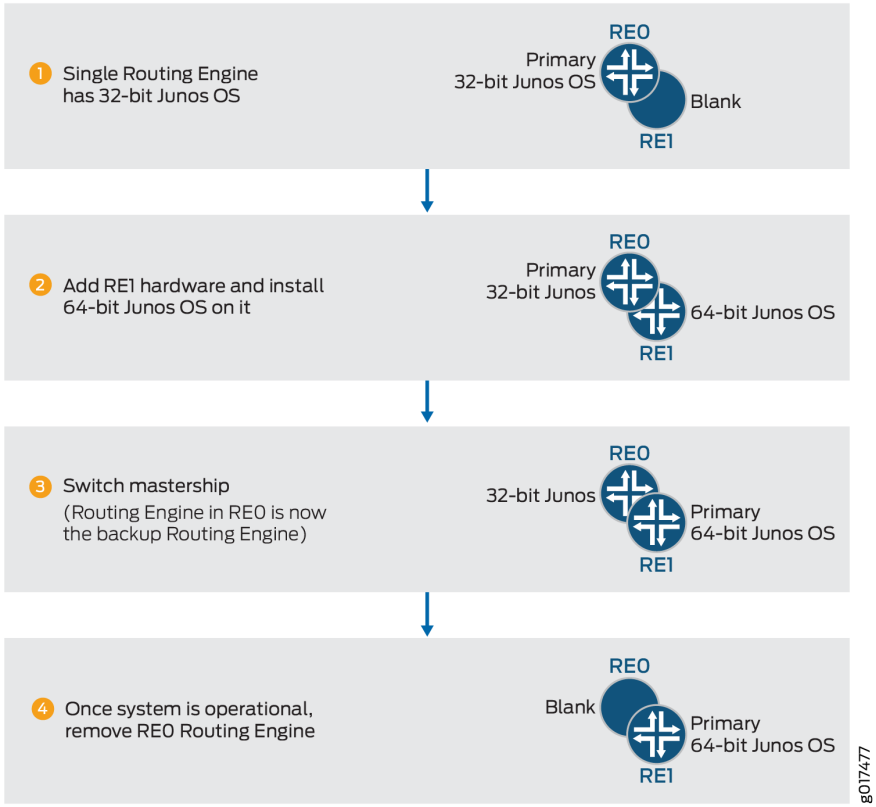
Upgrading a Single Routing Engine from 32-bit to 64-bit Junos OS Using Two Slots

This procedure provides a way to upgrade to a 64-bit Junos OS using two Routing Engine slots. Using two slots reduces the amount of network downtime.

If you have only one slot, use procedure "Upgrading a Single Routing Engine from 32-bit to 64-bit Junos OS Using One Slot" on page 329.

For a diagram of this procedure, see Figure 3 on page 331. In this procedure, slot 1 is initially empty.

Figure 3: Upgrading a Single Routing Engine to 64-bit Junos OS Using Two Slots



To upgrade a single Routing Engine to 64-bit Junos OS using two Routing Engine slots:

1. Install a 64-bit capable Routing Engine in slot 1.

   NOTE: The 64-bit version of Junos OS is not supported on every Routing Engine. To determine whether your router and Routing Engine support a 64-bit version of Junos OS, see Supported Routing Engines by Router.

   For instructions on installing a Routing Engine, see the hardware guide for your router.

2. Install 64-bit Junos OS on the now backup Routing Engine in slot 1.

   See "Installing the Software Package on a Device with Redundant Routing Engines" on page 124.

   CAUTION: Mixing 32-bit Junos OS and 64-bit Junos OS is not supported for normal operations.

You need to remove the Routing Engine from slot 0 to avoid mixing 32-bit Junos OS and 64-bit Junos OS.

3. Switch the primary Routing Engine from slot 0 to slot 1.

```
user@host> request chassis routing-engine master switch
```

4. When the 64-bit Junos OS is configured properly, remove the Routing Engine from slot 0 .

   For instructions on removing a Routing Engine, see the hardware guide for your router.

RELATED DOCUMENTATION

Installing the Software Package on a Device with Redundant Routing Engines (Junos OS) | 124

Installing the Software Package on a Router with a Single Routing Engine (Junos OS) | 123

Veriexec Overview

IN THIS SECTION

Verified Exec (also known as veriexec) is a file-signing and verification scheme that protects the Junos operating system (OS) against unauthorized software and activity that might compromise the integrity of your device. Originally developed for the NetBSD OS, veriexec was adapted for Junos OS and enabled by default from Junos OS Release 7.5 onward.

Authorized files, that is certain files that ship with Junos OS, have an associated fingerprint that veriexec checks to determine whether the file can be used (executed, or even opened). Any file which lacks a valid fingerprint cannot be executed or read by applications that require verified input.

Note that **/bin/sh** does not require verified input. It can be used to run arbitrary scripts because from a risk perspective, they are the same as interactive commands, which is already controlled through user

authentication and permissions. However, if a verified shell script contains instructions to run an arbitrary script, that is, a file that does not have a signature in the manifest, execution of that file will be prevented.

How Veriexec Works

Veriexec provides the kernel with a digitally signed manifest consisting of a set of fingerprints for all the executables and other files that should remain immutable. The veriexec loader feeds the contents of the manifest to the kernel only if the digital signature of the manifest is successfully verified. The kernel can then verify if a file matches its fingerprint. If veriexec is being enforced, only executables with a verified fingerprint will run. The protected files cannot be written to, modified, or changed.

Each install image contains a manifest. The manifest is read-only. It contains entries such as the following:

```
etc/rc sha1=478eeda6750c455fbfc18eeb06093e32a341911b uid=0 gid=0 mode=644
etc/rc.verify sha1=15566bb2731abee890fabd0ae8799e02071e006c uid=0 gid=0 mode=644

usr/libexec/veriexec-ext.so.1 sha1=8929292d008d12cd5beb2b9d9537458d4974dd22 uid=0 gid=0 mode=550
no_fips

sbin/verify-sig sha1=cd3ffd45f30f1f9441e1d4a366955d8e2c284834 uid=0 gid=0 mode=555 no_ptrace
sbin/veriexec sha1=7b40c1eae9658f4a450eb1aa3df74506be701baf uid=0 gid=0 mode=555 no_ptrace

jail/usr/bin/php sha1=c444144fef5d65f7bbc376dc3ebb24373f1433a2 uid=0 gid=0 mode=555 indirect
no_fips

usr/sbin/chassisd sha1=61b82b36da9c6fb7eeb413d809ae2764a8a3cebc uid=0 gid=0 mode=555 trusted
```

If a file has been modified and the resulting fingerprint differs from the one in the manifest, you will see a log message, such as the following example:

```
/kernel:veriexec:fingerprintfordev100728577,file70750 64ea873ed0ca43b113f87fa25fb30f9f60030cec!=
0d9457c041bb3646eb4b9708ba605facb84a2cd0
```

The log message is in the following format:

```
/kernel:veriexec:fingerprintfordev<deviceid>,file<fileid><calculatedfingerprint>!=
<fingerprintinthemanifest>
```

The fingerprint mismatch indicates that the file has been modified. Don't try to run the file. It could contain corrupted code. Contact JTAC.

The Importance of Veriexec

Veriexec is an effective and important tool for protecting against those seeking to breach the system security of Juniper Networks routers, switches, and firewalls. It thwarts threat actors who might want to establish a foothold on the system, gain persistent unauthorized access, or otherwise transition the system into a failure state. If such actors can run arbitrary unsigned binaries, they can make unauthorized modifications and run malware or other code that violates security policy.

Customers can add signed and authorized code with veriexec enforced to Junos OS by using the JET SDK. For more on the SDK solution, see *Develop On-Device JET Applications* in the *Juniper Extension Toolkit Developer Guide*.

How to Verify If Veriexec Is Enforced on a Device Running Junos OS

The following subsections give procedures on how to check if veriexec is enforced or not.

Some Junos OS platforms offer an optional version of Junos OS with veriexec enforcement disabled (referred to as Junos Enhanced Automation or Junos Flex). For more information about Junos Enhanced Automation, see *Overview of Junos Automation Enhancements on Devices Running Junos OS with Enhanced Automation*.

Use the sysctl security.mac.veriexec.state Command for Junos OS Release 15.1 and Later

Administrators can check whether veriexec is enforced by running the following commands from the Junos OS CLI shell:

1. Start the shell.

```
username@hostname> start shell
%
```

2. Use the `sysctl security.mac.veriexec.state` command.

```
% sysctl security.mac.veriexec.state
security.mac.veriexec.state: loaded active enforce
%
```

If veriexec is enforced, the output is `security.mac.veriexec.state: loaded active enforce`. If veriexec is not enforced, the output is `security.mac.veriexec.state: loaded active`.

NOTE: The `security.mac.veriexec.state` command is only valid in Junos OS Release 15.1 and later.

Another Way to Check If Veriexec Is Working

You can confirm whether veriexec is working by copying an authorized file (here, **/usr/bin/id**), to a new location as shown below. Veriexec prevents the operation because, although there is a valid fingerprint for **/usr/bin/id**, there is no fingerprint for **/tmp/id** even though the file is identical. What is happening is that veriexec evaluates the underlying Linux properties of the file, which are not identical after being copied, rather than the file itself.

1. Start the shell.

```
username@hostname> start shell
#
```

2. Change directories and then copy the example file, **/usr/bin/id** to a new location.

```
# /usr/bin/id
uid=928(username) gid=20 groups=20,0(wheel),10(field)
# cp /usr/bin/id /tmp
```

Results

If veriexec is being enforced, an Authentication error appears. If it is not, the file will be run as normal.

Output when veriexec is enforced (the file is blocked):

```
# /tmp/id
/bin/sh: /tmp/id: Authentication error
#
```

Output when veriexec is not enforced (the file is copied):

```
# /tmp/id
#
```

Veriexec-Capable Loader for SRX Series devices

The veriexec-capable loader installs a Junos OS image using the `install` command from a TFTP server or a USB storage device.

- Install the Junos OS image from a tftp server using the `install tftp://[host]/` install command.

  ```
  loader> install tftp://[host]/package
  ```

- Install the Junos OS image from a USB storage device using the `install file:///` install command.

  ```
  loader> install file:///package
  ```

The veriexec-capable loader validates the Junos OS image. The veriexec-capable loader boots up only a new Junos OS image with fingerprints and does not boot up the existing Junos OS image without fingerprints or kernel. You can use the `nextboot` function to check the current bootup device.

```
username@hostname# nextboot
Platform: srx-sword
    eUSB
```

```
usb
current bootdev is: eUSB
```

Bootupgrade is a tool available in the Junos OS package to support BIOS firmware upgrading. You can use the `bootupgrade` command to upgrade, check uboot, manually load, and to install the larger size veriexec-capable loader. The `bootupgrade -c loader` command prints the version string for current loader.

Before you install the veriexec-capable loader to Junos OS image, a Junos OS fingerprints identification is carried out in both dual-root partitions. Only when both dual-root partitions have Junos OS with fingerprints, is the veriexec capable loader installation allowed.

Install the veriexec-capable loader from the Junos OS CLI shell:

1. Start the shell.

```
username@hostname> start shell
%
```

2. Use the `bootupgrade -l /boot/veloader` command to install the veriexec-capable loader.

```
% bootupgrade -l /boot/veloader
Checking Loader CRC... veloader size 1251641 OK
```

3. You can see different scenarios here:

   - For Junos OS Release 20.3R1 and later, use `request system software add /var/tmp/xxx.tgz no-copy no-validate` command to install Junos OS with fingerprints normally.

```
username@hostname> request system software add /var/tmp/junos-
srxsme-20.4I-20200810_dev_common.0.0833.tgz no-copy no-validate
Formatting alternate root (/dev/ad0s2a)...
/dev/ad0s2a: 600.0MB (1228732 sectors) block size 16384, fragment size 2048
        using 4 cylinder groups of 150.00MB, 9600 blks, 19200 inodes.
super-block backups (for fsck -b #) at:
32, 307232, 614432, 921632
Installing package '/altroot/cf/packages/install-tmp/
junos-20.4I-20200810_dev_common.0.0833' ...
Verified junos-boot-srxsme.tgz signed by PackageDevelopmentECP256_2020 method
ECDSA256+SHA256
Verified junos-srxsme-domestic signed by PackageDevelopmentECP256_2020 method
ECDSA256+SHA256
```

```
Verified manifest signed by PackageDevelopmentECP256_2020 method ECDSA256+SHA256

WARNING:     The software that is being installed has limited support.
WARNING:     Run 'file show /etc/notices/unsupported.txt' for details.

JUNOS 20.4I-20200810_dev_common.0.0833 will become active at next reboot
WARNING: A reboot is required to load this software correctly
WARNING:     Use the 'request system reboot' command
WARNING:         when software installation is complete
Saving state for rollback ...
```

- For Junos OS Releases prior to 20.3R1, if the veriexec-capable loader is in use and the target Junos OS image for previous releases are not supported by the veriexec-capable loader, then use the `request system software add /var/tmp/xxx.tgz no-copy no-validate` command to automatically downgrade to the old loader from the veriexec-capable loader.

```
username@hostname> request system software add /var/tmp/junos-srxsme-19.4R1.3.tgz no-copy
no-validate
WARNING: Package junos-19.4R1.3 version 19.4R1.3 is not compatible with current loader
WARNING: Automatic recovering loader, please wait ...
Upgrading Loader...
####################################
Verifying the loader image... OK
WARNING: The new boot firmware will take effect when the system is rebooted.
WARNING: Loader recover finish.
Formatting alternate root (/dev/ad0s1a)...
/dev/ad0s1a: 598.5MB (1225692 sectors) block size 16384, fragment size 2048
     using 4 cylinder groups of 149.62MB, 9576 blks, 19200 inodes.
super-block backups (for fsck -b #) at:
32, 306464, 612896, 919328
Installing package '/altroot/cf/packages/install-tmp/junos-19.4R1.3' ...
Verified junos-boot-srxsme-19.4R1.3.tgz signed by PackageProductionEc_2019 method
ECDSA256+SHA256
Verified junos-srxsme-19.4R1.3-domestic signed by PackageProductionEc_2019 method
ECDSA256+SHA256
Verified junos-boot-srxsme-19.4R1.3.tgz signed by PackageProductionEc_2019 method
ECDSA256+SHA256 V
erified junos-srxsme-19.4R1.3-domestic signed by PackageProductionEc_2019 method
ECDSA256+SHA256
JUNOS 19.4R1.3 will become active at next reboot
WARNING: A reboot is required to load this software correctly
```

```
WARNING: Use the 'request system reboot' command
WARNING: when software installation is complete Saving state for rollback ...
```

- Use the `request system software add /var/tmp/xxx` command to check whether the Junos OS package is compatible for the installation.

```
username@hostname> request system software add /var/tmp/junos-srxsme-19.4R2.3.tgz
WARNING: Package junos-19.4R2.3 version 19.4R2.3 is not compatible with this system.
WARNING: Please install a package with veloadr support, 20.3 or higher.
```

The installation is terminated because the veriexec-capable loader is not supported for Junos OS Releases prior to 20.3R1.

CHAPTER 4

VM Host Support on Routing Engines

VM Host Overview (Junos OS)

IN THIS SECTION

What Are VM Hosts?

Starting in Junos OS Release 16.1, virtualized Routing Engines are supported that not only provide increased control plane scalability and performance but also provide virtualization capabilities to the Junos OS infrastructure. These virtualized Routing Engines, or VM hosts, are listed in Table 1

NOTE: VM hosts only run Junos OS with Upgraded FreeBSD.

The rest of this section describes the architecture of VM hosts. For more information on VM hosts, see the chapters on System Back Up and Recovery, Installing Software, Installing Firmware, and so on in this guide.

Figure 4 on page 342 illustrates the architecture of Routing Engines with VM Host support. It comprises the following components:

- The hardware layer
- The operating system and hypervisor layer.
- The host utilities and Junos VM guest layer.

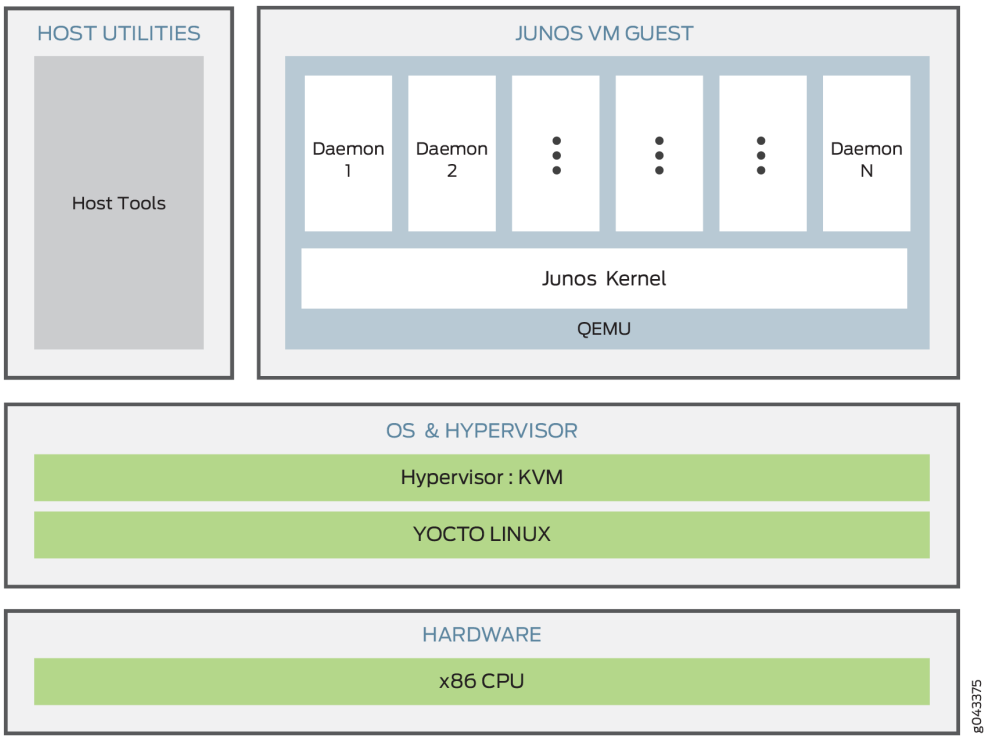
The server at the hardware layer contains the physical network interface cards (NICs), CPUs, memory, and Ethernet management port. The NICs support hardware virtualization based on single root I/O virtualization (SR-IOV). With SR-IOV, the physical NICs (known as a physical functions) are managed by the host, while the virtual functions are managed by the guest OS. Over the hardware layer, a Linux-based OS provides the host environment along with the kernel-based virtual machine (KVM) and Quick Emulator (QEMU). This host OS manages the boot complex, CPU memory storage, and various other hardware components such as the physical functions. Junos OS runs as guest OS, manages the virtual

functions, and serves as the administrative framework. Additionally, it also provides the interface for managing the host and the hypervisor.

The additional applications and utilities running on the host OS assist in providing the following functionality:

- Facilitating communication between host OS and guest OS.
- Triggering appropriate execution of the host OS based on the command and configuration on the guest Junos OS.
- Extending the VM management functionality to provide features such as autorecovery.

Figure 4: Architecture of Routing Engines with VM Host Support



Routing Engines with VM Host Support

The Routing Engines with VM host support not only provide increased control plane scalability and performance but also provide virtualization capabilities to the Junos OS infrastructure to support greater computing demands.

Virtualization enables multiple instances of operating systems, called guests, to run concurrently on the host and share virtualized hardware resources. A guest is a virtual machine (VM) that runs on a hypervisor-based host and shares its resources. A host is a virtualized software whose hypervisor allows multiple guest VMs to run on it concurrently and share its resources. The VMs must be instances of Junos OS. Third-party VMs are not supported on these Routing Engines. Each VM runs its own operating system image and applications that can be different from that of another VM running on the same host.

NOTE: Only Junos OS VM are supported. You cannot run third party VMs on these Routing Engines.

On the Routing Engines with VM host support, one instance of Junos OS runs as a VM over a Linux-based host (VM host) and serves as the VM operating in the administrative context. Junos OS manages all configurations, chassis control, communication with the host OS, and user interface command execution, thus providing near-native Junos OS experience to the end user.

See the following table for more information on hardware specifications of the Routing Engines with VMHost support.

Table 17: Hardware Specifications of the Routing Engines with VM Host Support

Model Number	Supported on Device	Specifications
RE-ACX-5448	ACX5448	• High-performance 1.6-GHz Intel 8 Core X86 CPU • 32-GB two DIMM DRAM • Two 100-GB SATA SSD
EX9200-RE2	EX9204, EX9208, and EX9214	• Six-core, 2-GHz Intel processor • 64-GB of DRAM and dual front pluggable SSDs, each providing 64-GB of storage for Junos OS images and logs.

Table 17: Hardware Specifications of the Routing Engines with VM Host Support *(Continued)*

Model Number	Supported on Device	Specifications
RE-S-1600x8	MX204	• High-performance 1.6-GHz Intel 8 Core X86 CPU • 32-GB DDR4 RAM • 100-GB SATA SSD
RE-S-X6-64G	MX240, MX480, and MX960	• 6-core Haswell CPU • Wellsburg PCH-based Routing Engine with 64-GB DRAM and two 64-GB solid-state drives (SSDs)
RE-S-X6-128G	MX240, MX480, and MX960	• 6-core Haswell CPU • Wellsburg PCH-based Routing Engine with 128-GB DRAM and two 128-GB solid-state drives (SSDs)
REMX2008-X8-64G-LT,	MX2008	• 8-core Haswell CPU • Wellsburg PCH-based Routing Engine with 64-GB DRAM and two 100-GB solid-state drives (SSDs)
REMX2008-X8-128G-S		• 8-core Haswell CPU • Wellsburg PCH-based Routing Engine with 128-GB DRAM and two 200-GB solid-state drives (SSDs)

Table 17: Hardware Specifications of the Routing Engines with VM Host Support *(Continued)*

Model Number	Supported on Device	Specifications
REMX2K-X8-64G	MX2020 and MX2010	• 8-core Haswell CPU • Wellsburg PCH-based Routing Engine with 64-GB DRAM and two 64-GB SSDs
RE-S-1600x8	MX10003	• High-performance 1.6-GHz Intel 8 Core X86 CPU • 64-GB DDR4 RAM • 100-GB SATA SSD
JNP10K-RE1, JNP10K-RE1-LT, and JNP10K-RE1-128	MX10008 MX10004	• High-performance 2.2-GHz Intel 10 Core X86 CPU • 64-GB DDR4 RAM • Two 200-GB SATA SSD
RCBPTX	PTX3000	• Wellsburg PCH-based Routing Engine with 64-GB DRAM and two 64-GB SSDs • Multi-core Haswell CPU RCB combines the functionality of a Routing Engine, Control Board, and Centralized Clock Generator (CCG)
RE-PTX-X8-64G	PTX5000	• 8-core Haswell CPU • Wellsburg PCH-based Routing Engine with 64-GB DRAM and two 64-GB SSDs • New Control Board CB2-PTX

Table 17: Hardware Specifications of the Routing Engines with VM Host Support *(Continued)*

Model Number	Supported on Device	Specifications
RE-PTX10002-60C	PTX10002-60C	• High-performance 1.6-GHz Intel 8 Core X86 CPU • 32-GB DDR4 RAM • Two 50-GB SATA SSD
RE-QFX10002-60C	QFX10002-60C	• High-performance 1.6-GHz Intel 8 Core X86 CPU • 32-GB DDR4 RAM • Two 50-GB SATA SSD
SRX5K-RE3	SRX5000	• 6-core Haswell CPU • 128-GB of DRAM • Two 128-GB solid-state drives (SSDs)

NOTE: Platform support depends on the Junos OS release in your installation.

SEE ALSO

Supported Routing Engines by Router

Salient Features of the Routing Engines with VM Host Support

IN THIS SECTION

While continuing to provide the same end-user experience, the new architecture provides a better performing Routing Engine.

The following are the salient features of the Routing Engines:

Platform Virtualization

Platform virtualization by the introduction of a middle layer that comprises the host OS and the KVM (or the hypervisor).

- Enables support for multiple instances of Junos OS to be run concurrently.
- Enables support for third-party software to be run directly.

Hardware Assisted Paravirtualized Guest Junos OS

Provides the user with the benefits of platform virtualization along with the default performance and functionality. Paravirtualization is a virtualization technique in which a software component similar to the underlying hardware component resides in the VM and interacts with the hypervisor to execute many operations. In contrast to full virtualization, this technique reduces the overhead of virtualization in the VM.

Guest Junos OS to Serve as the Administrative Framework

The configurations, chassis control, communication with the host OS, and user interface command execution are managed by the guest Junos OS.

Storage Partitioning and Redundancy

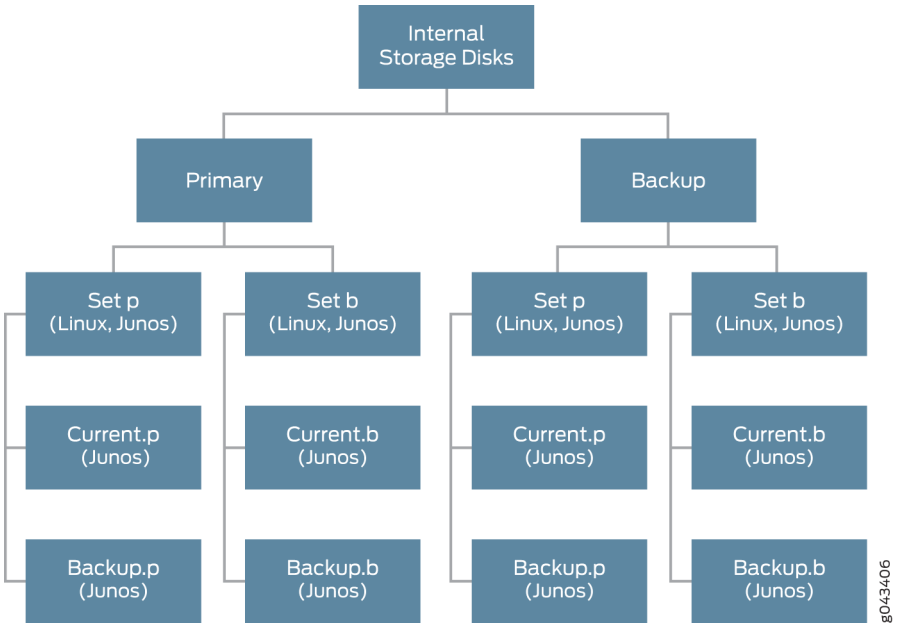
An Internal solid-state drive (SSD) is used as boot media for operating the Routing Engine. Additional options such as USB storage and network boot are available for installation and recovery purposes. A set of two 50-GB SSDs is available for normal functioning of the Routing Engine. The Routing Engine requires both the SSDs to be functional. Storage partitioning is important for debugging the Routing Engine, for new installations, and for SSD replacement.

Of the two SSDs, one operates as the primary SSD and the other as the backup SSD. Two sets of software boot images—the current set and the alternate (or previous) set are available on the primary SSD. The system boots from the current set, while the alternate set contains the previous version of the software boot image. After a software upgrade, the new version of the software is available on the alternate set. When the device is rebooted after the upgrade, the alternate set becomes the new current set and the current set, which now carries an older version of the software image, becomes the alternate set. You can switch to alternate set by using the `request vmhost software rollback` command. Until a software upgrade or a software rollback is performed, the system is programmed to boot from the same set of images on the disk.

Both the SSDs are partitioned to provide host boot partition, root partition, and partition for the guest image storage. The host boot partition contains the boot loader, which is the software responsible for booting the OS, Linux kernel, and RAM file system. The root partition contains the root file system for the host OS.

Figure 5 on page 349 shows the partitioning of SSDs.

Figure 5: SSD Partitioning



Each SSD partition contains more than one set of fully functional host software. In case of a boot failure on the primary SSD, the router can boot by using the snapshot available on the alternate SSD. This snapshot can be generated by a fresh installation or by using the `request vmhost snapshot` command.

Starting in Junos OS Release 18.1R1, the Routing Engines on the MX240, MX480,MX960, MX2010, MX2020, and PTX5000 support Secure Boot.

Starting in Junos OS Release 18.2R1, the Routing Engine on the MX2008 supports Secure Boot.

The Routing Engines with Secure Boot support have both RAM and SSD upgraded to 128GB and 2x200GB respectively. The increased SSD size facilitates increased storage of core and log files.

The following table provides information on the SSD size for different Routing Engines:

Table 18: SSD Size of Routing Engines

Devices	Routing Engine model number	SSD size
ACX5448	RE-ACX-5448	2x100GB
EX9204, EX9208, and EX9214	EX9200-RE2	2x64GB
MX204	RE-S-1600x8	2x50GB

MX240, MX480, and MX960	RE-S-2200X6-64G-S	2x50GB
	RE-S-X6-64G-LT	2x50GB
	RE-S-X6-128G-S	2x200GB
MX2008	REMX2008-X8-64G-LT	2x100GB
	REMX2008-X8-128G-S	2x200GB
MX2010 and MX2020	RE-MX2K-X8-64G	2x100GB
	RE-MX2K-X8-64G-LT	2x100GB
	RE-MX2K-X8-128G-S	2x200GB
MX10003	RE-S-1600x8	2x50GB
MX10008 MX10004	JNP10K-RE1, JNP10K-RE1-LT, and JNP10K-RE1-128	2x200GB
PTX3000	RCBPTX	2x64GB
PTX5000	RE-PTX-X8-64G	2x64GB
PTX10002-60C	RE-PTX10002-60C	2x50GB
QFX10002-60C	RE-QFX10002-60C	2x50GB
SRX5000	SRX5K-RE3	2x128GB

You can use the `show vmhost hardware` command to display the increased RAM size, SSD size, and other hardware information.

The following illustrations explains the partition of the host to facilitate the increased storage of core files and log files. Figure 6 on page 351 illustrates the partition of the host on MX240, MX480, MX960,

MX2008, and PTX5000 routers with the 200-GB SSDs. A virtual disk of size 56-GB will be allocated from VM partition to the guest as var-config.disk. The current size of this disk is 15-GB.

Figure 6: Host partition table for Routing Engines with 200-GB SSDs

Figure 7 on page 351 illustrates the storage allocation of the guest VM.

Figure 7: Partitioning of the guest VM

NOTE: For Routing Engines with 50GB SSD, the host partition remains as–is.

Figure 8 on page 351 and Figure 9 on page 351 illustrates the host partition table and the storage allocation of the guest VM for the MX2010 and MX2020 routers respectively.

Figure 8: Host partition table for Routing Engines on MX2010 and MX2020 routers with 100GB SSD

A virtual disk of size 32-GB is allocated from VM partition to the guest Junos OS as var-config.disk.

Figure 9: Guest VM partition on MX2010 and MX2020 Routers

A reformatting of the SSD is required to implement the enhancement of the /var size. The upgrade can be implemented by any of the following methods:

- Installation from SSD Disk2-Boot the host OS from the backup disk (SSD Disk2) and install the junos-vmhost-install-x.tgz image.
- Installation from USB

NTP and Time Zone

The date and time zones are synchronized from the administrative guest Junos OS to the host OS. Therefore, the timestamps in system log files of Junos OS and the host OS are synchronized.

Autorecovery

The automatic recovery (autorecovery) feature provides the following functions:

- Detecting corruptions in disk partitioning during system startup and attempting to recover partitions automatically
- Detecting corruptions in the Junos OS configuration during system startup and attempting to recover the configuration automatically, thereby ensuring that the operations and management are not disrupted.
- Detecting corruptions in Junos OS licenses during system startup and attempting to recover licenses automatically.

During the process of recovery, the host OS tries to launch the Junos VM from the image available on the primary disk. However, if the Junos VM fails to launch, the host OS attempts to launch the Junos VM from the snapshot of the host OS image and Junos OS image available in the backup disk, provided `request vmhost snapshot` was the last operation performed. If the backup disk does not contain the snapshot, the host OS attempts to launch the Junos VM from the software available in the alternate set in the primary disk, provided `request vmhost upgrade` was the last operation performed.

The autorecovery feature is enabled by default on the guest OS. If you need to disable autorecovery—for example, to examine the failure state for debugging—use the following command:

```
user@host> set vmhost no-auto-recovery
```

Handling Reboot and Power Off

You can reboot the Routing Engine by using the `request vmhost reboot` command. This command reboots the Routing Engine by rebooting both the guest Junos OS and the host OS. However, reboot of the Routing Engine can be triggered because of various reasons. The events or the reasons that trigger a host OS reboot are different from those that trigger a guest OS reboot.

Guest OS reboot implies that only the Junos OS is rebooted, and that the host OS is up and running. The following are a few of the reasons that trigger a guest OS reboot:

- Reboot due to panic
- VJUNOS reboot—Guest OS reboot after a shutdown.
- VJUNOS watchdog from host—Guest reboot due to emulated watchdog timer expiry

Host OS reboot implies that both the host OS and the guest OS (here, Junos OS) are rebooted. The following are a few reasons that trigger a host OS and guest OS reboot:

- Hypervisor reboot
- Power cycle or power failure
- Reboot due to exception.
- Reset-button reset—Reboot triggered by the pressing of the reset button on the front panel.
- Thermal shutdown
- Watchdog—Reboot due to PCH watchdog timer expiry

You can find the reason for the reboot by using the `show chassis routing-engine` command or the `show vmhost uptime` command.

For example:

```
host@router> show chassis routing-engine 0 | match "Last reboot reason”
Last reboot reason 0x4000:VJUNOS reboot
```

```
host@router> show vmhost uptime re0 | match “Vmhost last reboot reason”
Vmhost last reboot reason: 0x2000:hypervisor reboot
```

If the Routing Engine finishes booting and if you need to power off the router again, run the `request vmhost power-off` command. If you want the Routing Engine to reboot, use the `request vmhost reboot` command.

Release History Table

Release	Description
18.2	Starting in Junos OS Release 18.2R1, the Routing Engine on the MX2008 supports Secure Boot.

RELATED DOCUMENTATION

request vmhost snapshot | 904

request vmhost reboot | 902

request vmhost power-off | 898

Boot Process for Routers with VM Host Support

IN THIS SECTION

The boot process involves configuring the basic parameters through the console port and filename synchronization.

Booting for the First Time

When you power on a device for the first time, the router initiates the boot process.

After hardware and field-programmable gate array (FPGA) level initialization is complete, the Unified Extensible Firmware Interface (UEFI) selects the boot device to launch the host OS. The host OS launches the default guest Junos OS, which is the administrative context for the user. After the device has powered on completely, a login prompt is displayed on the console port.

Boot Sequence

The Routing Engine boots from the storage media in the following sequence:

- USB

- Solid-state Drive 1 (SSD1)
- Solid-state Drive 1 (SSD2)
- Preboot Execution Environment (PXÈ)

Understanding Console Port

To perform the initial configuration, you need to connect a terminal or laptop computer to the router through the console port, which is a serial port on the front of the router. The console port is the management port used by administrators to log in to Junos OS directly—that is, without using a network connection.

Two universal asynchronous receiver/transmitter (UART) ports are connected to the midplane to provide CTY access to line cards. At any time, two ports can be active for the CTY application. These ports are available to the Junos VMs for configuration.

For more information about configuring the router's basic properties, see Accessing a Junos OS Device the First Time.

Understanding Hostnames Synchronization

A hostname provides a unique identification for a router on the network. Junos OS uses the configured hostname as part of the command prompt, to prepend log files and other accounting information, as well as in other places where knowing the device identity is useful. Although Junos OS supports a maximum hostname length of 255 characters, the host OS supports hostnames that have only 64 characters or less. Therefore, hostnames need to be synchronized between Junos OS and the host OS. Keep in mind the following conditions when you synchronize the hostname configured on Junos OS with that on the host OS:

- If the Junos OS-configured hostname has less than or equal to 58 characters, then the hostname supported by the host OS (Linux) has the format *Junos hostname*-node.

  For example, if the Junos OS-configured hostname is *xx..xx*, the hostname is *xx..xx*-node.

- If the Junos OS-configured hostname is greater than 58 characters in length, then the synchronization process truncates characters from the 59th character onward and replaces the truncated characters with -*node*.

RELATED DOCUMENTATION

Creating an Emergency Boot Device for Routing Engines with VM Host Support | 365

vmhost | 640

request vmhost reboot | 902

request vmhost power-off | 898

Creating an Emergency Boot Device for Routing Engines with VM Host Support | 365

Installing, Upgrading, Backing Up, and Recovery of VM Host

IN THIS SECTION

You can install the Junos OS software package and host software package on the device. The following installation options are available:

NOTE: The VM Host installation works differently on the QFX10002-60C switch and PTX10002-60C router. See "Installing Software Packages on QFX Series Devices" on page 168 and Installing the Software on PTX10002-60C Routers for more details. However, the information on the rollback and snapshot features work the same on QFX10002-60C switches and PTX10002-60C routers.

- Fresh installation— This installation method can be used for factory installation as well as for recovery after corruption. Fresh installation can be done using Preboot Execution Environment (PXE)/NetBoot or a USB install media package. This method of installation installs the host OS, tools, and the Junos VMs.

  A PXE boot is an environment to boot devices using a network interface independent of available data storage devices or installed operating systems. The PXE environment is built on a foundation of

Internet protocols and services . These include TCP/IP, DHCP, and TFTP. This method of installation mostly used for installing the operating system on a device, without depending on the state of the internal media. The required software for network installation is stored on a TFTP server. PXE boot method supports remote installation thereby overcoming the need for an in-person assistance for installation. For more information, see "Copying VM Host Installation Package to the PXE Boot Server" on page 362. After you copy the VM Host Installation Package to the PXE Boot Server, you can use the `request vmhost reboot network` command and reboot the device to install the software. The device boots from the PXE server and installs the software on both the SSDs.

You can choose to use the USB disk installation method when the device fails to reboot because of internal media failure or when there is no installed Junos OS. For more information, see "Creating an Emergency Boot Device for Routing Engines with VM Host Support" on page 365.

On a fresh installation using USB, the following directories are populated with the Junos OS image on both the SSDs:

- Current.p
- Backup.p
- Backup.b

- Regular installation— This installation method is generally for an upgrade or a downgrade. This procedure can be used to install the runtime installation package on the currently running Junos VM to upgrade or downgrade relevant components. Junos VM performs the dependency check to identify the software components that require an upgrade or a downgrade to ensure compatibility.

NOTE: The RE-S-X6-64G-LT and RE-MX2K-X8-64G-LT Routing Engines are restricted to boot only the Junos OS with upgraded FreeBSD Limited image. They fail to boot if you try to install or upgrade the device with an image other than the Limited image, which begins with the **junos-vmhost-install** prefix.

VM Host Upgrade

Every Junos OS release is a group of files bundled together. The Routing Engines RE-MX-X6, RE-MX-X8, and RE-PTX-X8 support only the 64-bit version of Junos OS.

NOTE: If you have important files in directories other than /config and /var, copy the files to a secure location before upgrading the device. The files under /config and /var (except /var/etc) are preserved after the VM host upgrade.

NOTE: Before installing software on a device that has one or more custom YANG data models added to it, back up and remove the configuration data corresponding to the custom YANG data models from the active configuration. For more information see "Managing YANG Packages and Configurations During a Software Upgrade or Downgrade" on page 119.

In order to perform VM Host upgrade, use the **junos-vmhost-install-*x*.tgz** image. This upgrade installs the host image along with the compatible Junos OS.

NOTE: To upgrade the Junos OS on RE-S-X6, RE-MX-X8, and RE-PTX-X8 Routing Engines, always use the VM Host Installation Package. Do not use the jinstall package.

NOTE: Starting with Junos OS Release 21.4R1 and later, on the ACX5448, MX204, MX240, MX480, MX960,MX2010, MX2020, and MX2008 routers with VM host support, during an upgrade or reboot, the **root** login is required for copying the image from the Junos VM to the Linux host. Before the upgrade, you must delete the `system services ssh root-login deny` statement or change the configuration to `system services ssh root-login deny-password`. Once the upgrade is complete, you can add the `system service ssh root-login deny` statement back to your configuration. See https://kb.juniper.net/

The following example illustrates the upgrade operation. You can Install multiple software packages and software add-on packages at the same time.

```
user@host> > request vmhost software add        /var/tmp/junos-vmhost-install-ptx-x86-64-15.1F5-
S2.8.tgz
Initializing...
      Verified os-libs-10-x86-64-20160616 signed by PackageProductionEc_2016
      Mounting os-libs-10-x86-64-20160616.329709_builder_stable_10
      ....
      Transfer Done
      Transfer /packages/db/pkginst.13874/junos-vmhost-install*.tgz
      Transfer Done
```

```
      Starting upgrade ...
      Preparing for upgrade...
      /tmp/pkg-0mc/unpack/install/
      ...
      ...
      Cmos Write successfull for Boot_retry
      ... upgrade complete.
      A REBOOT IS REQUIRED TO LOAD THIS SOFTWARE CORRECTLY.
      Use the 'request vmhost reboot' command to reboot the system
```

VM Host Rollback

You can revert to the software version that was loaded at the last successful `request vmhost software add` operation. You can roll back to the previous set of software packages, including the host OS packages, by using the `request vmhost software rollback` command.

The following example illustrates the software rollback operation. The Routing Engine that has booted from the primary disk by using the set p had booted using the set b before the upgrade.

```
user@host> show vmhost version
Current root details,         Device sda, Label: jrootp_P, Partition: sda3
Current boot disk: Primary
      Current root set: p
      UEFI     Version: NGRE_v00.53.00.01
      Primary Disk, Upgrade Time: Wed Feb 24 17:51:53 UTC 2016
      Version: set p
      VMHost Version: 2.951
      VMHost Root: vmhost-x86_64-15.1I20160210_2212_builder
      VMHost Core: vmhost-core-x86_64-15.1I20160210_2212_builder
      kernel: 3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt
      Junos Disk: junos-install-x86-64-15.1F5.5
      Version: set b
      VMHost Version: 2.953
      VMHost Root: vmhost-x86_64-15.1F520160222_1052_builder
      VMHost Core: vmhost-core-x86_64-15.1F520160222_1052_builder
      kernel: 3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt
      Junos Disk: junos-install-x86-64-15.1F5.6
```

```
user@host> request vmhost software rollback
Current root details,         Device sda, Label: jrootp_P, Partition: sda3
      Finding alternate root for rollback
      Rollback to software on jrootb_P ...
      sh /etc/install/mk-mtre-rollback.sh jrootb_P b
      Mounting device in preparation for rollback...
      Updating boot partition for rollback...
      Rollback complete, please reboot the node for it to take effect.
      Cmos Write successfull
      Cmos Write successfull for Boot_retry
      Cmos Write successfull for Boot_retry
```

```
user@host> show vmhost version
Current root details,         Device sda, Label: jrootp_P, Partition: sda3
      Current boot disk: Primary
      Current root set: p
      UEFI     Version: NGRE_v00.53.00.01
      Primary Disk, Upgrade Time: Wed Feb 24 17:51:53 UTC 2016
      Pending reboot.
      Version: set p
      VMHost Version: 2.951
      VMHost Root: vmhost-x86_64-15.1I20160210_2212_builder
      VMHost Core: vmhost-core-x86_64-15.1I20160210_2212_builder
      kernel: 3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt
      Junos Disk: junos-install-x86-64-15.1F5.5
      Version: set b
      VMHost Version: 2.953
      VMHost Root: vmhost-x86_64-15.1F520160222_1052_builder
      VMHost Core: vmhost-core-x86_64-15.1F520160222_1052_builder
      kernel: 3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt
      Junos Disk: junos-install-x86-64-15.1F5.6
```

```
user@host> request vmhost reboot
Reboot the vmhost ? [yes,no] (no) yes
      warning: Rebooting re1
      Initiating vmhost reboot...  ok
```

```
      Initiating Junos shutdown...  shutdown: [pid 9733]
      Shutdown NOW!
        ok
      Junos shutdown is in progress...
        *** FINAL System shutdown message  ***
          System going down IMMEDIATELY
```

```
user@host> show vmhost version
Current root details,         Device sda, Label: jrootb_P, Partition: sda4
      Current boot disk: Primary
      Current root set: b
      UEFI     Version: NGRE_v00.53.00.01
      Primary Disk, Upgrade Time: Wed Feb 24 17:51:53 UTC 2016
      Version: set p
      VMHost Version: 2.951
      VMHost Root: vmhost-x86_64-15.1I20160210_2212_builder
      VMHost Core: vmhost-core-x86_64-15.1I20160210_2212_builder
      kernel: 3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt
      Junos Disk: junos-install-x86-64-15.1F5.5
      Version: set b
      VMHost Version: 2.953
      VMHost Root: vmhost-x86_64-15.1F520160222_1052_builder
      VMHost Core: vmhost-core-x86_64-15.1F520160222_1052_builder
      kernel: 3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt
      Junos Disk: junos-install-x86-64-15.1F5.6
```

VM Host Snapshot

The snapshot feature enables you to create copies of the currently running and active file system partitions on a device.

On the device, you can back up the snapshot of the host OS image along with the Junos OS image. You can use the `request vmhost snapshot` command to create a VM host recovery snapshot on the backup disk.

Disk Recovery Using the VM Host Snapshot

If the state of the primary disk (disk1) is good and the backup disk (disk2) has to be recovered then use the `request vmhost snapshot` command to recover the backup disk assuming the Routing Engine is booted from the primary disk. If the state of the secondary disk is not known or the file systems in disk are not in a consistent state, then include `partition` option in the command i.e. `request vmhost snapshot partition`.

If the state of the backup disk (disk2) is good and the primary disk (disk1) has to be recovered then use the `request vmhost snapshot recovery` command to recover the primary disk assuming the Routing Engine is booted from the backup disk. If the state of the primary disk is not known or the partition tables are in bad condition, then include `partition` option in the command i.e. `request vmhost snapshot recovery partition`.

To boot from desired disk, you can execute `request vmhost reboot { disk1, disk2}` command.

RELATED DOCUMENTATION

- Salient Features of the Routing Engines with VM Host Support | 347
- request vmhost software add | 909
- request vmhost software rollback | 919
- request vmhost snapshot | 904
- show vmhost snapshot | 954

Copying VM Host Installation Package to the PXE Boot Server

You can install the host OS, tools, and the Junos virtual machines (VMs) on the devices with RE-MX-X6, RE-MX-X8,RE-PTX-X8, and RE-QFX10002-60C, and RE-PTX10002-60C Routing Engines by using the Preboot Execution Environment (PXE) boot method. This is one of the methods used for a fresh installation. A PXE boot prepares a client/server environment to boot devices by using a network interface that is independent of available data storage devices or installed operating systems. The image of the operating system is stored on a TFTP server.

To copy the installation packages to the PXE boot server:

1. Copy the downloaded installation media to the **/var/tmp** directory in the PXE boot server.

```
scp  /volume/build/junos/15.1/release/15.1F3.9/ship/junos-vmhost-install-net-
x86-64-15.1F3.9.tgz user@host:/var/tmp/
```

2. Log in to the PXE boot server and verify the installation file.

```
user@host> ls -lh junos-vmhost-install-net-x86-64-15.1F3.9.tgz
-rw-r--r-- 1 root root 1.8G Oct 24 00:42 junos-vmhost-install-net-x86-64-15.1F3.9.tgz
```

3. Extract the **junos-vmhost-install-net** TAR file.

```
user@host> tar  xvzf junos-vmhost-install-net-x86-64-15.1F3.9.tgz  -C /var/tmp
contents/
contents/junos-vmhost-install.tgz
contents/vmhost-install-net-x86_64-15.1I20151019_1021_builder.tgz
manifest
manifest.certs
manifest.ecerts
manifest.esig
manifest.sig
package.xml
```

4. Remove the previously installed files, if any, from the **/tftpboot** directory.

```
user@host> rm -f /tftpboot/{vmhost-version.sh,bootpxe64.efi,vmhost-
version,grub.cfg,initramfs,vmlinuz}
user@host>ls -lh /tftpboot//
total 45M

rw-r--r-- 1 root root 690K Sep  8 13:22 bootpxe.efi
-rw-rw-r-- 1  930  930  45M Oct 20 01:51 vmhost-install-net-
x86_64-15.1I20151019_1021_builder.tgz
```

5. Extract the network installation package.

```
user@host> tar  xvzf  /var/tmp/contents/vmhost-install-net-
x86_64-15.1I20151019_1021_builder.tgz -C /tftpboot/
./
./vmhost-version.sh
```

```
./bootpxe64.efi
./vmhost-version
./grub.cfg
..
...
-rw-rw-r-- 1  930  930  45M Oct 20 01:51 vmhost-install-net-
x86_64-15.1I20151019_1021_builder.tgz
-rw-rw-r-- 1  930  930    6 Oct 20 01:51 vmhost-version
-rwxrwxr-x 1  930  930  416 Oct 20 01:51 vmhost-version.sh
-rw-r--r-- 1  930  930 6.9M Oct 20 01:51 vmlinuz
```

6. Rename or delete the previously installed root file system/scripts from the **/var/install** directory. Create a new **/var/install** directory.

```
user@host>mv /var/install /var/install_old
user@host>mkdir /var/install
```

7. Extract the installation package.

```
user@host>tar xvzf /var/tmp/contents/junos-vmhost-install.tgz  -C /var/install
./
./vmhost-pkgs-version
./vm/
./vm/note
./vm/grub.cfg.ngre
./vm/vsmartd-1.0-0.x86_64.rpm
./vm/re_fpga-1.0-0.x86_64.rpm
./vm/veccd-1.0-0.x86_64.rpm
./vmhost-version.sh
./vmhost/
./vmhost/vmhost-x86_64-15.1I20151019_1021_builder.img.gz
...
...
./junos/junos-mtre-upgrade.sh
./vmhost-core-x86_64-15.1I20151019_1021_builder.tgz
./junos/
./junos/junos-install-x86-64-15.1F3.9.img.gz
```

8. Set permissions for the files in the **/var/install** and **/tftpboot** directories.

```
user@host> chown root:root /tftpboot/*
user@host>chmod a+rwx /tftpboot/*
user@host>chown -R root:root /var/install
user@host>chmod -R a+rwx /var/install
```

9. Exit the PXE boot server.

```
user@host> exit
```

RELATED DOCUMENTATION

Installing, Upgrading, Backing Up, and Recovery of VM Host | 356

Creating an Emergency Boot Device for Routing Engines with VM Host Support | 365

Creating an Emergency Boot Device for Routing Engines with VM Host Support

If Junos OS on your device is damaged during loading in a way that prevents it from loading completely, you can use the emergency boot device to revive the device. The emergency boot device repartitions the primary disk and reloads a fresh installation of Junos OS. For RE-MX-X6, RE-MX-X8, RE-PTX-X8, and RCBPTX Routing Engines, you can use a USB storage device with at least 8 GB of free space to create an emergency boot device.

To create an emergency boot device on a device with RE-MX-X6, RE-MX-X8, RE-PTX-X8, RCBPTX, RE-QFX10002-60C, and RE-PTX10002-60C Routing Engines:

1. Copy the installation media into the device's **/var/tmp** directory.
2. Insert the USB storage device into the device's USB port.
3. In the UNIX shell, navigate to the **/var/tmp** directory:

```
start shell
cd /var/tmp
```

4. Log in as su:

   Super User (su) is one of the predefined login classes with preset permissions.

   ```
   su [enter]
   password: [enter SU password]
   ```

5. Gunzip the copied file.

   For example, to convert junos-vmhost-install-usb-mx-x86-64-15.1F6.8.img.gz to junos-vmhost-install-usb-mx-x86-64-15.1F6.8.img, , use the following command: `gunzip junos-vmhost-install-usb-mx-x86-64-15.1F6.8.img.gz`

6. Issue the following command:

   ```
   dd if=/path/to/downloaded.img of=/dev/devicenode bs=4M
   ```

   where:

   - *devicenode*—Refers to the name of the removable media of the emergency boot device. For names of storage media, see "Routing Engines and Storage Media Names (ACX Series, M Series, MX Series, PTX Series, T Series, TX Matrix, TX Matrix Plus, and JCS 1200 Routers)" on page 450.
   - *downloaded.img*—Refers to the installation media copied to the **/var/tmp** directory. For example, **junos-vmhost-install-usb-ptx-x86-64-15.1F6.8.img**.

   The following code example can be used to create an emergency boot device by using a USB storage device:

   ```
   dd if=/path/to/junos-vmhost-install-usb-mx-x86-64-15.1F6.8.img of=/dev/da0 bs=4M
   ```

   NOTE: In the dd command, use junos-vmhost-install-usb-mx-86 for RE-MX-X6 and RE-MX-X8 Routing Engines and junos-vmhost-install-ptx-86 for RE-PTX-X8 Routing Engine respectively.

7. Log out as su:

   ```
   exit
   ```

RELATED DOCUMENTATION

Boot Process for Routers with VM Host Support | 354

Upgrading the SSD Firmware on Routing Engines with VM Host Support

Starting in Junos OS Release 17.2R1, you can upgrade the solid-state drive (SSD) firmware on MX Series routers with the RE-S-X6-64G and RE-MX2K-X8-64G Routing Engines, on QFX10002-60C switches with the RE-QFX10002-60C Routing Engines, and PTX10002-60C routers with the RE-PTX10002-60C Routing Engines. A set of two SSDs, `disk1` and `disk2` , is available for normal functioning of the Routing Engine. This topic shows how to perform the upgrade.

NOTE: You must upgrade SSD firmware only under the direction of a Juniper Networks support representative.

NOTE: On QFX10002-60C switches, you can upgrade firmware only for the FPGA and BIOS, not the SSD.

Before you begin upgrading the firmware, check the current firmware version of the SSD.

```
user@host> show system firmware
    Part              Type       Tag       Current   Available Status
                                              version   version
    Routing Engine  0     RE BIOS   0        0.45      0.53      OK
    Routing Engine  0     RE FPGA   1        36.0.0    41.0      OK
    Routing Engine  0     RE SSD1   4        12028     12029     OK
    Routing Engine  0     RE SSD2   5         12028     12029     OK
    Routing Engine  1              0       1.4                    OK
```

If the value of `Current version` is less than the value of `Available version`, then you can use the following procedure for the SSD firmware upgrade.

To upgrade SSD firmware:

1. Copy the jfirmware package to the device.

If the file has been obtained from JTAC, use FTP or SCP to load the firmware file on the device. Save the file in the `/var/tmp` directory.

```
user@host> request system software add ftp://ftp.juniper.net/private/system/jfirmware-17.1R2-signed.tgz
```

2. Upgrade the SSD disk1 firmware.

> **NOTE**: In releases before Junos OS Release 18.3R1, you must upgrade the SSD on a primary Routing Engine only. For upgrading firmware on the backup Routing Engine, switch primary role by using the following command and then log in to the backup Routing Engine, which is now the new primary Routing Engine:.
>
> ```
> user@host> request chassis routing-engine master switch
> ```
>
> Starting in Junos OS Release 18.3R1, you can upgrade the SSD firmware on the primary and backup Routing Engines.

To initiate the upgrade, use the following command:

```
user@host> request system firmware upgrade re ssd disk1

Part        Type      Tag    Current   Available       Status
                            version   version
Routing Engine   0 RE SSD1    4      12028     12029        OK
Perform indicated firmware upgrade ? [yes,no] (no) yes

Firmware upgrade initiated, use "show system firmware"  to monitor status.
```

Monitor the upgrade status by using the `show system firmware` command.

```
user@host> show system firmware
    Part              Type       Tag       Current   Available Status
                                             version   version
    Routing Engine  0     RE BIOS   0        0.45      0.53      OK
    Routing Engine  0     RE FPGA   1        36.0.0    41.0      OK
    Routing Engine  0     RE SSD1   4        12028     12029     OK
    Routing Engine  0     RE SSD2   5         12028     12029     OK
    Routing Engine  1              0       1.4                    OK
```

```
user@host> show system firmware
    Part              Type       Tag       Current   Available Status
```

```
                                          version   version
    Routing Engine  0     RE BIOS   0        0.45      0.53      OK
    Routing Engine  0     RE FPGA   1        36.0.0    41.0      OK
    Routing Engine  0     RE SSD1   4        12029     12029     UPGRADED SUCCESSFULLY
    Routing Engine  0     RE SSD2   5         12028     12029     OK
    Routing Engine  1              0       1.4                    OK
```

After a successful upgrade, confirm that the current version and available version of the SSD firmware are identical.

3. Upgrade SSD Disk2 firmware.

   To initiate the upgrade, use the following command:

```
user@host> request system firmware upgrade re ssd disk2

Part   Type    Tag    Current   Available   Status
                      version   version
Routing Engine   0  RE SSD2 5    12028     12029     OK
Perform indicated firmware upgrade ? [yes,no] (no) yes

Firmware upgrade initiated, use "show system firmware"  to monitor status.
```

Monitor the upgrade status by using the `show system firmware` command.

```
user@host> show system firmware
    Part              Type       Tag       Current   Available Status
                                           version   version
    Routing Engine  0     RE BIOS   0        0.45      0.53      OK
    Routing Engine  0     RE FPGA   1        36.0.0    41.0      OK
    Routing Engine  0     RE SSD1   4        12028     12029     UPGRADED SUCCESSFULLY
    Routing Engine  0     RE SSD2   5         12028     12029     PROGRAMMING
    Routing Engine  1              0       1.4                    OK
```

```
user@host> show system firmware
    Part             Type     Tag       Current   Available     Status
                                        version   version
    Routing Engine  0     RE BIOS   0          0.45          0.53     OK
    Routing Engine  0     RE FPGA   1          36.0.0        41.0     OK
    Routing Engine  0     RE SSD1   4         12029         12029    UPGRADED SUCCESSFULLY
```

```
Routing Engine  0     RE SSD2   5        12029         12029    UPGRADED SUCCESSFULLY
Routing Engine  1             0     1.4                 OK
```

After a successful upgrade, confirm that the current version and available version of the SSD firmware are identical.

Release History Table

Release	Description
17.2R1	Starting in Junos OS Release 17.2R1, you can upgrade the solid-state drive (SSD) firmware on MX Series routers with the RE-S-X6-64G and RE-MX2K-X8-64G Routing Engines, on QFX10002-60C switches with the RE-QFX10002-60C Routing Engines, and PTX10002-60C routers with the RE-PTX10002-60C Routing Engines.

Upgrading the i40e NVM Firmware on Routing Engines with VM Host Support

Starting in Junos OS Release 21.4 R1, in order to install VM Host image based on Linux WR LTS19, you have to upgrade the i40e NVM firmware to version 7.0 or later. . However, if the Junos OS version is upgraded to 21.4R1 or later using the standard Junos OS upgrade process, the i40e NVM firmware upgrade is done automatically during the upgrade process. The corresponding i40e driver version to support i40e NVM version 7.0 will be version 2.8.43 (or later).

NOTE: i40e NVM version 6.01 is the prerequisite to install a LTS19 based image, else image installation will fail.

The i40e NVM firmware downgrade is not supported if the Junos OS version running on the system is downgraded from Junos OS 21.4R1. Hence, it is required to install a Junos OS version which supports the corresponding i40e NVM firmware version installed in the Routing Engine.

The following table lists the Junos OS releases contain both i40e driver version 2.8.43 and i40e driver version 2.4.3 to support both i40e NVM firmware version 6.01 and i40e NVM firmware version 7.0. Hence, they could be used on the Routing Engine which is running i40e NVM firmware version 6.01 or 7.0.

For JUNOS images prior to the listed versions below, i40e NVM firmware version 7.0 is not supported.

Table 19: Junos OS Releases which support i40e NVM firmware version 6.01 and i40e NVM firmware version 7.0.

19.3	19.4	20.1	20.2	20.3	20.4	21.1+
19.3R2-S6	19.4R1-S4	20.1R2-S2	20.2R2-S3	20.3R1-S2	20.4R1-S1	21.1R1 and higher
19.3R3-S2	19.4R2-S4	20.1R3	20.2R3	20.3R2	20.4R2	
	19.4R3-S2			20.3R2-S1		
	19.4R3-S3			20.3R3		
				20.3X75-D10		

In order to install VM Host image based on Linux WRL9, you have to upgrade the i40e NVM firmware to version 6.01. Starting in Junos OS Release 19.3R1, in order to install VM Host image based on Linux WRL9, you have to upgrade the i40e NVM firmware to version 6.01.

Table 20 on page 371 lists the Junos OS releases which support i40e NVM firmware upgrade.

Table 20: Junos OS Releases which Support i40e NVM Firmware Upgrade

Platform	15.x	16.x	17.x	18.x	19.x
EX9208	15.1F6-S11	16.1R7	17.1R3 / 17.2R3 / 17.3R3 / 17.4R2	18.1R1 / 18.2R1 / 18.3R1 / 18.4R1	19.1R1 or later
PTX5000	15.1F6-S11	16.1R7	17.1R3 / 17.2R3 / 17.3R3 / 17.4R2	18.1R1 / 18.2R1 / 18.3R1 / 18.4R1	19.1R1 or later

Table 20: Junos OS Releases which Support i40e NVM Firmware Upgrade *(Continued)*

Platform	15.x	16.x	17.x	18.x	19.x
PTX3000	Not applicable	Not applicable	Not applicable	18.2R3 / 18.3R3 / 18.4R2	19.1R2 / 19.2R1
MX240 / MX480 / MX960 / MX2010 / MX2020	15.1F6-S11	16.1R7	17.1R3 / 17.2R3 / 17.3R3 / 17.4R2	18.1R1 / 18.2R1 / 18.3R1 / 18.4R1	19.1R1 or later
MX2008	Not applicable	Not applicable	Not applicable	18.2R3 / 18.3R3 / 18.4R2	19.1R2 / 19.2R1
MX10016/MX10008 PTX10016/MX10008	Not applicable	Not applicable	Not applicable	18.2R3 / 18.3R3 / 18.4R2	19.1R2 / 19.2R1

You can install older Junos OS images on the Routing Engine with an upgraded i40e NVM firmware as it supports i40e 2.4.3 driver versions. If you install an older version of the VM Host image, which is not listed in Table 22 on page 373, using USB, the Routing Engine does not start up properly. In such a case, you can reinstall the VMHost image with a version which supports the new i40e NVM firmware.

Table 21: Junos OS Release Versions which Support i40e-1.1.23 Driver Versions/ NVM-4.26

Platform	i40e-1.1.23/ NVM-4.26 Support	
EX9208	Starting from 15.1F3	Up to 19.1R1 or later
PTX5000	Starting from 15.1F3	Up to 19.1R1 or later
PTX3000	Starting from 16.1R4	Up to 19.1R2/ 19.2R1
MX240/MX480/MX960	Starting from 15.1F3	Up to 19.1R1 or later

Table 21: Junos OS Release Versions which Support i40e-1.1.23 Driver Versions/ NVM-4.26 ***(Continued)***

Platform	i40e-1.1.23/ NVM-4.26 Support	
MX2010/MX2020	Starting from 15.1F5-S1	Up to 19.1R1 or later
MX2008	Starting from 15.1F7	Up to 19.1R1 or later
MX10016/MX10008 PTX10016/MX10008	Starting from 18.2R1	Up to 19.1R1 or later

Table 22: Junos OS Versions which Support i40e 2.4.3 Driver Versions/NVM-6.01.

Platform	i40e-2.4.3/ NVM-6.01 Support (backward compatible to i40e-1.1.23)				
EX9208	Starting from 15.1F6-S11	16.1R7	17.1R3 / 17.2R3 / 17.3R3 / 17.4R2	18.1R1 / 18.2R1 / 18.3R1 / 18.4R1	19.1R1 or later
PTX5000	Starting from 15.1F6-S11	16.1R7	17.1R3/ 17.2R3 / 17.3R3/ 17.4R2	18.1R1 / 18.2R3 / 18.3R1 / 18.4R1	19.1R1 or later
PTX3000	Not applicable	16.1R7	17.3R3-S6 / 17.4R2-S7	18.2R3-S8 / 18.2R3 / 18.3R3 / 18.4R2	19.1R2/ 19.2R1
MX240/MX480/MX960	Starting from 15.1F6-S11	16.1R7	17.1R3 / 17.2R3 / 17.3R3 / 17.4R2	18.1R1 / 18.2R1 / 18.3R1 / 18.4R1	19.1R1 or later
MX2010/MX2020	Starting from 15.1F6-S11	16.1R7	17.1R3 / 17.2R3 / 17.3R3 / 17.4R2	18.1R1 / 18.2R1 / 18.3R1 / 18.4R1	19.1R1 or later

Table 22: Junos OS Versions which Support i40e 2.4.3 Driver Versions/NVM-6.01. ***(Continued)***

Platform	i40e-2.4.3/ NVM-6.01 Support (backward compatible to i40e-1.1.23)				
MX2008	Not applicable	Not applicable	17.2R3 / 17.3R3 / 17.4R2	18.1R1 / 18.2R1 / 18.3R1 / 18.4R1	19.1R1 or later
MX10016/MX10008 PTX10016/MX10008	Not applicable	Not applicable	Not applicable	18.2R1 / 18.3R1 / 18.4R1	19.1R1 or later

NOTE: Starting in Junos OS Release 19.3R1, in order to install VM Host image based on Linux WRL9, you have to upgrade the i40e NVM firmware to version 6.01.

i40e-NVM upgrade is optional for the following platforms:

- MX10003
- MX204
- PTX10002-XX
- QFX1000, QFX10002
- QFX5000

NOTE:

- You must upgrade i40e NVM firmware only under the direction of a Juniper Networks support representative. Once you upgrade the NVM firmware, a downgrade action is not supported. For latest update, you can refer https://kb.juniper.net/.
- You must implement this procedure with a router console access. Also, you have to perform power cycling of the routing Engine multiple times during the firmware upgrade process.

Before you begin upgrading the firmware, check the current firmware version of the i40e NVM.

```
user@host> show system firmware
Part             Type           Tag Current    Available    Status
                                    version    version
Routing Engine 0  RE BIOS       0      0.53.1               OK
Routing Engine 1 RE BIOS        0      0.43         0.53    OK
Routing Engine 1 RE FPGA        1      28.0.0       41.0    OK
Routing Engine 1 RE SSD1        3      0.0.0                OK
Routing Engine 1 RE SSD2        3      0.0.0                OK
Routing Engine 1 RE i40e-NVM    7      4.26                 OK
```

If the value of `Current version` is less than `6.01`, then you can use the following procedure for the i40e NVM firmware upgrade.

To upgrade i40e NVM firmware on routers with single Routing Engine:

1. Upgrade the device with the Junos OS image version which supports i40e NVM firmware upgrade. See Table 20 on page 371.

   Copy and install the jfirmware-vmhost package to the device.

   If the file has been obtained from JTAC, use FTP or SCP to load the firmware file on the device. Save the file in the `/var/tmp` directory.

   ```
   user@host> request vmhost software add /var/tmp/jfirmware-vmhost-x86-64-19.2R1.tgz
   ```

2. Upgrade the NVM firmware.

   To initiate the upgrade, use the following command:

   ```
   user@host> request system firmware upgrade re i40nvm
   Part             Type           Tag   Current    Available  Status
                                         version    version
   Routing Engine 1 RE i40e-NVM    7     4.26       6.01         OK
   Perform indicated firmware upgrade ? [yes,no] (no) yes

   Firmware upgrade initiated, use "show system firmware" after reboot to verify the firmware
   version
   ```

Monitor the upgrade status by using the `show system firmware` command. If the upgrade is initiated the output displays `PROGRAMMING (0%)` as the status. However, note that the status `PROGRAMMING (0%)` does not increment during the process.

```
user@host> show system firmware
Part             Type           Tag Current   Available Status
                                    version   version
Routing Engine 0 RE BIOS        0           0.53.1            OK
Routing Engine 1 RE BIOS        0           0.43              OK
Routing Engine 1 RE FPGA        1           28.0.0            OK
Routing Engine 1 RE SSD1        3           0.0.0             OK
Routing Engine 1 RE SSD2        3           0.0.0             OK
Routing Engine 1 RE i40e-NVM    7       4.26 6.01          PROGRAMMING   (0%)
```

3. Reboot the device by using the `request vmhost reboot` command.

```
user@host> request vmhost reboot
```

4. Verfiy the progress of i40e NVM upgrade on the console. You may have to perform power recycle of the Routing Engine multiple times. When you are prompted for a power cycle on your console, use external power cycle for power cycling the Routing Engine.

   The following message is displayed on the console prompting you to perform a power cycle:

```
“Please Power Cycle your system now and run the NVM update utility again to complete the
update. Failure to do so will result in an incomplete NVM update.
Upgrade complete please power reboot
You may notify to  power reboot again after reboot if required”
```

5. After a successful upgrade, verify the version of the firmware.

NOTE: The `Current version` is displayed as 6.1 instead of 6.01.

```
user@host> show system firmware
Part             Type           Tag Current   Available Status
                                    version   version
Routing Engine 0 RE BIOS           0                 0.53.1          OK
Routing Engine 1 RE BIOS           0                 0.43            OK
Routing Engine 1 RE FPGA           1                 28.0.0          OK
```

```
Routing Engine 1 RE SSD1           3                0.0.0           OK
Routing Engine 1 RE SSD2           3                0.0.0           OK
Routing Engine 1 RE i40e-NVM  7    6.1              6.01            OK
```

NOTE: In case, you have run the `request vmhost snapshot` command with a Junos OS image which does not support i40e NVM firmware upgrade, (if the SSD recovery snapshot has a Junos OS version older than the Junos OS versions mentioned in Table 22 on page 373) we recommend you to take a snapshot using the `request vmhost snapshot` command again. Hence, in case of a recovery process, the SSD recovery snapshot will have a Junos OS image which supports NVM 6.01.

On routers with dual Routing Engines, you must use the `request chassis cb (offline | online) slot` *slot-number* to power cycle the Routing Engine. Thereby, you can avoid using an external power cycler and avoid abrupt power cycling of backup RE, which may cause file system errors.

To upgrade i40e NVM firmware on routers with dual Routing Engines:

NOTE: You must disable GRES before proceeding with the upgrade procedure. However, if you disable GRES in the beginning of the procedure, the device needs more number of switchovers for upgrading both the Routing Engines. Hence, to reduce the number of switchovers, it is recommended to upgrade the secondary Routing Engine first and then upgrade the primary Routing Engine .

1. Upgrade the device with the Junos OS image version which supports i40e NVM firmware upgrade. See Table 20 on page 371.

   Copy and install the jfirmware-vmhost package to the device.

   If the file has been obtained from JTAC, use FTP or SCP to load the firmware file on the device. Save the file in the `/var/tmp` directory.

   ```
   user@host> request vmhost software add /var/tmp/jfirmware-vmhost-x86-64-19.2R1.tgz
   ```

2. Upgrade the NVM firmware.

   To initiate the upgrade, use the following command:

   ```
   user@host> request system firmware upgrade re i40nvm
   Part             Type           Tag   Current   Available  Status
                                         version   version
   Routing Engine 1 RE i40e-NVM    7     4.26      6.01         OK
   ```

```
Perform indicated firmware upgrade ? [yes,no] (no) yes

Firmware upgrade initiated, use "show system firmware" after reboot to verify the firmware
version
```

Monitor the upgrade status by using the `show system firmware` command. If the upgrade is initiated the output displays `PROGRAMMING (0%)` as the status. However, note that the status `PROGRAMMING (0%)` does not increment during the process.

```
user@host> show system firmware
Part             Type           Tag Current   Available Status
                                    version   version
Routing Engine 0 RE BIOS        0           0.53.1            OK
Routing Engine 1 RE BIOS        0           0.43              OK
Routing Engine 1 RE FPGA        1           28.0.0            OK
Routing Engine 1 RE SSD1        3           0.0.0             OK
Routing Engine 1 RE SSD2        3           0.0.0             OK
Routing Engine 1 RE i40e-NVM    7       4.26 6.01          PROGRAMMING   (0%)
```

3. Switch to the backup Routing Engine by using the `request chassis routing-engine master switch` command to switch primary role to other RE (i.e, RE1).

> **NOTE**: This step is necessary, because in Step 6 you have to power cycle the Routing Engine which is undergoing the NVM upgrade (i.e, RE0) from RE1

```
user@host> request chassis routing-engine master switch
Toggle mastership between routing engines ? [yes,no] (no) yes

Resolving mastership...
Complete. The other routing engine becomes the master.
```

4. Reboot the device by using the `request vmhost reboot` command from the Routing Engine which is undergoing the NVM upgrade (i.e, RE0).

```
user@host> request vmhost reboot
```

5. Monitor the console output. You may have to perform power recycle of the Routing Engine multiple times. When you are prompted for a power cycle on your console, use external power cycle for power cycling the Routing Engine. Or, you can use the command `request chassis cb slot slot offline` as described in Step 6.

   The following message is displayed on the console prompting you to perform a power cycle:

```
“Please Power Cycle your system now and run the NVM update utility again to complete the
update. Failure to do so will result in an incomplete NVM update.
Upgrade complete please power reboot
You may notify to  power reboot again after reboot if required”
```

6. From RE1, power cycle the RE0 using following command `request chassis cb slot slot offline`.

   To power off RE0, use the command `request chassis cb slot 0 offline` and to power on RE0, use the command `request chassis cb slot 0 online`.

```
user@host> request chassis cb slot 0 offline
Offline initiated, use "show chassis environment cb" to verify
```

```
user@host> request chassis cb slot 0 online
Online initiated, use "show chassis environment cb" to verify
```

7. After a successful upgrade, verify the version of the firmware.

   NOTE: The `Current version` is displayed as 6.1 instead of 6.01.

```
user@host> show system firmware
Part             Type           Tag Current   Available Status
                                    version   version
Routing Engine 0 RE BIOS          0                 0.53.1          OK
Routing Engine 1 RE BIOS          0                 0.43            OK
Routing Engine 1 RE FPGA          1                 28.0.0          OK
Routing Engine 1 RE SSD1          3                0.0.0           OK
Routing Engine 1 RE SSD2          3                0.0.0           OK
Routing Engine 1 RE i40e-NVM  7   6.1              6.01            OK
```

NOTE: In case, you have run the `request vmhost snapshot` command with a Junos OS image which does not support i40e NVM firmware upgrade, (if the SSD recovery snapshot has a Junos OS version older than the Junos OS versions mentioned in Table 22 on page 373) we recommend you to take a snapshot using the `request vmhost snapshot` command again. Hence, in case of a recovery process, the SSD recovery snapshot will have a Junos OS image which supports NVM 6.01.

8. Similarly, while upgrading i40e NVM on RE1, power cycle RE1 from RE0.

```
user@host> request chassis cb slot 1 offline
Offline initiated, use "show chassis environment cb" to verify
```

```
user@host> request chassis cb slot 1 online
Online initiated, use "show chassis environment cb" to verify
```

9. You need to perform this step only if the image you downloaded does not contain debugfs based mechanism to stop LLDP.

   Download the lldp-patch-for-i40e-upgrade.tgz package. Copy and install the file in the /var/tmp/ directory on each Routing Engine.

```
user@host> request vmhost software add /var/tmp/lldp-patch-for-i40e-upgrade.tgz
Verified lldp-patch-for-i40e-upgrade signed by PackageDevelopmentEc_2018 method
ECDSA256+SHA256
[ re_name = RE-PTX-2X00x8 ]
Pushing script(s) to host ...
Install the script(s) under host-os....
Script(s) copy done
```

```
user@host>show version | match lldp
lldp-patch-for-i40e-upgrade
```

10. Reboot the device by using the `request vmhost reboot` command. The upgrade process is complete when the Routing Engine comes back online.

```
user@host> request vmhost reboot
```

Release History Table

Release	Description
19.3R1	Starting in Junos OS Release 19.3R1, in order to install VM Host image based on Linux WRL9, you have to upgrade the i40e NVM firmware to version 6.01.

Disabling Autorecovery on Routing Engines with VM Host Support

The autorecovery feature helps recover the Junos OS automatically in the event of a corruption, thereby ensuring that the Junos OS is available for operations and management always. The host Junos OS tries to launch the Junos VM from the image available on the primary disk. However, if the guest Junos OS fails to launch, the host OS attempts to launch the Junos VM from the snapshot of the host OS image and Junos OS image available in the backup disk, provided `request vmhost snapshot` was the last operation performed. If the backup disk does not contain the snapshot, the host OS attempts to launch the Junos VM from the software available in the alternate set in the primary disk, provided `request vmhost upgrade` was the last operation performed.

The autorecovery feature is enabled by default on the guest Junos OS. For debugging purposes, if you do not want the host to recover the Junos VM automatically, you can disable the auto-recovery by the host.

To disable the guest auto-recovery, include the `no-auto-recovery` statement at the `[edit vmhost]` hierarchy level:

```
[edit vmhost]
no-auto-recovery
```

RELATED DOCUMENTATION

vmhost | 640

VM Host Operations and Management

With the virtualization of the Routing Engine, Junos OS supports new request and show commands associated with the host and hypervisor processes. The commands are related to:

- Reboot, halt, and power management for the host.
- Software upgrade for the host.
- Disk snapshot for the host.

The following request commands are not available on the RE-MX-X6, RE-MX-X8, and RE-PTX-X8 Routing Engines:

- request system halt
- request system partition abort
- request system power-off
- request system power on

The following commands can be used only for the guest Junos OS:

- request system reboot
- request system snapshot
- request system software add
- request system zeroize

You can use the following new request vmhost commands on the host OS:

- request vmhost cleanup
- request vmhost file-copy
- request vmhost halt
- request vmhost hard-disk-test

- request vmhost power-off
- request vmhost power-on
- request vmhost reboot
- request vmhost snapshot
- request vmhost software abort in-service-upgrade

  NOTE: This command is not supported on the QFX10002-60C and PTX10002-60C devices.

- request vmhost software add
- request vmhost software in-service-upgrade

  NOTE: This command is not supported on the QFX10002-60C and PTX10002-60C devices.

- request vmhost software rollback
- request vmhost zeroize

RELATED DOCUMENTATION

Routing Engines with VM Host Support | 342

5

CHAPTER

Installing and Upgrading the BIOS and Firmware

Upgrading BIOS and Firmware (SRX only)

IN THIS SECTION

You can upgrade BIOS, back up the BIOS, and upgrade automatically on your SRX Series Firewalls.

Understanding BIOS Upgrades on SRX Series Firewalls

IN THIS SECTION

Understanding Manual BIOS Upgrade Using the Junos CLI

For these SRX Series Firewalls, the BIOS consists of a U-boot and the Junos loader. The SRX240, SRX300, and SRX320, and SRX650 Service Gateways also include a U-shell binary as part of the BIOS. Additionally, on SRX100, SRX110, SRX210, SRX220 and SRX240, SRX300, SRX320, SRX340, SRX345, and SRX380 Service Gateways, a backup BIOS is supported which includes a backup copy of the U-boot in addition to the active copy from which the system generally boots up.

Table 23 on page 386 Lists the CLI commands used for manual BIOS upgrade.

Table 23: CLI Commands for Manual BIOS Upgrade

Active BIOS	Backup BIOS
`request system firmware upgrade re bios`	`request system firmware upgrade re bios backup`

BIOS upgrade procedure:

1. **Install the jloader-srxsme package.**

   a. Copy the jloader-srxsme signed package to the device.

   > **NOTE**: The version of the jloader-srxsme package you install must match the version of Junos OS.

   b. Install the package using the `request system software add <path to jloader-srxsme package> no-copy no-validate` command.

   > **NOTE**: Installing the jloader-srxsme package places the necessary images under directory/boot.

2. Verify that the required images for upgrade are installed. Use the `show system firmware` to verify that the correct BIOS image version is available for upgrade.

3. Upgrade the BIOS (Active and backup) image.

   Active BIOS:

   a. Initiate the upgrade using the `request system firmware upgade re bios` command.

   b. Monitor the upgrade status using the `show system firmware` command.

   > **NOTE**: The device must be rebooted for the upgraded active BIOS to take effect.

   Backup BIOS:

   a. Initiate the upgrade using the `request system firmware upgade re bios backup` command.

   b. Monitor the upgrade status using the `show system firmware` command.

Understanding Auto BIOS Upgrade Methods on SRX Series Firewalls

The BIOS version listed in the **bios-autoupgrade.conf** file is the minimum supported version. If the current device has a BIOS version earlier than the minimum compatible version, then the auto BIOS upgrade feature upgrades the BIOS automatically to the latest version.

The BIOS upgrades automatically in the following scenarios:

- During Junos OS upgrade through either the J-Web user interface or the CLI (using the `request system software add no-copy no-validate` *`software-image`*). In this case, only the active BIOS is upgraded.
- During loader installation using TFTP or USB (using the `install tftp:///`*`software-image`* command). In this case, only the active BIOS is upgraded.
- During system boot-up. In this case, both the active BIOS and the backup BIOS are upgraded.

Disabling Auto BIOS Upgrade on SRX Series Firewalls

The auto BIOS upgrade feature is enabled by default. You can disable the feature using the CLI in configuration mode.

To disable the automatic upgrade of the BIOS on an SRX Series Firewall, use the `chassis routing-engine bios` command as following:

```
user@host# set chassis routing-engine bios no-auto-upgrade
```

NOTE: The command disables automatic upgrade of the BIOS only during Junos OS upgrade or system boot-up. It does not disable automatic BIOS upgrade during loader installation.

Starting in Junos OS Release 15.1X49-D70 and in Junos OS Release 17.3R1, the `set chassis routing-engine bios uninterrupt` command is introduced on SRX300, SRX320, SRX340, and SRX345 devices to disable user inputs at U-boot and boot loader stage. The `set chassis routing-engine bios uninterrupt` command is introduced in Junos OS Release 20.1R1 for SRX380 Series devices.

Starting in Junos OS Release 15.1X49-D120, the `set chassis routing-engine bios uninterrupt` command can be used on SRX300, SRX320, SRX340, and SRX345, devices to disable user inputs at U-boot, boot loader and and Junos-Kernel boot stage. The `set chassis routing-engine bios uninterrupt` command is introduced in Junos OS Release 20.1R1 on SRX380 Series devices.

To disable the user inputs at u-boot, boot loader and Junos Kernel boot stage, use the `chassis routing-engine bios` command as following:

```
user@host# set chassis routing-engine bios uninterrupt
```

NOTE: To disable user inputs at U-boot and boot loader stage using the `chassis routing-engine bios` command, SRX Series Firewalls must have u-boot version of v3.2 or a higher version, and loader version of v2.9 or a higher version.

You can check the version number at console output when your device boots up as shown in the following sample:

```
 U-Boot 2013.07-JNPR-3.4 (Build time: Aug 02 2017 - 18:57:37)
        FreeBSD/MIPS U-Boot bootstrap loader, Revision 2.9
```

You can also check the u-boot and loader version at Junos shell prompt as shown the following sample:

```
root@% kenv
        LINES="24"
        boot.ver="3.5"
        loader.name="FreeBSD/MIPS U-Boot bootstrap loader"
        loader.version="2.9"
        root@%
```

WARNING: On SRX Series Firewalls, if both `set system ports console insecure` and `set chassis routing-engine bios uninterrupt` options are configured, there is no alternative recovery method available in case Junos OS fails to boot and the device might become unusable.

Release History Table

Release	Description
15.1X49-D70	Starting in Junos OS Release 15.1X49-D70 and in Junos OS Release 17.3R1, the `set chassis routing-engine bios uninterrupt` command is introduced on SRX300, SRX320, SRX340, and SRX345 devices to disable user inputs at U-boot and boot loader stage

15.1X49-D120	Starting in Junos OS Release 15.1X49-D120, the `set chassis routing-engine bios uninterrupt` command can be used on SRX300, SRX320, SRX340, and SRX345, devices to disable user inputs at U-boot, boot loader and and Junos-Kernel boot stage

RELATED DOCUMENTATION

Installing Software on SRX Series Devices | 251

Upgrading 5.1KW HVAC/HVDC Single and Dual Input PSM Firmware (SRX5800)

The 5.1KW HVAC/HVDC Single and Dual Input PSM on SRX5800 provides a maximum output power of 5100W and supports AC or DC input. In single feed mode, the PSM provides power at a reduced capacity of 2550W. In dual feed mode, the PSM provides power at a full capacity of 5100W. The PSM supports a 1+1 redundancy. To upgrade firmware for SRX5800 PSM:

1. Disable alarms related to the PSMs in the system using `show chassis alarms` command.
2. The device chassis must have redundant PSMs. Power feeds (two, in case of dual input) of the PSMs must be upgraded, connected, and energized.
3. The AC/DC input must show status OK (2 active and connected feeds).
4. Perform the firmware upgrade one PSM at a time.

NOTE:

`request system firmware upgrade pem slot show system firmware`

RELATED DOCUMENTATION

show chassis power

show chassis firmware

show chassis hardware

Upgrading System CPLD, BIOS, CPU CPLD, PoE Firmware, and eMMC Firmware for EX4400 Devices

SUMMARY

IN THIS SECTION

The following sections describe the steps to upgrade BIOS, CPU CPLD, System CPLD, and Virtual Chassis (VC) firmware in EX4400.

Upgrading BIOS

Perform the following steps to upgrade the BIOS:

1. Add jfirmware.

```
user@host> request system software add /var/tmp/jfirmware-ex.tgz
```

2. Upgrade BIOS.

```
user@host> request system firmware upgrade jfirmware bios
```

3. Check the progress of the BIOS upgrade.

```
user@host> request system firmware upgrade jfirmware bios progress
```

4. Reboot the device for the upgrade to take effect.

```
root>request system reboot
```

5. Use the following command to confirm the BIOS version.

   Before upgrade:

```
user@host> show chassis firmware
Part                    Type       Version
FPC 0                   loader     FreeBSD EFI loader 2.0
                        BIOS       CDEN_P_EX1_00.15.01.00
                        System CPLD 0.f
                        CPU CPLD    1.0
```

   After upgrade:

```
user@host> show chassis firmware
Part                    Type       Version
FPC 0                   loader     FreeBSD EFI loader 2.0
                        BIOS       CDEN_P_EX1_00.20.01.00 <<<<<<<<<<<<<<<
                        System CPLD  1.0
                        CPU CPLD     1.1
```

Upgrading CPU CPLD

Perform the following steps to upgrade the CPU CPLD:

1. Add jfirmware.

```
user@host> request system software add /var/tmp/jfirmware-ex.tgz
```

2. Upgrade CPU CPLD.

```
user@root> request system firmware upgrade jfirmware cpld cpu
```

3. Check the progress of the upgrade.

```
user@host> request system firmware upgrade jfirmware cpld cpu progress
```

4. (Recommended) Perform a system halt using the following command.

```
user@host> request system halt
```

5. Power cycle the device for the upgrade to take effect.
6. Use the following command to confirm the CPU CPLD version.

   Before upgrade:

```
user@host> show chassis firmware
Part                    Type       Version
FPC 0                   loader     FreeBSD EFI loader 2.0
                        BIOS       CDEN_P_EX1_00.15.01.00
                        System CPLD 0.f
                        CPU CPLD    1.0
```

   After upgrade:

```
user@host> show chassis firmware
Part                    Type       Version
FPC 0                   loader     FreeBSD EFI loader 2.0
                        BIOS       CDEN_P_EX1_00.20.01.00
                        System CPLD  1.0
                        CPU CPLD     1.1 <<<<<<<<<<<<<<
```

Upgrading System CPLD

NOTE: EX4400 and EX4400-24X have separate system CPLD binary and CPLD version.

Perform the following steps to upgrade the system CPLD:

1. Add jfirmware.

```
user@host> request system software add /var/tmp/jfirmware-ex.tgz
```

2. Upgrade System CPLD.

```
user@host> request system firmware upgrade jfirmware cpld sys
```

   Initiates the firmware upgrade.

3. Check the progress of the CPLD upgrade.

```
user@host> request system firmware upgrade jfirmware cpld sys progress
```

4. Confirm if the CPLD upgrade is complete. You get the following message if the upgrade is completed successfully.

```
Firmware upgrade complete
```

5. (Recommended) Perform a system halt using the following command.

```
user@host> request system halt
```

6. Power cycle the device for the upgrade to take effect.
7. Use the following command to confirm the CPLD version.

NOTE: The System CPLD version should be 1.0 for EX4400 to support EX4400-EM-1C. The System CPLD version should be 0.6 for EX4400-24X.

EX4400-24X:

Before upgrade:

```
user@host> show system firmware
Part             Type              Tag Current              Available            Status
                                       version              version
FPC 0            BIOS                  15.01.00             20.01.00             OK
FPC 0            CPU CPLD              1.0                  1.1                  OK
FPC 0            System CPLD           .5                     .6                  OK
```

```
user@host> show chassis firmware
root@lagam-vc-p1c3-01> show chassis firmware
Part                 Type       Version
FPC 0                loader     FreeBSD EFI loader 2.0
                     BIOS       CDEN_P_EX1_00.15.01.00
                     System CPLD version 0.5
                     CPU CPLD version 1.0
```

After upgrade:

```
user@host> show chassis firmware
Part                 Type       Version
FPC 0                loader     FreeBSD EFI loader 2.0
                     BIOS       CDEN_P_EX1_00.20.01.00
                     System CPLD .6 <<<<<<<<<<<<<<<<<<<
                     CPU CPLD   1.1
```

EX-4400 (EX4400-24MP, EX4400-24P, EX4400-24T, EX4400-48F, EX4400-48MP, EX4400-48P, and EX4400-48T):

Before upgrade:

```
user@host> show system firmware
Part             Type              Tag Current              Available            Status
                                       version              version
FPC 0            BIOS                  15.01.00             20.01.00             OK
```

```
FPC 0            CPU CPLD              1.0                  1.1                  OK
FPC 0            System CPLD           .f                   1.0                  OK
```

```
user@host> show chassis firmware
Part                     Type       Version
FPC 0                    loader     FreeBSD EFI loader 2.0
                         BIOS       CDEN_P_EX1_00.15.01.00
                         System CPLD 0.f
                         CPU CPLD    1.0
```

After upgrade:

```
user@host> show chassis firmware
Part                     Type       Version
FPC 0                    loader     FreeBSD EFI loader 2.0
                         BIOS       CDEN_P_EX1_00.20.01.00
                         System CPLD  1.0 <<<<<<<<<<<<<<<<
                         CPU CPLD     1.1
```

Upgrading PoE Firmware

1. Check the current firmware version.

```
user@host> show chassis firmware detail
FPC 0
   PoE firmware            1.3.0.9.0
   Boot Firmware
      U-Boot               1.0
   Boot Firmware
      loader               FreeBSD EFI loader 2.0
```

2. Check the availability of a new PoE version in the latest Junos version.

```
user@host> show poe controller
```

```
user@host> show poe controller
Controller  Maximum   Power         Guard    Management   Status        Lldp
index       power     consumption   band                               Priority
   0**      740W      0.00W           0W     Class        BT_MODE       Disabled
  **New PoE software upgrade available.
 Use 'request system firmware upgrade poe fpc-slot <slot>'
 This procedure will take around 10 minutes (recommended to be performed during maintenance)
```

3. Upgrade the PoE firmware.

```
request system firmware upgrade poe fpc-slot <slot>
```

```
Firmware upgrade initiated. Poe Upgrade takes about 10 minutes
Use 'show poe controller' to get the download status,
Please Reboot the system after Upgrade is complete.
```

4. Monitor the PoE upgrade under the "status" field.

```
user@host> show poe controller | refresh 60
```

```
user@host> Controller  Maximum   Power         Guard    Management   Status        Lldp
index       power     consumption   band                               Priority
   0**      740W      0.00W           0W                 SW_DOWNLOAD(5%) Disabled
  **New PoE software upgrade available.
 Use 'request system firmware upgrade poe fpc-slot <slot>'
 This procedure will take around 10 minutes (recommended to be performed during maintenance)
---(refreshed at 2022-05-11 06:58:49 UTC)---
---(refreshed at 2022-05-11 07:06:49 UTC)---
Controller  Maximum   Power         Guard    Management   Status        Lldp
index       power     consumption   band                               Priority
   0**      740W      0.00W           0W                 SW_DOWNLOAD(100%) Disabled
  **New PoE software upgrade available.
 Use 'request system firmware upgrade poe fpc-slot <slot>'
```

```
 This procedure will take around 10 minutes (recommended to be performed during maintenance)
---(refreshed at 2022-05-11 07:07:49 UTC)---
Controller  Maximum   Power         Guard    Management   Status        Lldp
index       power     consumption   band                               Priority
   0        740W      0.00W           0W                 BT_MODE       Disabled
```

5. (Recommended) Perform a system halt using the following command.

```
user@host> request system halt
```

6. Power cycle the device for the upgrade to take effect.
7. Check the upgraded PoE.

   Before upgrade:

```
user@host> show chassis firmware detail
FPC 0
   PoE firmware            1.3.0.9.0
   Boot Firmware
      U-Boot               1.0
   Boot Firmware
      loader               FreeBSD EFI loader 2.0
```

   After upgrade:

```
user@host> show chassis firmware detail
FPC 0
   PoE firmware            1.3.0.11.0
   Boot Firmware
      U-Boot               1.0
   Boot Firmware
      loader               FreeBSD EFI loader 2.0
```

Upgrading PoE Firmware Using jfirmware

1. Check the current firmware version.

```
user@host> show chassis firmware detail
FPC 0
   PoE firmware            1.3.0.9.0
   Boot Firmware
      U-Boot               1.0
   Boot Firmware
      loader               FreeBSD EFI loader 2.0
```

2. Check the availability of a new PoE version in the latest Junos version.

```
user@host> show poe controller
```

```
user@host> show poe controller
Controller  Maximum   Power         Guard    Management   Status        Lldp
index       power     consumption   band                               Priority
   0**      740W      0.00W           0W     Class        BT_MODE       Disabled
  **New PoE software upgrade available.
 Use 'request system firmware upgrade poe fpc-slot <slot>'
 This procedure will take around 10 minutes (recommended to be performed during maintenance)
```

3. Upgrade the PoE firmware using jfirmware.

```
request system firmware upgrade jfirmware poe file jfirmware-file fpc-slot (number | all-
members)
 <poe-at-firmware | poe-bt-firmware>
```

- `file (jfirmware-file)` is the file name of the jfirmware package.
- `fpc-slot (number | all-members)` is the Virtual Chassis member or line card specified by number.

For example:

```
user@host> request system firmware upgrade jfirmware poe file jfirmware-ex.tgz fpc-slot 0
```

```
Firmware upgrade initiated. Poe Upgrade takes about 10 minutes
Use 'show poe controller' to get the download status,
Please Reboot the system after Upgrade is complete.
```

4. Monitor the PoE upgrade under the "status" field.

```
user@host> show poe controller | refresh 60
```

```
user@host> Controller  Maximum   Power         Guard    Management   Status        Lldp
index       power     consumption   band                               Priority
   0**      740W      0.00W           0W                 SW_DOWNLOAD(5%) Disabled
  **New PoE software upgrade available.
 Use 'request system firmware upgrade poe fpc-slot <slot>'
 This procedure will take around 10 minutes (recommended to be performed during maintenance)
---(refreshed at 2022-05-11 06:58:49 UTC)---
---(refreshed at 2022-05-11 07:06:49 UTC)---
Controller  Maximum   Power         Guard    Management   Status        Lldp
index       power     consumption   band                               Priority
   0**      740W      0.00W           0W                 SW_DOWNLOAD(100%) Disabled
  **New PoE software upgrade available.
 Use 'request system firmware upgrade poe fpc-slot <slot>'
 This procedure will take around 10 minutes (recommended to be performed during maintenance)
---(refreshed at 2022-05-11 07:07:49 UTC)---
Controller  Maximum   Power         Guard    Management   Status        Lldp
index       power     consumption   band                               Priority
   0        740W      0.00W           0W                 BT_MODE       Disabled
```

5. (Recommended) Perform a system halt using the following command.

```
user@host> request system halt
```

6. Power cycle the device for the upgrade to take effect.

7. Check the upgraded PoE.

```
user@host> show chassis firmware detail
```

```
user@host> show chassis firmware detail
FPC 0
   PoE firmware            1.3.0.11.0
   Boot Firmware
      U-Boot               1.0
   Boot Firmware
      loader               FreeBSD EFI loader 2.0
```

Upgrading eMMC Firmware

Perform the following steps to upgrade the eMMC formware:

1. Add jfirmware.

```
user@root> request system software add /var/tmp/jfirmware-ex.tgz
```

2. Upgrade eMMC firmware.

```
user@root> request system firmware upgrade jfirmware mmc
```

3. Check the progress of the upgrade.

```
user@root> request system firmware upgrade jfirmware mmc progress
```

4. Reboot the system.

```
user@root> request system reboot
Reboot the system ? [yes,no] (no) yes
```

5. Use the following command to confirm the eMMC version.

Before upgrade:

```
user@host> show system storage mmc status mmcsd0

Showing MMC status information
Device :  mmcsd0
        General information
        -------------------
        Disk size             : 20635975680B (19GB)
        Product name          : ATPBG2
        Product revision      : 1.3
        Product serial number : 894418974 (0x354FC01E)
        Manufacturing Date    : 05/2021
        Manufacturer          : Unrecognized
        Firmware version      : Q92-6192817UJ05P33         Health status
        -------------
        Pre EOL Information       : Normal
        Life time estimate Type-A : 0% - 10% device life time used
```

After upgrade:

```
user@host> show system storage mmc status mmcsd0

Device :  mmcsd0
        General information
        -------------------
        Disk size             : 20635975680B (19GB)
        Product name          : ATPBG2
        Product revision      : 1.3
        Product serial number : 894418974 (0x354FC01E)
        Manufacturing Date    : 05/2021
        Manufacturer          : Unrecognized
        Firmware version      : R92-6192817TH12P55         Health status    <<<<<<<<
        -------------
        Pre EOL Information       : Normal
        Life time estimate Type-A : 0% - 10% device life time used
```

Upgrading Firmware in Virtual Chassis

Perform the following steps to upgrade the VC firmware:

1. Add the jfirmware package in primary Routing Engine (RE).

```
user@host> request system software add /var/tmp/jfirmware-ex.tgz
```

2. Upgrade the BIOS and check the status in primary RE.

```
user@host> request system firmware upgrade jfirmware bios
```

```
user@host> request system firmware upgrade jfirmware bios progress
```

3. Upgrade the System CPLD and check the status in primary RE.

```
user@host> request system firmware upgrade jfirmware cpld sys
```

```
user@host> request system firmware upgrade jfirmware cpld sys progress
```

4. Upgrade the CPU CPLD and check the status in primary RE.

```
user@host> request system firmware upgrade jfirmware cpld cpu
```

```
user@host> request system firmware upgrade jfirmware cpld cpu progress
```

5. Repeat the steps 2, 3, and 4 in each member of the VC by logging in to the member. Use the `request session member <fpc-slot>` command to log in.
6. Power cycle or reboot all the members of the VC. Reboot the members one by one after the upgrade is successful after Step 4 depending on either CPLD or BIOS upgrade.

Checking Latest Firmware Versions

To check the latest firmware versions available, execute the `show system firmware` command. If a new firmware version is available, upgrade using the latest jfirmware package.

Upgrading U-Boot, PoE Firmware, eUSB Firmware, and System CPLD for EX4100 Devices

SUMMARY

IN THIS SECTION

The following sections describe the steps to upgrade U-boot, CPLD, and VC firmware in EX4100.

Upgrading U-Boot

Perform the following steps to upgrade the CPU:

1. Add jfirmware.

```
user@host> request system software add /var/tmp/jfirmware-ex-arm-64-22.3R1.12.tgz
```

2. Upgrade U-Boot.

```
user@host> request system firmware upgrade jfirmware uboot
```

   The system initiates the firmware upgrade.

3. Check the progress of the upgrade.

```
user@root> request system firmware upgrade jfirmware uboot progress
```

4. Reboot the system if the firmware upgrade is completed successfully.

```
user@root> request system reboot at now
```

5. Check the following command to confirm the U-boot version.

   Before upgrade:

```
user@host> show chassis firmware
Part                  Type       Version
FPC 0                U-Boot     1.5
                         loader     FreeBSD EFI loader 2.0
                         CPLD       1.4a
                         eUSB        200403
                         PSUs       5.5-5.5
                         PMIC       R0A
```

   After upgrade:

```
root@HW-sys> show chassis firmware
Part                  Type       Version
FPC 0                 U-Boot      1.6  <<<<<<<<<<<<<<<
                         loader     FreeBSD EFI loader 2.0
                         CPLD       1.4a
                         eUSB        200403
                         PSUs       5.5-5.5
                         PMIC       R0A
```

Upgrading System CPLD

Perform the following steps to upgrade the system CPLD:

1. Add jfirmware.

```
user@host> request system software add /var/tmp/jfirmware-ex.tgz
```

2. Upgrade system CPLD.

```
user@host> request system firmware upgrade jfirmware cpld sys
```

3. Check the progress of the CPLD upgrade.

```
user@host> request system firmware upgrade jfirmware cpld sys progress
```

4. (Recommended) Perform a system halt using the following command.

```
user@host> request system halt
```

5. Power cycle the device for the upgrade to take effect.
6. Use the following commands to confirm the CPLD version.

   Before upgrade:

```
user@root> show system firmware
Part            Type             Tag Current             Available           Status
                                     version             version
FPC 0           CPLD                 1.46                1.4a                OK
FPC 0           U-Boot               1.2                 1.6                 OK
```

   After upgrade:

```
user@host> show chassis firmware
Part                  Type       Version
FPC 0               U-Boot     1.6
                    loader     FreeBSD EFI loader 2.0
                    CPLD       1.4a
                    eUSB       200403
```

```
                    PSUs        5.5-5.5
                    PMIC        R0A
```

Upgrading PoE Firmware

See "Upgrading PoE Firmware" on page 395.

Upgrading PoE Firmware Using jfirmware

"Upgrading PoE Firmware Using jfirmware" on page 398
See

Upgrading eUSB Firmware

Perform the following steps to upgrade the eUSB firmware:

1. Add jfirmware.

```
user@root> request system software add /var/tmp/jfirmware-ex.tgz
```

2. Upgrade the eUSB firmware.

```
user@root> request system firmware upgrade jfirmware eusb
```

   Initiates the firmware upgrade.

3. Check the progress of the upgrade.

```
user@root> request system firmware upgrade jfirmware eusb progress
```

4. Use the following commands to confirm the eUSB version.

Before upgrade:

```
user@host> show chassis firmware
Part                  Type       Version
FPC 0                U-Boot     1.6
                         loader     FreeBSD EFI loader 2.0

                         CPLD       1.48
                         eUSB        0909-000
                         PSUs       5.5-5.5
                         PMIC       R0A
```

After upgrade:

```
user@host> show chassis firmware
Part                  Type       Version
FPC 0                U-Boot     1.6
                         loader     FreeBSD EFI loader 2.0

                         CPLD       1.4a
                        eUSB       200403    <<<<<<<<<<<<<<<<<<<
                         PSUs       5.5-5.5
                         PMIC       R0A
```

Upgrading Firmware in Virtual Chassis

Perform the following steps for the firmware upgrade in VC:

1. Add the jfirmware package in primary.

```
user@host> request system software add /var/tmp//jfirmware-ex.tgz.tgz
```

2. Upgrade the U-Boot in primary and check the status.

```
user@host> request system firmware upgrade jfirmware uboot
```

```
user@host> request system firmware upgrade jfirmware uboot progress
```

3. Upgrade the System CPLD in primary and check the status.

```
user@host> request system firmware upgrade jfirmware cpld sys
```

```
user@host> request system firmware upgrade jfirmware cpld sys progress
```

4. Repeat steps 2 and 3 in each member of the VC by logging in to the member. Use the `request session member <fpc-slot>` to log in.
5. Power cycle or reboot all the members of the VC. Reboot the members one by one after the upgrade is successful after Step 4 depending on either CPLD or BIOS upgrade.

Installing and Upgrading Firmware

IN THIS SECTION

To get the optimal network performance, and to fix a vulnerability, you can upgrade the firmware on your device.

Before You Begin Installing or Upgrading the Firmware

Before you begin installing or upgrading the firmware on the MIC or PIC, complete the following steps:

1. Verify that a previous version of the firmware package is installed on the router by using the `show version` command.

   show version (MX240, MX480, MX960, MX2010, MX2020)

```
user@host> show version
Hostname: mxHost
Model: mx480
Junos: 15.1I20160816_2117_yyin
JUNOS OS Kernel 64-bit (WITNESS) [20160723.102341_fbsd-builder_stable_10]
JUNOS OS libs [20160723.102341_fbsd-builder_stable_10]
JUNOS OS runtime [20160723.102341_fbsd-builder_stable_10]
JUNOS OS time zone information [20160723.102341_fbsd-builder_stable_10]
...
JUNOS jfirmware [20160628.005233_builder_release_151_f_throttle]
JUNOS Online Documentation [20160812.205759_yyin_release_151_f_throttle]
JUNOS FIPS mode utilities [20160816.211724_yyin_release_151_f_throttle]
....
```

   show version (PTX3000 and PTX5000)

```
user@host> show version
Hostname: ptxHost
Model: ptx3000
Junos: 15.1F-20160720.0
JUNOS Base OS boot [15.1F-20160720.0]
JUNOS Base OS Software Suite [15.1F-20160720.0]
JUNOS platform Software Suite [15.1F-20160720.0]
JUNOS Web Management [15.1F-20160720.0]
JUNOS Runtime Software Suite [15.1F-20160720.0]
JUNOS Online Documentation [15.1F-20160720.0]
...
JUNOS jfirmware [20160628.005233_builder_release_151_f_throttle]
JUNOS 64-bit Runtime Software Suite [15.1F-20160720.0]
JUNOS Packet Forwarding Engine Simulation Package [15.1F-20160720.0]
JUNOS Packet Forwarding Engine Support (M/T/EX Common) [15.1F-20160720.0]
```

```
JUNOS Packet Forwarding Engine Support (T-Series) [15.1F-20160720.0]
JUNOS Routing Software Suite [15.1F-20160720.0]
```

show version (ACX6360)

```
user@host> show version
Hostname: YYY

Model: ACX6360-OR
Junos: 18.3I20180430_1917_XXX
JUNOS OS Kernel 64-bit (WITNESS) [20180413.173511_fbsd-builder_stable_11]
JUNOS OS libs [20180413.173511_fbsd-builder_stable_11]
JUNOS OS runtime [20180413.173511_fbsd-builder_stable_11]
JUNOS OS time zone information [20180413.173511_fbsd-builder_stable_11]
...
JUNOS jfirmware [20180430.191738_XXX_dev_common]
JUNOS Online Documentation [20180430.191738_XXX_dev_common]
...
```

If the output of the `show version` command displays `JUNOS jfirmware..` among the list of packages that are installed on the router, then a previous version of the firmware package is installed on the router. If the output of the `show version` command does not display `JUNOS jfirmware..` among the list of packages that are installed on the router, the firmware package is not installed on the router.

2. If a previous version of the firmware package is installed on the router, delete the firmware package from the router by using the `request system software delete` command. If a previous version of the firmware package is not installed on the router, then proceed to install the firmware package. For information about how to install the firmware package, see "Installing Firmware on the 100-Gigabit DWDM OTN MIC (MIC3-100G-DWDM) " on page 414 or "Installing Firmware on the 5-Port 100-Gigabit DWDM OTN PIC (PTX-5-100G-WDM) " on page 411. For information about how to install the firmware package on ACX6360 router, see "Installing Firmware on ACX6360 Router" on page 417.

```
user@host> request system software delete jfirmware
/packages/db/jfirmware-x86-32-15.1F-20160625.0
```

3. To verify that the firmware package is removed from the router, use the `show version` command.

```
user@host> show version
Hostname: mxHost
Model: mx240
```

```
Junos: 15.1F6-S1.3
JUNOS OS Kernel 64-bit  [20160724.331042_builder_stable_10]
JUNOS OS libs [20160724.331042_builder_stable_10]
JUNOS OS runtime [20160724.331042_builder_stable_10]
JUNOS OS time zone information [20160724.331042_builder_stable_10]
....
JUNOS IDP Services [20160812.205945_builder_junos_151_f6_s1]
....
JUNOS Packet Forwarding Engine Support (M/T Common) [20160812.205945_builder_junos_151_f6_s1]
JUNOS Online Documentation [20160812.205945_builder_junos_151_f6_s1]
JUNOS FIPS mode utilities [20160812.205945_builder_junos_151_f6_s1]
```

show version (ACX6360)

```
user@host> show version
Hostname: YYY

Model: ACX6360-OR
Junos: 18.3I20180430_1917_XXX
JUNOS OS Kernel 64-bit (WITNESS) [20180413.173511_fbsd-builder_stable_11]
JUNOS OS libs [20180413.173511_fbsd-builder_stable_11]
JUNOS OS runtime [20180413.173511_fbsd-builder_stable_11]
JUNOS OS time zone information [20180413.173511_fbsd-builder_stable_11]
...

JUNOS IDP Services [20180430.191738_XXX_dev_common]
...
JUNOS Online Documentation [20180430.191738_XXX_dev_common]
...
```

If the firmware package is uninstalled successfully, the output of the `show version` command does not display `JUNOS jfirmware.` among the list of packages that are installed on the router.

Installing Firmware on the 5-Port 100-Gigabit DWDM OTN PIC (PTX-5-100G-WDM)

Before you install the firmware package, ensure that a previous version is not installed on the router. For more information, see "Before You Begin Installing or Upgrading the Firmware" on page 409.

To install the firmware package, complete the following steps:

1. Upgrade Junos OS on the router to the version that supports the firmware package. See Installing the Software Package on a Device with Redundant Routing Engines (Junos OS) or "Installing the Software Package on a Router with a Single Routing Engine (Junos OS)" on page 123 for more information.
2. Download the firmware package from https://support.juniper.net/support/downloads/. For information about downloading software packages, see "Downloading Software (Junos OS)" on page 108.

   NOTE: Download the firmware package specific to your router. The firmware package for PTX Series routers is different from the firmware package for the MX Series routers.

3. Save the firmware package to the `/var/path/package-name` directory on the router. For example, you can save the firmware package to the `/var/tmp` directory.
4. Install the firmware package by using the `request system software add path/package-name` command. For example, to install the `jfirmware-15.1F6.9.tgz` package:

```
user@host> request system software add jfirmware-15.1F6.9.tgz
```

5. Run the `show version` command to verify that the firmware package is installed.

```
user@host> show version
```

   After the firmware package is installed successfully, the output of the `show version` command displays `Junos jfirmware..` among the list of packages that are installed on the router.

Upgrading Firmware on the 5-Port 100-Gigabit DWDM OTN PIC (PTX-5-100G-WDM)

Before you upgrade the firmware package, ensure that a previous version is not installed on the router. For more information, see "Before You Begin Installing or Upgrading the Firmware" on page 409.

To upgrade the version of your firmware, complete the following steps:

1. Run the `show system firmware` command to view the list of components installed on the router and the firmware version for each component.

```
user@host> show system firmware
Part       Type           Tag Current   Available Status
                       version   version
```

```
FPC 0       ROM Monitor 0  0   10.4.1              OK
FPC 1       ROM Monitor 0  0   10.4.1              OK
FPC 2       ROM Monitor 0  0   10.4.1              OK
  PIC 0     CMIC LTC 2/0   1   .0        1.0       OK
FPC 3       ROM Monitor 0  0   10.4.1              OK
FPC 4       ROM Monitor 0  0   13.3.1              OK
FPC 4       MPCS(0)        2   0.24.0              OK
Routing Engine 0 RE BIOS        0   1.18           OK
Routing Engine 1                0   1.18           OK
```

The output of the `show system firmware` command displays the current firmware version of the PIC as `.0` and the available firmware version as `1.0`.

2. To upgrade the firmware of the PIC, use the `request system firmware upgrade pic` command. For example, to upgrade the firmware version of the PIC from `.0` to `1.0`, specify the FPC slot and PIC slot in the command.

```
user@host> request system firmware upgrade pic pic-slot 0 fpc-slot 2
Part             Type           Tag Current   Available Status
                    version   version
FPC 2
  PIC 0          CMIC LTC 2/0   1   .0        1.0       OK
Perform indicated firmware upgrade ? [yes,no] (no) yes
```

Confirm that you want to perform the firmware upgrade by typing `Yes` so the firmware upgrade is initiated.

3. To monitor the progress of the upgrade, use the `show system firmware` command. During the installation process, the status of the PIC changes to `PROGRAMMING`. When the installation process is complete, the status of the PIC changes to `UPGRADED SUCCESSFULLY`.

NOTE: The amount of time it takes to upgrade firmware varies depending on the component.

```
user@host> show system firmware
Part        Type           Tag Current   Available Status
                version   version
FPC 0            ROM Monitor 0  0   10.4.1             OK
FPC 1            ROM Monitor 0  0   10.4.1             OK
FPC 2            ROM Monitor 0  0   10.4.1             OK
  PIC 0          CMIC LTC 2/0   1   1.0        1.0     UPGRADED SUCCESSFULLY
FPC 3            ROM Monitor 0  0   10.4.1             OK
```

```
FPC 4            ROM Monitor 0  0   13.3.1              OK
FPC 4            MPCS(0)        2   0.24.0              OK
Routing Engine 0 RE BIOS        0   1.18                OK
Routing Engine 1                0   1.18                OK
```

NOTE: If the installation process fails, delete the firmware package by using the `request system software delete` *`firmware-package-name`* command. Reinstall the firmware package by following the procedure for installing the firmware package and then upgrade the firmware package.

4. Restart the FPC that the PIC is installed in by using the `request chassis fpc` *`fpc-slot`* `restart` command.
5. (Optional) After the firmware upgrade is successfully completed, uninstall the firmware package from the router by using the `request system software delete` command.

Installing Firmware on the 100-Gigabit DWDM OTN MIC (MIC3-100G-DWDM)

Before you install the firmware package, ensure that a previous version is not installed on the router. For more information, see "Before You Begin Installing or Upgrading the Firmware" on page 409.

To install the firmware package, complete the following steps:

1. Upgrade Junos OS on the router to the version that supports the firmware package. See Installing the Software Package on a Device with Redundant Routing Engines (Junos OS) or "Installing the Software Package on a Router with a Single Routing Engine (Junos OS)" on page 123 for more information.
2. Download the firmware package from https://support.juniper.net/support/downloads/. For information about downloading software packages, see "Downloading Software (Junos OS)" on page 108.

NOTE: Download the firmware package specific to your router. The firmware package for MX Series routers is different from the firmware package for the PTX Series routers.

3. Save the firmware package to the `/var/`*`path`*`/`*`package-name`* directory on the router. For example, you can save the firmware package to the `/var/tmp` directory.

4. Install the firmware package by using the `request system software add /var/path/package-name` command. For example, to install the `jfirmware-x86-32-15.1F6.9.tgz` package:

```
user@host> request system software add jfirmware-x86-32-15.1F6.9.tgz
```

5. Run the `show version` command to verify that the firmware package is installed.

```
user@host> show version
Hostname: Host1
Model: mx480
Junos: 15.1I20160816_2117_yyin
JUNOS OS Kernel 64-bit (WITNESS) [20160723.102341_fbsd-builder_stable_10]
JUNOS OS libs [20160723.102341_fbsd-builder_stable_10]
JUNOS OS runtime [20160723.102341_fbsd-builder_stable_10]
JUNOS OS time zone information [20160723.102341_fbsd-builder_stable_10]
...
JUNOS jfirmware [20160628.005233_builder_release_151_f_throttle]
JUNOS Online Documentation [20160812.205759_yyin_release_151_f_throttle]
JUNOS FIPS mode utilities [20160816.211724_yyin_release_151_f_throttle]
....
```

After the firmware package is installed successfully, the output of the `show version` command displays `JUNOS jfirmware..` among the list of packages that are installed on the router.

Upgrading Firmware on the 100-Gigabit DWDM OTN MIC (MIC3-100G-DWDM)

Before you upgrade the firmware package, ensure that a previous version is not installed on the router. For more information, see "Before You Begin Installing or Upgrading the Firmware" on page 409.

To upgrade the version of your firmware package, complete the following steps:

1. Run the `show system firmware` command to view the list of components installed on the router and the firmware version for each component.

```
user@host> show system firmware
Part       Type           Tag Current   Available Status
                  version   version
FPC 0            ROM Monitor 0  0   10.4.1             OK
```

```
FPC 1            ROM Monitor 0  0   10.4.1             OK
FPC 2            ROM Monitor 0  0   10.4.1             OK
  PIC 0          CMIC LTC 2/0   1   .0        1.0      OK
FPC 3            ROM Monitor 0  0   10.4.1             OK
FPC 4            ROM Monitor 0  0   13.3.1             OK
FPC 4            MPCS(0)        2   0.24.0             OK
Routing Engine 0 RE BIOS        0   1.18               OK
Routing Engine 1                0   1.18               OK
```

The output of the `show system firmware` command displays the current firmware version of the MIC as `.0` and the available firmware version as `1.0`.

2. To upgrade the firmware of the MIC, use the `request system firmware upgrade pic` command. For example, to upgrade the firmware version of the MIC from `.0` to `1.0`, specify the MPC slot and MIC slot in the command.

```
user@host> request system firmware upgrade pic pic-slot 0 fpc-slot 2
Part             Type           Tag Current   Available Status
                    version   version
FPC 2
  PIC 0          CMIC LTC 2/0              1   .0        1.0       OK
Perform indicated firmware upgrade ? [yes,no] (no) yes
```

Confirm that you want to perform the firmware upgrade by typing `Yes` so the firmware upgrade is initiated.

3. To monitor the progress of the upgrade, use the `show system firmware` command. During the installation process, the status of the MIC changes to `PROGRAMMING`. When the installation process is complete, the status of the MIC changes to `UPGRADED SUCCESSFULLY`.

NOTE: The amount of time it takes to upgrade firmware varies depending on the component.

```
user@host> show system firmware
Part       Type           Tag Current   Available Status
                 version   version
FPC 0            ROM Monitor 0  0   10.4.1             OK
FPC 1            ROM Monitor 0  0   10.4.1             OK
FPC 2            ROM Monitor 0  0   10.4.1             OK
  PIC 0          CMIC LTC 2/0   1   .0        1.0      OK
FPC 3            ROM Monitor 0  0   10.4.1             OK
FPC 4            ROM Monitor 0  0   13.3.1             OK
```

```
FPC 4            MPCS(0)        2   0.24.0              OK
Routing Engine 0 RE BIOS        0   1.18                OK
Routing Engine 1                0   1.18                  OK
```

NOTE: If the installation process fails, delete the firmware package by using the `request system software delete` *`firmware-package-name`* command. Reinstall the firmware package by following the procedure for installing the firmware package and then upgrade the firmware package.

4. Restart the MPC that the MIC is installed in by using the `request chassis fpc` *`fpc-slot`* `restart` command.
5. (Optional) After the firmware upgrade is successfully completed, uninstall the firmware package from the router by using the `request system software delete` command.

Installing Firmware on ACX6360 Router

Before you install the firmware package, ensure that a previous version is not installed on the router. For more information, see "Before You Begin Installing or Upgrading the Firmware" on page 409.

To install the firmware package, complete the following steps:

1. Upgrade Junos OS on the router to the version that supports the firmware package. See Installing the Software Package on a Device with Redundant Routing Engines (Junos OS) or "Installing the Software Package on a Router with a Single Routing Engine (Junos OS)" on page 123 for more information.
2. Download the firmware package from https://support.juniper.net/support/downloads/. For information about downloading software packages, see "Downloading Software (Junos OS)" on page 108.

NOTE: Download the firmware package specific to your router. The firmware package for ACX Series routers is different from the firmware package for the MX or PTX Series routers.

3. Save the firmware package to the `/var/`*`path`*`/`*`package-name`* directory on the router. For example, you can save the firmware package to the `/var/tmp` directory.
4. Install the firmware package by using the `request system software add /var/`*`path`*`/`*`package-name`* command. For example, to install the `jfirmware-x86-32-15.1F6.9.tgz` package:

```
user@host> request system software add jfirmware-x86-32-15.1F6.9.tgz
```

5. Run the `show version` command to verify that the firmware package is installed.

```
user@host> show version
Hostname: YYY

Model: ACX6360-OR
Junos: 18.3I20180430_1917_XXX
JUNOS OS Kernel 64-bit (WITNESS) [20180413.173511_fbsd-builder_stable_11]
JUNOS OS libs [20180413.173511_fbsd-builder_stable_11]
JUNOS OS runtime [20180413.173511_fbsd-builder_stable_11]
JUNOS OS time zone information [20180413.173511_fbsd-builder_stable_11]
...
JUNOS jfirmware [20180430.191738_XXX_dev_common]
JUNOS Online Documentation [20180430.191738_XXX_dev_common]
JUNOS jail runtime [20180413.173511_fbsd-builder_stable_11]
....
```

After the firmware package is installed successfully, the output of the `show version` command displays `JUNOS jfirmware..` among the list of packages that are installed on the router.

Upgrading Firmware on the ACX6360 Router

Before you upgrade the firmware package, ensure that a previous version is not installed on the router. For more information, see "Before You Begin Installing or Upgrading the Firmware" on page 409.

To upgrade the version of your firmware package, complete the following steps:

1. Run the `show system firmware` command to view the list of components installed on the router and the firmware version for each component.

```
user@host> show system firmware

Part            Type              Tag Current   Available Status
                                      version   version
Pseudo CB 0     CB FPGA           0   2.12.0    2.12.0    OK
Pseudo CB 0     PORT FPGA         9   1.14.0    1.15.0    OK
Pseudo CB 0     TIC FPGA          11  4101.5.0  4101.5.0  OK
FPC 0                             0   0.0.0     71.63d    OK
PIC 1           DWDM DCO-0/1/0    20  38.1.9    38.2.6    OK
PIC 1           DWDM DCO-0/1/1    21  1.0.0     38.2.6    OK
```

```
PIC 1            DWDM DCO-0/1/2    22  1.0.0     38.2.6    OK
PIC 1            DWDM DCO-0/1/3    23  1.0.0     38.2.6    OK
PIC 1            DWDM DCO-0/1/4    24  1.0.0     38.2.6    OK
PIC 1            DWDM DCO-0/1/5    25  1.0.0     38.2.6    OK
PIC 1            DWDM DCO-0/1/6    26  1.0.0     38.2.6    OK
PIC 1            DWDM DCO-0/1/7    27  1.0.0     38.2.6    OK
Routing Engine 0 RE BIOS           7   0.24.1    0.24.01   OK
Routing Engine 0 RE FPGA           2   9.6.0     9.9.0     OK
Routing Engine 0 RE SSD1           3   12028               OK
Routing Engine 0 RE SSD2           4   12028               OK
Power Supply 0                     0   0.0.0               OK
Power Supply 1                     0   0.0.0               OK
```

The output of the `show system firmware` command displays the current firmware version of the PIC as `.0` and the available firmware version as `1.0`.

2. To upgrade the firmware of the PIC, for ACX6360 use the `request system firmware upgrade pic` command. For example, to upgrade the firmware version of the PIC from `.0` to `1.0`, specify the FPC slot and PIC slot in the command.

```
user@host> request system firmware upgrade pic fpc-slot 0 pic-slot 1

Part             Type              Tag Current   Available Status
                                       version   version
FPC 0
PIC 1            DWDM DCO-0/1/0    20  38.2.9    38.2.6    OK
Perform indicated firmware upgrade ? [yes,no] (no) yes
```

Confirm that you want to perform the firmware upgrade by typing `Yes` so the firmware upgrade is initiated.

3. To monitor the progress of the upgrade, use the `show system firmware` command. During the installation process, the status of the PIC changes to `PROGRAMMING`. When the installation process is complete, the status of the PIC changes to `UPGRADED SUCCESSFULLY`.

NOTE: The amount of time it takes to upgrade firmware varies depending on the component.

```
user@host> show system firmware

Part             Type              Tag Current   Available Status
                                       version   version
```

```
Pseudo CB 0      CB FPGA           0   2.12.0    2.12.0    OK
Pseudo CB 0      PORT FPGA         9   1.14.0    1.15.0    OK
Pseudo CB 0      TIC FPGA          11  4101.5.0  4101.5.0  OK
FPC 0                              0   0.0.0     71.63d    OK
PIC 1            DWDM DCO-0/1/0    20  38.2.6    38.2.6    OK
PIC 1            DWDM DCO-0/1/1    21  1.0.0     38.2.6    OK
PIC 1            DWDM DCO-0/1/2    22  1.0.0     38.2.6    OK
PIC 1            DWDM DCO-0/1/3    23  1.0.0     38.2.6    OK
PIC 1            DWDM DCO-0/1/4    24  1.0.0     38.2.6    OK
PIC 1            DWDM DCO-0/1/5    25  1.0.0     38.2.6    OK
PIC 1            DWDM DCO-0/1/6    26  1.0.0     38.2.6    OK
PIC 1            DWDM DCO-0/1/7    27  1.0.0     38.2.6    OK
Routing Engine 0 RE BIOS           7   0.24.1    0.24.01   OK
Routing Engine 0 RE FPGA           2   9.6.0     9.9.0     OK
Routing Engine 0 RE SSD1           3   12028               OK
Routing Engine 0 RE SSD2           4   12028               OK
Power Supply 0                     0   0.0.0               OK
Power Supply 1                     0   0.0.0               OK
```

NOTE: If the installation process fails, delete the firmware package by using the `request system software delete` *`firmware-package-name`* command. Reinstall the firmware package by following the procedure for installing the firmware package and then upgrade the firmware package.

4. Restart the ACX6360 router by using `request chassis fpc restart slot 0` command for the upgrade to take effect.
5. (Optional) After the firmware upgrade is successfully completed, uninstall the firmware package from the router by using the `request system software delete` command.

RELATED DOCUMENTATION

- show system firmware
- *Configuring OTN Interfaces on MIC3-100G-DWDM MIC*
- *Understanding the PTX-5-100G-WDM PIC*
- *Configuring OTN Interfaces on PTX-5-100G-WDM PIC*

CHAPTER 6

Configuring Root Partitions

Configuring Dual-Root Partitions

IN THIS SECTION

Resilient dual-root partitioning, introduced on Juniper Networks EX Series Ethernet Switches in Juniper Networks Junos operating system (Junos OS) Release 10.4R3, provides additional resiliency to switches in the following ways:

- Allows the switch to boot transparently from the second (alternate) root partition if the system fails to boot from the primary root partition.
- Provides separation of the root Junos OS file system from the **/var** file system. If corruption occurs in the **/var** file system (a higher probability than in the root file system because of the greater frequency of reads and writes in **/var**), the root file system is insulated from the corruption.

NOTE: For instructions on upgrading to a release that supports resilient dual-root partitions from a release that does not, see the release notes. The procedure for upgrading to a resilient dual-root partition release is different from the normal upgrade procedure.

Resilient Dual-Root Partition Scheme (Junos OS Release 10.4R3 and Later)

EX Series switches that ship with Junos OS Release 10.4R3 or later are configured with a root partition scheme that is optimized for resiliency, as shown in Table 24 on page 423.

Table 24: Resilient Dual-Root Partition Scheme

Slice 1	Slice 2	Slice 3		Slice 4
s1a	s2a	s3e	s3d	s4d
/ (root Junos OS)	**/** (root Junos OS)	**/var**	**/var/tmp**	**/config**

In the resilient dual-root partition scheme, the **/var** file system is contained in a separate slice (Slice 3) from the root file systems, the **/config** directory is contained in its own slice (Slice 4), and switches ship from the factory with identical Junos OS images in Slice 1 and Slice 2. The **/var** file system, which has a greater frequency of reads and writes than the root file systems and is therefore more likely to have corruption issues, is isolated from the root directories and the **/config** directory. If the switch fails to boot from the active partition, the switch automatically boots from the alternate root partition and triggers an alarm.

Automatic Fixing of Corrupted Primary Root Partition with the Automatic Snapshot Feature

Resilient dual-root partitioning also provides the *automatic snapshot* feature, which allows the switch to automatically fix a corrupt Junos OS file in the primary root partition. If the automatic snapshot feature is enabled, the switch automatically takes a snapshot of the Junos OS root file system in the alternate root partition and copies it onto the primary root partition, thereby repairing the corrupt file in the primary root partition. The automatic snapshot procedure takes place whenever the system reboots from the alternate root partition, regardless of whether the reboot is due to a command or due to corruption of the primary root partition.

NOTE:

- EX9200 switches do not support the automatic snapshot feature.
- The automatic snapshot feature is enabled by default on the following EX Series switches:
  - EX4550 switches

    - EX Series switches that ship with Junos OS Release 12.3R1 or later
- The automatic snapshot feature is disabled by default on EX Series switches (except the EX4550 switches) running Junos OS Release 12.2 or earlier.
- If the automatic snapshot feature was disabled by default before the switch was upgraded to Junos OS Release 12.3R1 or later, the feature remains disabled (for backward compatibility) by default after the upgrade.
- If the automatic snapshot feature is enabled in a *Virtual Chassis* configuration, the automatic snapshot procedure takes place whenever any member of the Virtual Chassis reboots from its alternate root partition.
- You can enable the automatic snapshot feature by configuring the `auto-snapshot` statement at the `[edit system]` hierarchy level.

The automatic snapshot feature provides an additional layer of fault protection if you maintain the same version of Junos OS in both partitions of resilient dual-root partitions. When `auto-snapshot` is enabled, repair happens automatically. Therefore, the switch does not issue an alarm to indicate that the system has rebooted from the alternate partition. However, it does log the event. You cannot execute a manual snapshot when an automatic snapshot procedure is in process. The login banner indicates that an automatic snapshot operation is in progress and that banner is removed only after the snapshot operation is complete. The next reboot happens from the primary partition.

NOTE: EX Series switches that ship with Junos OS Release 10.4R3 or later are configured with identical Junos OS images in the primary root partition (Slice 1) and the alternate root partition (Slice 2).

However, if you do *not* maintain the same version of Junos OS in both partitions, you might want to disable the automatic snapshot feature. If you have an earlier version of Junos OS in the alternate partition and the system reboots from the alternate root partition, the automatic snapshot feature causes the later Junos OS version to be replaced with the earlier version.

When automatic snapshot is disabled and the system reboots from the alternate root partition, it triggers an alarm indicating that the system has rebooted from its alternate partition.

Earlier Partition Scheme (Junos OS Release 10.4R2 and Earlier)

The partition scheme used in Junos OS 10.4R2 and earlier is shown in Table 25 on page 425.

Table 25: Earlier Partition Scheme

Slice 1		Slice 2		Slice 3	
s1a	s1f	s2a	s2f	s3d	s3e
/ (root Junos OS)	**/var**	(empty until initial software upgrade)	(empty until initial software upgrade)	**/var/tmp**	**/config**

This is the partitioning scheme for a switch shipped with Release 10.4R2 or earlier (or after you reformat the disk during a downgrade from Release 10.4R3 or later to Release 10.4R2 or earlier). In this partitioning scheme, the switch comes from the factory with only one Junos OS image installed in the root Junos OS partition of Slice 1. The first time that you perform a software upgrade, the new Junos OS image is installed in Slice 2. If the switch fails to boot, you must manually trigger it to boot from the alternate partition (rebooting from the alternate partition does not occur automatically).

Understanding Upgrading or Downgrading Between Resilient Dual-Root Partition Releases and Earlier Releases

Upgrading from Release 10.4R2 or earlier to Release 10.4R3 or later differs from other upgrades in two important ways:

- You must install a new loader software package in addition to installing the new Junos OS image.
- Rebooting after the upgrade reformats the disk from three partitions to four partitions. See Table 24 on page 423.

You can perform all operations for this special software upgrade from the CLI.

CAUTION: Back up any important log files because the **/var/log** files are not saved or restored during an upgrade from Release 10.4R2 or earlier to a release that supports resilient dual-root partitions (Release 10.4R3 or later).

We recommend that you also save your **/config** files and any important log files to an external medium because if there is a power interruption during the upgrade process, they might be lost.

RELATED DOCUMENTATION

auto-snapshot | 602

Configuring Root Partitions on SRX Series Devices

IN THIS SECTION

The dual-root partitions help your SRX Series Firewalls to remain functional even if the file system is corrupted. Also, it helps to recover the file system in case of corruption.

Dual-Root Partitioning Scheme on SRX Series Firewalls

IN THIS SECTION

Junos OS Release 10.0 and later support dual-root partitioning on SRX Series Firewalls. Dual-root partitioning allows the SRX Series Firewall to remain functional even if there is file system corruption and to facilitate easy recovery of the file system.

NOTE: Starting in Junos OS Release 12.1X45, single root partitioning is not supported on SRX Series Firewalls.

SRX Series Firewalls running Junos OS Release 9.6 or earlier support a single-root partitioning scheme where there is only one root partition. Because both the primary and backup Junos OS images are located on the same root partition, the system fails to boot if there is corruption in the root file system. The dual-root partitioning scheme guards against this scenario by keeping the primary and backup Junos OS images in two independently bootable root partitions. If the primary root partition becomes corrupted, the system can still boot from the backup Junos OS image located in the other root partition and remain fully functional.

SRX Series Firewalls that ship with Junos OS Release 10.0 or later are formatted with dual-root partitions from the factory. SRX Series Firewalls that are running Junos OS Release 9.6 or earlier can be formatted with dual-root partitions when they are upgraded to Junos OS Release 10.0 or later.

NOTE: Although you can install Junos OS Release 10.0 or later on SRX Series Firewalls with the single-root partitioning scheme, we strongly recommend the use of the dual-root partitioning scheme.

Boot Media and Boot Partition on SRX Series Firewalls

When the SRX Series Firewall powers on, it tries to boot the Junos OS from the default storage media. If the device fails to boot from the default storage media, it tries to boot from the alternate storage media.

Table 26 on page 427 provides information on the storage media available on SRX Series Firewalls.

Table 26: Storage Media on SRX Series Firewalls

SRX Series Firewalls	Storage Media
SRX100, SRX210, and SRX240	• Internal NAND flash (default; always present) • USB storage device (alternate)
SRX110, SRX220	• CompactFlash (default; always present) • USB storage device (alternate)

Table 26: Storage Media on SRX Series Firewalls *(Continued)*

SRX Series Firewalls	Storage Media
SRX300, SRX320, and SRX340, and SRX345	• eUSB disk (default; always present) • USB storage device (alternate)
SRX380	• Internal SSD (default, always present). • USB storage device (alternate)
SRX550	• Internal CF (default; always present) • USB storage device (alternate)
SRX550M	• Internal CF (default; always present) • USB storage device (alternate)
SRX650	• Internal CF (default; always present) • External flash card (alternate) • USB storage device (alternate)

With the dual-root partitioning scheme, the SRX Series Firewall first tries to boot Junos OS from the primary root partition and then from the backup root partition on the default storage media. If both primary and backup root partitions of a media fail to boot, then the SRX Series Firewall tries to boot from the next available type of storage media. The SRX Series Firewall remains fully functional even if it boots Junos OS from the backup root partition of the storage media.

Important Features of the Dual-Root Partitioning Scheme

The dual-root partitioning scheme has the following important features:

- The primary and backup copies of Junos OS images reside in separate partitions. The partition containing the backup copy is mounted only when required. With the single-root partitioning scheme, there is one root partition that contains both the primary and the backup Junos OS images.

- The `request system software add` command for a Junos OS package erases the contents of the other root partition. The contents of the other root partition will not be valid unless software installation is completed successfully.
- Add-on packages, such as `jais` or `jfirmware`, can be reinstalled as required after a new Junos OS image is installed.
- The `request system software rollback` command does not delete the current Junos OS image. It is possible to switch back to the image by issuing the `rollback` command again.
- The `request system software delete-backup` and `request system software validate` commands do not take any action.

Understanding Automatic Recovery of the Primary Junos OS Image with Dual-Root Partitioning

The auto-snapshot feature repairs the corrupted primary root when the device reboots from the alternate root. This is accomplished by taking a snapshot of the alternate root onto the primary root automatically rather than manually from the CLI.

When this feature is enabled, and the device reboots from the alternate root (because of a corrupted primary root or power cycle during restart), the following actions take place:

1. A prominent message is displayed indicating a failure to boot from the primary root.

```
**************************************************************************
**                                                                      **
**  WARNING: THIS DEVICE HAS BOOTED FROM THE BACKUP JUNOS IMAGE         **
**                                                                      **
**  It is possible that the primary copy of JUNOS failed to boot up     **
**  properly, and so this device has booted from the backup copy.       **
**                                                                      **
**  Please re-install JUNOS to recover the primary copy in case         **
**  it has been corrupted and if auto-snapshot feature is not           **
**  enabled.                                                            **
**                                                                      **
**************************************************************************
```

2. A system `boot from backup root` alarm is set. This is useful for devices that do not have console access.
3. A snapshot of the alternate root onto the primary root is made.
4. Once the snapshot is complete, the system `boot from backup root` alarm is cleared.

During the next reboot, the system determines the good image on the primary root and boots normally.

NOTE: We recommend performing the snapshot once all the processes start. This is done to avoid any increase in the reboot time.

NOTE:

- Auto-snapshot feature is supported on SRX300, SRX320, SRX340, SRX345, SRX380, and SRX550M devices.
- By default the auto-snapshot feature is disabled.
- If you do not maintain the same version of Junos OS in both partitions, ensure that the automatic snapshot feature remains disabled. Otherwise, if you have an earlier version of Junos OS in the alternate partition and the system reboots from the alternate root partition, the automatic snapshot feature causes the later Junos OS version to be replaced with the earlier version.
- When automatic snapshot is disabled and the system reboots from the alternate root partition, it triggers an alarm indicating that the system has rebooted from its alternate partition.

Enable this feature with the `set system auto-snapshot` command. Once the primary root partition is recovered using this method, the device will successfully boot from the primary root partition on the next reboot.

Execute the `delete system auto-snapshot` command to delete all backed up data and disable auto-snapshot, if required.

Use the `show system auto-snapshot` command to check the auto-snapshot status.

When auto-snapshot is in progress, you cannot run a manual snapshot command concurrently and the following error message appears:

```
Snapshot already in progress. Please try after sometime.
```

NOTE: If you log into the device when the snapshot is in progress, the following banner appears:
`The device has booted from the alternate partition, auto-snapshot is in progress.`

Understanding How the Primary Junos OS Image with Dual-Root Partitioning Recovers Devices

If the SRX Series Services Gateway is unable to boot from the primary Junos OS image, and boots up from the backup Junos OS image in the backup root partition, a message appears on the console at the time of login indicating that the device has booted from the backup Junos OS image.

```
login: user

Password:

**************************************************************************

**                                                                      **

**  WARNING: THIS DEVICE HAS BOOTED FROM THE BACKUP JUNOS IMAGE      **

**                                                                      **

**  It is possible that the active copy of JUNOS failed to boot up   **

**  properly, and so this device has booted from the backup copy.    **

**                                                                      **

**  Please re-install JUNOS to recover the active copy in case       **

**  it has been corrupted.                                            **

**                                                                      **

**************************************************************************
```

Because the system is left with only one functional root partition, you must immediately restore the primary Junos OS image using one of the following methods:

- Install a new image using the CLI or J-Web user interface. The newly installed image will become the primary image, and the device will boot from it on the next reboot.

- Use a snapshot of the backup root partition by entering the `request system snapshot slice alternate` command. Once the primary root partition is recovered using this method, the device will successfully boot from the primary root partition on the next reboot. After the procedure, the primary root partition will contain the same version of Junos OS as the backup root partition. Once the snapshot is complete, the system `boot from backup root` alarm is cleared.

  NOTE: You can use the CLI command `request system snapshot slice alternate` to back up the currently running root file system (primary or secondary) to the other root partition on the system along with following:

  - Save an image of the primary root partition in the backup root partition when the system boots from the primary root partition.
  - Save an image of the backup root partition in the primary root partition when the system boots from the backup root partition.

  WARNING: The process of restoring the alternate root by using the CLI command `request system snapshot slice alternate` takes several minutes to complete. If you terminate the operation before completion, the alternate root might not have all required contents to function properly.

Understanding How Junos OS Release 10.0 or Later Upgrades with Dual-Root Partitioning

NOTE: If you are upgrading to Junos OS Release 10.0 without transitioning to dual-root partitioning, use the conventional CLI and J-Web user interface installation methods.

To format the media with dual-root partitioning while upgrading to Junos OS Release 10.0 or later, use one of the following installation methods:

- Installation from the boot loader using a TFTP server. We recommend this if console access to the system is available and a TFTP server is available in the network. See "Installing Junos OS on SRX Series Firewalls from the Boot Loader Using a TFTP Server" on page 271
- Installation from the boot loader using a USB storage device. We recommend this method if console access to the system is available and the system can be physically accessed to plug in a USB storage device. See "Installing Junos OS on SRX Series Firewalls from the Boot Loader Using a USB Storage Device" on page 274

- Installation from the CLI using the `partition` option. We recommend this method only if console access is not available. This installation can be performed remotely.

> **NOTE**: After upgrading to Junos OS Release 10.0 or later, the U-boot and boot loader must be upgraded for the dual-root partitioning scheme to work properly.

Reinstalling the Single-Root Partition on SRX Series Devices

Junos OS Release 9.6 and earlier is not compatible with the dual-root partitioning scheme. These releases can only be installed if the media is reformatted with single-root partitioning. Any attempt to install Junos OS Release 9.6 or earlier on a device with dual-root partitioning without reformatting the media will fail with an error. You must install the Junos OS Release 9.6 or earlier image from the boot loader using a TFTP server or USB storage device.

> **NOTE**: Junos OS Release 12.1X45 and later do not support single root partitioning.

> **NOTE**: You do not need to reinstall the earlier version of the boot loader if you are installing Junos OS Release 9.6.
>
> You cannot install a Junos OS Release 9.6 or earlier package on a system with dual-root partitioning using the Junos OS CLI or J-Web. If this is attempted, an error will be returned.
>
> You can install the Junos OS Release 9.6 (9.6R3 and 9.6R4 [only]) on a system with dual-root partitioning using `request system software add` command with `partition` option.

To reinstall the single-root partition:

1. Enter the request system software add partition command to install the previous Junos OS version (9.6R3 and 9.6R4):

   `user@host>`**request system software add partition**

2. Reboot the device

   `user@host>`**request system reboot**

   The previous software version gets installed after rebooting the device.

NOTE: Using the `request system software add` CLI command with the `partition` option to install Junos OS Release 9.6 (9.6R3 and 9.6R4) reformats the media with single-root partitioning. This process erases the dual-root partitioning scheme from the system, so the benefits of dual-root partitioning will no longer be available.

Release History Table

Release	Description
12.1X45-D10	Starting in Junos OS Release 12.1X45, single root partitioning is not supported on SRX Series Firewalls.

RELATED DOCUMENTATION

Installing Software on SRX Series Devices | 251

Configuring Root Partitions on ACX Series Routers

IN THIS SECTION

The dual-root partitions help your ACX Series routers to remain functional even if the file system is corrupted. Also, it helps to recover the file system in case of corruption.

Dual-Root Partitioning ACX Series Routers Overview

IN THIS SECTION

Dual-root partitioning allows the ACX Series router to remain functional even if there is file system corruption and to facilitate easy recovery of the file system. Dual-root partitioning means that the primary and backup Junos OS images are kept in two independently bootable root partitions. If the primary root partition becomes corrupted, the system can still boot from the backup Junos OS image located in the other root partition and remain fully functional.

NOTE: ACX5048 and ACX5096 routers do not support dual-root partitioning. All other ACX routers run with dual-root partitioning.

Boot Media and Boot Partition on the ACX Series Routers

With dual-root partitioning, the ACX Series router first tries to boot the Junos OS from the primary root partition and then from the backup root partition on the internal NAND flash. If both primary and backup root partitions of the internal NAND flash fail to boot, you must insert a USB storage media with a copy of the Junos OS from which to boot.

The following is the storage media available on the ACX Series router:

- USB media emergency boot device

  NOTE: The USB media device is not dual-root partitioned.

- Dual, internal NAND flash device (first daOs1, then daOs2)

Important Features of the Dual-Root Partitioning Scheme

The dual-root partitioning scheme has the following important features:

- The primary and backup copies of Junos OS images reside in separate partitions. The partition containing the backup copy is mounted only when required. With the single-root partitioning scheme, there is one root partition that contains both the primary and the backup Junos OS images.
- The `request system software add` command for a Junos OS package erases the contents of the other root partition. The contents of the other root partition will not be valid unless software installation is completed successfully.
- Add-on packages, such as jais or jfirmware, can be reinstalled as required after a new Junos OS image is installed.
- The `request system software rollback` command does not delete the current Junos OS image. It is possible to switch back to the image by issuing the `rollback` command again.

Understanding How the Primary Junos OS Image with Dual-Root Partitioning Recovers on the ACX Series Router

If the ACX Series Universal Metro router is unable to boot from the primary Junos OS image and boots up from the backup Junos OS image in the backup root partition, a message appears on the console at the time of login indicating that the device has booted from the backup Junos OS image.

NOTE: ACX5048 and ACX5096 routers do not support dual-root partitioning.

```
login: user

Password:

**************************************************************************

**                                                                      **

**  WARNING: THIS DEVICE HAS BOOTED FROM THE BACKUP JUNOS IMAGE      **

**                                                                      **

**  It is possible that the active copy of JUNOS failed to boot up   **
```

```
**  properly, and so this device has booted from the backup copy.    **

**                                                                    **

**  Please re-install JUNOS to recover the active copy in case       **

**  it has been corrupted.                                            **

**                                                                    **

************************************************************************
```

Because the system is left with only one functional root partition, you should immediately restore the primary Junos OS image using one of the following methods:

- Install a new image using the CLI. When you install the new image, the new image is installed on only one partition–the alternate partition, meaning the router is now running two images. When you reboot, the router boots from the newly installed image, which becomes the primary image. So now there are two different images running on the router. Run the installation process again to update the other partition.

- Use a snapshot of the backup root partition by entering the `request system snapshot slice alternate` command. After the primary root partition is recovered using this method, the device will successfully boot from the primary root partition on the next reboot. After the procedure, the primary root partition will contain the same version of Junos OS as the backup root partition.

  NOTE: You can use the CLI command `request system snapshot slice alternate` to back up the currently running root file system (primary or secondary) to the other root partition on the system.

  You can use this command to:

  - Save an image of the primary root partition in the backup root partition when the system boots from the primary root partition.
  - Save an image of the backup root partition in the primary root partition when the system boots from the backup root partition.

  WARNING: The process of restoring the alternate root by using the CLI command `request system snapshot slice alternate` takes several minutes to complete. If you

terminate the operation before completion, the alternate root might not have all required contents to function properly.

Junos OS Release 12.2 or Later Upgrades with Dual-Root Partitioning on ACX Series Routers

NOTE: If you are upgrading to Junos OS Release 12.2 without transitioning to dual-root partitioning, use the conventional CLI installation method.

To format the media with dual-root partitioning while upgrading to Junos OS Release 12.2 or later, use either of the following installation methods:

NOTE: ACX5048 and ACX5096 routers do not support dual-root partitioning. All other ACX routers run with dual-root partitioning.

- Installation using a USB storage device. We recommend this method if console access to the system is available and the system can be physically accessed to plug in a USB storage device. See *Installing Junos OS Using a USB Storage Device on ACX Series Routers*.
- Installation from the CLI. We recommend this method only if console access is not available. This installation can be performed remotely. See *Installing Junos OS Upgrades from a Remote Server on ACX Series Routers*.

Example: Installing Junos OS and Configuring a Dual-Root Partition on ACX Series Routers Using the CLI

IN THIS SECTION

This example shows how to install Junos OS Release 12.2 or later and configure a dual-root partition on ACX Series routers with the CLI.

Requirements

This example requires an ACX Series router. Before you begin, back up any important data.

Overview

IN THIS SECTION

This example formats the NAND Flash device and installs the new Junos OS image on the media with dual-root partitioning. Install the Junos OS Release 12.2 or later image from the CLI by using the `request system software add` command. Partitions are automatically created on ACX Series routers and no option needs to be manually entered for creating partitions. This command copies the image to the device, and then reboots the device for installation. The device boots with the Release 12.2 or later image installed with the dual-root partitioning scheme. The formatting and installation process is scheduled to run on the next reboot. Therefore, we recommend that this option be used together with the `reboot` option.

NOTE: The process might take 15 to 20 minutes. The system is not accessible over the network during this time.

CAUTION: Using the `request system software add` command erases the existing contents of the media. Only the current configuration is preserved. You should back up any important data before starting the process.

NOTE: Dual, internal NAND Flash device (first daOs1, then daOs2) and USB storage device are the storage media available on the ACX Series router. The USB storage device is not dual-root partitioned.

In this example, add the software package junos-juniper-12.2R1.9-domestic.tgz with the following options:

- `no-copy` option to install the software package. However, do not save the copies of the package files. You should include this option if you do not have enough space on the internal media to perform an upgrade that keeps a copy of the package on the device.
- `no-validate` option to bypass the compatibility check with the current configuration before installation starts.
- `reboot` option to reboot the device after installation is completed.

Topology

Configuration

IN THIS SECTION

Procedure

CLI Quick Configuration

To install Junos OS Release 12.2 or later and configure dual-root partitioning on ACX Series routers, copy the following command, paste it in a text file, remove any line break, and then copy and paste the command into the CLI.

From operational mode, enter:

```
user@host> request system software add junos-juniper-12.2R1.9-domestic.tgz no-copy no-validate
reboot
```

Step-by-Step Procedure

To install Junos OS Release 12.2 or later and configure a dual-root partition:

1. Upgrade the ACX Series router to Junos OS Release 12.2 or later using the CLI.
2. Install Junos OS Release 12.2 or later and configure the dual-root partition.

```
user@host> request system software add junos-juniper-12.2R1.9-domestic.tgz no-copy no-
validate reboot
Copying package junos-juniper-12.2R1.9-domestic.tgz to var/tmp/install
Rebooting ...
```

Results

In operational mode, confirm your configuration by entering the `show system storage` command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

Sample output on a system with dual-root partitioning that displays information about the root partition that is mounted (only one root partition is mounted at a point in time):

```
user@host> show system storage
```

```
Filesystem              Size       Used      Avail  Capacity   Mounted on
/dev/da0s1a             872M       150M       713M       17%  /
devfs                   1.0K       1.0K         0B      100%  /dev
/dev/md0                 41M        41M         0B      100%  /packages/mnt/jbase
/dev/md1                183M       183M         0B      100%  /packages/mnt/jkernel-
ppc-12.2I20121026_1217_sranjan
/dev/md2                 30M        30M         0B      100%  /packages/mnt/jpfe-
ACX-12.2I20121026_1217_sranjan
/dev/md3                9.1M       9.1M         0B      100%  /packages/mnt/
jdocs-12.2I20121026_1217_sranjan
/dev/md4                 55M        55M         0B      100%  /packages/mnt/jroute-
ppc-12.2I20121026_1217_sranjan
/dev/md5                 12M        12M         0B      100%  /packages/mnt/jcrypto-
ppc-12.2I20121026_1217_sranjan
/dev/md6                1.0G       8.0K       951M        0%  /tmp
/dev/md7                1.0G       448K       950M        0%  /mfs
```

```
/dev/da0s1e              92M        18K        91M        0%  /config
procfs                  4.0K       4.0K         0B      100%  /proc
/dev/da0s3f             3.9G       3.6G        30M       99%  /var
/dev/da0s3d             447M       2.8M       409M        1%  /var/log
```

If you are done configuring the device, enter `commit` in configuration mode.

You can issue the `fdisk` command from the Junos prompt to display information about the entire partition format on the NAND Flash device. All ACX Series routers run with dual-root partitioning. The following example displays the partition details on an ACX Series router with dual-root partitions:

```
user@host% fdisk
```

```
******* Working on device /dev/da0 *******
parameters extracted from in-core disklabel are:
cylinders=487 heads=255 sectors/track=63 (16065 blks/cyl)

parameters to be used for BIOS calculations are:
cylinders=487 heads=255 sectors/track=63 (16065 blks/cyl)

Media sector size is 512
Warning: BIOS sector numbering starts with sector 1
Information from DOS bootblock is:
The data for partition 1 is:
sysid 165 (0xa5),(FreeBSD/NetBSD/386BSD)
    start 567, size 1011528 (493 Meg), flag 80 (active)
        beg: cyl 0/ head 9/ sector 1;
        end: cyl 62/ head 254/ sector 63
The data for partition 2 is:
sysid 165 (0xa5),(FreeBSD/NetBSD/386BSD)
    start 1012662, size 1011528 (493 Meg), flag 0
        beg: cyl 63/ head 9/ sector 1;
        end: cyl 125/ head 254/ sector 63
The data for partition 3 is:
sysid 165 (0xa5),(FreeBSD/NetBSD/386BSD)
    start 2024757, size 3581928 (1748 Meg), flag 0
        beg: cyl 126/ head 9/ sector 1;
        end: cyl 348/ head 254/ sector 63
The data for partition 4 is:
sysid 165 (0xa5),(FreeBSD/NetBSD/386BSD)
    start 5607252, size 2200338 (1074 Meg), flag 0
```

```
        beg: cyl 349/ head 9/ sector 1;
        end: cyl 485/ head 254/ sector 63
```

In the preceding example, partition 1 and 2 contain two partitions each internally, a root partition and a configuration partition.

Verification

IN THIS SECTION

Confirm that the configuration is working properly.

Verifying the Partitioning Scheme Details

Purpose

Verify that the partitioning scheme details on the ACX Series router were configured.

Action

In operational mode, enter the `show system storage` command. For details about the output of this command and the descriptions of the output fields, see show system storage.

RELATED DOCUMENTATION

Installing Software on ACX Series Routers (Junos OS) | **310**

CHAPTER 7

Storage Media and Routing Engines

Storage Media and Routing Engines (Junos OS)

IN THIS SECTION

The Routing Engine and the Packet Forwarding Engine (PFE) are the two primary components of Juniper Networks platforms. Junos OS software is installed on the routing engine and it is stored in storage media.

Routing Engines and Storage Media (Junos OS)

Juniper Networks routing platforms are made up of two basic routing components:

- Routing Engine—The Routing Engine controls the routing updates and system management.
- Packet Forwarding Engine (PFE)—The Packet Forwarding Engine performs Layer 2 and Layer 3 packet switching, route lookups, and packet forwarding.

From a system administration perspective, you install the software onto the Routing Engine and during the installation, the appropriate software is forwarded to other components as necessary. Most Routing Engines include a CompactFlash card that stores Junos OS. On M Series Multiservice Edge Routers; MX240, MX480, and MX960 Universal Routing Platforms; T Series Core Routers; and TX Matrix routers, the system also includes a hard disk or solid-state drive (SSD) that acts as a backup boot drive. PTX Series Packet Transport Routers and the TX Matrix Plus router include a solid-state drive as a backup boot drive.

NOTE: The MX80 router is a single-board router with a built-in Routing Engine and single Packet Forwarding Engine. On an MX80 router, Junos OS is stored on dual, internal NAND flash devices. These devices provide the same functionality as a CompactFlash card and hard disk or solid-state drive (SSD).

NOTE: The ACX Series router is a single board router with a built-in Routing Engine and one Packet Forwarding Engine. The ACX router supports dual-root partitioning, which means that the primary and backup Junos OS images are kept in two independently bootable root partitions. If the primary partition becomes corrupted, the system remains fully functional by booting from the backup Junos OS image located in the other root partition.

On routing platforms with dual Routing Engines, each Routing Engine is independent with regard to upgrading the software. To install new software on both Routing Engines, you need to install the new software on each Routing Engine. On platforms with dual Routing Engines configured for high availability, you can use the unified in-service software upgrade procedure to upgrade the software. For more information about this procedure, see the *High Availability User Guide for Routing Devices*.

Repartitioning Routing Engine System Storage to Increase the Swap Partition (Junos OS)

You can increase the size of the swap partition by repartitioning the drive (hard disk or solid-state drive [SSD]) on the Routing Engine. This feature is first available in Junos OS Release 10.4R5, 11.1R3, and 11.2R1; in earlier Junos OS releases, the swap partition is not increased by the methods described here.

This behavior applies only to Routing Engines with more than 2 GB of RAM. The new size of the swap partition depends on the size of the drive and the amount of Routing Engine RAM.

- When the drive is 32 GB or less, the swap partition is limited to 8 GB.
- When the drive is larger than 32 GB, the swap partition matches the size of the Routing Engine RAM.

To repartition the drive, perform one of the following actions:

- During the installation of a Junos OS software package (**jinstall***), issue the `request system reboot media disk` command to boot from the drive instead of issuing the `request system reboot` command. The drive is automatically repartitioned. The `request system reboot media disk` command repartitions the drive only during a software upgrade.

- Manually partition the drive by issuing the `request system partition hard-disk` command, and then reboot the router when the command completes.

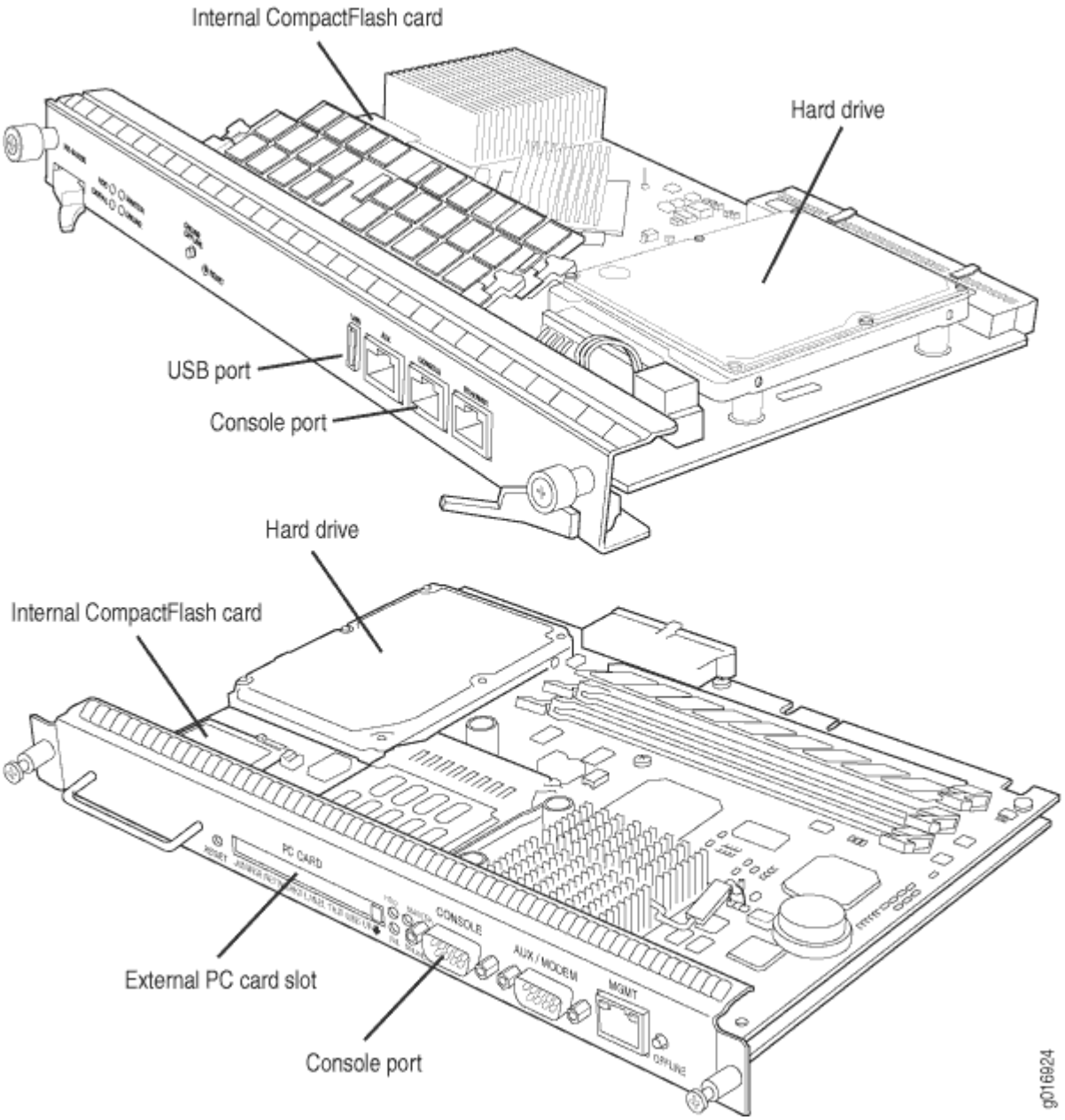
> ⚠ **CAUTION**: Repartitioning the drive re-creates the **/config** and **/var** directories in the router file system. Although the contents of **/config** and **/var/db** are preserved, the remaining contents of **/var** are lost. For this reason, we recommend that you back up the **/var** directory before you repartition the SSD on a router with this configuration.

System Memory and Storage Media on Routers (Junos OS)

IN THIS SECTION

Figure 10 on page 448 shows examples of Routing Engines.

Figure 10: Routing Engines



System Memory

Starting with Junos OS Release 9.0, all routing platforms require a minimum of 512 MB of system memory on each Routing Engine. All M7i and M10i routers delivered before December 7, 2007, had 256 MB of memory. These routers require a system memory upgrade before you install Junos OS Release 9.0 or a later release. To determine the amount of memory currently installed on your system, use the `show chassis routing-engine` command in the command-line interface (CLI).

For more information about upgrading your M7i or M10i router, see the Customer Support Center JTAC Technical Bulletin PSN-2007-10-001: https://www.juniper.net/alerts/viewalert.jsp?txtAlertNumber=PSN-2007-10-001&actionBtn=Search.

ACX2000 routers are shipped with 2 GB of memory and ACX1000 routers with 1 GB of memory.

Storage Media

Except for the ACX Series, MX80 routers, and MX104 routers, the M Series, MX Series, PTX Series, T Series, TX Matrix, and TX Matrix Plus routers use the following media storage devices:

- CompactFlash card—The CompactFlash card is typically the primary storage device for most routers.

  NOTE: M7i and M10i routers using RE-400 are not delivered from the factory with the CompactFlash card installed. In this case, the hard disk is the primary and only boot device. The M7i and M10i routers with RE-400 can be upgraded to include the CompactFlash card.

- Hard disk or solid -state drive—For most routers, a hard disk or solid-state drive is the secondary boot device. When the CompactFlash card is not installed on the router, the hard disk or the solid-state drive becomes the primary boot device. The hard disk or solid-state drive is also used to store system log files and diagnostic dump files.

- Emergency boot device—Depending on the router, the emergency boot device can be a PC card, a USB storage device, or an LS-120 floppy disk.

On MX80 routers, the internal NAND flash devices (first *da0*, then *da1*) act as the primary and secondary boot devices.

On ACX Series routers, the internal NAND flash devices (first da0s1, then da0s2) act as the primary and secondary boot devices.

Emergency boot devices can be used to revive a routing platform that has a damaged Junos OS. When an emergency boot device is attached to the router, the router attempts to boot from that device before it boots from the CompactFlash card, solid-state drive (SSD), or hard disk.

On an ACX Series router, the emergency boot device is a USB storage device.

On MX104 routers, the internal NAND flash device (da0) mounted on the internal eUSB card acts as the primary boot and storage device. On MX104 routers, the emergency boot device is a USB storage device that is plugged into one of the USB ports in the front plate.

When booting from an emergency boot device, the router requests a boot acknowledgment on the console interface. If you enter yes, the emergency boot device repartitions the primary boot device and reloads Junos OS onto the primary boot device. After the loading is complete, the routing platform

requests that you remove the emergency boot device and reboot the system. After the reboot is complete, you must perform an initial configuration of the router before it can be used on your network.

NOTE: For routers with RE-MX-X6, RE-MX-X8, and RE-PTX-X8 Routing Engines, a set of two 64-GB SSDs are available for storage and redundancy. For more information see Storage Partitioning and Redundancy topic in "Salient Features of the Routing Engines with VM Host Support" on page 347 section.

Routing Engines and Storage Media Names (ACX Series, M Series, MX Series, PTX Series, T Series, TX Matrix, TX Matrix Plus, and JCS 1200 Routers)

Table 27 on page 450 specifies the storage media names by Routing Engine. The storage media device names are displayed when the router boots.

Table 27: Routing Engines and Storage Media Names (ACX Series, M Series, MX Series, T Series, TX Matrix, TX Matrix Plus, and JCS 1200 Routers)

Routing Engine	Type of Junos OS	CompactFlash Card	Hard Disk	Solid-State Drive	Removable Media Emergency Boot Device
RE-400-768 (RE5)	FreeBSD 6.x	ad0	ad1	No	ad3
RE-600-2048 (RE3)	FreeBSD 6.x	ad0	ad1	No	ad3
RE-850-1536 (RE-850)	FreeBSD 6.x	ad0	ad1	No	ad3
RE-A-1000-2048 (RE-A-1000)	FreeBSD 6.x	ad0	ad2	No	da0

Table 27: Routing Engines and Storage Media Names (ACX Series, M Series, MX Series, T Series, TX Matrix, TX Matrix Plus, and JCS 1200 Routers) *(Continued)*

Routing Engine	Type of Junos OS	CompactFlash Card	Hard Disk	Solid-State Drive	Removable Media Emergency Boot Device
RE-A-1800x2 (RE-A-1800)	FreeBSD 6.x	ad0	No	Yes SSD1: ad1 SSD2: ad2	da0
RE-S-1300-2048 (RE-S-1300)	FreeBSD 6.x	ad0	ad2	No	da0
RE-S-1800x2 RE-S-1800x4 (RE-S-1800)	FreeBSD 6.x	ad0	No	Yes SSD1: ad1 SSD2: ad2	da0
	FreeBSD 10.x/ 11.x				
RE-B-1800X1-4G-S	FreeBSD 6.x	ad0	No	Yes SSD1: ad1	da0
RE-1600-2048 (RE4)	FreeBSD 6.x	ad0	ad1	No	ad3 and ad4
RE-A-2000-4096 (RE-A-2000)	FreeBSD 6.x	ad0	ad2	No	da0
RE-S-2000-4096 (RE-S-2000)	FreeBSD 6.x	ad0	ad2	No	da0
RE-MX-104	FreeBSD 6.x	No	da0	No	da1 and da2

Table 27: Routing Engines and Storage Media Names (ACX Series, M Series, MX Series, T Series, TX Matrix, TX Matrix Plus, and JCS 1200 Routers) ***(Continued)***

Routing Engine	Type of Junos OS	CompactFlash Card	Hard Disk	Solid-State Drive	Removable Media Emergency Boot Device
RE-DUO-C2600-16G (RE-DUO-2600)	FreeBSD 6.x	ad0	No	ad1	da0
RE-DUO-C1800-8G- (RE-DUO-1800)	FreeBSD 6.x	ad0	No	ad1	da0
RE-DUO-C1800-16G	FreeBSD 6.x	ad0	No	ad1	da0
RE-JCS1200-1x2330	FreeBSD 6.x	da0	da1	No	da2
RE-PTX-X8-64G	FreeBSD 6.x	No	No	Yes SSD1: sda SSD2: sdb	da0
RE-S-X6-64G	FreeBSD 6.x	No	No	Yes SSD1: sda SSD2: sdb	da0
REMX2K-X8-64G	FreeBSD 6.x	No	No	Yes SSD1: sda SSD2: sdb	da0

NOTE: On MX80 routers, the Routing Engine is a built-in device and has no model number. The dual internal NAND flash devices are da0 and da1. The USB storage device is da2.

NOTE: On ACX Series routers, the Routing Engine is a built-in device which does not have a model number. The dual internal NAND flash devices are da0s1 and da0s2. The USB storage device is da0s2a. Use the `show chassis hardware models` command to obtain the field-replaceable unit (FRU) model number—for example, `ACX2000BASE-DC` for the ACX2000 router.

To view the storage media currently available on your system, use the CLI `show system storage` command.

SEE ALSO

- Supported Routing Engines by Router
- Routing Engine Specifications
- RE-S-1300 Routing Engine Description
- RE-S-2000 Routing Engine Description
- RE-S-1800 Routing Engine Description
- JCS1200 Routing Engine Description

System Memory and Storage Media for SRX Series Firewalls

IN THIS SECTION

SRX Series Device Overview

Figure 11 on page 454 shows an example of SRX240 device.

Figure 11: SRX240 Device Front Panel

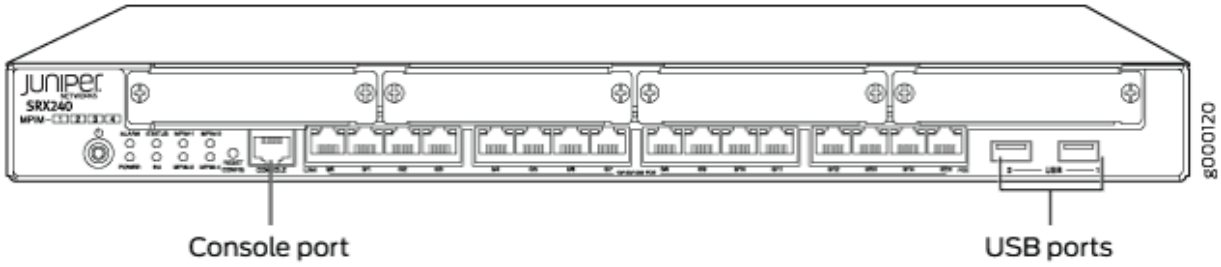


Figure 12 on page 454 shows an example of SRX650 device.

Figure 12: SRX650 Device System Routing Engine

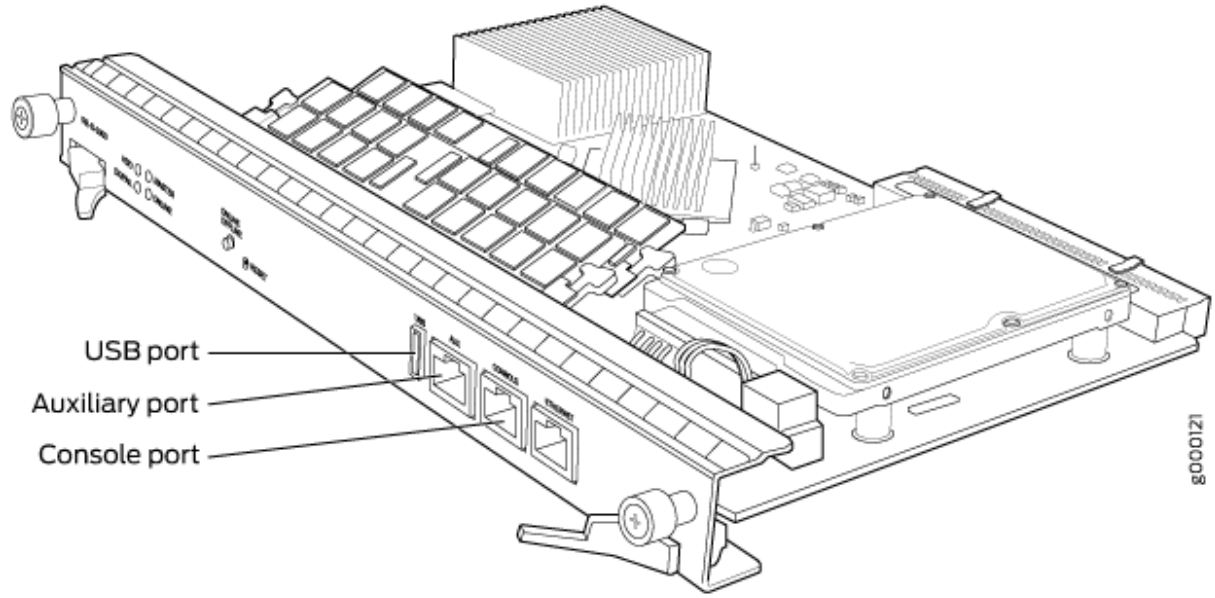


Figure 13 on page 454 shows the front panel of an SRX345 device.

Figure 13: SRX345 Device Front Panel

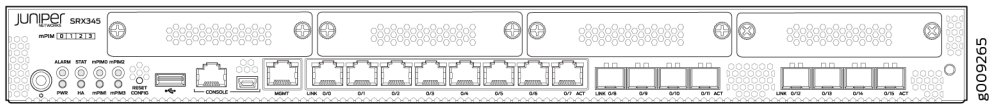


Figure 14 on page 455 shows an example of an SRX1500 device.

Figure 14: SRX1500 Device Front Panel

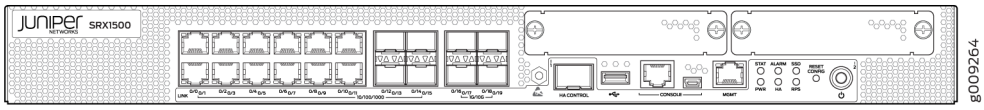


Figure 15 on page 455 shows an example of an SRX4200 device.

Figure 15: SRX4200 Firewall Front Panel

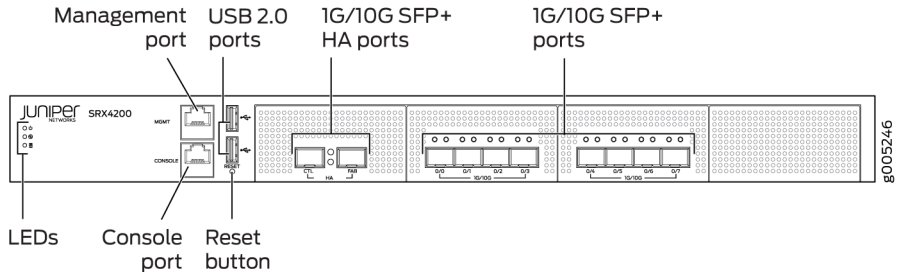


Figure 16 on page 455 shows an example of an SRX4600 device.

Figure 16: SRX4600 Firewall Front Panel

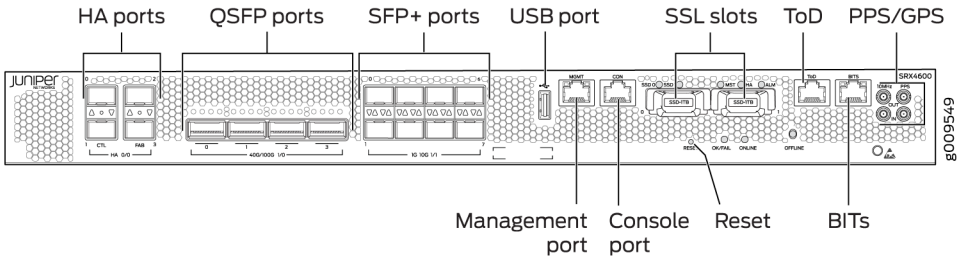
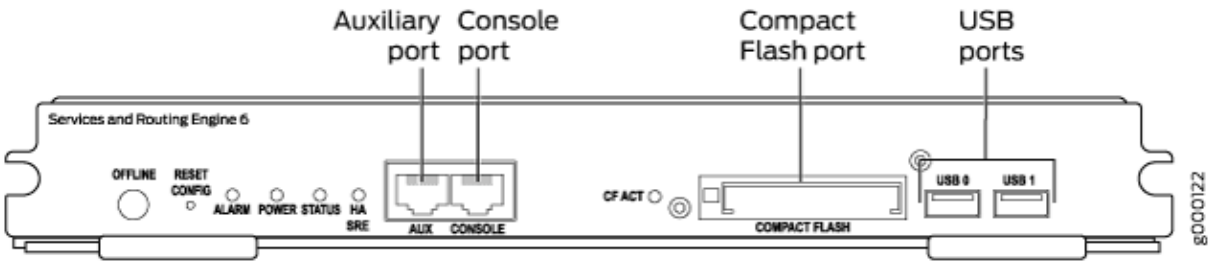


Figure 17 on page 456 shows an example of an SRX5800 device Routing Engine.

Figure 17: SRX5800 Device Routing Engine



System Memory

The amount of free disk space necessary to upgrade a device with a new version of Junos OS can vary from one release to another for different SRX Series Firewalls. Check the Junos OS software version you are installing to determine the free disk space requirements.

To determine the amount of free disk space on the device, issue the `show system storage detail` command. The command output displays statistics about the amount of free disk space in the device file systems.

Storage Media

The SRX100, SRX210, SRX240, Services Gateway can boot from the following storage media (in the order of priority):

- Internal NAND Flash (default; always present)
- USB storage key (alternate)

The SRX550 and SRX650 Services Gateway can boot from the following storage media (in the order of priority):

- CompactFlash (default; always present)
- External CompactFlash card (alternate) (SRX650 only)
- USB storage key (alternate)

The SRX300, SRX320, SRX340, and SRX345 Firewall can boot from the following storage media (in the order of priority):

- Internal NAND flash device mounted on the internal eUSB card (default; always present)
- USB storage key (alternate)
- External SSD (SRX340 and SRX345 devices)

The SRX380 Firewall can boot from the following storage media (in the order of priority):

- Internal SSD (default; always present)
- USB storage key (alternate)

The SRX550M Services Gateway can boot from the following storage media (in the order of priority):

- CompactFlash (default; always present)
- USB storage key (alternate)
- External SSD

SRX1500 device use the following media storage devices:

- Internal eSATA flash disk (default; always present)
- SSD

SRX1400, SRX3400, SRX3600, SRX5400, SRX5600, SRX5800 devices use the following media storage devices:

- The CompactFlash card in the Routing Engine
- The hard disk in the Routing Engine

> **NOTE**: You can also use a Junos OS image stored on a USB flash drive that you insert into the Routing Engine faceplate.

The SRX4100 and SRX4200 devices include the following storage media:

- Internal eSATA flash disk (default; always present)
- SSD

The SRX4600 devices include the following storage media:

- Internal eSATA flash disk (default; always present)
- SSD

Table 28 on page 458 specifies the storage media names used by the SRX Series Firewalls. The storage media device names are displayed as the device boots.

Table 28: Storage Media Names

Device	Internal CompactFlash Card	USB Storage Media Devices
SRX Series Firewall	da0	da1

To view the storage media currently available on your system, use the CLI `show system storage` command.

SEE ALSO

Verifying PIC Combinations (Junos OS) | 592

Accessing USB Storage on PTX1000 Routers

On PTX1000 routers, you can only view the USB storage information from Junos OS by using the CLI command "show vmhost hardware" on page 936, but cannot access it. However, you can access the USB storage information from the Linux host. From the Linux host, you can also send the USB storage device information with images across different sites where PTX1000 routers are deployed.

To access the USB storage device information on PTX1000 routers:

1. In Junos OS, ensure that the PTX1000 USB image to be copied to the USB storage device is present on the **var/tmp** folder of Junos OS. To copy the image from the **/var/tmp** directory of Junos OS to the **/var/tmp** directory of a Linux host, execute the following command on Junos OS:

```
user@host # vhclient rcp /var/tmp image-name
```

2. On the Linux host shell, execute the following command:

```
user@host # vhclient -s
dd if=/var/tmp/copied-image-name of=/dev/sdc bs=4M
sync
sync
```

In the command above, **/dev/sdc** is the USB storage device detected by the Linux host. You can determine the name of the USB storage device from host logs as shown in the sample below:

```
user@host # dmesg
...
...
[645888.884431] usb 1-1.2: new high-speed USB device number 5 using ehci-pci
[645889.131217] usb-storage 1-1.2:1.0: USB Mass Storage device detected
[645889.131275] scsi8 : usb-storage 1-1.2:1.0
[645890.134290] scsi 8:0:0:0: Direct-Access     JetFlash Transcend 8GB    8.07 PQ: 0 ANSI: 2
[645890.134456] sd 8:0:0:0: Attached scsi generic sg2 type 0

[645890.135908] sd 8:0:0:0: [sdc] 15687680 512-byte logical blocks: (8.03 GB/7.48 GiB)
```

In this example, `sdc` is the name of the USB storage device.

NOTE: The **/var/tmp** directory of a Linux host is mounted on the RAM (at the `ramfs` location), which is volatile storage, and is thus lost when you perform power cycling of or reboot the device. However, the Junos OS **/var/tmp** directory resides on the physical (nonvolatile) hard disk and thus exists even after rebooting or power cycling.

SEE ALSO

Creating an Emergency Boot Device for Routers | 26

RELATED DOCUMENTATION

Installing Software on Routing Devices (Junos OS) | 122

8
CHAPTER

Zero Touch Provisioning

Zero Touch Provisioning

IN THIS SECTION

Zero Touch Provisioning installs or upgrades the software automatically on your new Juniper Networks devices with minimal manual intervention.

Zero Touch Provisioning Overview

IN THIS SECTION

Zero Touch Provisioning (ZTP) allows you to provision new Juniper Networks devices in your network automatically, with minimal manual intervention. You can use either management ports or network ports, depending on your device, to connect to the network. When you physically connect a device to the network and boot it with a default factory configuration, the device upgrades (or downgrades) the software release and autoinstalls a configuration file from the network. The configuration file can be a configuration or a script. Using scripts, you can create device-specific configuration files and perform HTTP request operations to web servers to download specific configuration files or software releases.

To locate the necessary software image and configuration files on the network, the device uses information that you have configured on a Dynamic Host Configuration Protocol (DHCP) server. If you do not configure the DHCP server to provide this information, the device boots with the preinstalled software and default factory configuration.

For certain switches, you can use the phone-home client (PHC) to provision software for the switch. When the switch boots up, if there are DHCP options that have been received from the DHCP server for ZTP, ZTP resumes. If DHCP options are not present, PHC is attempted. For more information about PHC, see "Provision a Virtual Chassis Using the Phone-Home Client" on page 527.

NOTE: To see which platforms support ZTP, in a browser, go to Feature Explorer. In the **Explore Features** section of the Feature Explorer page, select **All Features**. In the **Features Grouped by Feature Family** box, select Zero Touch Provisioning. You can also type the name of the feature in the **Search for Features** edit box. See the Release History Table at the end of this topic for more details of how ZTP support has expanded.

ZTP Workflow

When a device boots up with the default configuration, the following events take place:

1. DHCP client is run on supported interfaces.
2. DHCP server provisions an IP address and includes several DHCP options in the reply related to the ZTP process.
3. The device processes the DHCP options and locates configuration files, executes scripts, and upgrades and/or downgrades software.
4. If both the image and configuration files are present, the image is installed and the configuration is applied.
5. If only the image file is present, the image is installed on the device.
6. If the image is the same as the image already installed on the device, ZTP continues and skips the installation step.
7. If the image was unable to be fetched by the device, ZTP will try to fetch the image again.
8. If the image is corrupted, installation fails.

   If installation fails for any reason, ZTP will restart.
9. If only the configuration file is present, the configuration is downloaded.

If the first line of the file consists of the #! characters followed by an interpreter path, then the file is considered a script, and the script is executed by the interpreter. If the script returns an error, ZTP state machine will re-fetch the script and attempt to execute the script again.

If the configuration file is unable to be downloaded, the ZTP process will try to download it again.

If the configuration file is corrupted, has syntax errors, or includes commands that are unsupported by the device, the device will be unable to commit, and the retry mechanism will restart.

10. If there is no image or configuration file, the ZTP process starts again.
11. If there is no file server information, the ZTP process starts again.
12. Once the configuration is committed, the ZTP process is deemed successful and terminates.

Provisioning a Device Using a Script

During the ZTP process, when you connect and boot a new networking device, the device requests an IP address from the DHCP server. The server provides the IP address, and if configured, the filenames and locations for the software image and configuration file for the device. The configuration file can be a configuration or a script.

If a configuration file is provided, the operating system determines if the file is a script based on the first line of the file. If the first line contains the characters `#!` followed by an interpreter path, the operating system treats the file as a script and executes it with the specified interpreter.

If the script returns an error (that is, a nonzero value), the ZTP state machine re-fetches the script and attempts to execute it again. This continues until the script executes successfully.

Table 29 on page 463 outlines the supported script types, the corresponding interpreter path, and the platforms that support that script type during the ZTP process.

Table 29: Scripts Supported During ZTP

Script Type	Interpreter Path	Platform Support
Shell script	`#!/bin/sh`	All devices
SLAX script	`#!/usr/libexec/ui/cscript`	All devices
Python script	`#!/usr/bin/python`	Devices running Junos OS with Enhanced Automation Devices running Junos OS Evolved

NOTE: For security reasons, Junos OS has strict requirements for running unsigned Python scripts on devices running Junos OS. Only devices running Junos OS with Enhanced Automation and devices running Junos OS Evolved support using unsigned Python scripts in DHCP option 43 suboption 01.

If the operating system does not find the characters `#!` followed by an interpreter path, it treats the file as a configuration in text format and loads the configuration on the device.

Zero Touch Provisioning Restart Process Triggers

ZTP restarts when any of the following events occur:

- Request for configuration file, script file, or image file fails.
- Configuration file is incorrect, and commit fails.
- No configuration file and no image file is available.
- Image file is corrupted, and installation fails.
- No file server information is available.
- DHCP server does not have valid ZTP parameters configured.
- When none of the DHCP client interfaces goes to a bound state.
- ZTP transaction fails after six attempts to fetch configuration file or image file.

When any of these events occur, ZTP resets the DHCP client state machine on all of the DHCP client-configured interfaces (management and network) and then restarts the state machine. Restarting the state machine enables the DHCP client to get the latest DHCP server-configured parameters.

Before ZTP restarts, approximately 15 to 30 seconds must elapse to allow enough time to build a list of bound and unbound DHCP client interfaces.

The list of bound and unbound DHCP client interfaces can contain:

- No entries.
- Multiple DHCP client interfaces.

  Priority is given to the DHCP client interfaces that have received all ZTP parameters (software image file, configuration file, and file server information) from the DHCP server.

After the lists of bound and unbound client interfaces are created, and a DHCP client gets selected for ZTP activity, any existing default route is deleted and the DHCP client interface that was selected adds a new default route. In order to add a new default route, only one ZTP instance can be active.

After ZTP restarts, the DHCP client attempts fetching files from the DHCP server for up to six times, with ten to fifteen seconds elapsing between attempts. Every attempt, whether successful or not, is logged and can be seen on the console.

If there is a failure, or the number of attempts exceeds the limit, ZTP stops. ZTP then clears the DHCP client bindings and restarts the state machine on the DHCP-configured interfaces.

The ZTP restart process continues until there is either a successful software upgrade, or an operator manually commits a user configuration and deletes the ZTP configuration.

Caveats Relating to ZTP

There are two downgrade limitations for EX Series switches:

- If you downgrade to a software version earlier than Junos OS Release 12.2, in which ZTP is not supported, the configuration file autoinstall phase of the zero touch provisioning process does not happen.
- To downgrade to a software version that does not support resilient dual-root partitions (Junos OS Release 10.4R2 or earlier), you must perform some manual work on the device. For more information, see "Configuring Dual-Root Partitions" on page 422.

The following are caveats for QFX Series switches:

- On QFX3500 and QFX3600 switches running the original CLI, you cannot use ZTP to upgrade from Junos OS Release 12.2 or later to Junos OS Release 13.2X51-D15 or later.
- QFX5200 switches only work with HTTP in 15.1X53-D30. FTP and TFTP protocols are not supported.
- If you are performing Zero Touch Provisioning (ZTP) with a Junos OS image that contains enhanced automation for the QFX5100 switch, configure root authentication, and the provider name, license type, and deployment scope for Chef and Puppet at the `[edit system]` hierarchy in the configuration file that is fetched from the server:

```
{ master:0}
root# set root-authentication (encrypted-password password | plain-text-password password |
ssh-dsa public-key | ssh-rsa public-key)
root# set extensions providers juniper license-type customer deployment-scope commercial
root# set extensions providers chef license-type customer deployment-scope commercial
```

- In Junos OS Release 18.1R1, if you are upgrading the software, you must perform a full software upgrade. A full upgrade includes upgrading both the Junos OS software and the host software packages.

Zero Touch Provisioning Using WAN Interfaces on PTX1000 Routers

Zero Touch Provisioning (ZTP) allows you to provision your router in your network automatically, with minimal manual intervention. Starting in Junos OS Release 19.3R1, you can use either WAN interfaces or management interfaces, to automatically download and install the appropriate software and the configuration file on your router during the ZTP bootstrap process.

When you connect the router to the network at the first time, you can choose any available WAN port on the router to connect the optics. The ZTP automatically configures WAN interfaces based on the optics type, and then connects your device to the Dynamic Host Configuration Protocol (DHCP) server to perform the bootstrap process.

The WAN interfaces created based on the optics type you connected to the device and the WAN interface speed auto-transitions through all possible supported port speeds until the ZTP gets completed successfully. The speed auto-transition ensures to establish physical link of the WAN port with the optics you connected and the peer end device connectivity to the DHCP server.

PTX1000 Port Mapping shows the available combinations for the ports on the PTX1000 routers.

Zero Touch Provisioning Using DHCP Options

Zero Touch Provisioning (ZTP) allows for automatic provisioning of Juniper Network devices that you add to your network. You can provision any supported device by using either a script to be executed or a configuration file to be loaded. You will also need to configure a DHCP server with required information, which is provided in this procedure, to use ZTP.

Optionally, you can configure an HTTP proxy server for either the phone-home server or redirect server. When the phone-home client receives information regarding the HTTP proxy server via DHCP option 43 suboption 8, it will create an HTTPS transparent tunnel with the proxy server. Once the tunnel is established, the phone-home client uses the tunnel as a proxy for the phone-home server or redirect server. The phone-home client downloads the software image and configuration file through the tunnel onto the device. Once bootstrapping is complete, the device reboots and the tunnel quits.

ZTP requires that your device is in a factory default state. The device from the factory boots with preinstalled software and factory default configuration. On a device that does not currently have the factory default configuration, you can issue the `request system zeroize` command.

NOTE: The `request system zeroize` command is not supported on PTX1000, PTX10001-20C, QFX10002-60C, PTX10002-60C devices. You must issue the `request vmhost zeroize` command (instead of `request system zeroize`) for factory default configuration on PTX1000 routers.

NOTE: On PTX10001-20C devices, after you issue the the `request vmhost zeroize` command, you will see the following message twice: `VMHost Zeroization : Erase all data, including configuration and log files ? [yes,no] (no) yes warning: Vmhost will reboot and may not boot without configuration Erase all data, including configuration and log files? [yes,no] (no) yes`

Before you begin:

- Ensure that the device has access to the following network resources:
  - The DHCP server that provides the location of the software image and configuration files on the network

    Refer to your DHCP server documentation for configuration instructions.
  - The File Transfer Protocol (anonymous FTP), Hypertext Transfer Protocol (HTTP), or Hypertext Transfer Protocol Secure (HTTPS), or Trivial File Transfer Protocol (TFTP) server on which the software image and configuration files are stored

    NOTE: Although TFTP is supported, we recommend that you use FTP or HTTP instead, because these transport protocols are more reliable.

    ⚠ **CAUTION**: HTTP URLs are limited to 256 characters in length.
  - A Domain Name System (DNS) server to perform reverse DNS lookup (not supported).
  - (Optional) An NTP server to perform time synchronization on the network
  - (Optional) A system log (syslog) server to manage system log messages and alerts.

    Syslog messages will be forwarded to this syslog server during ZTP.
- (Optional) An HTTP proxy server for either the phone-home server or redirect server.
- Locate and record the MAC address for your device.

On PTX10008 devices, the management MAC addresses are located on routing engines.

> **CAUTION**: You cannot commit a configuration while the device is performing the software update process. If you commit a configuration while the device is performing the configuration file autoinstallation process, the process stops, and the configuration file is not downloaded from the network.

To enable zero touch provisioning for a device using DHCP options:

1. Boot the device.
2. Make sure the device has the default factory configuration installed.

   Issue the `request system zeroize` command on the device that you want to provision.

   > **NOTE**: The `request system zeroize` command is not supported on PTX1000 devices. You must issue the `request vmhost zeroize` command (instead of `request system zeroize`) for factory default configuration on PTX1000 devices.

   We recommend you provision the DHCP server and save the software and configuration file in the specified DHCP server path on the file server.
3. Download the software image file and/or the configuration file to the FTP, HTTP, or TFTP server from which the device will download these files.

   > **NOTE**: If you are performing zero touch provisioning with a Junos OS image that contains enhanced automation for the QFX5100 device, configure root authentication and the provider name, license type, and deployment scope for Chef and Puppet at the `[edit system]` hierarchy in the configuration file that is fetched from the server:
   >
   > ```
   > { master:0}
   > root# set root-authentication (encrypted-password password | plain-text-password
   > password | ssh-dsa public-key | ssh-rsa public-key)
   > root# set extensions providers juniper license-type customer deployment-scope commercial
   > root# set extensions providers chef license-type customer deployment-scope commercial
   > ```

4. Configure the DHCP server to provide the necessary information to the device.

   Configure IP address assignment.

   You can configure the dynamic or static IP address assignment for the management address of the device.

To determine the management MAC address for static IP address mapping, add 1 to the last byte of the MAC address of the device, which you noted before you began this procedure.

NOTE: This address can be any address from the pool.

5. Define the format of the vendor-specific information for DHCP option 43 in the **dhcpd.conf** file.

   Here is an example of an ISC DHCP 4.2 server dhcpd.conf file:

```
option space NEW_OP; option;
 option NEW_OP.image-file-name code 0 = text;
 option NEW_OP.config-file-name code 1 = text;
 option NEW_OP.image-file-type code 2 = text;
 option NEW_OP.transfer-mode code 3 = text;
 option NEW_OP.alt-image-file-name code 4= text;
 option NEW_OP.http-port code 5= text;
 option NEW_OP-encapsulation code 43 = encapsulate NEW_OP;
 option NEW_OP.proxyv4-info code 8 = text;
```

   NOTE: Starting in Junos OS Release 18.2R1, a new DHCP option is introduced to set the timeout value for the file downloads over FTP. If the `transfer-mode` is set as FTP, the default value for the timeout is automatically set as 120 minutes, that is, in case the FTP session gets interrupted due to loss of connectivity in the middle of a file transfer, it will timeout after 120 minutes and ZTP will attempt to retry the file fetching process. This value can be overridden using the DHCP option as follows:

```
option NEW_OP.ftp-timeout code 7 = text;
option NEW_OP.ftp-timeout “val”;
```

   where “val” is the user configurable timeout value in seconds and must be provided within quotes (like, "val”).

6. Configure the following DHCP option 43 suboptions:

   - Suboption 00: The name of the software image file to install.

NOTE: When the DHCP server cannot use suboption 00, configure the software image filename using suboption 04. If both suboption 00 and suboption 4 are defined, suboption 04 is ignored.

```
option NEW_OP.image-file-name "/dist/images/jinstall-ex-4200-13.2R1.1-domestic-signed.tgz";
```

- Suboption 01: The name of the script or configuration file to install.

```
option NEW_OP.config-file-name "/dist/config/jn-switch35.config";
```

NOTE: ZTP determines if the file is a script file based on the first line of the file. If the first line contains the characters `#!` followed by an interpreter path, ZTP treats the file as a script and executes it with the specified interpreter path. For a script to execute, the script file must provide the ability to fetch and load a valid configuration file on the device during the ZTP process.

The following list provides the types of scripts and their associated interpreter paths:

- Shell script interpreter path: `#!/bin/sh`
- SLAX script interpreter path: `#!/usr/libexec/ui/cscript`
- Python script interpreter path: `#!/usr/bin/python`

  For security reasons, Junos OS has strict requirements for running unsigned Python scripts on devices running Junos OS. Only devices running Junos OS with Enhanced Automation and devices running Junos OS Evolved support running unsigned Python scripts as part of the ZTP process.

If the file does not contain special characters (`#!`) , ZTP determines that the file is a configuration file and loads the configuration file.

NOTE: Starting in Junos OS Release 21.1R1, ZTP Python scripts that are fetched from the ZTP server should be migrated to use Python 3 because Python 2.7 is no longer supported, In other words, the interpreter directive line should point to Python 3 and also the script's code needs to be migrated to Python 3.

- Suboption 02: The symbolic link to the software image file to install.

```
option NEW_OP.image-file-type "symlink";
```

> **NOTE**: If you do not specify suboption 2, the ZTP process handles the image filename as a filename, not a symbolic link.

- Suboption 03: The transfer mode that the device uses to access the TFTP, FTP, HTTP, or HTTPS server. If you select FTP as the transfer mode, Junos OS uses the anonymous FTP login to download files from the FTP server.

```
option NEW_OP.transfer-mode "ftp";
```

> **NOTE**: If suboption 03 is not configured, TFTP becomes the transfer mode by default.

- Suboption 04: The name of the software image file to install.

> **NOTE**: If the DHCP server does not support suboption 00, configure the image file using suboption 04. If both suboption 00 and suboption 4 are defined, suboption 04 is ignored.

```
option NEW_OP.alt-image-file-name "/dist/images/jinstall-ex-4200-13.2R1.1-domestic-signed.tgz";
```

- Suboption 05: The HTTP port that the device uses to download either the image or configuration file or both instead of the default HTTP port.

```
option NEW_OP.http-port code 5= 8080;
```

- Suboption 08: HTTP proxy server information that is passed from the DHCP server to the DHCP client. This is useful when the device needs to access the phone-home server or redirect server via a proxy server.

NOTE: When you configure the DHCP server and HTTP proxy server, make sure that you use the correct port number to allow traffic to flow through the secure tunnel. Also, make sure that the hostname or IP address of the HTTP proxy server and port number are separated by a colon: for example, 192.168.10.10:8080. If you don't use a colon, port 1080 is used.

When the DHCP client receives the HTTP proxy server information, it is saved in the /var/etc/phc_vendor_specific_info.xml (INET) file.

If the DHCP client does not receive the HTTP proxy server information, nothing is saved to the /var/etc/phc_vendor_specific_info.xml (INET) file, and the DHCP client moves into a bound state.

You can renew the HTTP proxy server information by issuing the `request dhcp client renew interface` command. The DHCP client fetches the valid HTTP proxy server information from the DHCP server. Using the command is simpler than having to restart the provisioning process When the HTTP proxy server is renewed, or the HTTP proxy server information is changed or deleted, jdhcp will rewrite the **/var/etc/phc_vendor_specific_info.xml** file with the latest information received from suboption 8.

```
option NEW_OP.proxyv4-info code 8 = text;
```

Here's the format for this option:

```
option NEW_OP.proxyv4-info "http://<proxyname>:<port-number>";
```

Here's an example of the format using a fictitious proxy name:

```
option NEW_OP.proxyv4-info "http://saras-mr2:3128";
```

7. (Mandatory) Configure either option 150 or option 66.

NOTE: You must configure either option 150 or option 66. If you configure both option 150 and option 66, option 150 takes precedence, and option 66 is ignored. Also, make sure you specify an IP address, not a hostname, because name resolution is not supported.

- Configure DHCP option 150 to specify the IP address of the FTP, HTTP, HTTPS, or TFTP server.

```
option option-150 code 150={ ip-address};
option option-150 10.100.31.71;
```

- Configure DHCP option 66 to specify the IP address of the FTP, HTTP, HTTPS, or TFTP server.

```
option tftp-server-name "10.100.31.71";
```

8. (Optional) Configure DHCP option 7 to specify one or more system log (syslog) servers.

```
option log-servers 10.100.31.72;
```

9. (Optional) Configure DHCP option 42 to specify one or more NTP servers.

   List each NTP server separated by a space.

```
option ntp-servers 10.100.31.73;
```

10. (Optional) Configure DHCP option 12 to specify the hostname of the device.

```
option hostname "jn-switch35";
```

The following sample configuration shows the DHCP options you just configured in this procedure:

```
host jn-switch35 {
    hardware ethernet ac:4b:c8:29:5d:02;
    fixed-address 10.100.31.36;

    option tftp-server-name "10.100.31.71";
     option NEW_OP.ftp-timeout “val”;
    option host-name "jn-switch35";
    option log-servers 10.100.31.72;
    option ntp-servers 10.100.31.73;
    option NEW_OP.image-file-name "/dist/images/jinstall-ex-4200-13.2R1.1-domestic-
signed.tgz";
    option NEW_OP.transfer-mode "ftp";
    option NEW_OP.http-port code 5= 8080;
```

```
    option NEW_OP.config-file-name "/dist/config/jn-switch35.config";
}
```

Based on the DHCP options configured in this example, the following items are added to the `[edit system]` hierarchy:

```
system {
    host-name jn-switch35;

    syslog {
        host 10.100.31.72 {
            any any;
        }
    }
    ntp {
        server 10.100.31.73;
    }
}
```

11. Connect the device to the network that includes the DHCP server and the FTP, HTTP, HTTPS, or TFTP server.
12. Power on the device.
13. Monitor the ZTP process by looking at the console.

> **NOTE**: When SLAX scripts are executed, the `op-script.log` and `event-script.log` files are produced.

You can use these log files to troubleshoot in case something goes wrong.

- /var/log/dhcp_logfile

  Use this file to check DHCP client logs.

- /var/log/event-script.log

  Use this file to check configuration commit status.

- /var/log/image_load_log

  Use this file to check software image and configuration file fetch and installation status.

- /var/log/messages

Use this file to check system-level logs.

- /var/log/op-script.log

  Use this file to check configuration commit status.

- /var/log/script_output

  Use this file to check script execution output.

You can also monitor the ZTP process by looking at error messages and issuing operational commands. See "Monitoring Zero Touch Provisioning" on page 492 for more information.

Zero Touch Provisioning Using DHCPv6 Options

The DHCPv6 protocol doesn't have a subnet option for the IA_NA (identity association for non-temporary addresses) to learn and install subnet routes. Instead, the subnet route is installed through Neighbor Discovery Protocol.

In IPv6, devices periodically advertise IPv6 prefixes along with other link parameters using Router Advertisement (RA) messages. On the client (Juniper device running ZTP), once the DHCPv6 client is bound, the Neighbor Discovery Protocol (NDP) will learn these prefixes and installs the prefix routes via the client interface, with the next hop as the link to the local address of the gateway device.

On the client device, router advertisement configuration is enabled by default along with the DHCPv6 configuration.

- Ensure that the device has access to the following network resources:
  - The DHCP server that provides the location of the software image and configuration files on the network

    Refer to your DHCP server documentation for configuration instructions.

  - On the MX Series, the File Transfer Protocol (anonymous FTP), Trivial File Transfer Protocol (TFTP), Hypertext Transfer Protocol (HTTP), or Hypertext Transfer Protocol Secure (HTTPS) server on which the software image and configuration files are stored.

    CAUTION: HTTP URLs are limited to 256 characters in length.

  - On the EX3400, EX4300, QFX5100, and QFX5200 devices, the Hypertext Transfer Protocol (HTTP) or Hypertext Transfer Protocol Secure (HTTPS) server on which the software image and configuration files are stored.

> **CAUTION**: HTTP URLs are limited to 256 characters in length.

  - (Optional) An HTTP proxy server for either the phone-home server or redirect server.

- Locate and record the MAC address printed on the device.

Zero Touch Provisioning (ZTP) allows for automatic provisioning of Juniper Network devices that you add to your network. You can provision any supported device by using either a script to be executed or a configuration file to be loaded.

To use ZTP, you configure a DHCP server to provide the required information. If you do not configure the DHCP server to provide this information, the device boots with the preinstalled software and default factory configuration. If your device is not in a factory default state, you can issue the `request system zeroize` command.

Optionally, you can configure an HTTP proxy server for either the phone-home server or redirect server. When the phone-home client receives information regarding the HTTP proxy server via DHCP option 17 suboption 8, it will create an HTTPS transparent tunnel with the proxy server. Once the tunnel is established, the phone-home client uses the tunnel as a proxy for the phone-home server or redirect server. The phone-home client downloads the software image and configuration file through the tunnel onto the device. Once bootstrapping is complete, the device reboots and the tunnel quits.

> **NOTE**: Starting in Junos OS Release 20.2R1-S1, the DHCPv6 client is supported the MX-Series, EX3400, EX4300, QFX5100, and QFX5200 switches. Both DHCPv4 and DHCPv6 clients are included as part of the default configuration. During the bootstrap process, the device first uses the DHCPv4 client to request for information regarding image and configuration file from the DHCP server. The device checks the DHCPv4 bindings sequentially. If there is a failure with one of the DHCPv4 bindings, the device will continue to check for bindings until provisioning is successful. If there are no DHCPv4 bindings, however, the device will check for DHCPv6 bindings and follow the same process as for DHCPv4 until the device can be provisioned successfully. The DHCP server uses DHCPv6 options 59 and 17 and applicable sub-options to exchange ZTP-related information between itself and the DHCP client.

> **CAUTION**: You cannot commit a configuration while the device is performing the software update process. If you commit a configuration while the device is performing the configuration file autoinstallation process, the process stops, and the configuration file is not downloaded from the network.

To use zero touch provisioning for a device using DHCPv6 options:

1. Boot the device.
2. Make sure the device has the default factory configuration installed.
   - If multiple DHCP replies arrive, the ZTP chooses the best set of arguments.
   - If multiple interfaces provide the same arguments, ZTP chooses one of the equal interfaces.
   - If there is an error while connecting to the DHCP server, ZTP tries again to connect to the DHCP server. If multiple interfaces again provide the same arguments, ZTP chooses one of the interfaces.

   We recommend you to provision the DHCP server and save the software and configuration file in the specified DHCP server path on the file server.
3. Download the software image file and the configuration file to the FTP, HTTP, HTTPS, or TFTP server from which the device will download these files.
4. Configure the DHCP server to provide the necessary information to the device.
5. Configure IP address assignment.

   You can configure dynamic or static IP address assignment for the management address of the device. To determine the management MAC address for static IP address mapping, add 1 to the last byte of the MAC address of the device, which you noted before you began this procedure.
6. Define the format of the DHCPv6 option 59 (OPT_BOOTFILE_URL) in the **dhcpd6.conf** file, so the server can send information about URLs to images to the client.

   NOTE: Only the HTTP and HTTPS transport protocols are supported on the EX3400, EX4300, QFX5100, and QFX5200 devices.

   Here's the format for this option:

   ```
   transfer-mode://[<ipv6-address>]:<port-number>/<path/image-file-name>
   ```

   For example:

   ```
   ftp://[2001:db8::40]:21/ZTP/bootimage.tgz
   tftp://[2001:db8::40]:69/ZTP/bootimage.tgz
   http://[2001:db8::40]:80/ZTP/bootimage.tgz
   https://[2001:db8::40]:443/ZTP/bootimage.tgz
   ```

   The transfer mode and IPv6 address are required, but the port number is optional. If you do not specify the port number, the default port number of the transfer mode is used. If you specify the port

number in options 17 and 59, then the port number mentioned in option 17 vendor-specific information option is used.

You can specify the image file name in either option 59 or option 17. If the image file name is mentioned in both options 59 and 17, then the image name mentioned in option 17 vendor-specific information option is used.

7. Define the format of the vendor-specific information for the following DHCP option 17 suboptions:

   Here is an example of an ISC DHCP 4.2 server dhcpd6.conf file:

```
option space NEW_OP_V6 code width 2 length width 2;
option NEW_OP_V6.image-file-name code 0 = text;
option NEW_OP_V6.config-file-name code 1 = text;
option NEW_OP_V6. image-file-type code 2 = text;
option NEW_OP_V6.transfer-mode code 3 = text;
option NEW_OP_V6. alt-image-file-name code 4 = text;
option NEW_OP_V6.port-number code 5 = text;
option NEW_OP_V6. jloader-file  code 6 = text;
option NEW_OP_V6. ftp-timeout code 7 = text
option NEW_OP.proxyv6-info code 8 = text;
option vsio.NEW_OP_V6 code 2636 = encapsulate NEW_OP_V6;
```

   - Suboption 00: The name of the software image file to install.

     NOTE: When the DHCP server cannot use suboption 00, configure the software image filename using suboption 04. If both suboption 00 and suboption 4 are defined, suboption 04 is ignored.

```
option NEW_OP_V6.image-file-name "ZTP_IMAGES/jinstall-qfx-5-20.2-img.tgz";
```

   - Suboption 01: The name of the script or configuration file to install.

```
option NEW_OP_V6.config-file-name "ZTP_FILES/baseline_config";
```

     NOTE: ZTP determines if the file is a script file based on the first line of the file. If the first line contains the characters `#!` followed by an interpreter path, ZTP treats the file as a

script and executes it with the specified interpreter path. In order for a script to execute, the script file must provide the ability to fetch and load a valid configuration file on the device during the ZTP process.

The following list provides the types of scripts and their associated interpreter paths:

- Shell script interpreter path: `#!/bin/sh`
- SLAX script interpreter path: `#!/usr/libexec/ui/cscript`
- Python script interpreter path: `#!/usr/bin/python`

  For security reasons, Junos OS has strict requirements for running unsigned Python scripts on devices running Junos OS. Only devices running Junos OS with Enhanced Automation and devices running Junos OS Evolved support running unsigned Python scripts as part of the ZTP process.

If the file does not contain special characters (`#!`) , ZTP determines that the file is a configuration file and loads the configuration file.

NOTE: Starting in Junos OS Release 21.1R1, ZTP Python scripts that are fetched from the ZTP server should be migrated to use Python 3 because Python 2.7 is no longer supported, In other words, the interpreter directive line should point to Python 3 and also the script's code needs to be migrated to Python 3.

- Suboption 02: The image type.

```
option NEW_OP_V6.image-file-type symlink;
```

NOTE: If you do not specify suboption 2, the ZTP process handles the software image as a filename, not a symbolic link.

- Suboption 03: The transfer mode that the device uses to access the TFTP, FTP, HTTP, or HTTPS server.

```
option NEW_OP_V6.transfer-mode "https";
```

NOTE: If suboption 03 is not configured, the transfer mode mentioned in option 59 for the boot image URL is used.

- Suboption 04: The name of the software image file to install.

NOTE: When the DHCP server cannot use suboption 00, configure the image file using suboption 04. If both suboption 00 and suboption 4 are defined, suboption 04 is ignored.

```
option NEW_OP_V6. alt-image-file-name  "ZTP_IMAGES/jinstall-qfx-5-20.2-alternate-img.tgz";
```

- Suboption 05: The port that the device uses to download either the image or configuration file or both instead of the default port.

```
option NEW_OP_V6.port-number 8080;
```

- Suboption 06: The JLoader package file name (supported only on QFX5100 devices)

```
option NEW_OP_V6. “jloader.tgz”;
```

- Suboption 07: FTP timeout code.

```
 option NEW_OP_V6. ftp-timeout “val”;
```

- Suboption 08: HTTP proxy server information that is passed from the DHCP server to the DHCP client. This is useful when a device needs to access the phone-home server or redirect server via a proxy server.

NOTE: When you configure the DHCP server and HTTP proxy server, make sure that you use the correct port number to allow traffic to flow through the secure tunnel. Also, make sure that the hostname or IP address of the HTTP proxy server and port number are separated by a colon: for example, "http://[2001::1]:3128. If you don't use a colon, port 1080 is used.

When the DHCP client receives the HTTP proxy server information, it is saved in the /var/etc/phc_v6_vendor_specific_info.xml (INET6) file.

You can renew the HTTP proxy server information by issuing the `request dhcp client renew interface` command. The DHCP client fetches the valid HTTP proxy server information from the DHCP server. Using the command is simpler than having to restart the provisioning process When the HTTP proxy server is renewed, or the HTTP proxy server information is changed or deleted, jdhcp will rewrite the **/var/etc/phc_v6_vendor_specific_info.xml** file with the latest information received from suboption 8.

```
option dhcp6.vendor-opts code 17 = string;
option NEW_OP.proxyv6-info code 8 = text;
```

- The DHCPv6 protocol defines the Vendor-specific Information Option ("VSIO") in order to send vendor options encapsulated in a standard DHCP option.

```
option vsio.NEW_OP_V6 code 2636 = encapsulate NEW_OP_V6;
```

The following sample configuration shows the DHCPv6 options you've just configured:

```
subnet6 2001:db8::/32 {
    range6 2001:db8::10  2001:db8::40;
}
host chocolate {
    option host-name chocolate;
    hardware ethernet 00:a0:a5:7b:cd:38;
    fixed-address6 2001:db8::11;
    option dhcp6.bootfile-url "https://[2001:db8::1]";

    option NEW_OP_V6.image-file-name "ZTP_IMAGES/jinstall-qfx-5-20.2I-img.tgz";
    option NEW_OP_V6.port-number 8080;
    option NEW_OP_V6.config-file-name "ZTP_FILES/baseline_config";
    option NEW_OP_V6.image-file-type symlink;
    option NEW_OP_V6.transfer-mode "https";
    option NEW_OP_V6.jloader-file  “jloader.tgz ”
    option dhcp6.vendor-opts code 17 = string;
    option NEW_OP.proxyv6-info "http://[2001::1]:3128";
}
```

8. Power on the device with the default configuration.

9. Monitor the ZTP process by looking at the console.

> **NOTE**: When SLAX scripts are executed, the `op-script.log` and `event-script.log` files are produced.

You can also use these log files to troubleshoot in case something goes wrong.

- /var/log/dhcp_logfile

  Use this file to check DHCP client logs.

- /var/log/event-script.log

  Use this file to check configuration commit status.

- /var/log/image_load_log

  Use this file to check software image and configuration file fetch and installation status.

- /var/log/messages

  Use this file to check system-level logs.

- /var/log/op-script.log

  Use this file to check configuration commit status.

- /var/log/script_output

  Use this file to check script execution output.

You can also monitor the ZTP process by looking at error messages and issuing operational commands. See "Monitoring Zero Touch Provisioning" on page 492 for more information.

Zero Touch Provisioning on SRX Series Firewalls

IN THIS SECTION

Understanding Zero Touch Provisioning on SRX Series Firewalls

IN THIS SECTION

This topic includes following sections:

Understanding ZTP on SRX Series Firewalls

Zero Touch Provisioning (ZTP) enables you to provision and configure devices automatically, minimizing most of the manual intervention required for adding devices to a network. ZTP is supported on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices.

Starting in Junos OS Release 20.2R1 on SRX300, SRX320, SRX340, SRX345, SRX550 HM, and SRX1500 devices, you can use Zero Touch Provisioning with DHCP options to provision your device. See "Zero Touch Provisioning Using DHCP Options" on page 466 for more information.

ZTP on SRX Series Firewalls is responsible for the initial bootup and configuration of the device when the device is powered on. This functionality includes:

- Providing the bare-minimum bootstrapping of the device. The SRX Series Firewall is shipped with a factory-default configuration. The factory-default configuration includes the URL of the redirect server, that is used to connect to the central server by using a secure encrypted connection.
- Automatically connecting to the server over the Internet, and downloading the configuration and Junos OS image as specified by the customer or user from the server when the SRX Series Firewall boots up with the factory-default configuration. The new image is installed first and then the initial configuration is applied and committed on the SRX Series Firewall.

ZTP offers the following advantages:

- Simplified and faster deployment
- Increased configuration accuracy
- Support for scaling of network without additional resources

The ZTP process uses Network Activator to initially provision SRX Series Firewalls.

Network Activator Overview

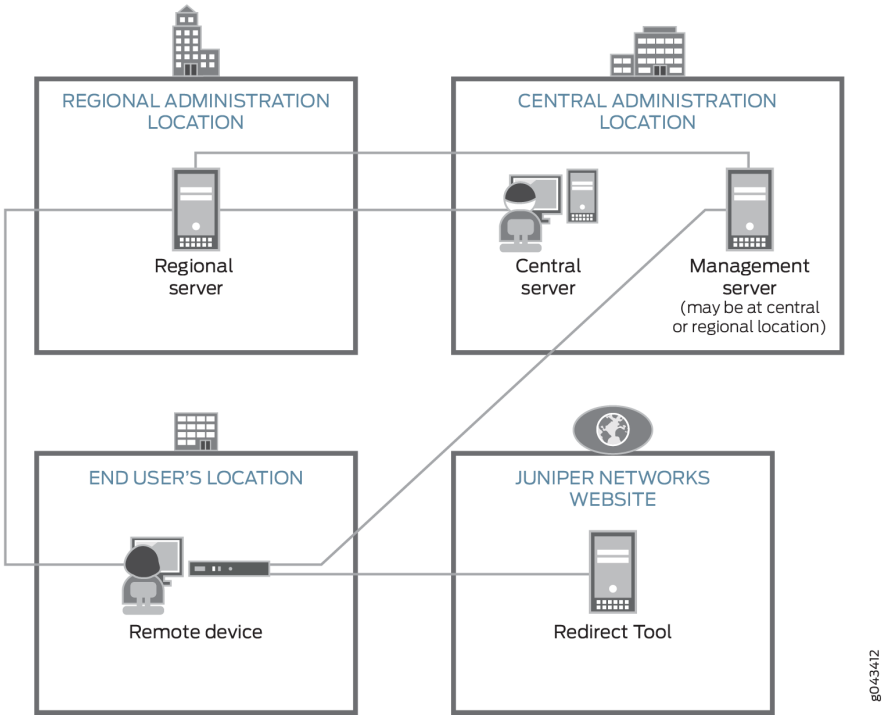
Network Service Activator enables fast device discovery and provisioning for automated configuration to eliminate complex device setup.

Network Activator initially provisions SRX Series Firewalls (henceforth referred to as *remote devices* in this documentation), which reside at end users' sites. The remote devices download a boot image and initial configuration files from servers hosting Network Activator, using a process that provides full authorization and authentication for all interactions. When initial provisioning is complete, the remote device communicates with a management server, which then starts to manage and monitor the remote device.

Network Activator uses a distributed architecture to support remote devices. Network Activator is installed on one central administration server (central server) and multiple regional administration servers (regional servers). A device communicates directly with its assigned regional server. The distributed architecture optimizes the efficiency of the initial provisioning process, contributing to high performance and scaling of the network.

Figure 18 on page 484 Illustrates the distributed architecture and the components involved in the initial provisioning process.

Figure 18: Components Involved in Initial Provisioning of Remote Device

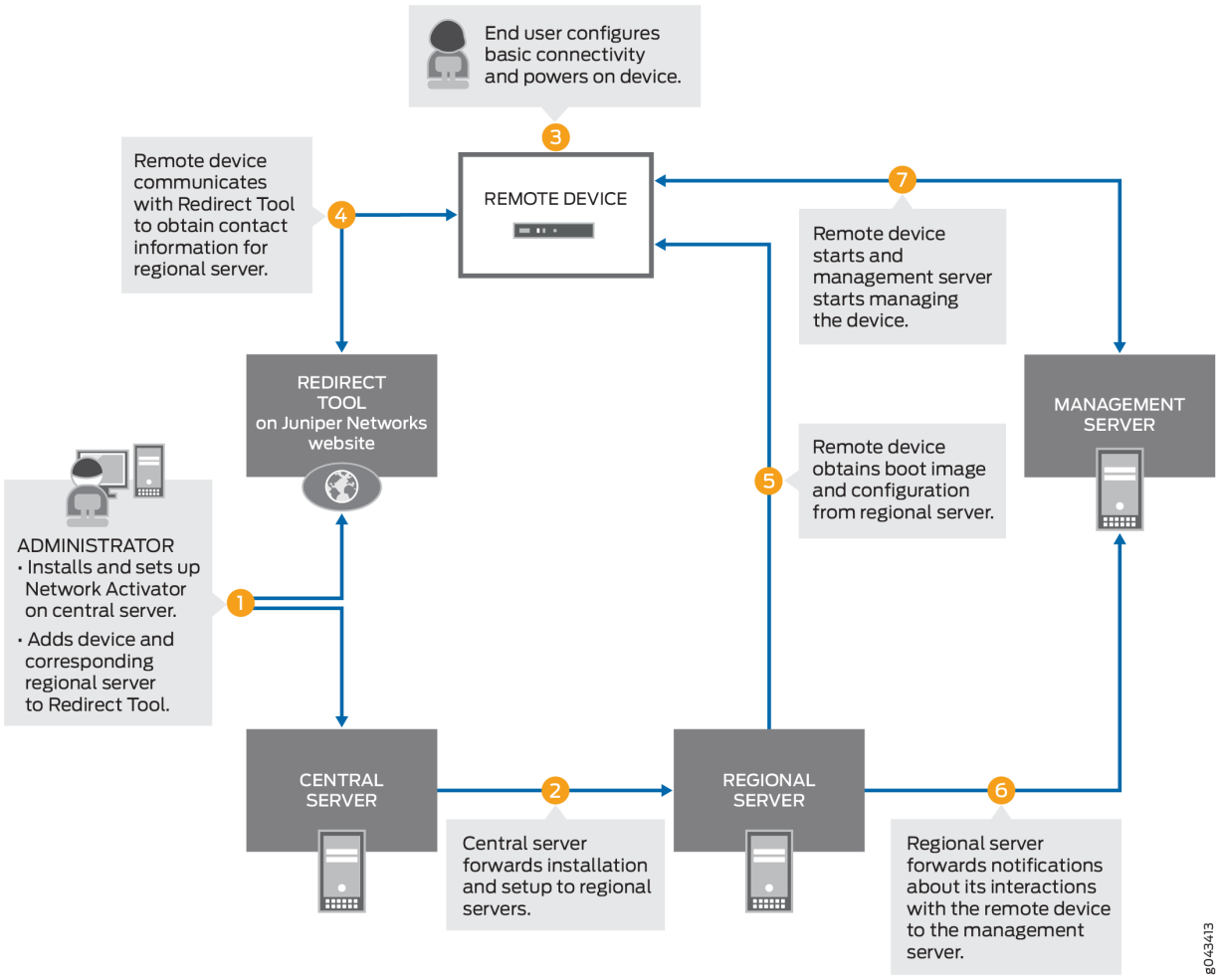


The roles of the components in the initial provisioning process are as follows:

- The remote device sends requests for initial provisioning. The remote device resides at the end user's location.
- The Redirect Tool provides authentication and authorization for remote devices to access their assigned regional servers through use of ITU-T X.509 private key infrastructure (PKI) digital certificates. Redirect service is hosted on Amazon Web Services (AWS), operated and maintained by Juniper Networks.
- The central server hosts Network Activator and communicates with the regional activator servers. Administrators at a service provider or central enterprise location interact with this server to install and set up Network Activator. The central server is located at a central geographic location for the service provider.
- The regional server also hosts Network Activator. This server stores information about its assigned remote devices and communicates directly with those devices. This server typically resides at a regional administrative location the provider designates for the end user.

Figure 19 on page 486 illustrates the initial provisioning workflow.

Figure 19: Workflow for Initial Provisioning



In detail, the provisioning workflow proceeds as follows:

1. The administrator at the service provider:
   - Installs and sets up Network Activator on the central server.
   - Adds remote devices and regional servers in the Redirect Tool.
2. The central server forwards the installation to the regional servers.
3. The end user powers on the remote device, connects it to a computer, and enters the authentication code in the webpage to send a request for initial provisioning.
4. The device transmits its X.509 certificate and fully qualified domain name (FQDN) as a provisioning request to the Redirect Tool.

5. The Redirect Tool searches its data store for the regional server that the administrator specified for this device, and confirms that the device's request corresponds to the X.509 certificate specified for the server.
6. The Redirect Tool sends contact information for the regional server to the device.
7. The device sends a request to the regional server for the URL of the boot image and the location of the initial configuration.
8. The regional server sends the information to the device.
9. The device obtains the boot image and configuration from the regional server.
10. The device uses the boot image and configuration to start and become operational.

Limitations

- There are no restrictions on the number of attempts for entering the correct activation code.
- If the remote device is not able to reach the server (because the configured address in the factory-default configuration is not correct or the server is down, and so on), the remote device attempts to connect to an alternative server (if configured in the factory-default configuration). If there is only one server configured, then you can reattempt to connect. In such scenarios, we recommend that you configure the device manually through the console.
- Captive portal redirection, required for automatically redirecting users to the authentication webpage for entering the activation code, is not supported. You must manually navigate to the activation page after connecting to the device.

Configuring Zero-Touch Provisioning on an SRX Series Firewall

Before you begin:

- Unpack the device, install it, complete the necessary cabling, connect a laptop or any other terminal device, and power on the device. See the *Hardware installation Guide* for your device for more information.
- For SRX300, SRX320, SRX340, SRX345, and SRX550M devices, connect the management device and access the J-Web interface.

  For more information, see Quick Start guides of respective devices at SRX300, SRX320, SRX340, SRX345, and SRX550M.

  You are provided with an option to use ZTP; you can use this option or skip it and continue with J-Web wizards.

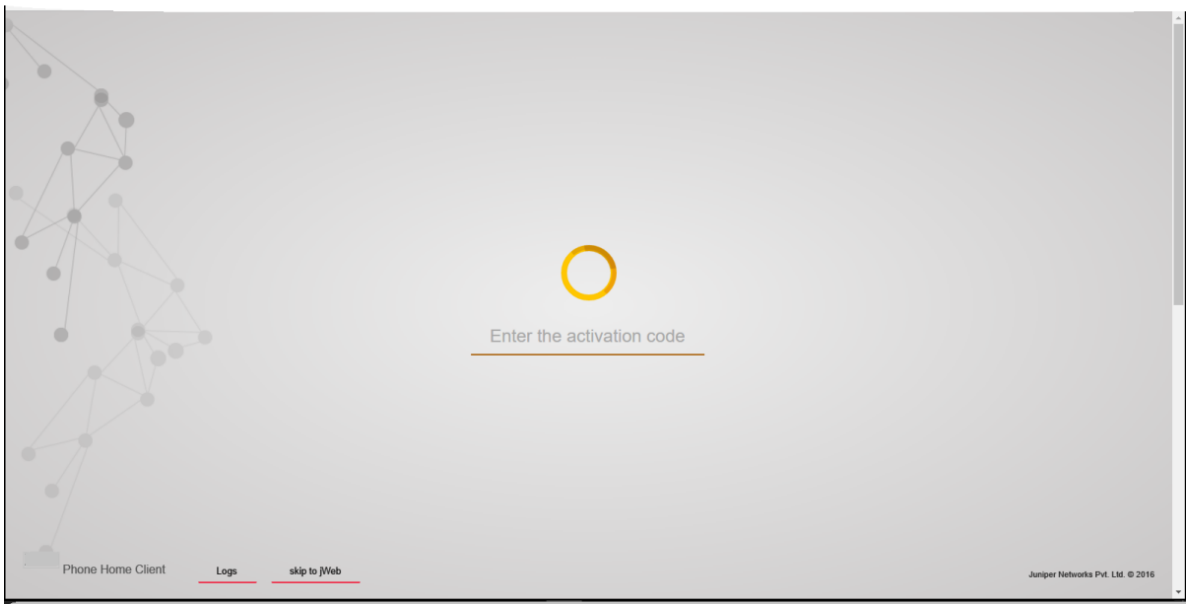
- For SRX1500 devices, before you can use J-Web to configure your device, you must access the CLI to configure the root authentication and the management interface. For more information, see How to Set Up Your SRX1500 Services Gateway.

This section provides step-by-step instructions on how to use ZTP on an SRX Series Firewall for initial provisioning of the device.

To provision an SRX Series Firewall by using ZTP:

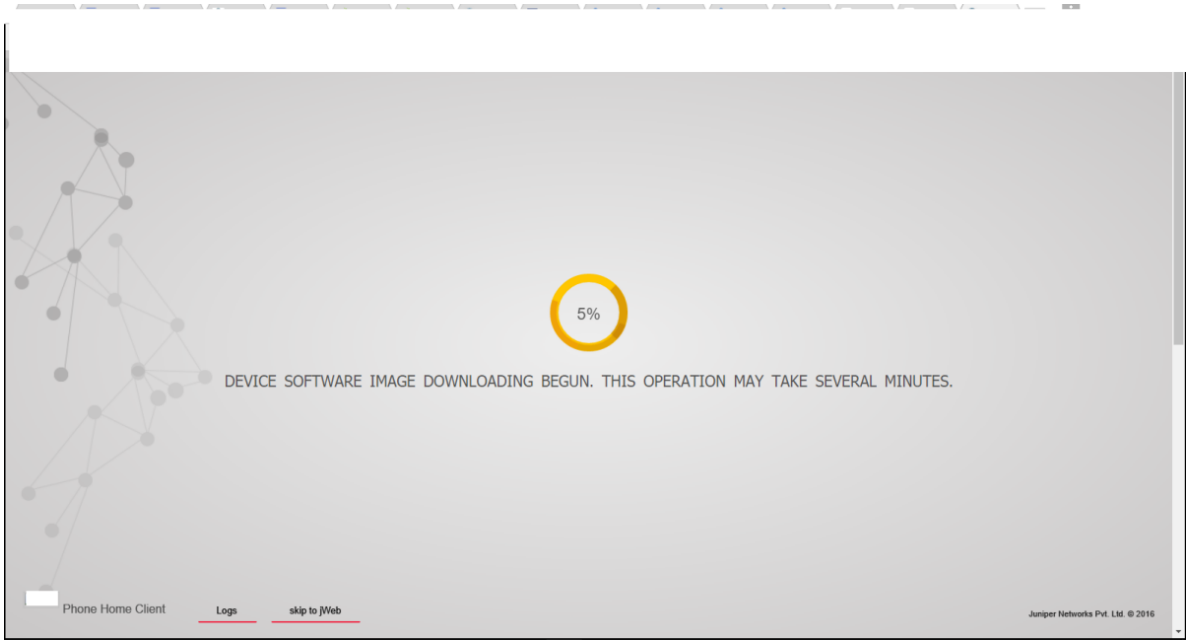
1. Connect a management device (PC or laptop) to any front panel Ethernet port (WAN port) of the SRX Series Firewall.
2. Launch a Web browser from the management device and enter the authentication code in the webpage as shown in Figure 20 on page 488.

Figure 20: Entering Activation Code for ZTP



After the device is successfully authenticated, it starts downloading the software image and initial configuration from the server as shown in Figure 21 on page 489.

Figure 21: Initiating ZTP Process (Software Image Downloading)

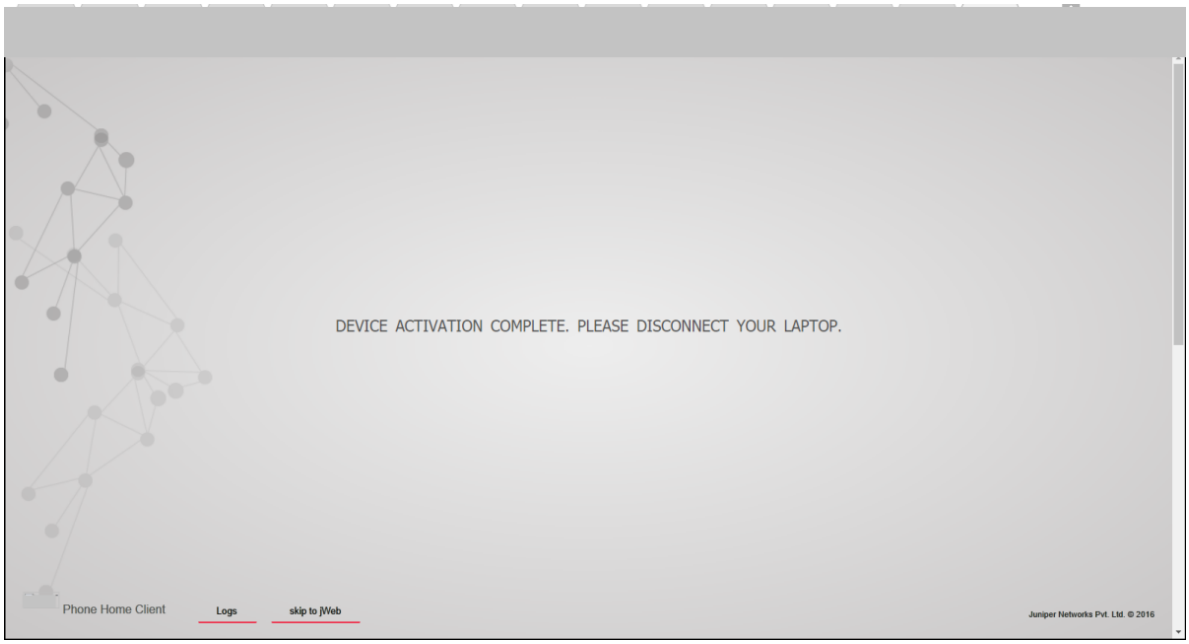


At this step:

- The activation code is sent to the server, and if the authentication is successful, the server pushes the initial configuration to the device. If the authentication is unsuccessful, you are asked to provide the correct code.
- The server can optionally pushes a new software image on the SRX Series Firewall. In that case, the new image is installed first and then the initial configuration is applied and committed on the device.

The new image is installed and then the initial configuration is applied and committed on the device. When the process is complete, a confirmation message is displayed, as shown in Figure 22 on page 490.

Figure 22: Completing ZTP Process



3. Click **Logs** to display details of the bootstrapping process.

After successfully installing the new software image and configuration on the system, the client sends the `bootstrap-complete` notification to the server that provided the image and the configuration. After the notification is sent, the configuration that includes the names of servers is deleted from the system. When you use ZTP the next time, you must explicitly configure the URL of the redirect server.

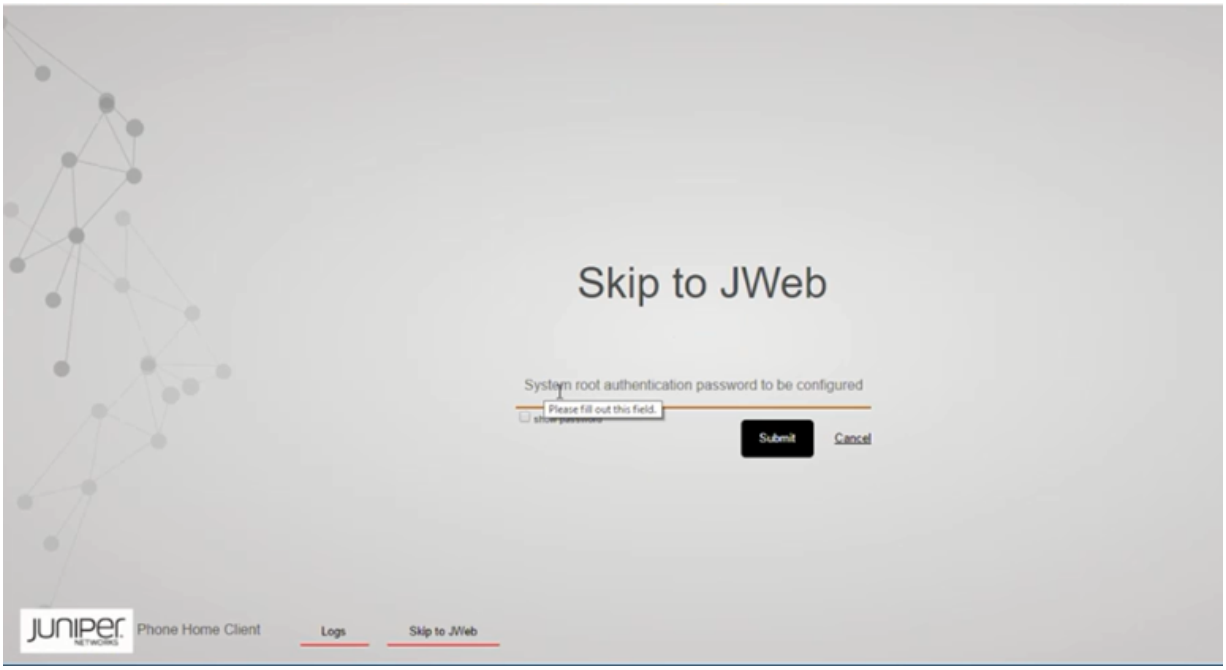
NOTE: In case of failure at any stage, the procedure is started all over again.

NOTE: The ZTP process either upgrades or downgrades the Junos OS version. During a downgrade on an SRX Series Firewall, if you downgrade to a software version earlier than Junos OS Release 15.1X49-D100, in which ZTP is not supported, the autoinstallation phase of the ZTP process does not happen.

For SRX300, SRX320, SRX340, SRX345, and SRX550M devices, ZTP is the default method for provisioning the devices. However, if you want to use J-Web-based provisioning (J-Web setup wizards supported for the SRX300 line of devices and SRX550M devices), then instead of ZTP, you can use the option provided in the client portal to skip to J-Web setup wizards for performing the initial software configuration of your device.

If you select the **Skip to JWeb** option, you must configure the system root authentication password as shown in Figure 23 on page 491.

Figure 23: Configuring System Root-Authentication Password



NOTE: For SRX1500 devices, the **Skip to JWeb** option is not supported. To access J-Web, the ZTP client configuration must be deleted during the initial setup of SRX1500 through CLI.

Understanding Factory-Default Configuration on SRX Series Firewall for Zero Touch Provisioning

Your services gateway is shipped with a factory-default configuration. Following is a sample of the default configuration that includes configuration for ZTP:

```
system {
    phone-home {
        rfc-compliant;
        server https://redirect.juniper.net;
    }
}
```

Note that, in this configuration:

- `server` indicates the name or IP address of the server. The factory-default configuration on an SRX Series Firewall might include IP addresses of more than one servers.

- `rfc-compliant` indicates that after an upgrade, the server enforces certain behaviors that are compliant with RFC standards.

NOTE: By default, the system autoinstallation configuration is part of the factory-default configuration of the device. So, the administrator must ensure that the configuration file sent from the regional server to the remote device (SRX Series Firewall) must include the `delete system autoinstallation` option in the factory-default configuration.

Monitoring Zero Touch Provisioning

IN THIS SECTION

You can use the console and operational mode commands to monitor Zero Touch Provisioning.

Using the Console to Monitor Zero Touch Provisioning in Junos OS

The following Zero Touch Provisioning (ZTP) activities are displayed on the console during the ZTP process:

- Starting and ending times of ZTP process.
- Lists of bound and unbound DHCP client interfaces.
- DHCP options that DHCP servers send to DHCP clients.

- Logs indicating which interfaces are used for ZTP.
- ZTP parameters that DHCP clients obtain from DHCP servers.
- Filenames of configuration and image files, names of file servers, protocols used to fetch files, and times when DHCP servers fetch configuration and image files.
- Failure states caused by files not being on servers, or unreachable servers, and time outs.
- Number of attempts made, and number of attempts remaining, for retry in current ZTP cycle.
- Completion of file transfers.
- Installation, reboot, and state of ZTP process.
- Internal state errors and termination of ZTP process.
- Logs for when default routes were added or deleted.

Using System Log Alerts to Monitor Zero Touch Provisioning

IN THIS SECTION

Purpose

In this example, the system log alert alerts you that the auto-image upgrade will start.

Action

Use the following system log alert to monitor the auto-image upgrade process.

```
“ALERT:Auto-image upgrade will start. This can terminate config CLI session(s). Modified
configuration will be lost. To stop Auto-image, in CLI do the
following: 'edit; delete chassis auto-image-upgrade; commit'.”

“Checking whether image upgrade is already invoked”
```

Meaning

This system log alert indicates that the auto-image upgrade will start, and provides information on how to stop the auto-image upgrade process.

Using Error Messages to Monitor Zero Touch Provisioning

IN THIS SECTION

Purpose

Error messages provide information on which DHCP options are not configured.

Action

Use the information in the following error message to find out which DHCP options are not configured.

```
“DHCP Log Server Option”
“DHCP Host Name Option”
“DHCP NTP Server Option”
```

Meaning

The error message indicates that the DHCP log server, hostname, and NTP server options are not configured.

Using System Log Files to Monitor Zero Touch Provisioning in Junos OS Using DHCP Options

IN THIS SECTION

Purpose

System log files provide information on the state of the auto-upgrade process, lists of bound and unbound DHCP client interfaces, IP addresses of file servers, names and locations of image and configuration files, and successful and failed attempts at fetching configuration and image files.

Action

Use the information in the following system log files to monitor the auto-upgrade process.

```
Auto Image Upgrade: Start fetching config-file file from server 10.1.1.1 through irb using ftp


Auto Image Upgrade: Tried [2] attempts to fetch config-file file from server 10.1.1.1 through
irb. Summary: "Retrieving /config-file
:: Failed to open file.". To retry [4] times.


Auto Image Upgrade: Tried [4] attempts to fetch config-file file from server 10.1.1.1 through
irb. Summary: "Retrieving /config-fileconfig-file
:: Failed to open file.". To retry [2] times.

Auto Image Upgrade: Tried [6] attempts to fetch config-file file from server 10.1.1.1 through
irb. Summary: "Retrieving /config-file
:: Failed to open file.". To retry [0] times.


Auto Image Upgrade: All [6] attempts to fetch config-file file from server 10.1.1.1 through irb
FAILED. Start retry again in few minutes.
```

Meaning

These system log files indicate that there were six failed attempts to fetch the configuration file from the file server, the IP address of the file server, the DHCP client interface name, and the number of times the retry process occurred.

Using System Log Files to Monitor Zero Touch Provisioning in Junos OS Using DHCPv6 Options

IN THIS SECTION

Purpose

System log files provide information on the state of the auto-upgrade process, lists of bound and unbound DHCP client interfaces, IP addresses of file servers, names and locations of image and configuration files, and successful and failed attempts at fetching configuration and image files.

Action

Use the information in the following system log files to monitor the auto-upgrade process.

```
Auto Image Upgrade: Tried [2] attempts to fetch junos-vmhost-install
-20.2.tgz file from server 2001:db8::1 through et-0
/0/0:2. Summary: "fetch-secure: https://[2001:*: Connection refused". To retry
[4] times.


Auto Image Upgrade: Tried [4] attempts to fetch junos-vmhost-install
-20.2.tgz file from server 2001:db8::1 through et-0
/0/0:2. Summary: "fetch-secure: https://[2001:*: Connection refused". To retry
[2] times.

Auto Image Upgrade: Tried [6] attempts to fetch junos-vmhost-install-
20.2.tgz file from server 2001:db8::1 through et-0
/0/0:2. Summary: "fetch-secure: https://[2001:*: Connection refused". To retry
[0] times.
```

Meaning

These system log files indicate that there were six failed attempts to fetch the image file from the file server, the IP address of the file server, the DHCPv6 client interface name, and the number of times the retry process occurred.

Using the show dhcp client binding Command

IN THIS SECTION

Purpose

Issue the `show dhcp client binding` command to display DHCP client binding information

Action

Issue the `show dhcp client binding` command to display the IP address of the DHCP client, the hardware address of the DHCP client, number of seconds in which the DHCP client's IP address lease expires, state of the DHCP client IP address in the binding table, and the name of the interface that has active client bindings.

show dhcp client binding

```
user@device# show dhcp client binding
IP address        Hardware address   Expires     State      Interface
10.0.0.0           00:22:83:2a:db:dc  0           SELECTING  irb.0
10.6.6.13          00:22:83:2a:db:dd  49201       BOUND      vme.0
10.0.0.0           00:22:83:2a:db:df  0           SELECTING  xe-0/0/0.0
10.0.0.0           00:22:83:2a:db:e0  0           SELECTING  xe-0/0/1.0
```

Meaning

The output of this command shows that there is one client interface that is bound, and that there are three interfaces that are receiving DHCP offers from the DHCP server.

Using the show dhcpv6 client binding Command

IN THIS SECTION

Purpose

Issue the `show dhcpv6 client binding` command to display DHCP client binding information

Action

Issue the `show dhcp6 client binding` command to display the IP address of the DHCPv6 client, the hardware address of the DHCPv6 client, number of seconds in which the DHCPv6 client's IP address lease expires, state of the DHCPv6 client IP address in the binding table, and the name of the interface that has active client bindings.

show dhcpv6 client binding

```
user@device# show dhcpv6 client binding
IP/prefix                  Expires    State           ClientType       Interface         Client
DUID
2001:db8::10                           57          SELECTING  STATEFUL      em0.0
LL0x3-54:4b:8c:d3:a2:34
2001:db8::10                           46          SELECTING  STATEFUL      em2.0
LL0x3-54:4b:8c:d3:a2:35
2001:db8::10                           38          SELECTING  STATEFUL      et-0/0/0:0.0
LL0x3-54:4b:8c:d3:a2:3b
2001:db8::10                           530         BOUND      STATEFUL      et-0/0/0:1.0
LL0x3-54:4b:8c:d3:a2:3c
```

Meaning

The output of this command shows that there is one client interface that is bound, and that there are three interfaces that are receiving DHCPv6 offers from the DHCP server.

Using the show dhcp client statistics Command

IN THIS SECTION

Purpose

Issue the `show dhcp client statistics` command to display DHCP client statistics.

Action

Issue the `show dhcp client statistics` command to display DHCP client statistics, such as the number of packets dropped, and the number DHCP and BOOTP messages sent and received.

show dhcp client statistics

```
user@device# show dhcp client statistics
Packets dropped:
    Total                     14
    Send error                14
Messages received:
    BOOTREPLY                 5
    DHCPOFFER                 1
    DHCPACK                   4
    DHCPNAK                   0
    DHCPFORCERENEW            0
Messages sent:
    BOOTREQUEST               6751
    DHCPDECLINE               0
    DHCPDISCOVER              6747
    DHCPREQUEST               4
    DHCPINFORM                0
    DHCPRELEASE               0
    DHCPRENEW                 0
    DHCPREBIND                0
```

Meaning

The output of this command displays how many packets were dropped with errors, the number of BOOTREPLY and DHCPOFFER messages that were received, and the number of BOOTREQUEST and DHCPREQUEST messages that were sent.

Using the show dhcpv6 client statistics Command

IN THIS SECTION

Purpose

Issue the `show dhcpv6 client statistics` command to display DHCPv6 client statistics.

Action

Issue the `show dhcpv6 client statistics` command to display DHCPv6 client statistics, such as the number of packets dropped, and the number of DHCPv6 messages sent and received.

show dhcpv6 client statistics

```
user@device# show dhcpv6 client statistics
Dhcpv6 Packets dropped:
    Total               20323
    Bad Send            7580
    Bad Options         12743

Messages received:
    DHCPV6_ADVERTISE           13
    DHCPV6_REPLY               109
    DHCPV6_RECONFIGURE         0

Messages sent:
    DHCPV6_DECLINE             0
    DHCPV6_SOLICIT             879
```

```
    DHCPV6_INFORMATION_REQUEST 0
    DHCPV6_RELEASE             0
    DHCPV6_REQUEST             9
    DHCPV6_CONFIRM             0
    DHCPV6_RENEW               61
    DHCPV6_REBIND              41
```

Meaning

The output of this command displays how many packets were dropped with errors, and the number of DHCPV6 messages that were received and sent.

Release History Table

Release	Description
21.4R1-EVO	Starting in Junos OS Evolved Release 21.4R1 on the QFX5130-32CD, QFX5220, and QFX5700 devices, ZTP supports the DHCPv6 client on the management interface. During the bootstrap process, the device first uses the DHCPv4 client to request for information regarding image and configuration file from the DHCP server. The device checks the DHCPv4 bindings sequentially. If there is a failure with one of the DHCPv4 bindings, the device will continue to check for bindings until provisioning is successful. If there are no DHCPv4 bindings, however, the device will check for DHCPv6 bindings and follow the same process as for DHCPv4 until the device can be provisioned successfully. The DHCP server uses DHCPv6 options 59 and 17 and applicable sub-options to exchange ZTP-related information between itself and the DHCP client.
21.3R1-EVO	Starting in Junos OS Evolved Release 21.3R1, on PTX10001-36MR, PTX10003, PTX10004, PTX10008, and PTX10016 devices, ZTP now supports DHCP options 61 and 77. DHCP option 61 is used to specify the chassis serial number, and DHCP option 77 is used to specify the make, model, and software version of the chassis.
21.2R1-EVO	Starting in Junos OS Evolved Release 21.2R1 on PTX10008 devices, Zero Touch Provisioning (ZTP) dynamically detects the port speed of WAN interfaces and uses this information to create ZTP server ports with the same speed.
21.2R1-EVO	Starting in Junos OS Evolved Release 21.2R1, QFX5700 devices support the ability for either WAN interfaces or management interfaces to automatically download and install the appropriate software and the configuration file on your device during the ZTP bootstrap process.
21.2R1	Starting in Junos OS Release 21.2R1 on QFX10002 devices, Zero Touch Provisioning (ZTP) dynamically detects the port speed of WAN interfaces and uses this information to create ZTP server ports with the same speed.

21.2R1	Starting in Junos OS Release 21.2R1, on EX2300-C, EX2300-MP, EX4300, EX4300-MP, EX4300-VC, EX4400-24MP, EX4400-48MP, EX4600-VC, EX4650, and EX4650-48Y-VC devices, during the bootstrapping process, the phone-home client can access the redirect server through a proxy server. The DHCP server uses DHCP option 43 suboption 8 to deliver the details of IPv4 and/or IPv6 proxy servers to the phone-home client. The DHCP daemon running on the target switch learns about the proxy servers in the initial DHCP cycle and then populates either the phc_vendor_specific_info.xml or the phc_v6_vendor-specific_info.xml files located in the /var/etc/ directory with the vendor-specific information.
21.2R1	Starting in Junos OS Release 21.2R1, on EX2300-C, EX2300-MP, EX4300, EX4300-MP, EX4300-VC, EX4400-24MP, EX4400-48MP, EX4600-VC, EX4650, and EX4650-48Y-VC devices, you can use a DHCPv6 client and ZTP to provision a switch. During the bootstrap process, the device first uses the DHCPv4 client to request for information regarding the image and configuration file from the DHCP server. The device checks the DHCPv4 bindings sequentially. If there is a failure with one of the DHCPv4 bindings, the device continues to check for bindings until provisioning is successful. However, if there are no DHCPv4 bindings, the device checks for DHCPv6 bindings and follows the same process as for DHCPv4 until the device is provisioned successfully. Both DHCPv4 and DHCPv6 clients are included as part of the default configuration on the device. The DHCP server uses DHCPv6 options 59 and 17 and applicable suboptions to exchange ZTP-related information between itself and the DHCP client.
21.1R1	Starting in Junos OS Release 21.1R1, on EX2300, EX2300-VC, EX3400, EX3400-VC, EX4400-24T, EX4400-48F, EX4400-48T, and EX4600 devices, when the phone-home client receives information regarding the HTTP proxy server via DHCP option 43 suboption 8, it will create an HTTPS transparent tunnel with the proxy server. Once the tunnel is established, the phone-home client uses the tunnel as a proxy for the phone-home server or redirect server. The phone-home client downloads the software image and configuration file through the tunnel onto the device. Once bootstrapping is complete, the device reboots and the tunnel quits.
21.1R1	Starting in Junos OS Release 21.1R1, on EX2300, EX2300-VC, EX3400, EX3400-VC, EX4400-24T, EX4400-48F, EX4400-48T, and EX4600 devices, during the bootstrapping process, the phone-home client can access the redirect server through a proxy server. The DHCP server uses DHCP option 43 suboption 8 to deliver the details of IPv4 and/or IPv6 proxy servers to the phone-home client. The DHCP daemon running on the target switch learns about the proxy servers in the initial DHCP cycle and then populates either the phc_vendor_specific_info.xml or the phc_v6_vendor-specific_info.xml files located in the /var/etc/ directory with the vendor-specific information.
20.4R1-EVO	Starting in Junos OS Evolved Release 20.4R1, PTX10004 devices support automation of the device configuration and software upgrade over the management interface of Routing Engine 0 (RE0).
20.4R1-EVO	Starting in Junos OS Evolved Release 20.4R1, ACX5448 and QFX5120-48YM devices support the ability for either WAN interfaces or management interfaces to automatically download and install the appropriate software and the configuration file on your device during the ZTP bootstrap process.

20.4R1	Starting in Junos OS Release 20.4R1 on the MX-Series, EX3400, EX4300, QFX5100, and QFX5200 devices, ZTP supports the DHCPv6 client. During the bootstrap process, the device first uses the DHCPv4 client to request for information regarding image and configuration file from the DHCP server. The device checks the DHCPv4 bindings sequentially. If there is a failure with one of the DHCPv4 bindings, the device will continue to check for bindings until provisioning is successful. If there are no DHCPv4 bindings, however, the device will check for DHCPv6 bindings and follow the same process as for DHCPv4 until the device can be provisioned successfully. The DHCP server uses DHCPv6 options 59 and 17 and applicable sub-options to exchange ZTP-related information between itself and the DHCP client.
20.4R1	Starting in Junos OS Release 20.4R1 on the EX4600, EX4650, EX9200 with RE-S-EX9200-2X00X6, QFX5110, QFX5200, QFX5210, QFX5120-32C, and QFX5120-48Y devices, you can use either the legacy DHCP-options-based ZTP or the phone-home client (PHC) to provision software for the switch. When the switch boots up, if there are DHCP options that have been received from the DHCP server for ZTP, ZTP resumes. If DHCP options are not present, PHC is attempted. PHC enables the switch to securely obtain bootstrapping data, such as a configuration or software image, with no user intervention other than having to physically connect the switch to the network. When the switch first boots up, PHC connects to a redirect server, which redirects to a phone home server to obtain the configuration or software image.
20.2R1-S1	Starting in Junos OS Release 20.2R1-S1 on the MX-Series, EX3400, EX4300, QFX5100, and QFX5200 devices, ZTP supports the DHCPv6 client. During the bootstrap process, the device first uses the DHCPv4 client to request for information regarding image and configuration file from the DHCP server. The device checks the DHCPv4 bindings sequentially. If there is a failure with one of the DHCPv4 bindings, the device will continue to check for bindings until provisioning is successful. If there are no DHCPv4 bindings, however, the device will check for DHCPv6 bindings and follow the same process as for DHCPv4 until the device can be provisioned successfully. The DHCP server uses DHCPv6 options 59 and 17 and applicable sub-options to exchange ZTP-related information between itself and the DHCP client.
20.2R1	Starting in Junos OS Release 20.2R1 on SRX300, SRX320, SRX340, SRX345, SRX550 HM, and SRX1500 devices, you can use Zero Touch Provisioning with DHCP options or the phone-home client to provision your device.
20.1R1-EVO	Starting in Junos OS Evolved Release 20.1R1 on PTX10003 devices, Zero Touch Provisioning (ZTP) dynamically detects the port speed of WAN interfaces and uses this information to create ZTP server ports with the same speed.
20.1R1-EVO	Starting in Junos OS Evolved Release 20.1R1, PTX10008 devices support automation of the device configuration and software upgrade over the management interface of Routing Engine 0 (RE0).

19.4R1	Starting in Junos OS Release 19.4R1, ZTP can automate the provisioning of the device configuration and software image on Juniper Route Reflector (JRR). ZTP supports self image upgrades and automatic configuration updates using ZTP DHCP options. In this release, ZTP supports revenue ports em2 thru em9, in addition to management port em0 which is supported in Junos OS Releases before 19.4R1.
19.3R1-Evo	Starting in Junos OS Evolved Release 19.3R1, on QFX5220-128C device, in Zero Touch Provisioning (ZTP), you can use either WAN interfaces or management interfaces, to automatically download and install the appropriate software and the configuration file on your device during the bootstrap process.
19.3R1	Starting in Junos OS Release 19.3R1, you can use either WAN interfaces or management interfaces to automatically download and install the appropriate software and the configuration file on your router during the ZTP bootstrap process.
19.2R1	Starting in Junos OS Release 19.2R1, ZTP can automate the provisioning of the device configuration and software image on management interface em0 for ACX5448 switches.
19.1R1-EVO	Starting in Junos OS Evolved Release 19.1R1, ZTP can automate the provisioning of the device configuration and software image on the management interface for QFX5220 and PTX10003 devices.
19.1-Evo	Starting in Junos OS Evolved Release 19.1R1, to monitor zero touch provisioning on Junos OS Evolved, use the *show system ztp* command.
18.3R1	Starting in Junos OS Release 18.3R1, ZTP, which automates the provisioning of the device configuration and software image with minimal manual intervention, is supported on MX Series VM hosts.
18.2R1	Starting in Junos OS Release 18.2R1, ZTP can automate the provisioning of the device configuration and software image on VM host platforms that use PTX5000, PTX3000, PTX10008, PTX10016, PTX10002-60C routers.
18.2R1	Starting in Junos OS Release 18.2R1, ZTP can automate the provisioning of the device configuration and software image on VM host platforms that use QFX10008 and QFX10016 switches.
18.1R1	Starting in Junos OS Release 18.1R1, ZTP can automate the provisioning of the device configuration and software image on VM host platforms that use QFX10002-60C switches.
17.2R1	Starting in Junos OS Release 17.2R1, ZTP can automate the provisioning of the device configuration and software image on VM host platforms that use PTX1000 routers.

16.1R1	Starting in Junos OS Release 16.1R1, you can provision supported devices by using either a script to be executed or a configuration file to be loaded.
12.2	Starting in Junos OS Release 12.2, you can use the console and operational commands to monitor Zero Touch Provisioning.

9

CHAPTER

Secure Zero Touch Provisioning

Secure Zero Touch Provisioning

IN THIS SECTION

NOTE: To see which platforms support Secure Zero Touch Provisioning (SZTP), go to Feature Explorer. In the **Explore Features** section of the Feature Explorer page, select **All Features**. In the **Features Grouped by Feature Family** box, select Secure ZTP. You can also type the name of the feature in the **Search for Features** edit box. See the Release History Table at the end of this topic for more details of how ZTP support has expanded.

Overview

NOTE: The phone-home client (PHC) process supports Secure Zero Touch Provisioning (SZTP).

You can use RFC-8572-based SZTP to bootstrap remotely located network devices that are in a factory-default state. SZTP enables mutual authentication between the bootstrap server and the network device before provisioning the remote network device.

To enable mutual authentication, you need a unique digital voucher and DevID (Digital Device ID or Cryptographic Digital Identity) programmed network device. The DevID is embedded inside the Trusted Platform Module (TPM) 2.0 chip on the network device. Juniper Networks issues a digital voucher to customers for each eligible network device.

We support SZTP on management and WAN interfaces.

> **NOTE**: DHCP-based legacy ZTP is disabled. We do not support DHCP-based legacy ZTP on hardware that supports SZTP.

SZTP is compliant with RFC 8572 and requires the following infrastructure to ensure the identity and authenticity of your network devices:

- Trusted Platform Module (TPM) 2.0
- Digital Device IDs (DevIDs)
- DevID Certificates
- X.509 Pinned Domain Certificates (PDCs)
- Owner Certificates
- DevID Trust Anchors
- Vouchers

  For information on how to generate vouchers, see Generate Voucher Certificate.

To onboard your Juniper devices with Secure ZTP, see Secure ZTP Quick Start Guide.

Benefits

- You can provision a remote network device without manual intervention.
- You can provision a network device securely from a central location, which prevents unauthorized entities from taking control of your network device.
- Your redirect and bootstrap servers verify the authenticity of your network device based on the DevID that's programmed in the network device's TPM.
- Your network device verifies the authenticity of your redirect servers and bootstrap servers, and bootstrap information, based on the devices' vouchers.

Use Case

For network devices that are shipped from the factory, you can make the network devices operational both securely and remotely without manually touching the network device. The network device needs to be able to use the Dynamic Host Configuration Protocol (DHCP) to obtain network connectivity information and connect to a remote bootstrap server.

SZTP Requirements

To deploy SZTP in your network, you need to perform the following tasks:

1. Deploy your DHCP and DNS servers.
2. Configure DHCP V4 option 143 or DHCP V6 option 136 on your DHCP server, so the DHCP server can advertise the names of your redirect and bootstrap servers.
3. Deploy your redirect and bootstrap servers.
4. Acquire DevID trust anchors from Juniper Networks.
5. Generate owner certificates for one network device or a group of network devices.
6. Generate pinned domain certificates (PDCs) for each network domain.
7. Acquire vouchers from Juniper Networks.
8. Generate redirect and bootstrap information for each network device.
9. Use the redirect and bootstrap information that the redirect and bootstrap servers provide to provision your network devices.

After you deploy SZTP in your network, and then deploy a new network device, the network device bootstraps automatically.

SZTP Infrastructure Components

Trusted Platform Module (TPM) 2.0

The TPM is a microchip that provides security-related functions. During the manufacturing process, Juniper Networks programs the TPM with a digital device ID (DevID) and an asymmetric keypair (public key and private key). The TPM locks the private key of the asymmetric pair in a tamper-proof location.

DevIDs

The DevID corresponds to the private key and protects the private key. Applications that require signing or encryption use the DevID private key.

Applications running on your network device use the DevID private key in the network device's TPM to prove the identity of the network device to a remote verifier.

DevID Certificates

Juniper Networks generates a DevID certificate (X.509 certificate) for the public key that corresponds to the DevID of the private key. The DevID certificate contains the serial number of the network device for which the DevID was created. DevID certificate is generated conforming to the IEEE 802.1AR standard.

NOTE: We support the IDevID. We do not support the LDevID.

X.509 Pinned Domain Certificates (PDCs)

Create an X.509 pinned domain certificate (PDC) for every network domain. The PDC can be either a root CA certificate or an intermediate CA certificate. Convert the PDC from distinguished encoding rules (DER) to base 64 encoding. Make sure that the PDC is a certificate authority (CA) and conforms to X.509.

Owner Certificates

The owner certificate verifies the vendor that bought or owns the network device. Generate an asymmetric key pair (public key and private key) for each network device or group of network devices. The key pair needs to use either Rivest-Shamir-Adleman (RSA) or elliptic curve cryptography (ECC). Keep the private key protected in a secure location. The Pinned Domain Certificate (PDC) should be the CA for the owner certificate.

DevID Trust Anchors

Juniper Networks provides DevID trust anchors. Install the DevID trust anchors in redirect and bootstrap servers to verify the DevID certificate that the device or client presents while it establishes a TLS session.

Voucher Certificates

To receive voucher certificates, enter the PDC and the network device's serial number in the Juniper Agile Licensing (JAL) Portal. Once you receive the voucher certificates, include them as part of the

bootstrap information on your bootstrap server. The bootstrap server provides the voucher certificates to your network devices. Your network devices then use the bootstrap information to verify the trust anchors that your redirect server provides.

For step-by-step instructions on how to receive vouchers, see Generate Voucher Certificate.

DevID Workflow

1. When an application requires signing or encryption that uses the DevID, the application requests a TLS session with the bootstrap server.
2. The bootstrap server sends a TLS response to the network device asking the network device to do the following:
   - Provide its DevID certificate
   - Prove that it has a private key
3. The network device signs the session data with the DevID of the private key.
4. The network device sends the digital signature and the DevID certificate to the bootstrap server.
5. The bootstrap server uses the DevID certificate to verify the digital signature.
6. The bootstrap server uses the DevID trust anchor that Juniper Networks provides to verify the DevID certificate.

Onboarding Information

In order for a network device to bootstrap itself and establish secure connections with other systems, you need to provide onboarding information. Onboarding information is data that a network device uses to bootstrap itself and connect with other systems. When a network device sends this data, the data needs to be encoded in a format that conforms to RFC 8572.

Boot Image Information

Boot image information includes the name of the OS and the OS version. We recommend that you specify "Junos" as the OS version. Make sure that you specify the correct OS version to prevent the network device from continuously downloading and installing software.

Download URI

The download URI provides the location of the boot image.

Image Verification

The image verification field includes the hash algorithm that you use to generate a secure hash for the software image and the digest value of the software image. SZTP supports SHA256. Encode the digest value as a hexadecimal string.

Configuration Handling

SZTP can either merge or replace a configuration. Create the configuration in XML and encode the configuration to Base 64 format. The configuration needs to in Base 64 format so that bootstrap server can include it in its bootstrap information.

Pre-configuration Scripts

SZTP supports Bourne shell scripts and Python scripts. The Bourne shell script interpreter path is #!/bin/sh, and the Python interpreter path is #!/usr/bin/python.

If the script is a Bourne script, SZTP checks the end value of the script. If the script exits with nonzero value, the SZTP process restarts. If the script is a Python script, SZTP doesn't check the end value of the script. The output of a script could have errors even if the script ran successfully.

Here's an example of the onboarding information in XML:

```
============================
<onboarding-information>
    <boot-image>
        <os-name>Junos</os-name>
        <os-version>22.2R1</os-version>
        <download-uri>https://example.com/path/to/image/file,https://example-1.com/path/to/image/
file</download-uri>
        <image-verification>
            <hash-algorithm> </hash-algorithm>
            <hash-
value>ba:ec:cf:a5:67:82:b4:10:77:c6:67:a6:22:ab:7d:50:04:a7:8b:8f:0e:db:02:8b:f4:75:55:fb:c1:13:b
2:33</hash-value>
        </image-verification>
    </boot-image>
    <configuration-handling>merge</configuration-handling>
```

```
    <pre-configuration-script>base64encodedvalue</pre-configuration-script>
    <configuration>base64encodedvalue</configuration>
    <post-configuration-script>base64encodedvalue</post-configuration-script>
</onboarding-information>
========================================
```

Post-configuration Scripts

The pre-configuration script requirements also apply to post-configuration scripts. If any post-configuration script fails, your device rolls back to the configuration it was running before the pre-configuration script was executed. The SZTP process restarts.

DHCP V4 Option 143

Configure DHCP V4 option 143 on your DHCP server before it can provide any IP addresses to the DHCP client.

If you use an MX-Series device as a DHCP server, enable DHCP V4 Option 143.

Here is a sample configuration:

```
access {
    address-assignment {
        pool p1 {
            family inet {
                 network 192.168.2.0/24;
                      range r1 {
                      low 192.168.2.2;
                      high 192.168.2.254;
            }
            dhcp-attributes {
            maximum-lease-time 2419200;
            server-identifier 192.168.2.1;
                router {
                    192.168.2.1;
                }
            }
            option 143 hex-string 001368747470733a2f2f6578616d706c652e636f6d;
       }
```

```
    }
}
```

DHCP V6 Option 136

Here is a sample configuration:

```
access {
    address-assignment {
    neighbor-discovery-router-advertisement p2;
              pool p2 {
                  family inet6 {
                  prefix 2001:db8:::/64;
                        range r1 {
                        low 2001:db8:::200/128;
                        high 2001:db8:::299/128;
                        }
              dhcp-attributes {
                  dns-server {
                       2001:db8:::8888;
                  }
              }
              option 136 hex-string 002968747470733a2f2f6d782d7068732d736572766572362e656e676c6
         }
    }
}
```

SZTP Workflow

NOTE: This topic includes only one of the permitted workflows. We support everything in the RFC 8572 standard, including Appendix-B.

If your device isn't already in a factory-default state, issue one of the following commands to bring your device into a factory-default state.

- On network devices running Junos OS, issue the `request vmhost zeroize` command.
- For network devices running Junos OS Evolved, issue the `request system zeroize` command.

When a device boots up in a factory-default state, the following events occur.

1. The DHCP client sends a request to the DHCP server to obtain the name, IP address, or host name of either the bootstrap server or customer redirect server.

   Configure either DHCP option 143 for V4 or DHCP option 136 for V6. The DHCP client requests the IP address for each bootstrap or redirect server until the device completes bootstrapping.

2. The DHCP server sends the server host name of either a bootstrap or a customer redirect server to the DHCP client.

3. The phone-home client (PHC) on your device sends a bootstrap request to the server it learned from the DHCP option. If you've provided multiple servers in the DHCP option, the device tries to bootstrap with each server sequentially.

   The device tries to bootstrap with any bootstrap, customer redirect, or DNS server that the PHC learns through the DHCP option. The device attempts to bootstrap to a server in round-robin fashion until the device bootstraps successfully.

4. The bootstrap server responds with signed onboarding information along with the owner certificate and ownership voucher.

5. The PHC uses the information in the owner certificate and ownership voucher to verify the signed onboarding information.

6. The PHC extracts image and configuration information.

7. If the device is running a different image, the device downloads the image, uses the new image to upgrade, and then reboots with the new image.

   Post reboot, the entire SZTP sequence repeats, except that device doesn't reboot because it already has the required image.

8. The PHC runs the pre-configuration scripts.

   SZTP supports Bourne and Python scripts.

   Encode your pre-configuration script and post-configuration script XML tag value according to RFC 8572.

9. The PHC commits the configuration.

10. The PHC runs post-configuration scripts.
11. The PHC sends a bootstrap complete message to the PHS.
12. The device cleans up the PHC-related configurations and resources.
13. The PHC terminates.

Table 30: Scripts Supported for SZTP

Script Type	Interpreter Path	Platform Support
Shell script	`#!/bin/sh`	All network devices
Python script	`#!/usr/bin/python`	Network devices running Junos OS with Enhanced Automation Network devices running Junos OS Evolved

SZTP for Network Devices with Dual Routing Engines

Before you upgrade the software on the backup Routing Engine on a network device that run Junos OS software, enable the `secure-ztp provision-backup-re` statement at the `[edit system]` hierarchy on the primary Routing Engine

On network devices that run Junos OS software, enable the `provision-backup-re` statement at the `[edit system]` hierarchy on the primary Routing Engine, so it can bootstrap the backup Routing Engine.

On network devices that run Junos OS Evolved software, enable the `auto-sw-sync` statement at the `[edit system]` hierarchy, so that the primary Routing Engine ensures the same image version is on the backup Routing Engine through either an upgrade or downgrade.

On Junos OS-based systems with dual Routing Engines, the primary Routing Engine downloads the image even if the primary Routing Engine is already running the required image version. The device downloads the image so that the primary Routing Engine is ready to upgrade the backup Routing Engine, if needed.

On Junos OS Evolved-based systems, the primary Routing Engine always keeps a copy of the image it is running.

If you haven't enabled the `synchronize` statement at the `[edit system]` hierarchy or Graceful Restart Engine Switchover (GRES) on the primary Routing Engine, the primary Routing Engine doesn't synchronize the configuration and state to the backup Routing Engine. In this situation, the primary Routing Engine

verifies the authenticity of the backup Routing Engine before it synchronizes any data with the backup Routing Engine.

Before the primary Routing Engine provisions the backup Routing Engine, the primary Routing Engine verifies the authenticity of the backup Routing Engine. The primary Routing Engine checks the DevID of the backup Routing Engine to make sure that the backup Routing Engine is a Juniper-authorized Routing Engine.

NOTE: The primary Routing Engine doesn't check whether the backup Routing Engine is authorized to receive information from the primary Routing Engine. Also, the backup Routing Engine doesn't verify authenticity or authorization of the primary Routing Engine.

The primary Routing Engine provisions the backup Routing Engine in the following situations:

- When the primary Routing Engine has bootstrapped using SZTP.
- When the backup Routing Engine is present when the primary Routing Engine is bootstrapping or inserted during the SZTP process.
- When the backup Routing Engine reboots or is replaced.

Once the primary Routing Engine verifies the backup Routing Engine's authenticity and meets the requirements for provisioning, the primary Routing Engine checks the version of software that is running on the backup Routing Engine. If the backup Routing Engine's software version is different from the primary Routing Engine's software version, the primary Routing Engine upgrades the backup Routing Engine to the same software version that the primary Routing Engine is running.

When both Routing Engines are running the same software, the primary Routing Engine synchronizes its configuration with the backup Routing Engine.

RELATED DOCUMENTATION

Generate Voucher Certificate

10
CHAPTER

Phone-Home Client

Obtaining Configurations and Software Image Without User Intervention Using Phone-Home Client

IN THIS SECTION

The phone-home client (PHC) enables the device or VM instance to securely obtain bootstrapping data, such as a configuration or software image, with no user intervention other than having to physically connect the device or VM instance to the network.

Prerequisites

PHC depends on the following software and utilities to operate:

- Connectivity to redirect server and phone-home server (PHS)
- DHCP client

  NOTE: DHCP-based ZTP is not supported on vSRX Virtual Firewall.

- SLAX support for configuration commits

- Python support
- Curl support
- Factory default configuration
- Mechanism to retrieve device serial number
- SHA1/MD5 utilities to verify software image
- Basic utilities like GREP and AWK

Understanding the Phone-Home Client

PHC enables the device or VM instance to securely obtain bootstrapping data, such as a configuration or software image, with no user intervention other than having to physically connect the device to the network. When the device or VM instance first boots, PHC connects to a redirect server, which then redirects to PHS to get the configuration or software image.

Similar to DHCP-based ZTP, the device or VM instance must be in factory default state in order for PHC to provision the device. If the device is not in factory default state, you can issue the `request system zeroize` command to bring the device back to the factory default state.

Understanding the Redirect Server Configuration

By default, the factory default configuration includes the redirect server URL, which is https://redirect.juniper.net.

Understanding Interoperability Between the Phone-Home Client and DHCP-Based ZTP

To avoid conflicts between these two provisioning methods, the following steps are taken when the device or VM instance boots up:

NOTE: DHCP-based ZTP is not supported on vSRX Virtual Firewall.

NOTE: Provisioning does not start if the device is not in factory default mode. If the device is not in factory default mode, issue the `request system zeroize` command.

NOTE: The `request system zeroize` command is not supported on vSRX Virtual Firewall.

1. If the DHCP client receives either partial or complete DHCP options, PHC is terminated, and DHCP-based ZTP attempts to provision the device until it is successful.
2. If the DHCP client does not receive DHCP options, PHC attempts to provision the device until it is successful.

   If PHC fails to connect to the redirect server, however, DHCP-based ZTP attempts to provision the device. Both provisioning methods attempt to provision the device until one method is successful.

Understanding the Phone-Home Client Process

The following steps take place when PHC is launched:

1. PHC connects to the redirect server.
2. The device or VM Instance downloads and installs the software image from PHS.

   If the software upgrade fails, the process starts over.
3. The device or VM instance reboots, and PHC validates the installed software image when the device comes back online.
4. The device or VM instance downloads the configuration.
5. If a script (either pre-configuration script, post-configuration scripts, or both) was received as part of the configuration, the following happens:

   NOTE: PHC supports both Python and shell scripts.

   a. The pre-configuration script is executed.

   b. The configuration received from the redirect server is committed.

   c. The post-configuration script is executed.

6. PHC sends a bootstrap-complete message to the PHS.
7. PHC cleans up the downloaded resources.
8. The existing phone-home configuration, along with any supporting configuration, is overwritten by the new configuration on the device or VM instance.
9. If any of the above steps fail, the phone-home process starts over again from the beginning, and a bootstrap failure error message is sent to PHS.

Understanding the Configuration File Format for the Phone-Home Client

PHC supports XML as the file format for the configuration file.

For example, the configuration file format looks like this:

```
<configuration>
[ Configuration in XML format ]
</configuration>
```

Currently, only the `merge` and `override` CLI commands are supported on configurations received by the PHC.

Understanding Pre-Configuration and Post-Configuration Scripts

You can include pre-configuration and post-configuration scripts on PHS in addition to, or instead of, using the Junos OS CLI. Embed the scripts in base64 encoded format. PHC extracts the encoded scripts from the bootstrap information received from PHS, decodes, and then runs the decoded scripts at the appropriate stages of provisioning.

Verifying that the Phone-Home Client Downloaded the Configuration and Software Image

To verify the progress of the phone-home process, you can view the `notification.xml` file on PHS.

Release History Table

Release	Description
21.1R1	Starting in Junos OS Release 21.1R1, the phone-home client is supported on vSRX Virtual Firewall.

Deploying the Phone-home Client and Zero Touch Provisioning on vSRX Virtual Firewall

SUMMARY

IN THIS SECTION

You can use the phone-home client and ZTP to provide a user-defined configuration file for the vSRX Virtual Firewall. The phone-home client and ZTP are supported on VMWare, KVM (Kernel-based Virtual Machine) hypervisors, and in various deployment environments, such as AWS (Amazon Web Service), GCP (Google Cloud Platform), OCI (Oracle Cloud Infrastructure, and Microsoft Azure.

Factory Default Configuration on vSRX Virtual Firewall

Here's the factory default configuration for the phone-home client:

```
set system services web-management http interface fxp0.0
set system services web-management https system-generated-certificate
set system services web-management https interface fxp0.0
set system name-server 8.8.8.8
```

```
set system name-server 8.8.4.4
set system syslog file messages any any
set system license autoupdate url https://ae1.juniper.net/junos/key_retrieval
set system phone-home server https://redirect.juniper.net
set system phone-home rfc-compliant
set interfaces fxp0 unit 0 family inet dhcp
```

NOTE: You must perform the changes suggested in the 'vSRX Virtual Firewall XML on KVM' and 'vSRX Virtual Firewall virtual machine edit settings in VMware' before the first reboot. This ensures that the correct factory default configuration with PHC commands are loaded during the first boot.

Deploying ZTP on KVM

To deploy ZTP on a KVM, set the **entry name='version' to phone-home-true** in the VM deployment XML file.

For example:

```
<os>
     ….
          <smbios mode='sysinfo'/>
     </os>
     <sysinfo type='smbios'>
           <system>
                <entry name='version'>phonehome=true</entry>
           </system>
     </sysinfo>
```

Deploying ZTP on VMWare

To deploy ZTP on VMWare, enable the **Open Virtualization Format (OVF)** setting in the VMWare GUI, and set **phone-home** to **true**.

1. To enable OVF in the VMWare GUI, go to **Edit Virtual Machine Setting | vApp Options | OVF setting : OVF environment transparent | VMWare Tools: enable**.

2. To enable the phone-home client in the VMWare GUI, go to **Edit Virtual Machine Setting | vApp Options | Properties | phone-home true** .

Deploying ZTP on Amazon Web Services, Google Cloud Platform, and Oracle Cloud Infrastructure

To enable ZTP on Amazon Web Services, Google Cloud Platform, and Oracle Cloud Infrastructure, add the following phone-home client configuration in the **CLOUD-INIT USER-DATA** file:

```
system {
    name-server {
        8.8.8.8;
        8.8.4.4;
    }
    syslog {
        file messages {
            any any;
        }
    }
    services {
        ssh;
        web-management {
            http {
                interface fxp0.0;
            }
            https {
                system-generated-certificate;
                interface fxp0.0;
            }
        }
}
license {
        autoupdate {
            url https://ae1.juniper.net/junos/key_retrieval;
        }
    }
    phone-home {
        server https://redirect.juniper.net;
        rfc-compliant;
```

```
    }
}

interfaces {
    fxp0 {
        unit 0 {
           family inet {
               dhcp;
           }
        }
    }
}
```

Deploying ZTP on Microsoft Azure

To enable ZTP on Microsoft Azure, add the following phone-home client configuration in the **write_files** section of the **CLOUD_INIT_CONFIG.JSON** file:

```
{
 "content": "configure\nset system name-server 8.8.8.8\nset system name-server 8.8.4.4\nset
system phone-home server
 https://redirect.juniper.net\nset system phone-home rfc-compliant\nset interfaces fxp0 unit 0
family inet dhcp\ncommit\n",
 "path": "/var/tmp/test_config"
 },
```

Provision a Virtual Chassis Using the Phone-Home Client

SUMMARY

Phone-home provisioning on a Virtual Chassis is a form of zero-touch provisioning (ZTP). The phone-home client (PHC) on the Virtual Chassis gets bootstrap information over the network from a phone-home server (PHS) and provisions the Virtual Chassis. The only user intervention required on the client side is to physically wire the Virtual Chassis members together and connect any port on the Virtual Chassis to the network.

IN THIS SECTION

Overview of Phone-Home Provisioning for a Virtual Chassis

IN THIS SECTION

With phone-home provisioning, a phone-home client (PHC) on a device initially provisions the device with a software image and configuration from a central network management data source called the phone-home server (PHS), requiring little or no user intervention at the remote site.

A Virtual Chassis consists of a set of devices interconnected together using ports called Virtual Chassis ports (VCPs). You configure and manage the Virtual Chassis as a single device. Starting with Junos OS Release 20.3R1, we've made extensions to the phone-home provisioning process for a standalone

device so it can also work on a Virtual Chassis. The PHC on a Virtual Chassis requires extra steps to coordinate and manage bootstrapping the member devices.

The PHS is usually part of a network management system (NMS) that supports phone-home provisioning. Your network administrator enters the intended provisioning data that directs how devices and Virtual Chassis at remote sites should be set up. Your organization might have more than one PHS for redundancy.

You can check Feature Explorer and search for **phone-home** to see the Virtual Chassis platforms that support phone-home provisioning.

Benefits of Phone-Home Provisioning on a Virtual Chassis

- Simplifies provisioning by launching the process automatically from the remote site, while securely obtaining bootstrap information from a central management system (the PHS) on your network or in the cloud.
- Doesn't require in-depth experience with the Junos OS CLI to coordinate the provisioning of multiple devices that make up a Virtual Chassis.

Overview of the Phone-Home Provisioning Process on a Virtual Chassis

On a Virtual Chassis that supports phone-home provisioning, for the process to work, you must set up the Virtual Chassis according to the requirements outlined in "How to Enable Phone-Home Provisioning on a Virtual Chassis" on page 529.

When the Virtual Chassis initially forms, the PHC process starts up automatically on the Virtual Chassis primary member and takes it from there:

1. The PHC connects to a PHS.

   The PHC sends a provisioning request to a default redirect server URL, https://redirect.juniper.net, which redirects the request to an available PHS controlled by your network administrator or NMS. This step is the same as phone-home provisioning on a single device.

2. The PHS responds to the PHC provisioning request with the bootstrapping information, which includes the intended Virtual Chassis topology, software image, and configuration.

3. The PHC provisions the Virtual Chassis as specified by the PHS.

   Provisioning includes steps such as:

   - Validate the Virtual Chassis topology.
   - Upgrade the software image sequentially on all of the member devices if needed.
   - Run any pre-configuration or post-configuration staging scripts.

- Commit a new configuration on the Virtual Chassis.

The PHC sends status notifications to the PHS during the bootstrapping process, so the network administrator can verify the process completes successfully.

The PHC also logs status locally in the system log files on the Virtual Chassis. If needed, you can view log files in the Junos OS CLI, and use Junos OS CLI commands to see Virtual Chassis and VCP connection status.

SEE ALSO

Obtaining Configurations and Software Image Without User Intervention Using Phone-Home Client | 519

Zero Touch Provisioning | 461

How To Enable Phone-Home Provisioning on a Virtual Chassis

On a Virtual Chassis that supports phone-home provisioning, if you set up the Virtual Chassis according to the steps listed here, a phone-home client (PHC) process starts up automatically on the Virtual Chassis primary member.

To enable phone-home provisioning on a Virtual Chassis:

1. Ensure that all Virtual Chassis members have the factory-default configuration and are powered off.

   You can run the `request system zeroize` Junos OS CLI command to return a device to its factory-default state.

   NOTE: The Virtual Chassis can't be a mixed-mode Virtual Chassis because mixed mode is never set in the factory-default configuration.

2. Interconnect the Virtual Chassis members in a ring topology using only dedicated or default-configured Virtual Chassis ports (VCPs) on each member device.

   Keep in mind that the PHC process works only if the Virtual Chassis is initially formed with VCPs that do not need to be explicitly configured (dedicated VCPs or ports that are VCPs in the factory-default configuration). See *VCP Options by Switch Type* for details on which ports are dedicated and default-configured VCPs on different devices that support Virtual Chassis. See the hardware guide for the device to locate those ports on the device.

3. Connect the Virtual Chassis management interface (`me0`) or any network-facing port on any Virtual Chassis member to the network.

   After the PHC starts up on the Virtual Chassis, it uses this connection to access a PHS over the network and retrieve the bootstrapping information for this Virtual Chassis.

   For details about how the management interfaces work on a Virtual Chassis, see *Understanding Global Management of a Virtual Chassis*.

4. Power on the members of the Virtual Chassis.

Figure 24 on page 530 shows an example of a Virtual Chassis topology that can support phone-home provisioning—a four-member EX4300 Virtual Chassis cabled in a ring topology using default-configured VCPs (in this case, two of the 40-Gigabit Ethernet QSFP+ ports on each device).

Figure 24: Sample Virtual Chassis That Can Support Phone-Home Provisioning

Usually you don't need to do anything else for the phone-home provisioning process to proceed and complete successfully. If you don't see successful completion status or the Virtual Chassis isn't up and operating as expected at the end of the process, read on to learn details about how the PHC works to help troubleshoot the issues.

SEE ALSO

Understanding Virtual Chassis Components

Virtual Chassis Overview for Switches

Phone-Home Process on a Virtual Chassis

IN THIS SECTION

Phone-home provisioning on a Virtual Chassis is an extension of the standalone device phone-home support described in "Obtaining Configurations and Software Image Without User Intervention Using Phone-Home Client " on page 519. The PHC performs additional steps to manage bootstrapping the member devices that make up the Virtual Chassis.

The PHC process on a Virtual Chassis also requires the same software tools and utilities that standalone devices require for PHC to work. For example, the phone-home process needs DHCP client support to facilitate the network connection to the PHS in the same way as for a single device, and verifies a downloaded software image using the same checksum utilities. See "Prerequisites" on page 519 for a list of these general PHC requirements.

Phone-home provisioning starts up automatically on a Virtual Chassis on the client side after you've performed the tasks in "How To Enable Phone-Home Provisioning on a Virtual Chassis" on page 529 and if the Virtual Chassis meets the conditions described in *Requirements for Phone-Home Provisioning to Work for a Virtual Chassis*.

The provisioning process steps are grouped into the stages described in this section.

Startup and Request Provisioning Information from PHS

In the startup and request stage:

1. The Virtual Chassis boots up in factory-default or zeroized state as a nonprovisioned Virtual Chassis, and elects the initial primary and backup members. (See *Understanding How the Primary in a Virtual Chassis Is Elected*.)
2. The PHC starts up on the Virtual Chassis primary member, connects to the default redirect server (https://redirect.juniper.net) and sends a bootstrap request for the device. The redirect server redirects the PHC to an available PHS.
3. The PHC receives the response from PHS, starts to discover what Virtual Chassis members are connected, and prepares to provision the Virtual Chassis. The PHS response includes:

- Virtual Chassis topology information—At a minimum, this part of the response indicates the device is expected to be part of a Virtual Chassis; otherwise, the PHC provisions only the primary member as a standalone device.

  The response might additionally have full topology information, which includes the serial IDs of all the members the network administrator expects to be in the Virtual Chassis.

- Software image upgrade information—Includes a path to the intended software image and image verification details.

- Pre-configuration and post-configuration script information—Includes any staging scripts the network administrator needs the PHC to run before or after applying the new configuration.

- Configuration information—Includes the intended Virtual Chassis configuration and the method to apply that configuration.

The PHC must receive minimum required topology information to recognize it should provision a Virtual Chassis. Otherwise, the PHC defaults to provisioning only the primary member as a standalone device.

The PHC extensions for Virtual Chassis support two provisioning modes—the default mode and a more strict mode the PHS can specify in the response:

- By default, the PHC provisions any members it detects in the VC at the time it receives the PHS response. If the PHC encounters an error when bootstrapping a particular member, it moves on to bootstrap the next member or continues to the next provisioning step.

- If the PHS specifies the strict mode option in the response, the response must also include the full Virtual Chassis topology information. Provisioning succeeds only if the PHC finds and successfully bootstraps all of the same members listed in the PHS response. If the PHC doesn't detect all of the intended members or provisioning fails for any of them, the PHC restarts the process from the beginning to resend the provisioning request to another available PHS.

NOTE: The PHS can include the Virtual Chassis member serial IDs in the response in either mode. However, in the default mode, bootstrapping the Virtual Chassis can succeed even if the PHC doesn't detect all the members in the PHS response or if the PHS response doesn't include member details at all.

In this step, if the response includes full Virtual Chassis topology information and indicates to use strict provisioning mode, the PHC validates what it finds in the Virtual Chassis locally against the Virtual Chassis member information from the PHS response.

Table 31 on page 533 summarizes the actions the PHC takes starting in this step based on the type of topology information it receives in the PHS response, the provisioning mode, and the Virtual Chassis members that the PHS discovers locally.

Table 31: PHC Actions Based on Topology Information in PHS Response

Virtual Chassis Topology Information from PHS	Default Mode Actions	Strict Mode Actions If PHS Requests This Option
No topology information provided	Try to provision as standalone device.	N/A (This mode can be specified only with full topology information)
Minimum required topology information for a Virtual Chassis	Discover members and proceed to provision Virtual Chassis with found members.	N/A (This mode can be specified only with full topology information)
Full topology information for a Virtual Chassis, including serial IDs for all intended Virtual Chassis members	Discover members. If member list doesn't match PHS response, proceed anyway to provision Virtual Chassis with found members.	Bootstrap intended Virtual Chassis members from PHS response. Detect members; if all expected members are present and up, provisioning succeeds. Otherwise retry to bootstrap and detect members that failed the process. After member detection timeout with failure to detect all expected members, report error and restart process contacting another PHS to re-request provisioning.

4. If the PHC proceeds to provision the devices in the Virtual Chassis, at this point the PHC commits some temporary changes to the Virtual Chassis configuration to enable smooth bootstrapping of all VC members.

   For example, the PHC makes sure the Virtual Chassis primary and backup member roles don't change while the PHC is upgrading the software image on all the members.

Bootstrap Virtual Chassis Members

In this stage, the PHC bootstraps the Virtual Chassis, which includes installing the software image on and rebooting all of the members.

1. The PHC on the primary member compares the bootstrap information in the PHS response with what's on the Virtual Chassis to see if it needs to upgrade the software image. If the versions match, the PHC skips the remaing steps in this stage.

2. If the PHC needs to upgrade the software image, the PHC uses the bootstrap information in the PHS response (image filename and checksum information) to download and validate the image.

   If the download operation fails, the PHC retries until it succeeds. (This behavior is the same for standalone device or Virtual Chassis phone-home provisioning.)

3. The PHC proceeds to install and reboot the Virtual Chassis members based on the member roles as follows in this order:

   a. Linecard members—Installs the image on the linecard role members sequentially (in member ID order), and then reboots them all at the same time.

   b. Backup member—Installs the image on the backup member and reboots it.

   c. Primary member—Installs the image on the primary member, synchronizes the current PHC Virtual Chassis bootstrap state to the backup member, and triggers the primary member to reboot.

   As the upgraded members boot up, the PHC checks that they are up and running again. This action is called *member detection* in log messages and status notifications. If the PHC fails to detect a member within a default member detection timeout, the PHC notifies the PHS of the error. See "Startup and Request Provisioning Information from PHS" on page 531 for the actions the PHC takes by default or if the PHS specified strict provisioning.

4. While the old primary member is rebooting, the original primary isn't available, so the Virtual Chassis switches primary role to the backup member. The Virtual Chassis also elects a new backup member at this time.

5. The PHC starts up on the new primary member (the original backup member) and resumes the Virtual Chassis bootstrap procedure from the PHC state inherited from the old primary.

   When the old primary finishes booting and rejoins the Virtual Chassis, it is initially in linecard role but then assumes the backup role to the new primary member.

6. When the PHC detects this last member is up and running, the provisioning process continues to the next stage to apply pre-configuration or post-configuration scripts and the new configuration to the Virtual Chassis.

> **NOTE**: Avoid having pre-configuration scripts, post-configuration scripts, or the new configuration make any changes that might cause the Virtual Chassis to assign new member roles or elect new primary and backup members during the provisioning process. Otherwise, provisioning might fail with unpredictable results.

Apply Scripts and New Configuration on the Virtual Chassis

The PHS response might include pre-configuration and post-configuration scripts the network administrator needs the PHC to run on the virtual Chassis before or after applying the new

configuration. Phone-home provisioning supports Python or shell scripts and only XML format for the configuration.

The PHS response also provides the Junos OS configuration for PHC to commit on the member devices in the Virtual Chassis.

A Virtual Chassis operates as if it's a single device, so the PHC performs these steps on the Virtual Chassis as a whole:

1. Runs any specified pre-configuration scripts from PHS.
2. Applies and commits the new configuration from PHS.
3. Runs any specified post-configuration scripts from PHS.

Provisioning Process Completion

To complete the phone-home provisioning process, the PHC logs that the process completed successfully and sends a bootstrap completion notification to the PHS.

The PHC doesn't run again unless you return the device or Virtual Chassis back to the factory-default state and have all other required conditions to trigger phone-home provisioning.

See *Requirements for Phone-Home Provisioning to Work for a Virtual Chassis* for details.

Phone-Home Provisioning Status Notifications

The PHC logs status information locally in the system log (**/var/log/messages**) on the Virtual Chassis and sends status notifications to the PHS to report the progress of the provisioning process. These messages signal when the PHC completes the different provisioning stages and help you troubleshoot issues if the process doesn't complete successfully. See "Phone-Home Process on a Virtual Chassis" on page 531 for the steps the PHC performs in each stage of Virtual Chassis provisioning.

Some PHC status messages are general and apply either for single device or Virtual Chassis provisioning.

Notification messages that are specific to a particular Virtual Chassis member include:

- The member ID
- The member's serial ID
- The member's current role in the Virtual Chassis—Master, Backup, or Linecard

Virtual Chassis member-specific notifications have the following format:

```
vc-member [memberID:serialID:role] message
```

For example:

```
vc-member [2:AA1234567890:Backup] Successfully installed downloaded image. Initiating member
reboot.
```

Phone-home process notifications consist of a notification type and message. Table 32 on page 536 lists notifications that are specific to the phone-home provisioning stages on a Virtual Chassis. Notification types with the `vc-member` keyword include Virtual Chassis member-specific information.

Table 32: PHC Notifications for Virtual Chassis Provisioning Steps

Notification Type	Notification Message
vc-member-image-installed	• Successfully installed downloaded image. Initiating image installation on next member. • Successfully installed downloaded image. Initiating member reboot.
vc-member-image-installation-failed	• Image failed to install on the member. Giving up and trying a different phone-home-server.
vc-member-reboot-initiated	• Reboot initiated for Line Card members. Waiting for the members to come back up.
vc-member-upgrade-success	• No upgrade required. • Successfully upgraded. • Member detected and successfully upgraded.
vc-member-upgrade-failed	• Upgrade failed !!! • Member detected but upgrade failed !!!

Table 32: PHC Notifications for Virtual Chassis Provisioning Steps *(Continued)*

Notification Type	Notification Message
`vc-member-detection-failed`	• `Did not come up post image upgrade` **NOTE**: This message means the PHC installed the new image and initiated a reboot of the Virtual Chassis member, but the PHC didn't detect that the member came up again within a prescribed member detection timeout.
`vc-bootstrap-failed`	• `VC member bootstrap failure detected with Strict provisioning set.` **NOTE**: This message mean the PHC upgraded the expected linecard role members successfully, but after rebooting them, PHC didn't detect that all members came up again within a prescribed member detection timeout. • `VC with detection failed members and Strict provisioning set.` **NOTE**: This message means the PHC failed to detect one or more members after upgrading and rebooting all of them, and upon checking again, finds that one or more of them still failed to come up. With strict provisioning mode, PHC must successfully bootstrap all intended members for the provisioning process to signal successful completion.

Verify Virtual Chassis Status After Phone-Home Provisioning

IN THIS SECTION

Purpose

Check the running status of the Virtual Chassis after PHC provisioning.

Action

Enter the `show virtual-chassis` command using the Junos OS CLI.

For example:

```
{master:1}
user@device>
Virtual Chassis ID: xxxx.xxxx.xxxx
Virtual Chassis Mode: Enabled
                                      Mstr           Mixed Route Neighbor List
Member ID  Status Serial No  Model    prio  Role     Mode  Mode  ID   Interface
0 (FPC 0)  Prsnt  ...        ex3400-24p  128   Backup    N    VC    2  vcp-255/1/0
                                                                  1  vcp-255/1/1
1 (FPC 1)  Prsnt  ...        ex3400-24p  128   Master*   N    VC    0  vcp-255/1/0
                                                                  2  vcp-255/1/1
2 (FPC 2)  Prsnt  ...        ex3400-48p  128   Linecard  N    VC    0  vcp-255/1/0
                                                                  1  vcp-255/1/1

Member ID for next new member: 3 (FPC 3)
```

Troubleshoot Phone-Home Provisioning Issues

To troubleshoot PHC problems during the provisioning process:

- Use utilities on the PHS side specific to your network management system to check device, Virtual Chassis, and connection status, or display phone-home process notifications (see "Phone-Home Provisioning Status Notifications" on page 535).
- Make sure the Virtual Chassis management or network interface is connected to the network and can connect to a PHS.

- If the PHS specified the strict mode option, verify the Virtual Chassis member serial IDs on the phone-home server side match the member devices you're interconnecting on the client side at the remote site.
- Look for error and status messages in the syslog file on the Virtual Chassis.

  For example, syslog status messages can show that the ZTP client is trying to provision the device instead of or in addition to the PHC. Upon startup with the factory-default configuration on either a standalone device or a Virtual Chassis primary member, both the PHC and the DHCP-based ZTP process (see "Zero Touch Provisioning" on page 461) start running automatically. ZTP proceeds if DHCP ZTP options are configured, which can cause unexpected provisioning behavior because ZTP isn't supported for a Virtual Chassis. To trigger only phone-home provisioning, your DHCP system administrator can make sure the ZTP-specific options are not set on the DHCP server for devices intended to be in a Virtual Chassis under PHS management.
- Check the configuration on the Virtual Chassis after provisioning using the `show configuration` CLI command.

RELATED DOCUMENTATION

Obtaining Configurations and Software Image Without User Intervention Using Phone-Home Client | 519

Understanding Virtual Chassis Components

Zero Touch Provisioning | 461

CHAPTER 11

Automatic Installation of Configuration Files

Understanding Autoinstallation of Configuration Files (Junos OS)

IN THIS SECTION

Autoinstallation is an automated process and does not require any specific configuration on a device. To simplify the process, you can specify one or more interfaces, protocols, and configuration servers to be used for autoinstallation.

Autoinstallation Overview

IN THIS SECTION

If you are setting up many devices, autoinstallation can help automate the configuration process by loading configuration files onto new or existing devices automatically over the network. You can use either the J-Web configuration editor or the CLI configuration editor to configure a device for autoinstallation.

Autoinstallation provides automatic configuration for a new device that you connect to the network and turn on, or for a device configured for autoinstallation. The autoinstallation process begins any time a

device is powered on and cannot locate a valid configuration file in the CompactFlash (CF) card. Typically, a configuration file is unavailable when a device is powered on for the first time, or if the configuration file is deleted from the CF card. The autoinstallation feature enables you to deploy multiple devices from a central location in the network.

For the autoinstallation process to work, you must store one or more host-specific or default configuration files on a configuration server in the network and have a service available—typically Dynamic Host Configuration Protocol (DHCP)—to assign an IP address to the device.

Autoinstallation takes place automatically when you connect an Ethernet or serial port on a new Juniper Networks device to the network and power on the device. To simplify the process, you can explicitly enable autoinstallation on a device and specify a configuration server, an autoinstallation interface, and a protocol for IP address acquisition.

This section contains the following topics:

Automatic Installation of Configuration Files

On SRX Series Firewalls, you can specify a remote server where configuration files are located. If a configuration file cannot be found on the device's CompactFlash card, the device automatically retrieves the configuration file from this remote server. For security purposes, you can encrypt these remote files using the DES cipher, and once they have been retrieved, the device decrypts them for use on the server.

To encrypt the files, we recommend the OpenSSL tool. You can get the OpenSSL tool at http://www.openssl.org/. To encrypt the file, use the following syntax:

```
% openssl enc -des -k passphrase -in original-file -out encrypted-file
```

- *passphrase*—Passphrase used to encrypt the configuration file. The passphrase should be the name of the file without the path information or file extension.
- *original-file*—Unencrypted configuration file.
- *encrypted-file*—Name of the encrypted configuration file.

For example, if you are encrypting the active configuration file `juniper.conf.gz`, the passphrase is `juniper.conf`. The openSSL syntax used to encrypt the file is:

```
% openssl enc -des -k juniper.conf -in juniper.conf.gz -out juniper.conf.gz.enc
```

Supported Autoinstallation Interfaces and Protocols

Before autoinstallation on a device can take place, the device must acquire an IP address. The protocol or protocols you choose for IP address acquisition determine the device interface to connect to the network for autoinstallation. The device detects the connected interface and requests an IP address with a protocol appropriate for the interface. Autoinstallation is supported over an Ethernet LAN interface or a serial LAN or WAN interface. Table 33 on page 543 lists the protocols that the device can use on these interfaces for IP address acquisition.

Table 33: Interfaces and Protocols for IP Address Acquisition During Autoinstallation

Interface and Encapsulation Type	Protocol for Autoinstallation
Ethernet LAN interface with High-Level Data Link Control (HDLC)	DHCP, BOOTP, or Reverse Address Resolution Protocol (RARP)
Serial WAN interface with HDLC	Serial Line Address Resolution Protocol (SLARP)
Serial WAN interface with Frame Relay	BOOTP

If the server with the autoinstallation configuration file is not on the same LAN segment as the new device, or if a specific device is required by the network, you must configure an intermediate device directly attached to the new device through which the new device can send Trivial File Transfer Protocol (TFTP), BOOTP, and Domain Name System (DNS) requests. In this case, you specify the IP address of the intermediate device as the location to receive TFTP requests for autoinstallation.

Typical Autoinstallation Process on a New Device

When a device is powered on for the first time, it performs the following autoinstallation tasks:

1. The new device sends out DHCP, BOOTP, RARP, or SLARP requests on each connected interface simultaneously to obtain an IP address.

   If a DHCP server responds, it provides the device with some or all of the following information:

   - An IP address and subnet mask for the autoinstallation interface.
   - The location of the TFTP (typically), Hypertext Transfer Protocol (HTTP), or FTP server on which the configuration file is stored.
   - The name of the configuration file to be requested from the TFTP server.
   - The IP address or hostname of the TFTP server.

If the DHCP server provides only the hostname, a DNS server must be available on the network to resolve the name to an IP address.

- The IP address of an intermediate device if the configuration server is on a different LAN segment from the new device.

2. After the new device acquires an IP address, the autoinstallation process on the device attempts to download a configuration file in the following ways:

   a. If the DHCP server specifies the host-specific configuration file (boot file) *hostname*.conf, the device uses that filename in the TFTP server request. (In the filename, *hostname* is the hostname of the new device.) The autoinstallation process on the new device makes three unicast TFTP requests for *hostname*.conf. If these attempts fail, the device broadcasts three requests to any available TFTP server for the file.

   b. If the new device cannot locate *hostname*.conf, the autoinstallation process unicasts or broadcasts TFTP requests for a default device configuration file called network.conf, which contains hostname-to-IP address mapping information, to attempt to find its hostname.

   c. If network.conf contains no hostname entry for the new device, the autoinstallation process sends out a DNS request and attempts to resolve the new device's IP address to a hostname.

   d. If the new device can determine its hostname, it sends a TFTP request for the *hostname*.conf file.

   e. If the new device is unable to map its IP address to a hostname, it sends TFTP requests for the default configuration file router.conf.

3. After the new device locates a configuration file on a TFTP server, autoinstallation downloads the file, installs the file on the device, and commits the configuration.

NOTE:

- If you configure the DHCP server to provide only the TFTP server hostname, add an IP address-to-hostname mapping entry for the TFTP server to the DNS database file on the DNS server in the network.

- If the new device is not on the same network segment as the DHCP server (or other device providing IP address resolution), configure an existing device as an intermediate to receive TFTP and DNS requests and forward them to the TFTP server and the DNS server. You must configure the LAN or serial interface on the intermediate device with the IP addresses of the hosts providing TFTP and DNS service. Connect this interface to the new device.

NOTE: Starting in Junos OS Release 15.1X49-D60 and in Junos OS Release 17.3R1, on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices, some of the factory-default configurations are changed.

- The `name-server` statement, used to configure one or more Domain Name System (DNS) name servers, is changed to 8.8.8.8 and 8.8.4.4. Previously, it was 208.67.222.222 and 208.67.220.220.

- A new system service, NETCONF service over SSH, is introduced at the `[edit system services]` hierarchy:

```
edit system services netconf ssh
```

- The following configuration setting for HTTPS (secure management) access using the J-Web interface is changed. Now, there is no need to specify the interface details for J-Web management. With this configuration, you can manage the device from any interface through HTTPS.

```
edit system services web-management https interface [irb.0]
```

- A license autoupdate URL (**https://ae1.juniper.net/junos/key_retrieval**) is now supported under the `[edit system]` hierarchy:

```
license {
    autoupdate {
        url https://ae1.juniper.net/junos/key_retrieval;
    }
}
```

- A new system log configuration is introduced to configure system log messages to record all commands entered by users and all authentication or authorization attempts under the `[edit system]` hierarchy:

```
syslog {
    archive size 100k files 3;
    user * {
        any emergency;
```

```
        }
        file messages {
            any notice;
            authorization info;
        }
        file interactive-commands {
            interactive-commands any;
        }
    }
```

The above factory-default configurations are also applicable on SRX380 Series devices.

NOTE: On SRX300, SRX320, SRX340, SRX345, SRX380, and SRX550M devices, telnet and xnm-clear-text are not part system services in factory-default configurations.

NOTE: In Junos OS Release 15.1X49-D40 and earlier, configuring autoinstallation using USB and Layer Ethernet switching was supported on the same interface. However, the command caused improper installation of the interface-related configurations.

Layer 2 Ethernet switching is not supported on the same interface for SRX300, SRX320, SRX340, SRX345, SRX380, and SRX550M devices.

The `system autoinstallation interfaces <interface names>` command and the `set interface <interface names> unit 0 family ethernet-switching` command cannot be configured on the same interface.

NOTE: USB auto-installation is not supported on SRX1500 devices and vSRX Virtual Firewall instances.

Autoinstallation is the automatic configuration of a device over the network from a preexisting configuration file that you create and store on a configuration server—typically a Trivial File Transfer Protocol (TFTP) server. You can use autoinstallation to configure new devices automatically and to deploy multiple devices from a central location in the network.

You enable autoinstallation so that the switches in your network implement autoinstallation when they are powered on. To configure autoinstallation, you specify a configuration server, an autoinstallation interface, and a protocol for IP address acquisition.

NOTE: The QFX5200 switches only work with HTTP for autoinstallation. TFTP and FTP protocols are not supported.

Typical Uses for Autoinstallation

Typical uses for autoinstallation of the software include:

- To deploy and update multiple devices from a central location in the network.
- To update a device—Autoinstallation occurs when a device that has been manually configured for autoinstallation is powered on.

Autoinstallation Configuration Files and IP Addresses

For the autoinstallation process to work, you must store one or more host-specific or default configuration files on a configuration server in the network and have a service available—typically Dynamic Host Configuration Protocol (DHCP)—to assign an IP address to the switch.

You can set up the following configuration files for autoinstallation on the switch:

- **network.conf**—Default configuration file for autoinstallation, in which you specify IP addresses and associated hostnames for devices on the network.
- **switch.conf**—Default configuration file for autoinstallation with a minimum configuration sufficient for you to telnet to the device and configure it manually.
- ***hostname*.conf**—Host-specific configuration file for autoinstallation on a device that contains all the configuration information necessary for the switch. In the filename, ***hostname*** is replaced with the hostname assigned to the switch.

If the server with the autoinstallation configuration file is not on the same LAN segment as the new device, or if a specific device is required by the network, you must configure an intermediate device directly attached to the new switch, through which the new switch can send TFTP, Boot Protocol (BOOTP), and Domain Name System (DNS) requests. In this case, you specify the IP address of the intermediate device as the location to receive TFTP requests for autoinstallation.

Typical Autoinstallation Process on a New Switch

When the switch configured for autoinstallation is powered on, it performs the following autoinstallation tasks:

1. The switch sends out DHCP or BOOTP requests on each connected interface simultaneously to obtain an IP address.

   If a DHCP server responds to these requests, it provides the switch with some or all of the following information:

   - An IP address and subnet mask for the autoinstallation interface.
   - The location of the (typically) TFTP server, Hypertext Transfer Protocol (HTTP) server, or FTP server on which the configuration file is stored.
   - The name of the configuration file to be requested from the TFTP server.
   - The IP address or hostname of the TFTP server.

     If the DHCP server provides the server's hostname, a DNS server must be available on the network to resolve the name to an IP address.
   - The IP address of an intermediate device if the configuration server is on a different LAN segment from the switch.

2. After the switch acquires an IP address, the autoinstallation process on the switch attempts to download a configuration file in the following ways:

   a. If the DHCP server specifies the host-specific configuration file ***hostname*.conf**, the switch uses that filename in the TFTP server request. The autoinstallation process on the new switch makes three unicast TFTP requests for ***hostname*.conf**. If these attempts fail, the switch broadcasts three requests to any available TFTP server for the file.

   b. If the switch does not locate a ***hostname*.conf** file, the autoinstallation process sends three unicast TFTP requests for a **network.conf** file that contains the switch's hostname-to-IP-address mapping information. If these attempts fail, the switch broadcasts three requests to any available TFTP server for the file.

   c. If the switch fails to find a **network.conf** file that contains a hostname entry for the switch, the autoinstallation process sends out a DNS request and attempts to resolve the switch's IP address to a hostname.

   d. If the switch determines its hostname, it sends a TFTP request for the ***hostname*.conf** file.

   e. If the switch is unable to map its IP address to a hostname, it sends TFTP requests for the default configuration file **switch.conf**. The TFTP request procedure is the same as for the **network.conf** file.

3. After the switch locates a configuration file on a TFTP server, the autoinstallation process downloads the file, installs the file on the switch, and commits the configuration.

NOTE: Please refer to the product Data Sheets for details, or contact your Juniper Account Team or Juniper Partner. Please refer to the Juniper Licensing Guide for general information about License Management.

Autoinstallation Process on Satellite Devices in a Junos Node Unifier Group

IN THIS SECTION

Autoinstallation provides automatic configuration for a new router that you connect to the network and power on, or for a router configured for autoinstallation. The autoinstallation process begins any time a router is powered on and cannot locate a valid configuration file in the CompactFlash card. Typically, a configuration file is unavailable when a router is powered on for the first time, or if the configuration file is deleted from the CompactFlash card. The autoinstallation feature enables you to deploy multiple routers from a central location in the network.

For the autoinstallation process to work, you must store one or more host-specific or default configuration files on a configuration server in the network and have a service available—typically Dynamic Host Configuration Protocol (DHCP)—to assign an IP address to the router.

Autoinstallation takes place automatically when you connect an Ethernet interface on a new Juniper Networks router to the network and power on the router. To simplify the process, you can explicitly enable autoinstallation on a router and specify a configuration server, an autoinstallation interface, and a protocol for IP address acquisition.

This topic describes:

Supported Autoinstallation Interfaces and Protocols

Before autoinstallation on a router can take place, the router must acquire an IP address or a USB key. The protocol or protocols you choose for IP address acquisition determine the router interface to connect to the network for autoinstallation. The router detects the connected interface and requests an

IP address with a protocol appropriate for the interface. Autoinstallation is supported over an Ethernet LAN interface. For IP address acquisition, the JNU satellite router uses DHCP, BOOTP, or Reverse Address Resolution Protocol (RARP) on an Ethernet LAN interface.

If the server with the autoinstallation configuration file is not on the same LAN segment as the new router, or if a specific router is required by the network, you must configure an intermediate router directly attached to the new router, through which the new router can send HTTP, FTP, Trivial File Transfer Protocol (TFTP), BOOTP, and Domain Name System (DNS) requests. In this case, you specify the IP address of the intermediate router as the location to receive HTTP, FTP, or TFTP requests for autoinstallation.

Typical Autoinstallation Process on a New Router

When a router is powered on for the first time, it performs the following autoinstallation tasks:

1. The new router sends out DHCP, BOOTP, or RARP requests on each connected interface simultaneously to obtain an IP address.

   If a DHCP server responds, it provides the router with some or all of the following information:

   - An IP address and subnet mask for the autoinstallation interface.
   - The location of the TFTP (typically), HTTP, or FTP server on which the configuration file is stored.
   - The name of the configuration file to be requested from the HTTP, FTP, or TFTP server.
   - The IP address or hostname of the HTTP, FTP, or TFTP server.

     If the DHCP server provides only the hostname, a DNS server must be available on the network to resolve the name to an IP address.
   - The IP address of an intermediate router if the configuration server is on a different LAN segment from the new router.

2. After the new router acquires an IP address, the autoinstallation process on the router attempts to download a configuration file in the following ways:

   a. If the configuration file is specified as a URL, the router fetches the configuration file from the URL by using HTTP, FTP, or TFTP, depending on the protocol specified in the URL.

   b. If the DHCP server specifies the host-specific configuration file (boot file) *hostname*.conf, the router uses that filename in the TFTP server request. (In the filename, ***hostname*** is the hostname of the new router.) The autoinstallation process on the new router makes three unicast TFTP requests for ***hostname*.conf**. If these attempts fail, the router broadcasts three requests to any available TFTP server for the file.

c. If the new router cannot locate ***hostname*.conf**, the autoinstallation process unicasts or broadcasts TFTP requests for a default router configuration file called **network.conf**, which contains hostname-to-IP address mapping information, to attempt to find its hostname.

d. If **network.conf** contains no hostname entry for the new router, the autoinstallation process sends out a DNS request and attempts to resolve the new router's IP address to a hostname.

e. If the new router can determine its hostname, it sends a TFTP request for the ***hostname*.conf** file.

f. If the new router is unable to map its IP address to a hostname, it sends TFTP requests for the default configuration file **router.conf**.

3. After the new router locates a configuration file on a TFTP server, the autoinstallation process downloads the file, installs the file on the router, and commits the configuration.

In a Junos Node Unifier (JNU) group that contains an MX Series router as a controller that manages satellite devices, such as EX Series Ethernet Switches, QFX Series devices, and ACX Series Universal Metro Routers, the autoinstallation functionality is supported for the satellite devices. JNU has an autoinstallation mechanism that enables a satellite device to configure itself out-of-the-box with no manual intervention, using the configuration available either on the network or locally through a removable media, or using a combination of both. This autoinstallation method is also called the *zero-touch* facility.

The zero-touch configuration delivers the following benefits:

- The router can be sent from the warehouse to the deployment site without any preconfiguration steps.
- The procedure required to deploy the device at the cell site is simplified, resulting in reduced operational and administrative costs.
- You can roll out large numbers of these devices in a very short time.

The factory default setting is autoinstallation-enabled. After you make the first configuration to the router, you can do either of the following:

- A JNU factory default file, **jnu-factory.conf**, is present in the **/etc/config/** directory and contains the configuration to perform autoinstallation on satellite devices. The zero-touch configuration can be disabled by including the `delete-after-commit` statement at the `[edit system autoinstallation]` hierarchy level and committing the configuration. This way, the saved configuration is used the next time the system reboots.
- Alternatively, if the router must get the configuration from the server each time a system reboot occurs, the zero-touch configuration must not be changed (that is, you must not include the `delete-after-commit` statement at the `[edit system autoinstallation]` hierarchy level and commit the settings).

SEE ALSO

autoinstallation (JNU Satellite Devices) | 606

delete-after-commit (JNU Satellites) | 617

Release History Table

Release	Description
15.1X49-D60	Starting in Junos OS Release 15.1X49-D60 and in Junos OS Release 17.3R1, on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices, some of the factory-default configurations are changed.

Configuring Autoinstallation of Configuration Files (Junos OS)

IN THIS SECTION

Autoinstallation is an automated process and does not require any specific configuration on a device. To simplify the process, you can specify one or more interfaces, protocols, and configuration servers to be used for autoinstallation.

Configuring Autoinstallation of Configuration Files (CLI Procedure)

Autoinstallation is the automatic configuration of a device over the network from a pre-existing configuration file that you create and store on a configuration server. A configuration server is typically a Trivial File Transfer Protocol (TFTP) server. You can use autoinstallation to deploy multiple devices automatically from a central location in the network.

Before you can configure autoinstallation, you must enable autoinstallation to run when you power on a device already installed in your network. You enable it by specifying one or more interfaces, protocols, and configuration servers to be used for autoinstallation.

To enable autoinstallation to run, complete the following steps:

1. Ensure that a service such as Dynamic Host Configuration Protocol (DHCP) is available to assign an IP address to the device.
2. Configure a DHCP server on your network to meet your network requirements. You can configure a switch to operate as a DHCP server.
3. Create one of the following configuration files, and store it on a TFTP server (or HTTP server or FTP server) in the network:
   - A host-specific file with the name ***hostname*.conf** for each device undergoing autoinstallation. Replace ***hostname*** with the name of a device. The ***hostname*.conf** file typically contains all the configuration information necessary for the device with this hostname.
   - A default configuration file named **device.conf** with the minimum configuration necessary to enable you to telnet into the new device for further configuration.
4. Physically attach the device to the network using a Gigabit Ethernet port.
5. If you configured the DHCP server to provide only the TFTP server hostname, add an IP address-to-hostname mapping entry for the TFTP server. Map the TFTP server hostname to the DNS database file on the Domain Name System (DNS) server in the network.
6. If the device is not on the same network segment as the DHCP server (or other device providing IP address resolution), configure an existing device as an intermediate device to receive TFTP and DNS requests and forward them to the TFTP server and the DNS server. You must configure the LAN or serial interface on the intermediate device with the IP addresses of the hosts providing TFTP and DNS services. Connect this interface to the device.
7. If you are using ***hostname*.conf** files for autoinstallation, you must also complete the following tasks:
   - Configure the DHCP server to provide a ***hostname*.conf** filename to each device. Each device uses its ***hostname*.conf** filename to request a configuration file from the TFTP server. Copy the necessary ***hostname*.conf** configuration files to the TFTP server.

- Create a default configuration file named **network.conf**, and copy it to the TFTP server. This file contains IP-address-to-hostname mapping entries. If the DHCP server does not send a ***hostname*.conf** filename to a new device, the device uses **network.conf** to resolve its hostname based on its IP address.

  Alternatively, you can add the IP-address-to-hostname mapping entry for the device to a DNS database file.

  The device uses the hostname to request a ***hostname*.conf** file from the TFTP server.

Before you explicitly enable and configure autoinstallation on the device, perform these tasks as needed for your network configuration:

To configure autoinstallation:

1. Specify the URL address of one or more servers from which to obtain configuration files.

```
[edit system]
user@host# set autoinstallation configuration-servers tftp://tftpconfig.example.com
```

NOTE: You can also use an FTP address such as **ftp://*user*:*password*@sftpconfig.example.com**.

2. Configure one or more Ethernet interfaces to perform autoinstallation and one or two procurement protocols for each interface. The switch uses the protocols to send a request for an IP address for the interface:

```
[edit system]
user@host# set autoinstallation interfaces ge-0/0/0 bootp
```

To verify autoinstallation, from the CLI enter the `show system autoinstallation status` command.

Example:

```
user@host> show system autoinstallation status
Autoinstallation status:
Master state: Active
Last committed file: None
Configuration server of last committed file: 10.25.100.1
Interface:
  Name: ge-0/0/0
```

```
  State: Configuration Acquisition
  Acquired:
    Address: 192.168.124.75
    Hostname: host-ge-000
    Hostname source: DNS
    Configuration filename: device-ge-000.conf
    Configuration filename server: 10.25.100.3
  Address acquisition:
    Protocol: DHCP Client
    Acquired address: None
    Protocol: RARP Client
    Acquired address: None
Interface:
  Name: ge-0/0/1
  State: None
  Address acquisition:
    Protocol: DHCP Client
    Acquired address: None
    Protocol: RARP Client
    Acquired address: None
```

Example: Configuring Autoinstallation on SRX Series Devices

IN THIS SECTION

This example shows how to configure a device for autoinstallation.

Requirements

Before you begin:

- Configure a DHCP server on your network to meet your network requirements. You can configure a device to operate as a DHCP server.
- Create one of the following configuration files, and store it on a TFTP server in the network:
  - A host-specific file with the name *hostname*.conf for each device undergoing autoinstallation. Replace *hostname* with the name of a device. The *hostname*.conf file typically contains all the configuration information necessary for the device with this hostname.
  - A default configuration file named router.conf with the minimum configuration necessary to enable you to telnet into the new device for further configuration.
- Physically attach the device to the network using one or more of the following interface types:
  - Fast Ethernet
  - Gigabit Ethernet
  - Serial with HDLC encapsulation

Overview

No configuration is required on a device on which you are performing autoinstallation, because it is an automated process. However, to simplify the process, you can specify one or more interfaces, protocols, and configuration servers to be used for autoinstallation.

The device uses these protocols to send a request for an IP address for the interface.

- BOOTP—Sends requests over all interfaces.
- RARP—Sends requests over Ethernet interfaces.

NOTE: Starting with Junos OS Release 15.1X49, you need to additionally configure the family inet under the interface using the `set interfaces ge-0/0/X unit 0 family inet` command for the SRX Series Firewall to send dhcp requests out.

Configuration

IN THIS SECTION

Procedure

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the `[edit]` hierarchy level, and then enter `commit` from configuration mode.

```
set system autoinstallation configuration-servers tftp://tftpconfig.sp.com
set system autoinstallation interfaces ge-0/0/0 bootp rarp
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure a device for autoinstallation:

1. Enable autoinstallation and specify the URL address of one or more servers from which to obtain configuration files.

   ```
   [edit system]
   user@host# set autoinstallation configuration-servers tftp://tftpconfig.sp.com
   ```

   NOTE: You can also use an FTP address, for example, ftp://user:password@sftpconfig.sp.com.

2. Configure one or more Ethernet or serial interfaces to perform autoinstallation, and configure one or two procurement protocols for each interface.

   ```
   [edit system]
   user@host# set autoinstallation interfaces ge-0/0/0 bootp rarp
   ```

Results

From configuration mode, confirm your configuration by entering the `show system autoinstallation status` command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show system autoinstallation status
```

```
Autoinstallation status:
Master state: Active
Last committed file: None
Configuration server of last committed file: 10.25.100.1
Interface:
  Name: ge-0/0/0
  State: Configuration Acquisition
  Acquired:
    Address: 192.168.124.75
    Hostname: host-ge-000
    Hostname source: DNS
    Configuration filename: router-ge-000.conf
    Configuration filename server: 10.25.100.3
  Address acquisition:
    Protocol: BOOTP Client
    Acquired address: None
    Protocol: RARP Client
    Acquired address: None
```

If you are done configuring the device, enter `commit` from configuration mode.

NOTE: When there is a user-specified configuration for a particular interface, delete the factory default for that interface. Having two configurations for the same device might lead to errors. For example, if PPP encapsulation is set on a T1 interface through user configuration while the factory default configuration configures CISCO HLDC on the same interface, then the interface might not come up and the following error is logged in the message file: **"DCD_CONFIG_WRITE_FAILED failed."**

Verification

IN THIS SECTION

Confirm that the configuration is working properly.

Verifying Autoinstallation

Purpose

Verify that the device has been configured for autoinstallation.

Action

From operational mode, enter the `show system autoinstallation status` command. The output shows the settings configured for autoinstallation. Verify that the values displayed are correct for the device when it is deployed on the network.

Verifying Autoinstallation Status

IN THIS SECTION

Purpose

Display the status of the autoinstallation feature.

Action

From the CLI, enter the `show system autoinstallation status` command.

Sample Output

command-name

```
user@switch> show system autoinstallation status
Autoinstallation status:
Master state: Active
Last committed file: None
Configuration server of last committed file: 10.25.100.1
Interface:
  Name: ge-0/0/0
  State: Configuration Acquisition
  Acquired:
    Address: 192.168.124.75
    Hostname: host-ge-000
    Hostname source: DNS
    Configuration filename: switch-ge-000.conf
    Configuration filename server: 10.25.100.3
  Address acquisition:
    Protocol: DHCP Client
    Acquired address: None
    Protocol: RARP Client
    Acquired address: None
Interface:
  Name: ge-0/0/1
  State: None
  Address acquisition:
    Protocol: DHCP Client
    Acquired address: None
    Protocol: RARP Client
    Acquired address: None
```

Meaning

The output shows the settings configured for autoinstallation. Verify that the values displayed are correct for the switch when it is deployed on the network.

Autoinstalling a Configuration File from a Disk-on-Key USB Memory Stick onto an EX2200 or EX3300 Switch

If you have a new EX2200 or EX3300 switch, you can use a Disk-on-Key USB memory stick (“USB key”) to configure the switch, using either a text configuration file or an XML configuration file.

Before you begin this task, ensure you have the following items:

- A management device (PC or laptop).
- A Junos Space platform to generate a valid XML file (if you will be installing the XML configuration file).
- A Disk-on-Key device with one of the following 16-bit or 32-bit FAT file systems:
  - DOS 3.0+ 16-bit FAT (up to 32 MB)
  - DOS 3.31+ 16-bit FAT (more than 32 MB)
  - FAT32
  - FAT32, LBA-mapped
  - 16-bit FAT, LBA-mapped
- An EX2200 or EX3300 switch with the factory configuration. If other Junos OS configuration files exist on the switch, the switch cannot read the **juniper-config.txt** or **juniper-config.xml** file from the Disk-on-Key device.

> **NOTE**: The USB-based autoinstallation process overrides the network-based autoinstallation process. If the switch detects a Disk-on-Key device containing a valid configuration file during autoinstallation, it configures the switch by using the configuration file on the Disk-on-Key device instead of fetching the configuration from the network.
>
> If both **juniper-config.txt** and **juniper-config.xml** files are on the Disk-on-Key device, the switch uses the text (`txt`) file.

To configure the switch by using a Disk-on-Key device that contains the configuration file in *text format*:

1. Using a text editor on the PC or laptop, create the configuration file, named **juniper-config.txt**, as a sequence of configuration commands (`set` commands). To reuse the configuration from another switch, save the configuration in configuration mode as a sequence of configuration commands on the switch using the `show | display set | save` *`filename`* command and then copying the file to the PC or switch as **juniper-config.txt**.

> **NOTE**: Ensure that the first line in the **juniper-config.txt** is `edit` and that the last line in the file is `commit and-quit`.

2. Copy the **juniper-config.txt** file to the Disk-on-Key device.
3. Plug the Disk-on-Key device into the USB port on the switch.
4. Power on the switch.
5. Observe the LEDs on the Disk-on-Key device, and wait as the switch starts and then accesses the Disk-on-Key device.

   The switch reads the **juniper-config.txt** file from the Disk-on-Key device and commits the configuration.

   > **NOTE**: Before you remove the Disk-on-Key device from the switch, ensure that the configuration has been applied to the switch. You can issue the `show configuration` operational mode command on the switch to see the configuration.

   Then remove the Disk-on-Key device from the switch.

   The configuration of the switch is complete.

To configure the switch by using a Disk-on-Key device that contains the configuration file in *XML format*:

1. Power on the switch.
2. Configure the switch to use autoinstallation:

   a. Load the factory default configuration:

   ```
   [edit]
   user@switch# load factory-default
   ```

   b. Set the switch for autoinstallation:

   ```
   [edit]
   user@switch# set system autoinstallation delete-upon-commit
   ```

c. Set the root authentication password:

```
[edit]
user@switch# set system root-authentication plain-text-password
```

d. Commit the changes:

```
[edit]
user@switch# commit
```

3. Power off the switch.
4. Using the Junos Space platform, create a valid configuration file in XML format, and name it **juniper-config.xml**.
5. Copy the **juniper-config.xml** file to the Disk-on-Key device.
6. Plug the Disk-on-Key device into the USB port on the switch.
7. Power on the switch.
8. Observe the LEDs on the Disk-on-Key device, and wait as the switch starts and then accesses the Disk-on-Key device.

   The switch reads the **juniper-config.xml** file from the Disk-on-Key device and commits the configuration.

   NOTE: Before you remove the Disk-on-Key device from the switch, ensure that the configuration has been applied to the switch . You can issue the `show configuration` operational mode command on the switch to see the configuration.

   Then remove the Disk-on-Key device from the switch.

   The configuration of the switch is complete.

SEE ALSO

show system autoinstallation status | 832

Installing Software on EX Series Switches | 133

Configuring Autoinstallation on JNU Satellite Devices

No configuration is required on a device on which you are performing autoinstallation because it is an automated process. However, to simplify the process, you can specify one or more interfaces, protocols, and configuration servers to be used for autoinstallation. In this scenario, satellite devices, such as EX Series Ethernet Switches, QFX Series devices, and ACX Series Universal Metro Routers, that are managed by the controller are considered.

To configure autoinstallation:

1. Load the JNU factory-default configuration file on the satellite device to enable the device to function in JNU mode.

```
user@satellite# load override /etc/config/jnu-factory.conf
```

   An override operation discards the current candidate configuration and loads the configuration in the specified filename or the one that you type at the terminal. When you use the override option and commit the configuration, all system processes reparse the configuration.

2. Specify the URL address of one or more servers from which to obtain configuration files:

```
[edit system]
user@host# set autoinstallation configuration-servers tftp://tftpconfig.sp.com
```

   NOTE: You can also use an HTTP or FTP address—for example, **http://** ***user.password*****@httpconfig.sp.com** or **ftp://** ***user.password*****@sftpconfig.sp.com**.

3. Configure one or more Ethernet interfaces to perform autoinstallation and IP address acquisition protocols for each interface. The router uses the protocols to send a request for an IP address for the interface:

```
[edit system]
user@host# set autoinstallation interfaces ge-0/0/0 bootp
```

4. Set the root password, entering a clear-text password that the system will encrypt, a password that is already encrypted, or an SSH public key string.

   Choose one of the following:

- To enter a clear-text password, use the following command:

```
[edit system]
user@host# set root-authentication plain-text-password
New password: type password here
Retype new password: retype password here
```

- To enter a password that is already encrypted, use the following command:

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

- To enter an SSH public key, use the following command:

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

5. Save the Junos OS configuration changes, activate the configuration on the device, and exit configuration mode, using the `commit-and-quit` command.

```
[edit]
user@host# commit-and-quit
```

When the satellite device reboots, it triggers the autoinstallation mechanism to retrieve its initial configuration and downloads the settings from the configuration file stored on a configuration server in the network. On the controller, you must enable the FTP service by using the `set system services ftp` command and save the configuration on the satellite device at the **/var/jnu/** directory.

The following configuration is generated on the satellite device as a result of the preceding procedure to configure autoinstallation:

```
system {
    autoinstallation {
    traceoptions {
        flags {
        all;
        }
        file autod;
        level all;
```

```
    }
        delete-after-commit;   /* After initial config, no need to keep */
        interfaces {
            ge-* {
                bootp;
        }
            xe-* {
                bootp;
            }
            configuration-servers {
                "ftp://192.168.0.1/var/jnu/sat1.conf";
            }
        }
    }
    root-authentication {
       encrypted-password "$ABC123";

    }
}
```

SEE ALSO

- autoinstallation (JNU Satellite Devices) | **606**
- delete-after-commit (JNU Satellites) | **617**

Verifying Autoinstallation on JNU Satellite Devices

IN THIS SECTION

Purpose

After you have configured autoinstallation, display the status of autoinstallation on a satellite device, such as an ACX Series router, an EX Series switch, or a QFX Series device, in a Junos Node Unifier (JNU) group that is managed by a controller, which is an MX Series router.

Action

From the CLI, enter the `show system autoinstallation status` command. The following example displays the autoinstallation settings of an ACX Series router that operates as a satellite in a JNU group.

Sample Output

command-name

```
user@host> show system autoinstallation status
 Autoinstallation status:
    Master state: Active
    Last committed file: None
    Configuration server of last committed file: 10.25.100.1
    Interface:
      Name: ge-0/1/0
      State: Configuration Acquisition
      Acquired:
        Address: 192.168.124.75
        Hostname: host-ge-000
        Hostname source: DNS
        Configuration filename: router-ge-000.conf
        Configuration filename server: 10.25.100.3
      Address acquisition:
        Protocol: DHCP Client
        Acquired address: None
        Protocol: RARP Client
        Acquired address: None
    Interface:
      Name: ge-0/1/1
      State: None
      Address acquisition:
        Protocol: DHCP Client
        Acquired address: None
        Protocol: RARP Client
```

```
        Acquired address: None
```

Meaning

The output shows the settings configured for autoinstallation. Verify that the values displayed are correct for the router when it is deployed on the network.

SEE ALSO

autoinstallation (JNU Satellite Devices) | 606

delete-after-commit (JNU Satellites) | 617

show system autoinstallation status | 832

Configuring Autoinstallation of Configuration Files on ACX Series (Junos OS)

IN THIS SECTION

Autoinstallation is an automated process and does not require any specific configuration on a device. To simplify the process, you can specify one or more interfaces, protocols, and configuration servers to be used for autoinstallation.

ACX Series Autoinstallation Overview

IN THIS SECTION

Autoinstallation provides automatic configuration for a new router that you connect to the network and turn on, or for a router configured for autoinstallation. The autoinstallation process begins anytime a router is powered on and cannot locate a valid configuration file in the CompactFlash (CF) card. Typically, a configuration file is unavailable when a router is powered on for the first time, or if the configuration file is deleted from the CF card. The autoinstallation feature enables you to deploy multiple routers from a central location in the network.

For the autoinstallation process to work, you must store one or more host-specific or default configuration files on a configuration server in the network and have a service available—typically Dynamic Host Configuration Protocol (DHCP)—to assign an IP address to the router.

Autoinstallation takes place automatically when you connect an Ethernet on a new Juniper Networks router to the network and power on the router. To simplify the process, you can explicitly enable autoinstallation on a router and specify a configuration server, an autoinstallation interface, and a protocol for IP address acquisition.

Supported Autoinstallation Interfaces and Protocols

Before autoinstallation on a router can take place, the router must acquire an IP address or a USB key. The protocol or protocols you choose for IP address acquisition determine the router interface to connect to the network for autoinstallation. The router detects the connected interface and requests an IP address with a protocol appropriate for the interface. Autoinstallation is supported over an Ethernet LAN interface. For IP address acquisition, the ACX Series router uses DHCP, BOOTP, or Reverse Address Resolution Protocol (RARP) on an Ethernet LAN interface.

If the server with the autoinstallation configuration file is not on the same LAN segment as the new router, or if a specific router is required by the network, you must configure an intermediate router

directly attached to the new router, through which the new router can send HTTP, FTP, Trivial File Transfer Protocol (TFTP), BOOTP, and Domain Name System (DNS) requests. In this case, you specify the IP address of the intermediate router as the location to receive HTTP, FTP, or TFTP requests for autoinstallation.

Typical Autoinstallation Process on a New Router

When a router is powered on for the first time, it performs the following autoinstallation tasks:

1. The new router sends out DHCP, BOOTP, or RARP requests on each connected interface simultaneously to obtain an IP address.

   If a DHCP server responds, it provides the router with some or all of the following information:

   - An IP address and subnet mask for the autoinstallation interface.
   - The location of the TFTP (typically), Hypertext Transfer Protocol (HTTP), or FTP server on which the configuration file is stored.
   - The name of the configuration file to be requested from the HTTP, FTP, or TFTP server.
   - The IP address or hostname of the HTTP, FTP, or TFTP server.

     If the DHCP server provides only the hostname, a DNS server must be available on the network to resolve the name to an IP address.
   - The IP address of an intermediate router if the configuration server is on a different LAN segment from the new router.

2. After the new router acquires an IP address, the autoinstallation process on the router attempts to download a configuration file in the following ways:

   a. If the configuration file is specified as a URL, the router fetches the configuration file from the URL by using HTTP, FTP, or TFTP depending on the protocol specified in the URL.

   b. If the DHCP server specifies the host-specific configuration file (boot file) ***hostname*.conf**, the router uses that filename in the TFTP server request. (In the filename, ***hostname*** is the hostname of the new router.) The autoinstallation process on the new router makes three unicast TFTP requests for ***hostname*.conf**. If these attempts fail, the router broadcasts three requests to any available TFTP server for the file.

   c. If the new router cannot locate ***hostname*.conf**, the autoinstallation process unicasts or broadcasts TFTP requests for a default router configuration file called **network.conf**, which contains hostname-to-IP address mapping information, to attempt to find its hostname.

   d. If **network.conf** contains no hostname entry for the new router, the autoinstallation process sends out a DNS request and attempts to resolve the new router's IP address to a hostname.

e. If the new router can determine its hostname, it sends a TFTP request for the ***hostname*.conf** file.

f. If the new router is unable to map its IP address to a hostname, it sends TFTP requests for the default configuration file **router.conf**.

3. After the new router locates a configuration file on a TFTP server, autoinstallation downloads the file, installs the file on the router, and commits the configuration.

Before You Begin Autoinstallation on an ACX Series Universal Metro Router

To configure a router for autoinstallation, complete the following tasks:

- Make sure you have a DHCP server on your network to meet your network requirements.
- Create one of the following configuration files and store it on an HTTP, FTP, or TFTP server in the network:
  - A host-specific file with the name ***hostname*.conf** for each router undergoing autoinstallation. Replace ***hostname*** with the name of a router. The ***hostname*.conf** file typically contains all the configuration information necessary for the router with this hostname.
  - A default configuration file named **router.conf** with the minimum configuration necessary to enable you to telnet into the new router for further configuration.
- Physically attach the router to the network using a Gigabit Ethernet interface.
- If you configure the DHCP server to provide only the HTTP, FTP, or TFTP server hostname, add an IP address-to-hostname mapping entry for the HTTP, FTP, or TFTP server to the DNS database file on the DNS server in the network.
- If the new router is not on the same network segment as the DHCP server (or other router providing IP address resolution), configure an existing router as an intermediate to receive HTTP, FTP, or TFTP and DNS requests and forward them to the HTTP, FTP, or TFTP and DNS servers. You must configure the LAN on the intermediate router with the IP addresses of the hosts providing HTTP, FTP, or TFTP and DNS service. Connect this interface to the new router.
- If you are using ***hostname*.conf** files for autoinstallation of host-specific configuration files, you must also complete the following tasks:
  - Configure the DHCP server to provide a ***hostname*.conf** filename to each new router. Each router uses its ***hostname*.conf** filename to request a configuration file from the TFTP server. Copy the necessary ***hostname*.conf** configuration files to the TFTP server.

- Create a default configuration file named **network.conf** and copy it to the TFTP server. This file contains IP address-to-hostname mapping entries. If the DHCP server does not send a ***hostname*.conf** filename to a new router, the router uses **network.conf** to resolve its hostname based on its IP address.

  Alternatively, you can add the IP address-to-hostname mapping entry for the new router to a DNS database file.

  The router uses the hostname to request a ***hostname*.conf** file from the server.

Autoinstallation Configuration of ACX Series Universal Metro Routers

No configuration is required on a router on which you are performing autoinstallation because it is an automated process. However, to simplify the process, you can specify one or more interfaces, protocols, and configuration servers to be used for autoinstallation.

To configure autoinstallation:

1. Specify the URL address of one or more servers from which to obtain configuration files.

```
[edit system]
user@host# set autoinstallation configuration-servers tftp://tftpconfig.sp.com
```

NOTE: You can also use an HTTP or FTP address—for example, **http://** ***user*:*password*@httpconfig.sp.com** or **ftp://** ***user*:*password*@sftpconfig.sp.com**.

2. Configure one or more Ethernet interfaces to perform autoinstallation and IP address acquisition protocols for each interface. The router uses the protocols to send a request for an IP address for the interface:

```
[edit system]
user@host# set autoinstallation interfaces ge-0/0/0 bootp
```

Verifying Autoinstallation on ACX Series Universal Metro Routers

IN THIS SECTION

Purpose

After you have configured autoinstallation, display the status of autoinstallation on an ACX Series router.

Action

From the CLI, enter the `show system autoinstallation status` command.

Sample Output

show system autoinstallation status

```
user@host> show system autoinstallation status
 Autoinstallation status:
    Master state: Active
    Last committed file: None
    Configuration server of last committed file: 10.25.100.1
    Interface:
      Name: ge-0/1/0
      State: Configuration Acquisition
      Acquired:
        Address: 192.168.124.75
        Hostname: host-ge-000
        Hostname source: DNS
        Configuration filename: router-ge-000.conf
        Configuration filename server: 10.25.100.3
      Address acquisition:
        Protocol: DHCP Client
```

```
        Acquired address: None
        Protocol: RARP Client
        Acquired address: None
    Interface:
      Name: ge-0/1/1
      State: None
      Address acquisition:
        Protocol: DHCP Client
        Acquired address: None
        Protocol: RARP Client
        Acquired address: None
```

Meaning

The output shows the settings configured for autoinstallation. Verify that the values displayed are correct for the router when it is deployed on the network.

SEE ALSO

> *autoinstallation*
>
> show system autoinstallation status | 832

USB Autoinstallation on ACX Series Routers

If you have a new ACX Series router, you can use a Disk-on-Key USB memory stick (“USB key”) to configure the router.

This configuration method has the following requirements:

- A management device (PC or laptop).
- A Disk-on-Key device with one of the following 16-bit or 32-bit file allocation table (FAT) file systems:
  - DOS 3.0+ 16-bit FAT (up to 32 MB)
  - DOS 3.31+ 16-bit FAT (over 32 MB)
  - FAT32

  - FAT32, LBA-mapped
  - 16-bit FAT, LBA-mapped
- An ACX Series router with the factory configuration. If other Junos OS configuration files exist on the router, the router cannot read the **juniper-config.txt** file from the Disk-on-Key device.

> **NOTE**: The USB-based autoinstallation process overrides the network-based autoinstallation process. If the ACX Series router detects a USB Disk-on-Key device containing a valid configuration file during autoinstallation, it configures the router using the configuration file on Disk-on-Key instead of fetching the configuration from the network.

To configure an ACX Series router using Disk-on-Key:

1. Using a text editor on a PC or laptop, create the configuration file, named *juniper-config.txt*, as a sequence of configuration commands ("set" commands). To reuse configuration from another ACX Series router, the configuration can be saved in configuration mode as a sequence of configuration commands on the router using the "`show | display set | save <filename>`" command and then copying the <filename> to the PC or router as *juniper-config.txt.*
2. Copy the *juniper-config.txt* file to a Disk-on-Key device.
3. Plug the Disk-on-Key device into the USB port on the new ACX Series router.
4. Power on the router by pressing the POWER button on the front panel. Wait for the router to start and access the Disk-on-Key device (observe the LEDs on the Disk-on-Key device).

   The router reads the *juniper-config.txt* file from the Disk-on-Key device and commits the configuration.
5. Remove the Disk-on-Key device from the router.
6. The configuration of the router is complete.

Autoinstallation on ACX Series Routers in Hybrid Mode Overview

The ACX Series router has an autoinstallation mechanism that allows the router to configure itself out-of-the-box with no manual intervention, using the configuration available either on the network, locally through a removable media, or a combination of both.

Autoinstallation process delivers the following benefits:

- The router can be sent from the warehouse to the deployment site without any pre-configuration steps.

- The procedure required to deploy the device at the cell site is simplified, resulting in reduced operational and administrative costs.
- You can roll out large numbers of these devices in a very short time.

ACX Series routers support the retrieval of partial configuration from an external USB storage device plugged into the router's USB port during the autoinstallation process. This partial configuration in turn facilitates the network mode of autoinstallation to retrieve the complete configuration file from the network. This method is called hybrid mode of autoinstallation.

Autoinstallation process operates in three modes:

- USB mode—Autoinstallation obtains the required configuration from the configuration file saved in an external USB storage device plugged into the router.
- Network Mode—Autoinstallation triggers IP address acquisition mechanism (the router sends out DHCP or RARP requests on each connected interface simultaneously) to obtain an IP address. Once the router has an IP address, it sends a request to the specified configuration server and downloads and installs the configuration.
- Hybrid mode—Autoinstallation obtains partial configuration from an external USB storage device and uses that configuration to obtain the complete configuration file in network mode. This mode is a combination of USB mode and Network mode.

On the different ACX Series routers, autoinstallation is supported on the following Gigabit Ethernet (ge) and 10- Gigabit Ethernet (xe) interfaces:

- On ACX1000 routers, interfaces ge-0/1/0 through ge-0/1/7, and ge-0/2/0 through ge-0/2/3
- On ACX1100 routers, interfaces ge-0/0/0 through ge-0/0/7, and ge-0/1/0 through ge-0/1/3
- On ACX2000 routers, interfaces ge-0/1/0 through ge-0/1/7, ge-0/2/0 through ge-0/2/1, and xe-0/3/0 through xe-0/3/1
- On ACX2100 routers, interfaces ge-1/0/0 through ge-1/0/3, ge-1/1/0 through ge-1/1/3, ge-1/2/0 through ge-1/2/1, and xe-1/3/0 through xe-1/3/1
- On ACX2200 routers, interfaces ge-0/0/0 through ge-0/0/3, ge-0/1/0 through ge-0/1/3, ge-0/2/0 through ge-0/2/1, and xe-0/3/0 through xe-0/3/1
- On ACX4000 routers, interfaces ge-0/0/0 through ge-0/0/7, ge-0/1/0 through ge-0/1/1, ge-1/0/0 through ge-1/0/5, ge-1/1/0 through ge-1/1/5 , and xe-0/2/0 through xe-0/2/1

Prerequisites for Autoinstallation on ACX Series Routers in Hybrid Mode

Before you perform autoinstallation on a router in hybrid mode, complete the following tasks:

Using a text editor on a PC or laptop, create the configuration file, named *juniper-config.txt*, as a sequence of configuration commands ("set" commands). To reuse configuration from another ACX Series router, the configuration can be saved in configuration mode as a sequence of configuration commands on the router using the "`show | display set | save <filename>`" command and then copying the <filename> to the PC or router as *juniper-config.txt.*

You must copy the *juniper-config.txt* file to an external USB storage device. Plug the USB device into the USB port on the new ACX Series router. When you power on the router, the router first attempts to access the external USB storage device. The router reads the *juniper-config.txt* file from the external USB storage device and commits the configuration.

> **NOTE**: For autoinstallation process to switch to the network mode, the `continue-network-mode` statement must be present in the autoinstallation stanza at the `[edit system autoinstallation]` hierarchy level of the **juniper-config.txt** configuration file. The presence of the `continue-network-mode` statement in the **juniper-config.txt** file causes the router to consider it as a partial configuration. Otherwise, if the `continue-network-mode` statement is not present in the **juniper-config.txt** file, the router considers the configuration on the external USB storage device as the complete configuration and it will not switch to the network mode.

Perform all of the steps described in the "Before You Begin Autoinstallation on an ACX Series Universal Metro Router" on page 571 section, which prepares the router for network-based autoinstallation.

Autoinstallation Process on a New ACX Series Router in Hybrid Mode

You can perform autoinstallation on a new ACX Series router in hybrid mode, which is a combination of the USB-based autoinstallation process and the network-based autoinstallation process.

This configuration method has the following requirements:

- A management device (PC or laptop).
- An external USB storage device with one of the following 16-bit or 32-bit file allocation table (FAT) file systems:
  - DOS 3.0+ 16-bit FAT (up to 32 MB)
  - DOS 3.31+ 16-bit FAT (over 32 MB)

- FAT32
- FAT32, LBA-mapped
- 16-bit FAT, LBA-mapped

BOOTP, RARP and DHCP are the supported protocols for acquisition of IP address of the router and TFTP, FTP, and HTTP are the supported protocols for downloading the configuration file from an external server URL on which the configuration file is stored.

The following operations occur during autoinstallation in hybrid mode on ACX Series routers:

1. When a new ACX Series router is powered on for the first time, the router performs the following autoinstallation tasks: The router boots the Junos OS image. The management process (mgd) is invoked and it determines whether a valid configuration exists on the router's Flash memory. If a valid configuration is not present on the router, it loads and commits the factory-default configuration.

2. If the factory-default configuration contains the `autoinstallation configuration` stanza at the `[edit system]` hierarchy level, the autoinstallation process is triggered.

3. The autoinstallation process detects whether an external USB storage device is connected to the router and examines whether the USB device contains a valid configuration file. If the USB storage device contains a configuration file named **juniper-config.txt**, the router reads the **juniper-config.txt** file and commits the configuration.

4. If the **juniper-config.txt** file on the external USB storage device contains `continue-network-mode` statement, the configuration is treated as partial configuration. The autoinstallation process uses this partial configuration to obtain the complete configuration file from a server on the network. At this stage, the router completes the USB mode of the autoinstallation procedure and switches to the network mode of the autoinstallation procedure.

   NOTE: The `continue-network-mode` statement must be present in the autoinstallation stanza at the `[edit system autoinstallation]` hierarchy level of the **juniper-config.txt** file.

5. After acquiring the partial configuration from the **juniper-config.txt** file, the configuration discovery procedure is initiated. For all physical Ethernet interfaces that transition to the up state, the autoinstallation process verifies whether autoinstallation is configured on that Ethernet interface. The autoinstallation process starts IP address acquisition mechanism to obtain IP address of the server followed by the configuration file retrieval mechanism.

6. For the interfaces that take part in the autoinstallation process, the IPv4 address discovery procedure is triggered. The new ACX Series router sends out DHCP, or BOOTP, or RARP requests on each connected interface simultaneously to obtain an IP address. The interfaces statement in the

`autoinstallation configuration` stanza at the `[edit system]` hierarchy level in the factory-default configuration also specify the protocols to be used for IPv4 address discovery. If the interfaces statement is not configured, all the applicable protocols for an interface are used to send out requests on each connected Ethernet interface.

7. If an IPv4 address cannot be retrieved, the autoinstallation process starts the DHCP server on all participating interfaces (assigns static IP address in the form of 192.168.x.1 to allow a management station to connect to the router for manual configuration) and terminates the autoinstallation procedure.

8. If a DHCP server responds, it provides the router with some or all of the following information:

   - An IP address and subnet mask for the autoinstallation interface.
   - The location of the TFTP server on which the configuration file is stored.
   - The name of the configuration file to be requested from the TFTP server.
   - The IP address or hostname of the TFTP server.
   - If the DHCP server provides configuration server hostname, a DNS server must be available on the network to resolve the name to an IP address.
   - The IP address of an intermediate router if the configuration server is on a different LAN segment from the new router.

   NOTE: To use HTTP or FTP server, you need to specify the URL of the configuration server under the `[edit system autoinstallation configuration-servers]` hierarchy level.

9. After an IPv4 address is retrieved for an interface, the interface is configured with that address and the autoinstallation process starts the configuration file discovery procedure. The autoinstallation process on the router attempts to download a configuration file in the following methods:

   a. If the configuration file is specified as a URL, the router fetches the configuration file from the URL by using HTTP, FTP, or TFTP depending on the protocol specified in the URL.

   b. If the DHCP server specifies the host-specific configuration file (either through file field option or boot file option or host name), the router uses that filename in the TFTP server request. In case of host name, the configuration filename is hostname.conf. The autoinstallation process on the new router makes unicast TFTP request for hostname.conf. If this attempt fails, the router broadcasts the request to any available TFTP server for the configuration file.

   c. If the new router is unable locate the configuration file, the autoinstallation process unicasts or broadcasts TFTP requests for a default router configuration file called network.conf, which contains hostname-to-IP address mapping information, to attempt to find its hostname.

d. If network.conf contains no hostname entry for the new router, the autoinstallation process sends out a DNS request and attempts to resolve the new router's IP address to a hostname.

e. If the new router can determine its hostname, it sends a TFTP request for the hostname.conf file.

f. If the new router is unable to map its IP address to a hostname, it sends TFTP requests for the default configuration file router.conf.

> **NOTE**: The autoinstallation process makes a maximum of three attempts to retrieve the configuration file by repeating the methods listed above (b to f). In case the autoinstallation process fails to retrieve the configuration file after three attempts, the autoinstallation process goes to start state.

g. After the new router locates a configuration file on a TFTP server, autoinstallation downloads the file, installs the file on the router, and commits the configuration.

Configuring Autoinstallation of ACX Series Routers in Hybrid Mode

To configure the router for autoinstallation in hybrid mode, perform the following tasks:

Create a configuration file as *juniper-config.txt*.

1. Using a text editor on a PC or laptop, create the configuration file, named *juniper-config.txt*. This configuration file must contain a sequence of configuration commands ("set" commands).

> **NOTE**: To reuse a configuration from another ACX Series router, save the configuration in configuration mode as a sequence of configuration commands on the router using the "`show | display set | save <filename>`" command and then copying the <filename> to the PC or router as *juniper-config.txt.*

2. Include the `continue-network-mode` statement at the `[edit system autoinstallation]` hierarchy level in the *juniper-config.txt* configuration file. The presence of the `continue-network-mode` statement causes the router to consider it as a partial configuration and the autoinstallation process switches to network mode to retrieve the complete configuration from a network server.

```
[edit system]
user@host# set autoinstallation continue-network-mode
```

3. Specify the URL address of one or more network servers from which to obtain the complete configuration.

```
[edit system]
user@host# set autoinstallation configuration-servers tftp://
username:password@tftpconfig.sp.com/filename.conf
```

> **NOTE**: You can also use an HTTP or FTP address—for example, **http://*user.password*@httpconfig.sp.com/filename.conf** or **ftp://*user.password*@sftpconfig.sp.com/filename.conf**.

4. Specify the root authentication password.

```
[edit system]
user@host# set root-authentication encrypted-password “password”
```

5. Configure one or more Ethernet interfaces to perform autoinstallation and IP address acquisition protocols for each interface. The router uses the protocols to send a request for an IP address for the interface:

```
[edit system]
user@host# set autoinstallation interfaces ge-0/0/0 bootp
```

> **NOTE**: Configuring an interface is optional. If an interface is configured, then autoinstallation process is triggered on the configured interface only. If an interface is not configured, then autoinstallation process is triggered on all the interfaces that are physically in link up state.

6. Copy the *juniper-config.txt* file to an external USB storage device.
7. Plug the external USB storage device to the router’s USB port.

From configuration mode, confirm your configuration by entering the `show system autoinstallation status` command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@host> show system autoinstallation status
```

```
Autoinstallation status:
Master state: Active
Last committed file: None
Configuration server of last committed file: 10.25.100.1
Interface:
  Name: ge-0/0/0
  State: Configuration Acquisition
  Acquired:
    Address: 192.168.124.75
    Hostname: host-ge-000
    Hostname source: DNS
    Configuration filename: router-ge-000.conf
    Configuration filename server: 10.25.100.3
  Address acquisition:
    Protocol: BOOTP Client
    Acquired address: None
    Protocol: RARP Client
    Acquired address: None
```

SEE ALSO

autoinstallation

show system autoinstallation status | 832

12

CHAPTER

Troubleshooting Software Installation

Troubleshooting Software Installation on EX Series Switches

IN THIS SECTION

This topic describes troubleshooting issues with software installations on EX Series switches.

Recovering from a Failed Software Upgrade on an EX Series Switch

IN THIS SECTION

Problem

Description

If Junos OS loads but the CLI is not working, or if the switch has no software installed, use this recovery installation procedure to install Junos OS.

Solution

If there is already a Junos OS image on the system, you can either install the new Junos OS package in a separate partition and have both Junos OS images remain on the system, or you can wipe the disk clean before the new installation proceeds.

If there is no Junos OS image on the system, follow the instructions in Booting an EX Series Switch Using a Software Package Stored on a USB Flash Drive to get an image on the system and boot the switch.

To perform a recovery installation:

1. Power on the switch.

   The loader script starts.

   After the message `Loading /boot/defaults/loader.conf` displays, you are prompted with the following:

   ```
   Hit [Enter] to boot immediately, or space bar for command prompt.
   ```

2. Press the space bar to enter the manual loader.

   The `loader>` prompt displays.

3. Enter the following command:

   ```
   loader> install [- -format]  [- -external] source
   ```

   where:

   - `format`—Use this option to wipe the installation media before installing the software package. If you do not include this option, the system installs the new Junos OS package in a different partition from the partition used by the most recently installed Junos OS package.
   - `external`—Use this option to install the software package on an external medium.
   - *source*—Represents the name and location of the Junos OS package either on a server on the network or as a file on the USB flash drive:
     - Network address of the server and the path on the server; for example, **tftp://192.168.1.28/junos/jinstall-ex-4200-9.4R1.5-domestic-signed.tgz**
     - The Junos OS package on a USB device is commonly stored in the root drive as the only file; for example, **file:///jinstall-ex-4200-9.4R1.5-domestic-signed.tgz**

   The boot process proceeds as normal and ends with a login prompt.

Rebooting from the Inactive Partition

IN THIS SECTION

Problem

Description

EX Series switches shipped with Junos OS Release 10.4R2 or earlier have Junos OS loaded on the system disk in partition 1. The first time you upgrade, the new software package is installed in partition 2. When you finish the installation and reboot, partition 2 becomes the active partition. Similarly, subsequent software packages are installed in the inactive partition, which becomes the active partition when you reboot at the end of the installation process.

On switches shipped with Release 10.4R3 and later, the same Junos OS image is loaded in each of the two root partitions, and you should copy the new software image to the alternate partition each time you upgrade.

If you performed an upgrade and rebooted, the system resets the active partition. You can use this procedure to manually boot from the inactive partition.

NOTE: If you have completed the installation of the software image but have not yet rebooted, issue the `request system software rollback` command to return to the original software installation package.

Solution

Reboot from the inactive partition:

```
user@switch> request system reboot slice alternate
```

NOTE: If you cannot access the CLI, you can reboot from the inactive partition using the following procedure from the loader script prompt:

1. Unload and clear the interrupted boot from the active partition:

   ```
   loader> unload
   loader> unset vfs.root.mountfrom
   ```

2. Select the new (inactive) partition to boot from:

   ```
   loader> set currdev=diskxsy:
   ```

   where *x* is either 0 (internal) or 1 (external), and the y indicates the number of the inactive partition, either 1 or 2.

   You must include the colon (:) at the end of this command.

3. Boot Junos OS from the inactive partition:

   ```
   loader> boot
   ```

Freeing Disk Space for Software Installation

IN THIS SECTION

Problem

Description

The software installation process requires a certain amount of unused disk space. If there is not enough space, you might receive an error message such as:

```
fetch: /var/tmp/incoming-package.tgz: No space left on device
```

Solution

Identify and delete unnecessary files by using the `request system storage cleanup` command.

Installation from the Boot Loader Generates 'cannot open package' Error

IN THIS SECTION

Problem

Description

When installing a Junos OS software image from the loader prompt, a "cannot open package error" is generated:

```
loader> install - -format
tftp://10.204.33.248/images/Flash_corr/official/jinstall-ex-4200-10.4I2011012-domestic-signed.tgz
Speed: 1000, full duplex
bootp: no reply
No response for RARP request
```

```
net_open: RARP failed
cannot open package (error 5)
```

Solution

This might be due to the IP address, gateway IP address, netmask address, or server IP address not being properly set. You can set these values either from the shell or from the u-boot prompt.

To set these values from the shell:

```
% nvram setenv ipaddr 10.204.35.235
% nvram setenv netmask 255.255.240.0
% nvram setenv gatewayip 10.204.47.254
% nvram setenv serverip 10.204.33.248
```

To set these values from the u-boot prompt, log in to a console connection, reboot, and stop at the u-boot prompt (Cntrl+c):

```
=> setenv ipaddr 10.204.35.235
=> setenv gatewayip 10.204.47.254
=> setenv serverip 10.204.33.248
=> setenv netmask 255.255.240.0
=> saveenv
=> printenv Verify whether variables are set properly or not
=> boot
```

RELATED DOCUMENTATION

- Installing Software on an EX Series Switch with a Virtual Chassis or Single Routing Engine (CLI Procedure) | 136
- Upgrading Software on an EX6200 or EX8200 Standalone Switch Using Nonstop Software Upgrade (CLI Procedure)
- Installing Software on EX Series Switches (J-Web Procedure)
- Understanding Software Installation on EX Series Switches | 134
- show system storage partitions | 876

Troubleshooting a Switch That Has Booted from the Backup Junos OS Image

IN THIS SECTION

Problem

Description

The switch boots from the backup root file partition. It is possible that the primary copy of Junos OS failed to boot properly, which could indicate that it is corrupted. This event is flagged in two ways:

- Upon login through the console or management port, the following warning message is displayed:

```
WARNING: THIS DEVICE HAS BOOTED FROM THE BACKUP JUNOS IMAGE

It is possible that the primary copy of JUNOS failed to boot up
properly, and so this device has booted from the backup copy.

Please re-install JUNOS to recover the primary copy in case
it has been corrupted.
```

- The following alarm message is generated:

```
user@switch> show chassis alarms
1 alarms currently active
Alarm time               Class  Description
2011-02-17 05:48:49 PST  Minor  Host 0 Boot from backup root
```

If the switch is in a Virtual Chassis, the switch member number appears in the `Description` field, where the switch is called a host.

Solution

Install a new Junos OS image on the partition that had the corruption, or take a snapshot (use "request system snapshot" on page 721) of the currently active partition and use it to replace the image in the alternate partition:

If the switch is a standalone switch or a Virtual Chassis primary switch, enter this command:

```
user@switch> request system snapshot slice alternate
```

If the switch is a Virtual Chassis member switch (not the primary), enter this command on the Virtual Chassis:

```
user@switch> request system snapshot slice alternate member member-id
```

where *member-id* is the Virtual Chassis member ID number.

RELATED DOCUMENTATION

Verifying Junos OS and Boot Loader Software Versions on an EX Series Switch | 101

Troubleshooting Software Installation on EX Series Switches | 584

show system storage partitions | 876

Managing Disk Space for Junos OS Installation

A Junos OS installation or upgrade may fail if your router has a shortage of disk space. If a disk space error occurs, use one or more of the following options to complete the installation:

- Use the `request system storage cleanup` command to delete unnecessary files and increase storage space on the router.
- Specify the `unlink` option when you use the `request system software add` command to install the Junos OS:
  - On the M Series, MX Series, and T Series routers, the `unlink` option removes the software package after a successful upgrade.

- Download the software packages you need from the Juniper Networks Support Web site at **https://www.juniper.net/support/**. The download program provides intelligent disk space management to enable installation.

RELATED DOCUMENTATION

Junos OS Configuration Using the CLI

Verifying PIC Combinations (Junos OS)

On Juniper Networks routing platforms, you can typically install any combination of Physical Interface Cards (PICs) on a single Enhanced Flexible PIC Concentrator (FPC) or in two PIC slots served by a single Layer 2/Layer 3 Packet Processing application-specific integrated circuit (ASIC).

Newer Junos OS services for some PICs can require significant Internet Processor ASIC memory, and some configuration rules limit certain combinations of PICs if they are installed on some platforms.

During software installation, the configuration checker in the installation program checks the router's PICs. If any configuration rules affect your PIC combinations, the installation process stops and displays a message similar to the following:

```
The combination of PICS in FPC slot 3 is not supported with this release
    PIC slot 0 -
    PIC slot 1 - 1x OC-12 ATM-II IQ
    PIC slot 2 - 1x G/E IQ, 1000 BASE
    PIC slot 3 - 1x Link Service (4)
If you continue the installation, one or more PICs on
FPC slot 3 might appear to be online but
cannot be enabled and cannot pass traffic with this release of JUNOS.
See the Release Notes for more information.
WARNING: This installation attempt will be aborted. If you
WARNING: wish to force the installation despite these warnings
WARNING: you may use the 'force' option on the command line.
pkg_add: package /var/tmp/jbundle-7.6R1.x-domestic-signed.tgz fails requirements - not installed
```

The configuration checker has the following limitations:

- If a PIC is offline when you upgrade the router with new software, the configuration checker cannot detect PIC combinations affected by configuration rules and cannot warn about them.

- If you specify the **force** option when you upgrade the Junos OS, the configuration checker warns about the affected PIC combination and the software installation continues. However, after rebooting, one or more PICs might fail to initialize.
- The configuration checker looks for combinations of three affected PICs. If an Enhanced FPC contains four affected PICs, the script generates multiple warnings.

If you install a PIC into a router already running Junos OS, you can identify the presence of affected PIC combinations from messages in the system logging (**syslog**) file:

```
    Feb 6 17:57:40 CE1 feb BCHIP 0: uCode overflow - needs 129 inst space to load
b3_atm2_LSI_decode for stream 12
    Feb 6 17:57:41 CE1 chassisd[2314]: CHASSISD_IFDEV_DETACH_PIC: ifdev_detach_pic(0/3)
    Feb 6 17:57:41 CE1 feb BCHIP 0: binding b3_atm2_LSI_decode to stream 12 failed
    Feb 6 17:57:41 CE1 feb PFE: can not bind B3 ucode prog b3_atm2_LSI_decode to FPC 0: stream 12
```

For more information about checking for unsupported PIC combinations, see the corresponding PIC guide for your router, the *Junos OS Release Notes*, and *Technical Support Bulletin PSN-2004-12-002, PIC Combination Notes Summary* on the Juniper Networks Support Web site at **https://www.juniper.net/support/**.

For SRX Series Services Gateways

SRX5600 and SRX5800 devices support IOC or SPC on any given card slot, and there is no complexity in equipping the services gateways with the perfect balance of processing and I/O capacity. You can install up to 11 (on SRX5800) and 5 (SRX5600) SPCs and IOCs on the device. However, you must install at least one SPC on device. For more details, see SRX5600 and SRX5800 Services Gateway Card Guide.

SRX3600 supports a maximum of up to seven SPCs,three NPCs, six IOCs, and 11 NP-IOCs per chassis. However you must install at least one SPcs and NPC on the chassis. SRX3400 supports a maximum of up to four SPCs,two NPCs, four IOCs, and six NP-IOCs per chassis. However you must install at least one SPcs and NPC on the chassis. On SRX3400 and SRX3600 devices you must install PICs on the front slots of the chassis. For more details, see SR X1400 , SRX3400 , and SRX3600 Services Gateway Module Guide.

RELATED DOCUMENTATION

System Memory and Storage Media for SRX Series Firewalls | 453

Storage Media Names for SRX Series Devices

13

CHAPTER

Configuration Statements

auto-configuration

IN THIS SECTION

Syntax

```
auto-configuration {
    command binary-file-path;
    disable;
}
```

Hierarchy Level

```
[edit system processes]
```

Description

Configure the autoconfiguration process.

Options

- `command binary-file-path`—Path to the binary process.
- `disable`—Disable the autoconfiguration process.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 8.5.

RELATED DOCUMENTATION

Autoinstallation Overview

Example: Configuring Autoinstallation on SRX Series Devices | 555

auto-configuration (System)

IN THIS SECTION

Syntax

```
auto-configuration {
    traceoptions {
        file {
        filename;
            files number;
            match regular-expression;
            size maximum-file-size;
            (world-readable | no-world-readable);
        }
        flag flag;
        level (all | error | info | notice | verbose | warning);
        no-remote-trace;
    }
}
```

Hierarchy Level

```
[edit system]
```

Description

Configure the autoconfiguration process.

Options

`traceoptions`—Set the trace options.

- `file`—Configure the trace file information.
  - `filename`—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory `/var/log`. By default, the name of the file is the name of the process being traced.

- files *number*—Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed to trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. The oldest archived file is overwritten.

  If you specify a maximum number of files, you also must specify a maximum file size with the size option and a filename.

  Range: 2 through 1000 files

  Default: 10 files

- match *regular-expression*—Refine the output to include lines that contain the regular expression.

- size *maximum-file-size*—Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named trace-file reaches this size, it is renamed trace-file.0. When trace-file again reaches its maximum size, trace-file.0 is renamed trace-file.1 and trace-file is renamed trace-file.0. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

  If you specify a maximum number of files, you also must specify a maximum file size with the size option and a filename.

  Syntax: x K to specify KB, x m to specify MB, or x g to specify GB

  Range: 10 KB through 1 GB

  Default: 128 KB

- world-readable | no-world-readable—By default, log files can be accessed only by the user who configures the tracing operation. The world-readable option enables any user to read the file. To explicitly set the default behavior, use the no-world-readable option.

- flag—Specify the tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. You can include the following flags.

  - all—Trace all events.

  - auth—Trace VLAN authentication.

  - configuration—Trace configurations.

  - interfaces—Trace interface operations.

  - io—Trace I/O operations.

  - rtsock—Trace routing socket operations.

  - ui—Trace user interface operations.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Autoinstallation Overview

Example: Configuring Autoinstallation on SRX Series Devices | 555

auto-image-upgrade

IN THIS SECTION

Syntax

```
auto-image-upgrade;
```

Hierarchy Level

```
[edit chassis]
```

Description

Enable automatic software download using Zero Touch Provisioning (ZTP).

If the `auto-image-upgrade` statement is included in the factory default configuration, then ZTP will start automatically when the device is booted up. Otherwise, ZTP will start with the first power cycle after the `auto-image-update` statement is configured.

The DHCP client compares the software package name in the DHCP server message to the name of the software package that booted the switch. If the software packages are different, the DHCP client downloads and installs the software package specified in the DHCP server message.

Before you upgrade software using automatic software download, ensure that you have configured DHCP services, including configuring a path to a boot server and a boot file. See the *Junos OS System Basics Configuration Guide* for information about using the CLI to configure DHCP services and settings.

Default

Automatic software download is disabled.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.6.

RELATED DOCUMENTATION

Upgrading Software by Using Automatic Software Download for Switches (Junos OS) | 181

Understanding Software Installation on EX Series Switches | 134

auto-snapshot

IN THIS SECTION

Syntax

```
auto-snapshot;
```

Hierarchy Level

```
[edit system]
```

Description

Enable the automatic snapshot feature, which allows the device to automatically fix a corrupt Junos OS file in the primary root partition. If the automatic snapshot feature is enabled, the device automatically takes a snapshot of the Junos OS root file system in the alternate root partition and copies it onto the primary root partition, thereby repairing the corrupt file in the primary root partition. The automatic snapshot procedure takes place whenever the system reboots from the alternate root partition, regardless of whether the reboot is due to a command or due to corruption of the primary root partition.

NOTE: EX9200 devices do not support the automatic snapshot feature.

Default

- The automatic snapshot feature is enabled by default on the following EX Series devices:
  - EX4550 devices
  - EX Series devices that ship with Junos OS Release 12.3R1 or later
- The automatic snapshot feature is disabled by default on EX Series devices (except the EX4550 devices) running Junos OS Release 12.2 or earlier.
- If the automatic snapshot feature was disabled by default before the device was upgraded to Junos OS Release 12.3R1 or later, the feature remains disabled (for backward compatibility) by default after the upgrade.
- By default, the auto-snapshot feature is disabled on SRX300, SRX320, SRX340, SRX345, SRX380, and SRX550M devices.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 12.3.

RELATED DOCUMENTATION

Configuring Dual-Root Partitions | 422

show system auto-snapshot | 850

autoinstallation

IN THIS SECTION

Syntax

```
autoinstallation {
    configuration-servers {
        url {
             password password;
        }
    }
    interfaces {
        interface-name {
            bootp;
```

```
            rarp;
        }
    }
    usb {
        disable;
    }
}
```

Hierarchy Level

```
[edit system]
```

Description

Specify the configuration for autoinstallation.

Options

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Example: Configuring Autoinstallation on SRX Series Devices | 555

autoinstallation (JNU Satellite Devices)

IN THIS SECTION

Syntax

```
autoinstallation {
    delete-after-commit;
    configuration-servers {
        url;
    }
    interfaces {
        interface-name {
            bootp;
            rarp;
        }
    }
}
```

Hierarchy Level

```
[edit system]
```

Description

(Satellite devices in a JNU group) Download a configuration file automatically from an FTP or HTTP server. When you power on a router or switch configured for autoinstallation, it requests an IP address from a Dynamic Host Configuration Protocol (DHCP) server. When the router or switch has an address, it sends a request to a configuration server and downloads and installs a configuration.

Options

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 13.3.

RELATED DOCUMENTATION

- Autoinstallation of Satellite Devices in a Junos Node Unifier Group
- Autoinstallation Process on Satellite Devices in a Junos Node Unifier Group
- Configuring Autoinstallation on JNU Satellite Devices | 564
- Verifying Autoinstallation on JNU Satellite Devices | 566

bootp

IN THIS SECTION

Syntax

```
bootp {
    command binary-file-path;
    disable;
    failover (alternate-media | other-routing-engine);
}
```

Hierarchy Level

```
[edit system processes]
```

Description

Specify the booting process.

Options

- `command` *`binary-file-path`*—Path to the binary process.
- `disable` —Disable the booting process.
- `failover`—Configure the device to reboot if the software process fails four times within 30 seconds, and specify the software to use during the reboot.
  - `alternate-media`—Configure the device to switch to backup media that contains a version of the system if a software process fails repeatedly.
  - `other-routing-engine`—Instruct the secondary Routing Engine to take primary role if a software process fails. If this statement is configured for a process, and that process fails four times within 30 seconds, then the device reboots from the secondary Routing Engine.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 8.5.

commit (System)

IN THIS SECTION

Syntax

```
commit {
    commit-synchronize-server;
    delta-export;
    fast-synchronize;
    notification;
    peers;
    peers-synchronize;
    persist-groups-inheritance | no-persist-groups-inheritance;
    server;
    synchronize;
}
```

The parameters for fast-synchronize and synchronize do not apply for the SRX Series.

Hierarchy Level

```
[edit system]
```

Description

Configure options for Junos OS commit.

Options

`commit-synchronize-server`—(Optional) Specify traceoptions for commit synchronize server actions.

`delta-export`—(Optional) Configure system commit to export only the changes made in the candidate configuration instead of exporting the entire candidate configuration to the configuration database. This helps to reduce the time taken to commit the configuration changes..

`fast-synchronize`—(Optional) Configure commits to run in parallel (simultaneously) on both the primary and backup Routing Engines to reduce the time required for commit synchronization. The fast-synchronize configuration is valid only on systems with two Routing Engines. (Option not available for SRX Series.)

`notification`—(Optional) Notify applications upon commit completion.

`peers`—(Optional) Specify the host names or IP addresses of the MC-LAG peers and the user authentication details for the users administering the MC-LAG peers that are participating in commit synchronization.

> **NOTE**: Starting in Junos OS Release 17.1R1, the `peers` option at the [`edit system commit`] hierarchy level is not supported in batch configuration mode.

`peers-synchronize`—(Optional) Configure a commit synchronization on MC-LAG peers.

`persist-group-inheritance`—(Optional) Configure this option to improve commit performance for systems that use many configuration groups that use wildcards. This option causes the full inheritance paths of the configuration groups to be built in the database instead of in the process memory. To disable this option, use `no-persist-groups-inheritance`. Starting in Junos OS Evolved Release 19.2R1 and Junos OS Release 19.4R1, this option is enabled by default. Junos OS Evolved requires this feature to be enabled. The `no-persist-groups-inheritance` option to disable `persist-group-inheritance` is not supported in Junos OS Evolved.

`server`—(Optional) Configure a default batch commit.

`synchronize`—(Optional) For devices with multiple Routing Engines only. Configure the commit command to automatically perform a commit synchronize action between dual Routing Engines within the same chassis. The Routing Engine on which you execute the commit command (the requesting Routing Engine) copies and loads its candidate configuration to the other (the responding) Routing Engine. Each

Routing Engine then performs a syntax check on the candidate configuration file being committed. If no errors are found, the configuration is activated and becomes the current operational configuration on both Routing Engines. (Option not available for SRX Series.)

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

maintenance—To view or add this statement in the configuration.

Release Information

Statement introduced in Junos OS Release 7.4.

Option `persist-groups-inheritance` added in Junos OS Release 13.2.

Option `delta-export` added in Junos OS Release 14.2.

Option `peers` added in Junos OS Release 14.2R6.

Option `peers-synchronize` added in Junos OS Release 14.2R6.

Option `no-persist-groups-inheritance` added in Junos OS Evolved Release 19.2R1 and Junos OS Release 19.4R1.

RELATED DOCUMENTATION

Improving Commit Time When Using Configuration Groups

server

synchronize

commit-synchronize-server

IN THIS SECTION

Syntax

```
commit-synchronize-server {
    traceoptions {
        file {
            filename;
            files number;
            microsecond-stamp;
            size maximum-file-size;
            (world-readable | no-world-readable);
        }
        flag (all | debug | ephemeral-commit | operational-command);
        no-remote-trace;
    }
}
```

Hierarchy Level

```
[edit system commit]
```

Description

For commit synchronize server actions, configure tracing operations.

Options

filename Name of the file to receive the output of the tracing operation.

> **NOTE**: If you configure traceoptions and do not explicitly specify a filename for logging the events, the events are logged in the file `/var/log/commitd` by default.

files *number* Maximum number of trace files.

flag *flag* Tracing operation to perform. To specify more than one tracing operation, include multiple `flag` statements. You can include the following flags:

- `all`—All tracing operations flags.
- `debug`—Trace operations for debug events.
- `ephemeral-commit`—Trace operations for ephemeral database commit synchronize events.
- `operational-command`—Trace operations for operational command events.

microsecond-stamp Include microsecond in the timestamp.

no-remote-trace Disable remote tracing.

size Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB).

world-readable | no-world-readable Grant all users permission to read archived log files, or restrict the permission only to the root user and users who have the Junos OS maintenance permission.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 16.1R3 and Junos OS Evolved Release 22.1R1.

RELATED DOCUMENTATION

commit (System) | 610

configuration-servers

IN THIS SECTION

Syntax

```
configuration-servers {
    url {
        password password;
```

```
    }
}
```

Hierarchy Level

```
[edit system autoinstallation]
```

Description

Configure the URL address of a server from which the configuration files must be obtained.

You can download a configuration file automatically from an FTP, Hypertext Transfer Protocol (HTTP), or Trivial FTP (TFTP) servers. Examples of URLs:

- tftp://hostname/path/filename
- ftp://username:password@ftp.hostname.net
- http://hostname/path/filename
- http://usenamer:password@httpconfig.sp.com

Options

- `url`—Specify the URL address of the server containing the configuration files.
- *password*—Specify the password for authentication with the configuration server. Specifying a password in URLs and in the *password* option might result in commit failure. We recommend you to use the *password* option for specifying the password.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Example: Configuring Autoinstallation on SRX Series Devices | 555

delete-after-commit (JNU Satellites)

IN THIS SECTION

Syntax

```
delete-after-commit;
```

Hierarchy Level

```
[edit system autoinstallation]
```

Description

Specify that during the subsequent commit operation of configuration settings (after the autoinstallation process successfully retrieves, installs, and commits the configuration), the autoinstallation configuration parameters be removed from the router. Removal of the autoinstallation parameters and statements from the committed configuration on the router ensures that the router does not attempt to perform an autoinstallation process when it is powered on the next time. Although you can optionally specify the interfaces to perform autoinstallation or configuration servers from which the files are to be downloaded, you must include the `delete-after-commit` statement to prevent the router from entering a recursive loop and repeatedly performing an autoinstallation every time it is powered on.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 13.3.

RELATED DOCUMENTATION

- Autoinstallation of Satellite Devices in a Junos Node Unifier Group
- Autoinstallation Process on Satellite Devices in a Junos Node Unifier Group
- Configuring Autoinstallation on JNU Satellite Devices | **564**
- Verifying Autoinstallation on JNU Satellite Devices | **566**
- autoinstallation (JNU Satellite Devices) | **606**

file (App Engine Virtual Machine Management Service)

IN THIS SECTION

Syntax

```
file {filename <files number> | match | no-world-readable | size size | world-readable
}
```

Hierarchy Level

```
[edit system processes app-engine-virtual-machine-management-service traceoptions]
```

Description

Trace file information for the Virtual Machine Management Daemon (vmmd), which communicates with the host OS.

Options

filename Name of the file in which the trace information is stored. By default, the file is created in the **/var/log** directory.

files ***number*** (Optional) Maximum number of trace files. When a trace file reaches the size specified by the `size` option, the filename is appended with 0 and compressed. For example, when a trace file named trace-file-log reaches size *size*, it is compressed and renamed as trace-file-log.0.gz. When trace-file-log reaches size *size* for the second time, trace-file-log.0.gz is renamed as trace-file-log.1.gz and trace-file-log is compressed and renamed as trace-file-log.0.gz. This renaming sheme ensures that the older logs have a greater index number. When number of trace files reaches *number*, the oldest file is deleted.

If you specify a maximum number of files, you also must specify a maximum file size with the `size` option and a filename.

- **Range:** 2 through 1000
- **Default:** 10

match Refine the output to include only those lines that match the given regular expression.

no-world-readable Restrict file access to the user who created the trace files.

size*size* Maximum size of each trace file . By default, the number entered is treated as bytes. Alternatively, you can include a suffix to the number to indicate kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you also must specify a maximum number of trace files with the files option.

- **Range:** 10 KB through 1 GB
- **Default:** 128 KB

world-readable Enable unrestricted file access.

Required Privilege Level

system-control

Release Information

Statement introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

traceoptions (App Engine Virtual Machine Management Service) | 633
level (App Engine Virtual Machine Management Service) | 626
flag (App Engine Virtual Machine Management Service) | 621

flag (App Engine Virtual Machine Management Service)

IN THIS SECTION

Syntax

```
flag (all |ccif | configuration | heartbeat | init | miscellaneous | platform | pxe | routing-
instances | snmp)
```

Hierarchy Level

```
[edit system processes app-engine-virtual-machine-management-service traceoptions]
```

Description

Perform different tracing operations. To specify more than one tracing operation, include multiple `flag` statements.

Default

Tracing operations are not performed.

Options

all	Trace all events.
ccif	Trace compute node interface events. This is the default option.
configuration	Trace configuration events.
heartbeat	Trace compute node heartbeat-related events.
init	Trace initialization events.
miscellaneous	Trace miscellaneous events.

`platform`	Trace platform-related events.
`pxe`	Trace events related to Preboot Execution Environment (PXE).
`routing-instances`	Trace events related to routing instances.
`snmp`	Trace SNMP events.

Required Privilege Level

system-control

Release Information

Statement introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

traceoptions (App Engine Virtual Machine Management Service) | 633
file (App Engine Virtual Machine Management Service) | 619
level (App Engine Virtual Machine Management Service) | 626

interfaces (Autoinstallation)

IN THIS SECTION

Syntax

```
interfaces {
    interface-name {
        bootp;
        rarp;
    }
}
```

Hierarchy Level

```
[edit system autoinstallation]
```

Description

Configure the interface on which to perform autoinstallation. A request for an IP address is sent from the interface. Specify the IP address procurement protocol.

NOTE: When you run the `system autoinstallation` command, the command will configure unit 0 logical interface for all the active state physical interfaces. However, few commands like `fabric-options` do not allow its physical interface to be configured with a logical interface. If the `system`

autoinstallation and the fabric-options commands are configured together the following message is displayed incompatible with 'system autoinstallation'.

Options

- bootp—Enables BOOTP or DHCP during autoinstallation.
- rarp—Enables RARP during autoinstallation.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Autoinstallation Overview

Example: Configuring Autoinstallation on SRX Series Devices | 555

level (App Engine Virtual Machine Management Service)

IN THIS SECTION

Syntax

```
level (all | error| info | notice | verbose | warning)
```

Hierarchy Level

```
[edit system processes app-engine-virtual-machine-management-service traceoptions]
```

Description

Set level of debugging output.

Default

info

Options

`all`	Match all levels.
`error`	Match error conditions.
`info`	Match informational messages.
`notice`	Match conditions that must be handled specially.
`verbose`	Match verbose messages.
`warning`	Match warning messages.

Required Privilege Level

system-control

Release Information

Statement introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

traceoptions (App Engine Virtual Machine Management Service) | 633

flag (App Engine Virtual Machine Management Service) | 621

file (App Engine Virtual Machine Management Service) | 619

license

IN THIS SECTION

Syntax

```
license {
    autoupdate {
        url url <password password>;
    }
    keys {
        key key
    }
    renew {
        before-expiration number;
        interval interval-hours;
    }
    traceoptions {
         file {
            filename;
            files number;
            match regular-expression;
            size maximum-file-size;
            (world-readable | no-world-readable);
        }
        flag flag;
        no-remote-trace;
```

```
    }
}
```

Hierarchy Level

```
[edit system]
```

Description

Specify license information for the device.

Options

autoupdate — Autoupdate license keys from license servers.

before-expiration *number* — License renewal lead time before expiration, in days.

- **Range:** 0 through 60 days

interval *interval-hours* — License checking interval, in hours.

- **Range:** 1 through 336 hours

keys key *key* — Configure one or more license keys. For example,

```
[edit]
user@device# set system license keys key "key_1"
user@device# set system license keys key "key_2"
user@device# set system license keys key "key_3"
user@device# set system license keys key "key_4"
user@device# commit
commit complete
```

renew — License renewal lead time and checking interval.

`url`	URL of a license server.

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 8.5.

Options keys introduced in Junos OS Release 14.1X53-D10.

nextboot

IN THIS SECTION

Syntax

```
nextboot {
    media-device;
}
```

Hierarchy Level

```
[edit]
```

Description

You can use the `nextboot` function to check the current bootup device. This function lists the available boot device choice for the media devices and current settings.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 20.3R1.

RELATED DOCUMENTATION

Veriexec Overview | 332

notification (Commit)

IN THIS SECTION

Syntax

```
notification;
```

Hierarchy Level

```
[edit system commit]
```

Description

Notify applications upon commit completion.

Options

There are no options for this configuration statement.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 16.1R3.

RELATED DOCUMENTATION

commit (System) | 610

traceoptions (App Engine Virtual Machine Management Service)

IN THIS SECTION

Syntax

```
traceoptions {
    file filename <files number> | match | no-world-readable |<size size> <world-readable >;
    flag (all |ccif | configuration | heartbeat | init | miscellaneous | platform | pxe |
routing-instances | snmp);
    level (all | error| info | notice | verbose | warning)
}
```

Hierarchy Level

```
[edit system processes app-engine-virtual-machine-management-service]
```

Description

Enable traceoptions for the app-engine virtual machine management service system process.

Default

Traceoptions are not enabled.

Options

file	Trace file information.
flag	Perform defined tracing operation.
level	Set traceoptions level.
no-remote-trace	Disable remote tracing.

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

system-control

Release Information

Statement introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

processes
level (App Engine Virtual Machine Management Service) | 626
flag (App Engine Virtual Machine Management Service) | 621
file (App Engine Virtual Machine Management Service) | 619

traceoptions (System License)

IN THIS SECTION

Syntax

```
traceoptions {
    file {
        filename;
        files number;
        match regular-expression;
        size maximum-file-size;
        (world-readable | no-world-readable);
    }
    flag flag;
    no-remote-trace;
}
```

Hierarchy Level

```
[edit system license]
```

Description

Set trace options for licenses.

Options

file Configure the trace file information.

filename — Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory **/var/log**. By default, the name of the file is the name of the process being traced.

files *number* — Maximum number of trace files. When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum number of files, you also must specify a maximum file size with the `size` *maximum file-size* option.

- **Range:** 2 through 1000 files
- **Default:** 10 files

match *regular-expression* — Refine the output to include lines that contain the regular expression.

size *size* — Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you also must specify a maximum number of trace files with the `files` *number* option.

- **Range:** 10 KB through 1 GB
- **Default:** 128 KB

world-readable | no-world-readable — By default, log files can be accessed only by the user who configures the tracing operation. The `world-readable` option enables any user to read the file. To explicitly set the default behavior, use the `no-world-readable` option.

flag *flag* — Specify which tracing operation to perform. To specify more than one tracing operation, include multiple `flag` statements. You can include the following flags.

- `all`—Trace all operations.
- `config`—Trace license configuration processing.
- `events`—Trace licensing events and their processing.

no-remote-trace — Disable the remote tracing.

Required Privilege Level

trace—To view this statement in the configuration.

trace-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 8.5.

usb

IN THIS SECTION

Syntax

```
usb {
    disable;
}
```

Hierarchy Level

```
[edit system autoinstallation]
```

Description

Disable the USB autoinstallation process.

Options

`disable`—Disable the process.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 7.4.

RELATED DOCUMENTATION

Example: Configuring Autoinstallation on SRX Series Devices | 555

vmhost

IN THIS SECTION

Syntax

```
vmhost {
    interfaces  name {
        family {
            (inet | inet6) {
                address name {
                    master-only;
                }
                gateway gateway;
            }
        }
    }
    management-if {
        disable;
        link-mode (automatic | full-duplex | half-duplex);
        speed (100m | 10m | 1g | automatic);
    }
    no-auto-recovery;
    resize {
        vjunos {
            compact;
        }
    }
```

```
    services {
        ssh {
            root-login (allow | deny);
        }
    }
    syslog {
        file name {
            vmhost-syslog-object (any | authorization | cron | daemon | kernel | local0 | local1
| local2 | local3 | local4 | local5 | local6 | local7 | lpr | mail | mark | news | privileged |
syslog | user | uucp) {
                                        level;
            }
        }
        host name {
            transport (tcp | udp);
            vmhost-syslog-object (any | authorization | cron | daemon | kernel | local0 | local1
| local2 | local3 | local4 | local5 | local6 | local7 | lpr | mail | mark | news | privileged |
syslog | user | uucp) {
                level;
            }
        }
    }
}
```

Hierarchy Level

```
[edit]
```

Description

Configure VM host management properties. Set values in the `edit vmhost` hierarchy of the configuration.

Options

interfaces Configure interface properties of the host.

- management-if0 | management-if1—Configure the host's side management interface0 or interface1.

  family (inet|inet6) address— Configure IPv4 or IPv6 parameters.

  primary-only— Configure the IP address to be used when the Routing Engine is the current primary. The configured IP address is assigned to primary RE host when the Routing Engine is the current primary. It is recommended to set this option for platforms with dual Routing Engine architecture with VM host support.

  gateway— Configure gateway IP address.

management-if Configure management interface properties of the host.

- disable—Disable the host interface eth0, which serves as the management port
- link-mode (automatic | half-duplex | full-duplex)—Configure the link mode of the host interface eth0, which serves as the management port as half-duplex or full-duplex. You can also manually select the link mode option as either half-duplex or full-duplex.
- speed (automatic | 10m | 100m | 1g)—Configure the link speed of the host interface eth0, which serves as the management port. If you set the link speed as 10m or 100m, autonegotiation is turned off and the link speed is the speed that you specify.

no-auto-recovery Disable the automatic guest recovery by the host.

services Enable ssh access to the host and enable or disable root-login to the host from guest.

- ssh—Allow ssh access

  root-login—Configure host root access through ssh

  allow | deny—Allow or deny root access through ssh.

syslog Enable the remote syslog configuration from guest to host OS. Based on the severity configured on guest, the syslog information is logged onto the **/etc/syslog.conf** file on the host.

- host <host-name>—Host notified for remote syslog configuration.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

Routing Engines with VM Host Support | 342

Disabling Autorecovery on Routing Engines with VM Host Support | 381

vmhost management-if disable

IN THIS SECTION

Syntax

```
vmhost management-if disable
```

Hierarchy Level

```
[edit vmhost]
```

Description

Disable the host interface eth0, which serves as the management port. You can the disable the interface if there are any issues associated with security or any hardware failures either at the local end or the remote end of the interface. if you disable the interface, the transmitter is turned off and the link partner experiences a link-down condition.

Default

The host interface eth0 which serves as the management port is enabled.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 15.1F6.

NOTE: The command is supported on the routers with RE-MX-X6, RE-MX-X8, and RE-PTX-X8 Routing Engines only.

RELATED DOCUMENTATION

vmhost | 640
vmhost management-if speed | 647
vmhost management-if link-mode | 645
show vmhost management-if | 943

vmhost management-if link-mode

IN THIS SECTION

Syntax

```
vmhost management-if link-mode (automatic | half-duplex | full-duplex)
```

Hierarchy Level

```
[edit vmhost]
```

Description

Configure the link mode of the host interface eth0, which serves as the management port as half-duplex or full-duplex. You can also manually select the link mode option as either half-duplex or full-duplex.

Default

The link partners auto-negotiate the speed and duplex link mode and select the highest common capability.

Options

automatic Autonegotiate the link mode of the management interface. if you set the link mode to `automatic`, you must also set the link speed to `automatic`.

half-duplex Set the link mode of the management interface to half-duplex.

full-duplex Set the link mode of the management interface to full-duplex.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 15.1F6.

NOTE: The command is supported on the routers with RE-MX-X6, RE-MX-X8, and RE-PTX-X8 Routing Engines only.

RELATED DOCUMENTATION

- vmhost | 640
- vmhost management-if disable | 643
- vmhost management-if speed | 647
- show vmhost management-if | 943

vmhost management-if speed

IN THIS SECTION

Syntax

```
vmhost management-if speed { automatic | 10m | 100m | 1g }
```

Hierarchy Level

```
[edit vmhost]
```

Description

Configure the link speed of the host interface eth0, which serves as the management port. If you set the link speed as `10m` or `100m`, autonegotiation is turned off and the link speed is the speed that you specify.

Default

The link partners auto-negotiate the speed and duplex link mode and select the highest common capability.

Options

automatic Autonegotiate the link speed of the management interface. If you set the link speed as `automatic`, speed and link mode are auto-negotiated with the link partner.

10m Set the link speed of the management interface to 10Mbps.

100m Set the link speed of the management interface to 100Mbps

1g Set the link speed of the management interface to 1Gbps. If you set link speed to `1Gbps`, autonegotiation is enabled. However, the interface advertises only 1Gbps speed and full-duplex mode.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 15.1F6.

NOTE: The command is supported on the routers with RE-MX-X6, RE-MX-X8, and RE-PTX-X8 Routing Engines only.

RELATED DOCUMENTATION

- vmhost | 640
- vmhost management-if disable | 643
- vmhost management-if link-mode | 645
- show vmhost management-if | 943

upgrade-mode

IN THIS SECTION

Syntax

```
upgrade-mode (3d-fabric | default | t4000);
```

Hierarchy Level

```
[edit chassis fabric],
[edit chassis member name fabric]
```

Description

Configures upgrade mode for SIBs and forces them to operate in the same mode until the upgrade is complete. Upgrade mode is used so that two different types of SIBs can be installed in an operational router or routing matrix. After you upgrade the SIBs delete the `upgrade-mode` statement from the configuration. See the hardware installation guide for your router for more information about upgrading SIBs in an operational router or routing matrix.

Options

3d-fabric Enables the TX Matrix Plus router to upgrade to a TX Matrix Plus router with 3D SIBs. On the SFC, enables setting proper support for mixed SIBs (TXP-F13 SIB and TXP-F13-3D SIB). On the T640 or T1600 or T4000 routers in a routing matrix enables support for mixed SIBs (TXP-T1600 SIB and TXP-3D-LCC SIBs on the T1600 router and SIB-I-T4000 and TXP-3D-LCC SIBs on the T4000 router).

default Enables support for mixed SIBs when upgrading SIBs in the PTX3000 and PTX5000 routers.

t4000 Enables support for mixed SIBs when upgrading to SIB-I-T4000 SIBs in a T640 or T1600.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 7.5.

RELATED DOCUMENTATION

- TX Matrix Router and T640 Router Configuration Overview
- Configuring Junos OS to Upgrade a T4000 Router to LCC 0 of a TX Matrix Plus Router with 3D SIBs
- Configuring Junos OS to Upgrade the T1600 Router Chassis to LCC 0 of a TX Matrix Plus Router with 3D SIBs
- Upgrading an Operational Standalone Router and Integrating It into a TX Matrix Plus Routing Matrix with 3D SIBs
- Upgrading to SIB3-SFF-PTX SIBs in an Operational PTX3000
- Upgrading the FPCs in an Operational PTX5000

14

CHAPTER

Operational Commands

clear system login lockout

IN THIS SECTION

Syntax

```
clear system login lockout
<all>
<user username>
```

Description

Use this command to unlock the locked user account.

Options

all	Clear all locked user accounts.
user *username*	Clear the specified locked user account.

Required Privilege Level

clear

Output Fields

This command produces no output.

Release Information

Command introduced in Junos OS Release 11.2.

RELATED DOCUMENTATION

retry-options

show system login lockout | 855

request app-engine cleanup

IN THIS SECTION

Syntax

```
request app-engine cleanup
<compute-cluster compute-cluster-name>
<compute-cluster compute-cluster-name compute-node compute-node-name>
```

Description

Cleans up temporary files on the Junos V App Engine or the host OS of QFX Series switches. This command deletes all files from the directories where temporary files are normally stored, such as /var/tmp and /var/log.

Be sure to collect any temporary files and logs you want to save before running this command.

Options

- `compute-cluster` *compute-cluster-name* `compute-node` *compute-node-name*—Name of the compute cluster and name of the compute node. On QFX Series switches, the default names of the compute cluster and compute node are default-cluster and default-node, which applies to the host OS.

Required Privilege Level

view

Output Fields

For a description of the output fields, see Table 34 on page 658. Output fields are listed in the approximate order in which they appear.

Table 34: request app-engine cleanup Output Fields

Field Name	Field Description
`Compute Cluster`	Name of compute cluster.
`Compute Node`	Name of compute node.
`Cleanup`	Lists the directories that were cleaned up.

Sample Output

request app-engine cleanup (QFX 5100 Switches)

```
user@host> request app-engine cleanup
user@host> request app-engine cleanup
Compute cluster: default-cluster

  Compute node: default-node

   Cleanup (/var/tmp)
   =======
```

Release Information

Command introduced in Junos OS Release 13.1X51-D10.

RELATED DOCUMENTATION

show app-engine crash | 824

show app-engine logs | 827

request app-engine file-copy (crash | log) from-jhost to-vjunos

IN THIS SECTION

Syntax

```
request app-engine file-copy (crash | log)
from-jhost host-os-filename
to-vjunos vjunos-filename
```

Description

In Junos OS environments with a host OS, copies core files (`crash` option) or system log files (`log` option) from the host OS to a Junos OS filename.

- `crash` option—Core files are copied from the directory where the host OS normally stores core files. For example, when the host OS is Linux, the source directory is **/var/crash**. The `show app-engine crash` command displays the list of core files available to copy from the host OS source directory.
- `log` option—Log files are copied from the directory where the host OS normally stores system log files. For example, when the host OS is Linux, the source directory is **/var/log**. The `show app-engine logs` command displays the list of system log files available to copy from the host OS source directory.

Either the `crash` or `log` option is required. When the destination Junos OS path for the `to-vjunos` argument is a directory, the destination filename is the source filename by default. To rename the file at the destination, specify a full path that includes a destination filename in the path with the `to-vjunos` argument.

Options

- `from-jhost` *host-os-filename*—Source filename to copy from the host OS.
- `to-vjunos` *vjunos-filename*—Junos OS destination path (with or without a filename) to which the file is copied. If this path is a directory, the source filename is used as the destination filename by default.

Additional Information

This command does not apply to accessing files on guest virtual machines (VMs) on QFX Series devices that support guest VMs.

Required Privilege Level

view

Output Fields

This command produces no output. To see the results of the copy operation, you can run Junos OS commands for viewing files, such as `file list` with the destination directory, `show system core-dumps`, or `show log`.

Sample Output

request app-engine file-copy crash

```
user@host> request app-engine file-copy crash from-jhost
localhost.dcfpe.6449.1454328456.core.tgz to-junos /var/tmp

user@host> show system core-dumps
re0:
--------------------------------------------------------------------------
-rw-r--r--  1 user  test    2538949 Feb 2  19:01 /var/tmp/
localhost.dcpfe.6449.1454328456.core.tgz
total files: 1
```

Release Information

Command introduced in Junos OS Release 13.1X51-D10.

RELATED DOCUMENTATION

- show app-engine crash | 824
- show app-engine logs | 827
- request app-engine cleanup | 656

request system autorecovery state

IN THIS SECTION

Syntax

```
request system autorecovery state  (save | recover | clear)
```

Description

Use this command to prepare the system for autorecovery of configuration, licenses, and disk information.

In devices running FreeBSD Release 12 or later, you cannot back up data with the autorecovery feature. Instead, back up data using snapshots. To learn if your device is running FreeBSD Release 12 or later, issue the `show version` command and look for the `fbsd_builder_stable` string in the module names. If the string includes the number 12 or later, your device is running FreeBSD Release 12 or later.

Options

save Save the current state of the disk partitioning, configuration, and licenses for autorecovery.

The active Junos OS configuration is saved as the Junos rescue configuration, after which the rescue configuration, licenses, and disk partitioning information is saved for autorecovery. Autorecovery information must be initially saved using this command for the autorecovery feature to verify integrity of data on every bootup.

Any recovery performed at a later stage will restore the data to the same state as it was when the save command was executed.

A fresh rescue configuration is generated when the command is executed. Any existing rescue configuration will be overwritten.

recover Recover the disk partitioning, configuration, and licenses.

After autorecovery data has been saved, the integrity of saved items is always checked automatically on every bootup. The recovery command allows you to forcibly re-run the tests at any time if required.

clear Clear all saved autorecovery information.

Only the autorecovery information is deleted; the original copies of the data used by the router are not affected. Clearing the autorecovery information also disables all autorecovery integrity checks performed during bootup.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system autorecovery state save

```
user@host> request system autorecovery state save
Saving config recovery information
      Saving license recovery information
      Saving bsdlabel recovery information
```

Sample Output

request system autorecovery state recover

```
user@host> request system autorecovery state recover

Configuration:
File             Recovery Information    Integrity Check    Action / Status
rescue.conf.gz   Saved                   Passed             None
Licenses:
File             Recovery Information    Integrity Check    Action / Status
JUNOS282736.lic  Saved                   Passed             None
JUNOS282737.lic  Saved                   Failed             Recovered
BSD Labels:
Slice            Recovery Information    Integrity Check    Action / Status
s1               Saved                   Passed             None
s2               Saved                   Passed             None
s3               Saved                   Passed             None
s4               Saved                   Passed             None
```

Sample Output

request system autorecovery state clear

```
user@host> request system autorecovery state clear
Clearing config recovery information
       Clearing license recovery information
       Clearing bsdlabel recovery information
```

Release Information

Command introduced in Junos OS Release 15.1X49-D35.

RELATED DOCUMENTATION

show system autorecovery state | 835

request system configuration rescue delete

IN THIS SECTION

Syntax

```
request system configuration rescue delete
```

Description

Delete an existing rescue configuration.

NOTE: The `[edit system configuration]` hierarchy is not available on QFabric systems.

Options

This command has no options.

Required Privilege Level

maintenance

Output Fields

This command produces no output.

Sample Output

request system configuration rescue delete

```
user@host> request system configuration rescue delete
```

Release Information

Command introduced before Junos OS Release 7.4.

Command introduced in Junos OS Evolved Release 20.4R2.

request system configuration rescue save

IN THIS SECTION

Syntax

```
request system configuration rescue save
```

Description

Save the most recently committed configuration as the rescue configuration so that you can return to it at any time by using the `rollback` command. If saved on a device with redundant Routing Engines, the rescue configuration file is saved on both Routing Engines.

NOTE: The `[edit system configuration]` hierarchy is not available on QFabric systems.

Options

This command has no options.

Required Privilege Level

maintenance

Output Fields

This command produces no output.

Sample Output

request system configuration rescue save

```
user@host> request system configuration rescue save
```

Release Information

Command introduced before Junos OS Release 7.4.

Command introduced in Junos OS Evolved Release 20.4R2.

request system download abort

IN THIS SECTION

Syntax

```
request system download abort <download-id>
```

Description

Use this command to terminate a download. The download instance is stopped and cannot be resumed. Any partially downloaded file is automatically deleted to free disk space. Information regarding the download is retained and can be displayed with the `show system download` command until a `request system download clear` operation is performed.

Downloads in the active, paused, and error states can be terminated.

Options

`download-id`—(Required) The ID number of the download to be terminated.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system download abort

```
user@host> request system download abort 1
Aborted download #1
```

Release Information

Command introduced in Junos OS Release 15.1X49-D35.

RELATED DOCUMENTATION

request system download start | 676
request system download pause | 672
request system download resume | 674
request system download clear | 670

request system download clear

IN THIS SECTION

Syntax

```
request system download clear
```

Description

Use this command to delete the history of completed and aborted downloads.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system download clear

```
user@host> request system download clear
Cleared information on completed and aborted downloads
```

Release Information

Command introduced in Junos OS Release 15.1X49-D35.

RELATED DOCUMENTATION

request system download start | 676
request system download pause | 672
request system download resume | 674
request system download abort | 668

request system download pause

IN THIS SECTION

Syntax

```
request system download pause <download-id>
```

Description

Use this command to suspend a particular download instance. Downloads in the active state can be paused.

Options

`download-id`—(Required) The ID number of the download to be paused.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system download pause

```
user@host> request system download pause 1
Paused download #1
```

Release Information

Command introduced in Junos OS Release 15.1X49-D35.

RELATED DOCUMENTATION

request system download start | 676
request system download resume | 674
request system download abort | 668
request system download clear | 670

request system download resume

IN THIS SECTION

Syntax

```
request system download resume download-id <max-rate>
```

Description

Use this command to resume a download that has been paused. You can resume the downloaded instances that are not in progress because of an error or that have been explicitly paused. The file will continue downloading from the point where it paused. By default, the download resumes with the same bandwidth specified with the `request system download start` command. You can specify a new (maximum) bandwidth with the `request system download resume` command.

Downloads in the paused and error states can be resumed.

Options

`download-id`—(Required) The ID number of the download to be resumed.

max-rate—(Optional) The maximum bandwidth for the download.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system download resume

```
user@host> request system download resume 1
Resumed download #1
```

Release Information

Command introduced in Junos OS Release 15.1X49-D35.

RELATED DOCUMENTATION

request system download start | 676
request system download pause | 672
request system download abort | 668
request system download clear | 670

request system download start

IN THIS SECTION

Syntax

```
request system download start  (sftp-url | delay | identity-file | login | max-rate | passphrase
| save as )
```

Description

Use this command to create a download instance and identify it with a unique integer called the download ID.

Options

`sftp-url`—(Required) The FTP or HTTP URL location of the file to be downloaded securely.

`delay`—(Optional) The number of hours after which the download should start. Ranges from 1 through 48 hours.

identity-file—(Required) The name of the file requesting a Secure FTP (SFTP) download. The SFTP in smart download leverages public key authentication to authenticate a download request. You must generate a private or public key pair before starting a download, and then upload a public key to an SFTP server.

login—(Optional) The username and password for the server in the format username:password.

max-rate—(Optional) The maximum average bandwidth for the download. Numbers with the suffix k or K, m or M, and g or G are interpreted as Kbps, Mbps, or Gbps, respectively.

passphrase—(Required) The passphrase to protect the private key file stored on the file system. This option does not allow the user to enter a weak passphrase, which ensures stronger security.

save-as—(Optional) The filename to be used for saving the file in the **/var/tmp** location.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system download start

```
user@host> request system download start identity-file mytestkey sftp://mysftpserver/homes/kelly/
test.tgz max-rate 200 save as newfile.tgz
Starting download #8
```

Release Information

Command introduced in Junos OS Release 15.1X49-D35.

RELATED DOCUMENTATION

request system download pause | 672

request system download resume | 674

request system download abort | 668

request system download clear | 670

request system firmware upgrade

IN THIS SECTION

Syntax

```
request system firmware upgrade

<bios <progress>>
<cpld cpu <progress>>
<cpld sys <progress>>
<cb <(fancpld | optics)>>
<eusb <progress>>
<fpc <(bcm-pfe | slot slot-number)>>
<fpm>
<ftc slot (0 | 1)>
<mmc <progress>>
<pem slot slot-number mcu (primary |secondary)>
```

```
<poe fpc-slot slot-number>
<poe file jfirmware filename fpc-slot (number | all-numbers) <poe-at-firmware|poe-bt-firmware>
<psm <slot slot-number>>
<re <(bios | fpga | i210 | i40nvm | ssd (disk1 | disk2) | xmcfpga)>>
<sfb slot slot-number tag tag-number>
<uboot <progress>>
<vcpu>
```

Description

Use this command to upgrade firmware and optics module on a system running either Junos OS or Junos OS Evolved.

Options

bios (EX4400 and EX4100) Upgrade BIOS.

- `progress`—(Optional) Check the progress of BIOS upgrade.

cpld cpu (EX4400) Upgrade CPU CPLD.

- `progress`—(Optional) Check the progress of CPU CPLD upgrade.

cpld sys (Ex4400 and EX4100) Upgrade system CPLD.

- `progress`—(Optional) Check the progress of system CPLD upgrade.

cb (ACX7100 Series routers, MX10004, and MX10008 routers) Upgrade baseboard FPGA.

- `fancpld`—(Optional) Upgrade fanboard CPLD.
- `optics`—(Optional) Upgrade optics CPLD.

eusb (EX4100) Upgrade eUSB firmware.

- `progress`—(Optional) Check the progress of eUSB firmware upgrade.

fpc Upgrade FPC ROM monitor.

- bcm-pfe—(Optional) Upgrade BCM PFE chip.
- slot *slot-number*—(Optional) Upgrade all devices in a particular FPC slot.

  After you upgrade the firmware on the LC9600 line card, the line card may go offline. If this happens, use the request chassis fpc *slot-number* restart command to restart the line card.

fpm (MX10004 and MX100008 routers) Upgrade front panel module firmware.

ftc slot (0 | 1) (MX10004 and MX10008 routers) Upgrade fan tray controller firmware.

mmc (EX4400) Upgrade the eMMC firmware.

- progress—(Optional) Check the progress of eMMC upgrade.

poe file *<jfirmware filename>* fpc-slot *(number | all-numbers)* <poe-at-firmware | poe-bt-firmware> (EX4400 and EX4100) Upgrade the PoE controller firmware for the Virtual Chassis member or line card specified by number, or for all Virtual Chassis members and line cards, specified by all-members.

- poe-at-firmware—(EX4300-48MP switches only) Rollback the PoE firmware to IEEE 802.3at (PoE-at).
- poe-bt-firmware—(EX4300-48MP switches only) Upgrade the PoE firmware to IEEE 802.3bt (PoE-bt).

pic (Junos OS only) Upgrade PIC firmware.

pem slot *slot-number* mcu (primary | secondary) (Junos OS only—PTX10008, PTX10016, QFX10008, QFX10016, MX10004, MX10008, MX10016, and MX304 devices) Upgrade PEM firmware. The mcu option upgrades the firmware on one micro controller unit at a time, applies only to the MX304 router, and is required for the MX304 PEM firmware upgrade.

poe fpc-slot *slot-number* Upgrade Power over Ethernet (PoE) firmware.

psm Upgrade power supply module firmware.

- slot *slot-number*—(Optional) Upgrade a particular power supply module.

re Upgrade baseboard BIOS/FPGA. There is an active BIOS image and a backup BIOS image.

- bios—(Optional) Upgrade BIOS.
- fpga—(Optional) Upgrade baseboard FPGA.

- i210—(Optional) Upgrade baseboard i210 GbE NIC.
- i40nvm—(Optional) Upgrade baseboard i40.

  Starting in Junos OS Release 19.3R1, you can upgrade the i40e NVM firmware on routers with VM Host support.
- ssd—(Optional) Upgrade Routing Engine solid-state drive (SSD) firmware.
  - disk1—Upgrade SSD disk1 firmware.
  - disk2—Upgrade SSD disk2 firmware.

  Starting in Junos OS Release 17.2R1, you can upgrade the SSD firmware on routers with the VM Host support.
- xmcfpga—(Optional) Upgrade XMC FPGA.

sfb slot *slot-number* tag *tag-number*

(MX10004 and MX10008 routers) Upgrade the SF2 and SFB2 switch fabric firmware. *slot-number* can be 0 to 5. For tag *tag-number* option, specify the tag number that indicates you want to update the FPGA. To find out what number you should use for the tag option, issue the show system firmware command. For example, on the MX10004 router, the show system firmware command shows the tag numbers in the third column as follows:

```
user@host> show system firmware
Part           Type             Tag  Current             Available
Status
                                       version              version
[output truncated]
...
SFB 0          FPGA PRIM         0   0.13.0               0.13.0
OK
SFB 1          FPGA PRIM         0   0.13.0               0.13.0
OK
SFB 2          FPGA PRIM         0   0.13.0               0.13.0
OK
SFB 3          FPGA PRIM         0   0.13.0               0.13.0
OK
SFB 4          FPGA PRIM         0   0.13.0               0.13.0
OK
SFB 5          FPGA PRIM         0   0.13.0               0.13.0
OK
```

```
...
[output truncated]
```

After you upgrade the firmware on the SFB, you must take the SFB offline by using the `request chassis sfb slot` *`slot-number`* `offline` command. Once the SFB is offline, bring the SFB back online and make the new firmware take effect by using the `request chassis sfb slot` *`slot-number`* `online-reload` command.

uboot <progress> (EX4100) Upgrade the U-boot firmware.

- `progress`—(Optional) Check the progress of U-boot upgrade.

vcpu Upgrade VCPU ROM monitor.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system firmware upgrade

```
user@host> request system firmware upgrade re bios
Part             Type           Tag Current   Available Status
                                    version   version
Routing Engine 0 RE BIOS        0   1.5       1.9       OK
Routing Engine 0 RE BIOS Backup 1   1.7       1.9       OK
Perform indicated firmware upgrade ? [yes,no] (no) yes
user@host> request system firmware upgrade re bios backup
Part             Type           Tag Current   Available Status
                                    version   version
```

```
Routing Engine 0 RE BIOS        0   1.5       1.9       OK
Routing Engine 0 RE BIOS Backup 1   1.7       1.9       OK
Perform indicated firmware upgrade ? [yes,no] (no) yes

user@host> request system firmware upgrade re ssd disk1
Part    Type    Tag                   Current   Available       Status
                                     version   version
Routing Engine   0 RE SSD1    4      12028     12029        OK
Perform indicated firmware upgrade ? [yes,no] (no) yes

Firmware upgrade initiated, use "show system firmware"  to monitor status.

user@host> request system firmware upgrade pem slot 0
...
...
Firmware upgrade initiated, use "show system firmware"  to monitor status.

user@host> request system firmware upgrade optics fpc-slot 0
...
...
Firmware optics upgrade initiated, use "show system firmware"  to monitor status.
```

request system firmware upgrade fpc slot

```
user@host> request system firmware upgrade fpc slot 0
...
...
FPC may go offline after the upgrade, Please restart FPC post upgrade.

“request chassis fpc <slot> restart” command can be used for restarting the fpc.
```

request system firmware upgrade sfb

```
user@host> request system firmware upgrade sfb slot 0 tag 0
...
...
"Firmware upgrade initiated, use "show system firmware" to monitor status. After upgrade, do
"request chassis sfb slot <slot> offline" and “request chassis sfb slot <slot> online-reload”
for new firmware to take effect.
```

Release Information

Command introduced in Junos OS Release 10.2.

`cb` option added in Junos OS Evolved Releases 21.1R2 and 21.2R1. Support for the MX10004 router added in Junos OS Release 22.3R1.

`pem` option introduced in Junos OS Release 21.2R1.

`sfb` option introduced in Junos OS Release 21.4R1 for the MX10008 router. Support for the MX10004 router added in Junos OS Release 22.3R1.

`mcu` option introduced in Junos OS Release 22.2R1-S1 and 22.3R1 for the MX304 router.

RELATED DOCUMENTATION

watchdog

request system halt

IN THIS SECTION

Syntax

```
request system halt
<at time>
<backup-routing-engine>
<both-routing-engines>
<other-routing-engine>
<in minutes>
<media (compact-flash | disk | removable-compact-flash | usb)>
<message "text">
```

Syntax (EX Series Switches)

```
request system halt
<all-members>
<at time>
<backup-routing-engine>
<both-routing-engines>
<in minutes>
<local>
<media (external | internal)>
<member member-id>
<message "text">
<other-routing-engine>
<slice slice>
```

Syntax (PTX Series)

```
request system halt
<at time>
<backup-routing-engine>
<both-routing-engines>
<other-routing-engine>
<in minutes>
<media (compact-flash | disk)>
<message "text">
```

Syntax (MX Series Router)

```
request system halt
<all-members>
<at time>
<backup-routing-engine>
<both-routing-engines>
<in minutes>
<local>
<media (external | internal)>
<member member-id>
<message "text">
<other-routing-engine>
```

Syntax (QFX Series)

```
request system halt
<all-members>
<at time>
<both-routing-engines>
<director-device director-device-id>
<in minutes>
<local>
<media >
```

```
<member member-id>
<message "text">
<other-routing-engine>
<slice slice>
```

Syntax (SRX Series)

```
request system halt
<at time>
<in minutes>
<media (compact-flash | disk | usb)>
<message "text">
```

Description

Stop the device software.

NOTE: When you issue this command on an individual component—for example, a Node device—in a QFabric system, you will receive a warning that says “Hardware-based members will halt, Virtual Junos Routing Engines will reboot.” If you want to halt only one member of a Node group, issue this command with the `member` option on the Node device CLI, because you cannot issue this command from the QFabric CLI. Also, issuing this command might cause traffic loss on an individual component.

When you issue this command on a QFX5100 switch, you are not prompted to reboot. You must power cycle the switch to reboot.

NOTE: For the routers with the Routing Engines RE-S-2x00x6, RE-PTX-2x00x8, and RE-S-2x00x8, this command is deprecated and might be removed completely in a future release.

On these routers, this command is replaced with the `request vmhost halt` command which provides similar functionality.

Options

none	Stop the router or switch software immediately.
all-members	(Optional) Halt all members of the Virtual Chassis configuration.
at *time*	(Optional) Time at which to stop the software, specified in one of the following ways: • `now`—Stop the software immediately. This is the default. • `+`*`minutes`*—Number of minutes from now to stop the software. • *`yymmddhhmm`*—Absolute time at which to stop the software, specified as year, month, day, hour, and minute. • *`hh:mm`*—Absolute time on the current day at which to stop the software.
backup-routing-engine	(Optional) Halt the backup Routing Engine. This command halts the backup Routing Engine, regardless from which Routing Engine the command is executed. For example, if you issue the command from the primary Routing Engine, the backup Routing Engine is halted. If you issue the command from the backup Routing Engine, the backup Routing Engine is halted.
both-routing-engines	(Optional) Halt both Routing Engines at the same time.
director-device *director-device-id*	(QFabric systems only) Halt a specific Director device.
local	(Optional) Halt the local Virtual Chassis member.
in *minutes*	(Optional) Number of minutes from now to stop the software. This option is an alias for the at +*minutes* option.
media (compact-flash /disk)	(Optional) Boot medium for the next boot.
media (external | internal)	(EX Series and QFX Series switches and MX Series routers only) (Optional) Halt the boot media: • `external`—Halt the external mass storage device. • `internal`—Halt the internal flash device.
media (compact-flash | disk | usb)	(SRX Series only) (Optional) Boot media for the next boot.

- `compact-flash`— Standard boot from a flash device.
- `disk`— Boot from a hard disk.
- `usb`— Boot from a USB device.

member *member-id* (Optional) Halt the specified member of the Virtual Chassis configuration. For an MX Series Virtual Chassis, *`member-id`* can only be 0 or 1.

message "*text*" (Optional) Message to display to all system users before stopping the software.

other-routing-engine (Optional) Halt the other Routing Engine from which the command is issued. For example, if you issue the command from the primary Routing Engine, the backup Routing Engine is halted. Similarly, if you issue the command from the backup Routing Engine, the primary Routing Engine is halted.

slice *slice* (EX Series and QFX Series switches only) (Optional) Halt a partition on the boot media. This option has the following suboptions:

- 1—Halt partition 1.
- 2—Halt partition 2.
- `alternate`—Reboot from the alternate partition.

Additional Information

On the M7i router, the `request system halt` command does not immediately power down the Packet Forwarding Engine. The power-down process can take as long as 5 minutes.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system halt

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

*** FINAL System shutdown message from root@section2 ***
System going down IMMEDIATELY
Terminated
...
syncing disks... 11 8 done
The operating system has halted.
Please press any key to reboot.
```

request system halt (SRX Series)

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

*** FINAL System shutdown message from user@host ***

System going down IMMEDIATELY


Shutdown NOW!
[pid 7560]

user@host> Dec  8 08:57:37 Waiting (max 60 seconds) for system process `vnlru' to stop...done
Waiting (max 60 seconds) for system process `vnlru_mem' to stop...done
Waiting (max 60 seconds) for system process `bufdaemon' to stop...done
Waiting (max 60 seconds) for system process `syncer' to stop...
Syncing disks, vnodes remaining...2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 done

syncing disks... All buffers synced.
Uptime: 2d16h25m9s
recorded reboot as normal shutdown
```

```
The operating system has halted.
Please press any key to reboot.
```

request system halt (In 2 Hours)

The following example, which assumes that the time is 5 PM (1700), illustrates three different ways to request that the system stop 2 hours from now:

```
user@host> request system halt at +120
user@host> request system halt in 120
user@host> request system halt at 19:00
```

request system halt (Immediately)

```
user@host> request system halt at now
```

request system halt (At 1:20 AM)

To stop the system at 1:20 AM, enter the following command. Because 1:20 AM is the next day, you must specify the absolute time.

```
user@host> request system halt at yymmdd120
request system halt at 120
Halt the system at 120? [yes,no] (no) yes
```

Release Information

Command introduced before Junos OS Release 7.4.

`other-routing-engine` option introduced in Junos OS Release 8.0.

`director-device` option introduced for QFabric systems in Junos OS Release 12.2.

`backup-routing-engine` option introduced in Junos OS Release 13.1.

RELATED DOCUMENTATION

- clear system reboot
- request system power-off
- request vmhost halt

request system partition compact-flash

IN THIS SECTION

Syntax

```
request system partition compact-flash
```

Description

Use this command to reboot the device and repartition the compact flash. The CompactFlash card is repartitioned only if it is possible to restore all the data on the CompactFlash card. Otherwise, the operation is terminated, and a message is displayed indicating that the current disk usage needs to be reduced.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system partition compact-flash (If Yes)

```
user@host> request system partition compact-flash
Are you sure you want to reboot
and partition the compact-flash ? [yes,no] yes
Initiating repartition operation.
The operation may take several minutes to complete.
System will reboot now...
<System reboots>
<Repartition operation is performed>
<System reboots and starts up normally>
```

Sample Output

request system partition compact-flash (If No)

```
user@host> request system partition compact-flash
Are you sure you want to reboot
and partition the compact-flash ? [yes,no] no
```

Release Information

Command introduced in Junos OS Release 9.2.

Command deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1.

NOTE: To determine which platforms run Junos OS with Upgraded FreeBSD, see the table listing the platforms currently running Junos OS with upgraded FreeBSD in Release Information for Junos OS with Upgraded FreeBSD.

request system power-off (SRX Series)

IN THIS SECTION

Syntax

```
request system power-off
at <time>
in <minutes>
junos
message <message>
network
oam
```

```
power-off
usb
media (compact-flash | disk | usb | internal)
```

Description

Use this command to power off the system.

Options

at *time* Time at which to power off the system.

in *minutes* Number of minutes to delay before powering off the system.

media Boot media for the next boot.

- `compact-flash`— Standard boot from a flash device.
- `disk`— Boot from a hard disk.
- `usb`— Boot from a USB device.
- `internal`— Boot from internal flash.

message *message* Message that is displayed to all system users before powering off the system.

junos (SRX1500, SRX5400, SRX5600, and SRX5800) Boot off Junos volume.

network (SRX1500, SRX5400, SRX5600, and SRX5800) Network boot through PXE.

oam (SRX1500, SRX5400, SRX5600, and SRX5800) Boot off OAM volume.

usb (SRX1500, SRX5400, SRX5600, and SRX5800) Boot off USB device.

power-off (SRX1500) Power off the software on RE.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system power-off

```
user@host> request system power-off
Power Off the system ? [yes,no] (no) yes

Shutdown NOW!
[pid 3300]


*** FINAL System shutdown message from user@host ***

System going down IMMEDIATELY


user@host> Dec  8 09:37:45 Waiting (max 60 seconds) for system process `vnlru' to stop...done
Waiting (max 60 seconds) for system process `vnlru_mem' to stop...done
Waiting (max 60 seconds) for system process `bufdaemon' to stop...done
Waiting (max 60 seconds) for system process `syncer' to stop...
Syncing disks, vnodes remaining...2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 done

syncing disks... All buffers synced.
Uptime: 38m33s
recorded reboot as normal shutdown

The operating system has halted.
```

```
Turning the system power off.
```

Release Information

Command introduced in Junos OS Release 11.4.

RELATED DOCUMENTATION

request system halt | 684

request system reboot (Junos OS)

IN THIS SECTION

Syntax

```
request system reboot
<at time>
<both-routing-engines>
<in minutes>
<media (compact-flash | disk | removable-compact-flash | usb)>
<message "text">
<other-routing-engine>
```

Syntax (EX Series Switches and EX Series Virtual Chassis)

```
request system reboot
<all-members | local | member member-id>
<at time>
<in minutes>
<media (external | internal)> | <media (compact-flash | disk | removable-compact-flash | usb)>
<message "text">
<slice slice>
```

Syntax (MX Series Routers and MX Series Virtual Chassis, EX9200 Switches and EX9200 Virtual Chassis)

```
request system reboot
<all-members | local | member member-id>
<at time>
<both-routing-engines>
<in minutes>
<media (external | internal)> | <media (compact-flash | disk | usb)> | <junos | network | oam |
usb>
<message "text">
<other-routing-engine>
```

Syntax (QFabric Systems)

```
request system reboot
<all <graceful>>
<at time>
<director-device name>
<director-group <graceful>>
<fabric <graceful>>
<in minutes>
<in-service>
<media>
<message “text”>
<node-group name>
<slice slice>
```

Syntax (QFX Series Switches and QFX Series Virtual Chassis, Virtual Chassis Fabric)

```
request system reboot
<all-members | local | member member-id>
<at time>
<in minutes>
<in-service>
<hypervisor>
<junos | network | oam | usb>
<message “text”>
<slice slice>
```

Syntax (TX Matrix Router)

```
request system reboot
<all-chassis | all-lcc | lcc number /  scc>
<at time>
<both-routing-engines>
```

```
<in minutes>
<media (compact-flash | disk)>
<message "text">
<other-routing-engine>
```

Syntax (TX Matrix Plus Router)

```
request system reboot
<all-chassis | all-lcc | lcc number | sfc number>
<at time>
<both-routing-engines>
<in minutes>
<media (compact-flash | disk)>
<message "text">
<other-routing-engine>
<partition (1 | 2 | alternate)>
```

Description

Use this command to reboot the device software.

This command can be used on standalone devices and on devices supported in a Virtual Chassis, Virtual Chassis Fabric, or QFabric system.

Starting with Junos OS Release 15.1F3, the `request system reboot` command reboots only the guest operating system on the PTX5000 with RE-PTX-X8-64G and, MX240, MX480, and MX960 with RE-S-X6-64G.

Starting with Junos OS Release 15.1F5, the `request system reboot` command reboots only the guest operating system on the MX2010, and MX2020 with REMX2K-X8-64G.

Starting from Junos OS Release 17.2R1, PTX10008 routers do not support the `request system reboot` command. Starting from Junos OS Release 17.4R1, PTX10016 routers do not support the `request system reboot` command. Use the `request vmhost reboot` command instead of the `request system reboot` command on the PTX10008 and PTX10016 routers to reboot the Junos OS software package or bundle on the router. See request vmhost reboot.

Starting from Junos OS Release 19.1R1, the PTX10002-60C router and the QFX10002-60C switch do not support the `request system reboot` command. Use the `request vmhost reboot` command instead of the `request system reboot` command on these devices to reboot the Junos OS software package or bundle on the device. See request vmhost reboot.

On a QFabric system, to avoid traffic loss on the network Node group, switch mastership of the Routing Engine to the backup Routing Engine, and then reboot.

Options

The options described here are not all supported on every platform or release of Junos OS. Refer to the Syntax sections for the options commonly available on each type of platform.

none — Reboot the software immediately.

all-chassis — (Optional) On a TX Matrix router or TX Matrix Plus router, reboot all routers connected to the TX Matrix or TX Matrix Plus router, respectively.

all-lcc — (Optional) On a TX Matrix router or TX Matrix Plus router, reboot all line card chassis connected to the TX Matrix or TX Matrix Plus router, respectively.

all-members | local | member *member-id* — (Optional) Specify which member of the Virtual Chassis to reboot:

- `all-members`—Reboots each switch that is a member of the Virtual Chassis.
- `local`—Reboots only the local switch (switch where you are logged in).
- `member` *member-id*—Reboots the specified member switch of the Virtual Chassis

at *time* — (Optional) Time at which to reboot the software, specified in one of the following ways:

- `now`—Stop or reboot the software immediately. This is the default.
- *+minutes*—Number of minutes from now to reboot the software.
- *yymmddhhmm*—Absolute time at which to reboot the software, specified as year, month, day, hour, and minute.
- *hh:mm*—Absolute time on the current day at which to stop the software, specified in 24-hour time.

both-routing-engines — (Optional) Reboot both Routing Engines at the same time.

fast-boot (Optional, QFX Series) Minimizes traffic loss and downtime of network ports by leaving the network ports up during the system reboot.

hypervisor (Optional) Reboot Junos OS, host OS, and any installed guest VMs.

in *minutes* (Optional) Number of minutes from now to reboot the software. The minimum value is 1. This option is an alias for the `at +minutes` option.

in-service (Optional) Enables you to reset the software state (no software version change) of the system with minimal disruption in data and control traffic.

junos (Optional) Reboot from the Junos OS (main) volume.

lcc *number* —(Optional) Line-card chassis (LLC) number.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

media (compact-flash | disk | removable-compact-flash | usb) (Optional) Use the indicated boot medium for the next boot.

media (external | internal) (Optional) Use the indicated boot medium for the next boot:

- `external`—Reboot the device using a software package stored on an external boot source, such as a USB flash drive.
- `internal`—Reboot the device using a software package stored in an internal memory source.

message "*text*" (Optional) Message to display to all system users before stopping or rebooting the software.

network (Optional) Reboot using the Preboot Execution Environment (PXE) boot method over the network.

oam (Optional) Reboot from the maintenance volume (OAM volume, usually the compact flash drive).

other-routing-engine (Optional) Reboot the other Routing Engine from which the command is issued. For example, if you issue the command from the primary Routing Engine, the backup Routing Engine is rebooted. Similarly, if you issue the command from the backup Routing Engine, the primary Routing Engine is rebooted.

partition *partition* (Optional) Reboot using the specified partition on the boot media. This option is equivalent to the `slice` option that is supported on some devices. Specify one of the following *partition* values:

- `1`—Reboot from partition 1.
- `2`—Reboot from partition 2.
- `alternate`—Reboot from the alternate partition.

scc (Optional) Reboot the Routing Engine on the TX Matrix switch-card chassis. If you issue the command from re0, re0 is rebooted. If you issue the command from re1, re1 is rebooted.

sfc *number* (Optional) Reboot the Routing Engine on the TX Matrix Plus switch-fabric chassis. If you issue the command from re0, re0 is rebooted. If you issue the command from re1, re1 is rebooted. Replace *number* with 0.

slice *slice* (Optional) Reboot using the specified partition on the boot media. This option was originally the `partitiion` option but was renamed to `slice` on EX Series and QFX Series switches. Specify one of the following *slice* values:

- `1`—Reboot from partition 1.
- `2`—Reboot from partition 2.
- `alternate`—Reboot from the alternate partition (which did not boot the switch at the last bootup).

NOTE: The `slice` option is not supported on QFX Series switches that have no alternate slice when Junos OS boots as a Virtual Machine (VM). To switch to

the previous version of Junos OS, issue the `request system software rollback` command.

usb (Optional) Reboot from a USB device.

The following options are available only on QFabric Systems:

all (Optional) Reboots the software on the Director group, fabric control Routing Engines, fabric manager Routing Engines, Interconnect devices, and network and server Node groups.

director-device *name* (Optional) Reboots the software on the Director device and the default partition (QFabric CLI).

director-group (Optional) Reboots the software on the Director group and the default partition (QFabric CLI).

fabric (Optional) Reboots the fabric control Routing Engines and the Interconnect devices.

node-group *name* (Optional) Reboots the software on a server Node group or a network Node group.

graceful (Optional) Enables the QFabric component to reboot with minimal impact to network traffic. This sub-option is only available for the `all`, `fabric`, and`director-group` options.

Additional Information

Reboot requests are recorded in the system log files, which you can view with the `show log` command (see *show log*). Also, the names of any running processes that are scheduled to be shut down are changed. You can view the process names with the `show system processes` command (see *show system processes*).

On a TX Matrix or TX Matrix Plus router, if you issue the `request system reboot` command on the primary Routing Engine, all the primary Routing Engines connected to the routing matrix are rebooted. If you issue this command on the backup Routing Engine, all the backup Routing Engines connected to the routing matrix are rebooted.

NOTE: Before issuing the `request system reboot` command on a TX Matrix Plus router with no options or the `all-chassis`, `all-lcc`, `lcc` *number*, or `sfc` options, verify that primary Routing Engine for all routers in the routing matrix are in the same slot number. If the primary Routing Engine for a

line-card chassis is in a different slot number than the primary Routing Engine for a TX Matrix Plus router, the line-card chassis might become logically disconnected from the routing matrix after the `request system reboot` command.

NOTE: To reboot a router that has two Routing Engines, reboot the backup Routing Engine (if you have upgraded it) first, and then reboot the primary Routing Engine.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system reboot

```
user@host> request system reboot
Reboot the system ? [yes,no] (no)
```

request system reboot (at 2300)

```
user@host> request system reboot at 2300 message ?Maintenance time!?
Reboot the system ? [yes,no] (no) yes

shutdown: [pid 186]
*** System shutdown message from root@test.example.net ***
System going down at 23:00
```

request system reboot (in 2 Hours)

The following example, which assumes that the time is 5 PM (17:00), illustrates three different ways to request the system to reboot in two hours:

```
user@host> request system reboot at +120
 user@host> request system reboot in 120
 user@host> request system reboot at 19:00
```

request system reboot (Immediately)

```
user@host> request system reboot at now
```

request system reboot (at 1:20 AM)

To reboot the system at 1:20 AM, enter the following command. Because 1:20 AM is the next day, you must specify the absolute time.

```
user@host> request system reboot at 06060120
request system reboot at 120
Reboot the system at 120? [yes,no] (no) yes
```

request system reboot in-service

```
user@switch> request system reboot in-service
Reboot the system ? [yes,no] yes
[Feb 22 02:37:04]:ISSU: Validating Image

 PRE ISSR CHECK:
 ---------------
 PFE Status                          : Online
 Member Id zero                      : Valid
 VC not in mixed or fabric mode      : Valid
 Member is single node vc            : Valid
 BFD minimum-interval check done     : Valid
```

```
 GRES enabled                          : Valid
 NSR enabled                           : Valid
 drop-all-tcp not configured           : Valid
 Ready for ISSR                        : Valid

warning: Do NOT use /user during ISSR. Changes to /user during ISSR may get lost!
Current image is jinstall-jcp-i386-flex-18.1.img
[Feb 22 02:37:14]:ISSU: Preparing Backup RE
Prepare for ISSR
[Feb 22 02:37:19]:ISSU: Backup RE Prepare Done
Spawning the backup RE
Spawn backup RE, index 1 successful
Starting secondary dataplane
Second dataplane container started
GRES in progress
Waiting for backup RE switchover ready
GRES operational
Copying home directories
Copying home directories successful
Initiating Chassis In-Service-Upgrade for ISSR
Chassis ISSU Started
[Feb 22 02:42:55]:ISSU: Preparing Daemons
[Feb 22 02:43:00]:ISSU: Daemons Ready for ISSU
[Feb 22 02:43:05]:ISSU: Starting Upgrade for FRUs
[Feb 22 02:43:15]:ISSU: FPC Warm Booting
[Feb 22 02:44:16]:ISSU: FPC Warm Booted
[Feb 22 02:44:27]:ISSU: Preparing for Switchover
[Feb 22 02:44:31]:ISSU: Ready for Switchover
Checking In-Service-Upgrade status
  Item           Status                  Reason
  FPC 0          Online (ISSU)
Send ISSR done to chassisd on backup RE
Chassis ISSU Completed
Removing dcpfe0 eth1 128.168.0.16 IP
Bringing down bme00
Post Chassis ISSU processing done
[Feb 22 02:44:33]:ISSU: IDLE
Stopping primary dataplane
Clearing ISSU states
Console and management sessions will be disconnected. Please login again.
device_handoff successful ret: 0
Shutdown NOW!
[pid 14305]
```

```
*** FINAL System shutdown message from root@sw-duckhorn-01 ***

System going down IMMEDIATELY
```

Release Information

Command introduced before Junos OS Release 7.4.

Option `other-routing-engine` introduced in Junos OS Release 8.0.

Option `sfc` introduced for the TX Matrix Plus router in Junos OS Release 9.6.

Option `partition` changed to `slice` in Junos OS Release 10.0 for EX Series switches.

Option `both-routing-engines` introduced in Junos OS Release 12.1.

Option `fast-boot` introduced in Junos OS Release 14.1X53-D10 for QFX Series.

RELATED DOCUMENTATION

request system halt

Routing Matrix with a TX Matrix Plus Router Solutions Page

request vmhost reboot | **902**

clear system reboot

request system reboot (Junos OS with Upgraded FreeBSD)

IN THIS SECTION

Syntax

```
request system reboot
<at time>
<both-routing-engines>
<in minutes>
<junos>
<message "text">
<network>
<oam>
<other-routing-engine>
<usb>
```

Description

For devices running FreeBSD Release 10 or above, use this command to reboot the device software.

Options

none Reboot the device software immediately.

at *time* (Optional) Time at which to reboot the software, specified in one of the following ways:

- now—Stop or reboot the software immediately. This is the default.
- *+minutes*—Number of minutes from now to reboot the software.
- *yymmddhhmm*—Absolute time at which to reboot the software, specified as year, month, day, hour, and minute. Omitting a value will default to the current date for that value.
- *hh:mm*—Absolute time on the current day at which to stop the software, specified in 24-hour time.

both-routing-engines (Optional) Reboot both Routing Engines at the same time.

in *minutes* (Optional) Number of minutes from now to reboot the software. This option is an alias for the `at +minutes` option.

junos (Optional) Reboot from the **junos** volume.

message "*text*" (Optional) Message to display to all system users before stopping or rebooting the software.

network (Optional) Reboot from the network.

oam (Optional) Reboot from the **oam** volume.

other-routing-engine (Optional) Reboot the other Routing Engine from which the command is issued. For example, if you issue the command from the primary Routing Engine, the backup Routing Engine is rebooted. Similarly, if you issue the command from the backup Routing Engine, the primary Routing Engine is rebooted.

usb (Optional) Reboot from the USB device.

Additional Information

Reboot requests are recorded in the system log files, which you can view with the `show log` command (see *show log*). Also, the names of any running processes that are scheduled to be shut down are changed. You can view the process names with the `show system processes` command (see show system processes).

NOTE: To reboot a device that has two Routing Engines, reboot the backup Routing Engine (if you have upgraded it) first, and then reboot the primary Routing Engine.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system reboot

```
user@host> request system reboot
Reboot the system ? [yes,no] (no)
```

request system reboot (at 2300)

```
user@host> request system reboot at 2300 message “Maintenance time!”
Reboot the system ? [yes,no] (no) yes

shutdown: [pid 186]
*** System shutdown message from root@berry.network.net ***
System going down at 23:00
```

request system reboot (in 2 Hours)

The following example, which assumes that the time is 5 PM (17:00), illustrates three different ways to request the system to reboot in two hours:

```
user@host> request system reboot at +120
 user@host> request system reboot in 120
 user@host> request system reboot at 19:00
```

request system reboot (Immediately)

```
user@host> request system reboot at now
```

request system reboot (at 1:20 AM)

To reboot the system at 1:20 AM, enter the following command. Because 1:20 AM is the next day, you must specify the absolute time.

```
user@host> request system reboot at 06060120
request system reboot at 120
Reboot the system at 120? [yes,no] (no) yes
```

Release Information

Command introduced in Junos OS Release 15.1.

Command introduced for all platforms using Junos OS with upgraded FreeBSD. To find which platforms in which releases use Junos OS with upgraded FreeBSD, see Feature Explorer, enter **freebsd**, and select **Junos kernel upgrade to FreeBSD 10+**.

RELATED DOCUMENTATION

- request system snapshot (Junos OS with Upgraded FreeBSD) | **735**
- show system snapshot (Junos OS with Upgraded FreeBSD) | **865**
- clear system reboot
- *request system halt*
- Release Information for Junos OS with Upgraded FreeBSD

request system recover

IN THIS SECTION

Syntax

```
request system recover (junos-volume | oam-volume)
```

Description

For devices running FreeBSD 10 or above, use this command to recover a specified volume of the system.

Guest network functions (GNFs) do not support the `recover` option under the `request system` command. See Components of Junos Node Slicing for more details on GNF.

Options

junos-volume Specify the **/junos** volume to be recovered. The **/junos** volume is the main drive and contains all the software and files needed for the day-to-day running of the device, including configuration information and logs. The**/junos** volume also contains non-recovery snapshots,

which are new with Junos OS with upgraded FreeBSD. Non-recovery snapshots cannot be used for recovery of a failed system.

oam-volume Specify the **/oam** volume to be recovered. The compact flash drive is the **/oam** volume and stores recovery snapshot backup information. In case of failure of the **/junos** volume, the **/oam** volume can be used to boot the system. The **/oam** volume has the recovery snapshot, which is created with the `request system snapshot recovery` command. A recovery snapshot is always replaced when a new recovery snapshot is taken.

Additional Information

If you try to recover the **/junos** volume while you are booted on the **/junos** volume, you will get an error message.

To recover the **/junos** volume, do the following:

1. Recover the **/oam** volume.

```
user@host> request system recover oam-volume
```

2. Reboot on the **/oam** volume.

```
user@host> request system reboot oam-volume
```

Required Privilege Level

view

Sample Output

request system recover junos-volume (While booted on the /junos volume)

```
user@host> request system recover junos-volume
ERROR: You are currently running on the Junos volume
ERROR: A recovery of the Junos volume is not possible
```

request system recover junos-volume (While booted on the /oam volume)

```
user@host> request system recover junos-volume
NOTICE: Recovering the Junos volume ...
ada0p3 deleted
ada0 created
ada0p1 added
bootcode written to ada0
ada0p3 added
ada0p2 added
/dev/gpt/junos: 20303.9MB (41582448 sectors) block size 32768, fragment size 4096
        using 33 cylinder groups of 626.22MB, 20039 blks, 80256 inodes.
super-block backups (for fsck_ffs -b #) at:
 192, 1282688, 2565184, 3847680, 5130176, 6412672, 7695168, 8977664, 10260160,
 11542656, 12825152, 14107648, 15390144, 16672640, 17955136, 19237632,
 20520128, 21802624, 23085120, 24367616, 25650112, 26932608, 28215104,
 29497600, 30780096, 32062592, 33345088, 34627584, 35910080, 37192576,
 38475072, 39757568, 41040064
NOTICE: Junos volume recovered
```

request system recover oam-volume

```
user@host> request system recover oam-volume
NOTICE: Recovering the OAM volume ...
ada1p2 deleted
ada1 created
ada1p1 added
bootcode written to ada1
ada1p2 added
/dev/gpt/oam: 3831.6MB (7847136 sectors) block size 32768, fragment size 4096
```

```
        using 7 cylinder groups of 626.09MB, 20035 blks, 80256 inodes.
super-block backups (for fsck_ffs -b #) at:
 192, 1282432, 2564672, 3846912, 5129152, 6411392, 7693632
Verified oam signed by PackageProductionEc_2017 method ECDSA256+SHA256
Installing OAM volume contents ...
The OAM volume is now installed
NOTICE: Creating a recovery snapshot on the OAM volume ...
Creating image ...
Compressing image ...
Image size is 1717MB
Recovery snapshot created successfully
NOTICE: OAM volume recovered
```

Release Information

Command introduced in Junos OS Release 15.1.

Command introduced for all platforms using Junos OS with upgraded FreeBSD. To find which platforms in which releases use Junos OS with upgraded FreeBSD, see Feature Explorer, enter **freebsd**, and select **Junos kernel upgrade to FreeBSD 10+**.

RELATED DOCUMENTATION

- Release Information for Junos OS with Upgraded FreeBSD
- Changes in Disk Volumes for Junos OS with Upgraded FreeBSD
- Changes in Use of Snapshots for Junos OS with Upgraded FreeBSD

request system scripts add

IN THIS SECTION

Syntax

```
request system scripts add <package-name>
<no-copy>
<unlink>
```

Description

Use this command to install AI-Script (jais) packages on Juniper Networks devices.

Options

no-copy Don't save a copy of the jais package file.

```
user@host> request system scripts add no-copy <package-name>
```

If you use the no-copy option during the jais installation, the jais package cannot be rolled back.

unlink Remove the package after successful installation.

```
user@host> request system scripts add unlink <package-name>
```

Required Privilege Level

maintenance

Release Information

Command introduced before Junos OS Release 9.0.

RELATED DOCUMENTATION

request system scripts delete | 718

request system scripts rollback | 720

request system scripts event-scripts reload

request system scripts delete

IN THIS SECTION

Syntax

```
request system scripts delete <package-name>
```

Description

(Junos OS only) Use this command to delete AI-Script (jais) packages on Juniper Networks devices.

Options

No options are available.

Required Privilege Level

maintenance

Release Information

Command introduced before Junos OS Release 9.0.

NOTE: This command is not supported on Junos OS Evolved. AI-Scripts and Service Now are not supported on Junos OS Evolved.

RELATED DOCUMENTATION

request system scripts add | 716

request system scripts rollback | 720

request system scripts event-scripts reload

request system scripts rollback

IN THIS SECTION

Syntax

```
request system scripts rollback
```

Description

(Junos OS only) Use this command to roll back to most recent installation of AI-Scripts (jais) package.

Options

No options are available.

Required Privilege Level

maintenance

Release Information

Command introduced before Junos OS Release 9.0.

> **NOTE**: This command is not supported on Junos OS Evolved. AI-Scripts and Service Now are not supported on Junos OS Evolved.

RELATED DOCUMENTATION

- request system scripts add | 716
- request system scripts delete | 718
- *request system scripts event-scripts reload*

request system snapshot (Junos OS with FreeBSD Prior to Release 10)

IN THIS SECTION

If your device is running an upgraded version of FreeBSD (10+), use this topic instead: request system snapshot (Junos OS with Upgraded FreeBSD).

To determine which platforms support Junos OS with upgraded FreeBSD, see Feature Explorer and enter one of the following:

- For non-virtualized, enter **freebsd** and select **Junos kernel upgrade to FreeBSD 10+**.
- For virtualized, enter **virtualization** and select **Virtualization of the Routing Engine**.

Syntax (ACX Series Routers)

```
request system snapshot
<media type>
<partition>
```

Syntax (EX Series Switches; for EX4600, see QFX Series Syntax)

```
request system snapshot
<all-members | local | member member-id>
<media type>
<partition>
<re0 | re1 | routing-engine routing-engine-id>
<slice alternate>
```

Syntax (MX Series Routers)

```
request system snapshot
<all-members>
<config-partition>
<local>
<member member-id>
<media usb-port-number>
<partition>
<root-partition>
```

Syntax (PTX Series)

```
request system snapshot
<partition>
```

Syntax (QFX Series, OCX1100, and EX4600)

```
request system snapshot
<all-members | local | member member-id>
<config-partition>
<partition>
<root-partition>
<slice alternate>
```

Syntax (SRX Series Firewalls)

```
request system snapshot
<config-partition>
<media (compact-flash | hard-disk | internal | usb)>
<partition>
```

```
<root-partition>
<factory>
<node (all | local | node-id | primary)>
<slice (alternate) >
```

Syntax (TX Matrix Routers)

```
request system snapshot
<all-chassis | all-lcc | lcc number /  scc>
<config-partition>
<partition>
<root-partition>
```

Syntax (TX Matrix Plus Routers)

```
request system snapshot
<all-chassis | all-lcc | lcc number /  sfc number>
<config-partition>
<partition>
<root-partition>
```

Description

- On routers and firewalls running Junos OS, back up the currently running and active file system partitions to standby partitions that are not running. Specifically, the root file system (/) is backed up to **/altroot**, and **/config** is backed up to **/altconfig**. The root and **/config** file systems are on the flash drive, and the **/altroot** and **/altconfig** file systems are on the hard drive.
- On switches running Junos OS, take a snapshot of the files currently used to run the switch—the complete contents of the root (/) , **/altroot**, **/config**, **/var**, and **/var-tmp** directories, which include the running version of Junos OS, the active configuration, and log files.

NOTE: System snapshot is not supported on EX4650 switches. System snapshot is not supported on QFX10000,QFX5110, and QFX5200 switches. System snapshot using an external USB drive is supported on EX4600 switches.

Starting with Junos OS Release 15.1F3, the command `request system snapshot` creates a snapshot of the guest OS image only for the PTX5000 with RE-DUO-C2600-16G, and the MX240, MX480, and MX960 routers with RE-S-1800X4-32G-S.

Starting with Junos OS Release 15.1F5, the command `request system snapshot` creates a snapshot of the guest OS image only for the MX2010 and MX2020 routers with REMX2K-1800-32G-S.

On these routers, in order to create snapshot of the host OS image along with Junos OS image, use the `request vmhost snapshot` command.

CAUTION: After you run the `request system snapshot` command, you cannot return to the previous version of the software, because the running and backup copies of the software are identical.

Options

The specific options available depend upon the device:

none Back up the currently running software as follows:

- On the router or firewall, back up the currently running and active file system partitions to standby partitions that are not running. Specifically, the root file system (/) is backed up to **/altroot**, and **/config** is backed up to **/altconfig**. The root and **/config** file systems are on the flash drive, and the **/altroot** and **/altconfig** file systems are on the hard drive.
- On the switch, take a snapshot of the files currently used to run the switch and copy them to the media that the switch did not boot from. If the switch is booted from internal media, the snapshot is copied to external (USB) media. If the switch is booted from external (USB) media, the snapshot is copied to internal media.

- If the snapshot destination is external media but a USB flash drive is not connected, an error message is displayed.
- If the automatic snapshot procedure is already in progress, the command returns the following error: `Snapshot already in progress. Cannot start manual snapshot.` For additional information about the automatic snapshot feature, see "Configuring Dual-Root Partitions" on page 422.

all-chassis | all-lcc | lcc *number*

(TX Matrix and TX Matrix Plus router only) (Optional)

- `all-chassis`—On a TX Matrix router, archive data and executable areas for all Routing Engines in the chassis. On a TX Matrix Plus router, archive data and executable areas for all Routing Engines in the chassis.
- `all-lcc`—On a TX Matrix router, archive data and executable areas for all T640 routers (or line-card chassis) connected to a TX Matrix router. On a TX Matrix Plus router, archive data and executable areas for all routers (or line-card chassis) connected to a TX Matrix Plus router.
- `lcc` *number*—On a TX Matrix router, archive data and executable areas for a specific T640 router (or line-card chassis) that is connected to a TX Matrix router. On a TX Matrix Plus router, archive data and executable areas for a specific router (line-card chassis) that is connected to a TX Matrix Plus router.

  Replace *number* with the following values depending on the LCC configuration:

  - 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
  - 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
  - 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
  - 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

all-members | local | member *member-id*

(EX Series Virtual Chassis, MX Series routers, QFX Series switches, QFabric System, and OCX1100 only) (Optional) Specify where to place the snapshot (archive data and executable areas) in a Virtual Chassis:

- `all-members`—Create a snapshot (archive data and executable areas) for all members of the Virtual Chassis.

- `local`—Create a snapshot (archive data and executable areas) on the member of the Virtual Chassis that you are currently logged into.
- `member` *member-id*—Create a snapshot (archive data and executable areas) for the specified member of the Virtual Chassis.

config-partition (EX Series Virtual Chassis, MX Series routers, QFX Series switches, QFabric System, OCX1100, SRX Series Firewalls, and T and TX Series routers only) Create a snapshot of the configuration partition only and store it onto the default **/altconfig** on the hard disk device or an **/altconfig** on a USB device. Option deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1.

To determine which platforms support Junos OS with upgraded FreeBSD, see Feature Explorer and enter one of the following:

- For non-virtualized, enter **freebsd** and select **Junos kernel upgrade to FreeBSD 10+**.
- For virtualized, enter **virtualization** and select **Virtualization of the Routing Engine**.

factory (SRX Series Firewalls only) (Optional) Specifies that only the files shipped from the factory are included in the snapshot. Deprecated in Junos OS Release 23.2R1.

media ***type*** (ACX Series, M320, T640, and MX Series routers, SRX Series Firewalls) (Optional) Specify the boot device the software is copied to:

- `compact-flash`—(SRX5800, SRX5600, and SRX5400 devices only) Copy software to the primary compact flash drive.
- `external`—(Switches and SRX650 Services Gateway only) Copy software to an external mass storage device, such as a USB flash drive. If a USB drive is not connected, the switch displays an error message. This option is available for the compact flash on the SRX650 Services Gateway.
- `hard-disk`—(SRX5800, SRX5600, and SRX5400 devices only) Copy software to the hard disk drive.
- `internal`—(SRX300, SRX320, SRX340, SRX345, SRX380 devices only) Copy software to an internal flash drive. This is the default option. Deprecated in Junos OS Release 23.2R1, because FreeBSD 12 does not support this option.
- `removable-compact-flash`—(ACX Series, M320, T640, and MX Series routers only) Copy software to the removable compact flash drive.
- `usb`—(ACX Series, SRX Series Firewalls, M320, T640, and, except for MX104, MX Series routers) Copy software to the device connected to the USB port.

- `usb0`—(MX104 routers only) Copy software to the device connected to the USB0 port.
- `usb1`—(MX104 routers only) Copy software to the device connected to the USB1 port.

node (SRX Series Firewalls only) (Optional) Specify the archive data and executable areas of a specific node. If you do not specify the `node` option, the device considers the current node as the default option.

- `node-id`—Specify for node (0, 1).
- `all`—Specify for all nodes.
- `local`—Specify for local nodes.
- `primary`— Specify for primary nodes.

partition (Optional) Repartition the flash drive before a snapshot occurs. If the partition table on the flash drive is corrupted, the `request system snapshot` command fails and reports errors. The partition option is only supported for restoring the software image from the hard drive to the flash drive.

(Routers only) You cannot issue the request system snapshot command when you enable flash disk mirroring. We recommend that you disable flash disk mirroring when you upgrade or downgrade the software.

(EX Series switches only) If the snapshot destination is the media that the switch did not boot from, you must use the `partition` option.

(SRX Series Firewalls only) (Default) The target media is partitioned whether or not it is specified in the command, because this is a mandatory option. For example:

```
user@host> request system snapshot media usb partition
```

```
user@host> request system snapshot media usb partition factory
```

re0 | re1 | routing-engine *routing-engine-id* (EX6200 and EX8200 switches only) Specify where to place the snapshot in a redundant Routing Engine configuration.

- `re0`—Create a snapshot on Routing Engine 0.
- `re1`—Create a snapshot on Routing Engine 1.
- `routing-engine` *routing-engine-id*—Create a snapshot on the specified Routing Engine.

root-partition (M, MX, T, and TX Series routers; EX Series Virtual Chassis; QFX Series switches; QFabric System; SRX Series Firewalls; and OCX1100 only) Create a snapshot of the root partition only and store it onto the default **/altroot** on the hard disk device or an **/altroot** on a USB device. Option deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1.

To determine which platforms run Junos OS with Upgraded FreeBSD, see the information in Release Information for Junos OS with Upgraded FreeBSD.

slice alternate (EX Series switches, EX Series Virtual Chassis, QFX Series switches, QFabric System, SRX Series Firewalls, and OCX1100 only) (Optional) Take a snapshot of the active root partition and copy it to the alternate slice on the boot media.

(SRX Series Firewalls) The slice option cannot be used along with the other `request system snapshot` options, because the options are mutually exclusive. If you use the `factory`, `media`, or `partition` option, you cannot use the `slice` option; if you use the `slice` option, you cannot use any of the other options.

Option deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1.

To determine which platforms support Junos OS with upgraded FreeBSD, see Feature Explorer and enter one of the following:

- For non-virtualized, enter **freebsd** and select **Junos kernel upgrade to FreeBSD 10+**.
- For virtualized, enter **virtualization** and select **Virtualization of the Routing Engine**.

scc (TX Matrix router only) (Optional) Archive data and executable areas for a TX Matrix router (or switch-card chassis).

sfc *number* (TX Matrix Plus router only) (Optional) Archive data and executable areas for a TX Matrix Plus router (or switch-fabric chassis). Replace *number* with 0.

Additional Information

- (Routers only) Before you upgrade the software on the router, when you have a known stable system, issue the `request system snapshot` command to back up the software, including the configuration, to the **/altroot** and **/altconfig** file systems. After you have upgraded the software on the router and are satisfied that the new packages are successfully installed and running, issue the `request system snapshot` command again to back up the new software to the **/altroot** and **/altconfig** file systems.

- (Routers only) You cannot issue the `request system snapshot` command when you enable flash disk mirroring. We recommend that you disable flash disk mirroring when you upgrade or downgrade the software.
- (TX Matrix and TX Matrix Plus router only) On a routing matrix, if you issue the `request system snapshot` command on the primary Routing Engine, all the primary Routing Engines connected to the routing matrix are backed up. If you issue this command on the backup Routing Engine, all the backup Routing Engines connected to the routing matrix are backed up.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system snapshot (Routers)

```
user@host> request system snapshot
umount: /altroot: not currently mounted
Copying / to /altroot.. (this may take a few minutes)
umount: /altconfig: not currently mounted
Copying /config to /altconfig.. (this may take a few minutes)

The following filesystems were archived: / /config
```

request system snapshot (EX Series Switches)

```
user@switch> request system snapshot partition
Clearing current label...
Partitioning external media (/dev/da1) ...
```

```
Partitions on snapshot:

  Partition  Mountpoint  Size    Snapshot argument
      s1a    /altroot    179M    none
      s2a    /           180M    none
      s3d    /var/tmp    361M    none
      s3e    /var        121M    none
      s4d    /config     60M     none
Copying '/dev/da0s1a' to '/dev/da1s1a' .. (this may take a few minutes)
Copying '/dev/da0s2a' to '/dev/da1s2a' .. (this may take a few minutes)
Copying '/dev/da0s3d' to '/dev/da1s3d' .. (this may take a few minutes)
Copying '/dev/da0s3e' to '/dev/da1s3e' .. (this may take a few minutes)
Copying '/dev/da0s4d' to '/dev/da1s4d' .. (this may take a few minutes)
The following filesystems were archived: /altroot / /var/tmp /var /config
```

request system snapshot partition (EX4600, QFX Series, QFabric System, and OCX1100)

```
user@switch> request system snapshot partition
Clearing current label...
Partitioning external media (da1) ...
Verifying compatibility of destination media partitions...
Running newfs (334MB) on external media  / partition ...
Running newfs (404MB) on external media  /config partition ...
Running newfs (222MB) on external media  /var partition ...
Copying '/dev/da0s2a' to '/dev/da1s1a' .. (this may take a few minutes)
Copying '/dev/da0s3e' to '/dev/da1s3e' .. (this may take a few minutes)
Copying '/dev/da0s2f' to '/dev/da1s1f' .. (this may take a few minutes)
The following filesystems were archived: / /config /var
```

request system snapshot partition (SRX Series Firewalls)

```
user@host> request system snapshot partition
Verifying compatibility of destination media partitions...
Running newfs (439MB) on internal media  / partition (da0s1a)...
Running newfs (46MB) on internal media  /config partition (da0s1e)...
Copying '/dev/da1s1a' to '/dev/da0s1a' .. (this may take a few minutes)
Copying '/dev/da1s1e' to '/dev/da0s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

request system snapshot config-partition (SRX Series Firewalls)

```
user@host> request system snapshot config-partition
Doing the initial labeling...
Verifying compatibility of destination media partitions...
Running newfs (391MB) on hard-disk media  /config partition (ad1s1e)...
Copying '/dev/ad0s1e' to '/dev/ad1s1e' .. (this may take a few minutes)
The following filesystems were archived: /config
```

request system snapshot root-partition (SRX Series Firewalls)

```
user@host> request system snapshot root-partition
Doing the initial labeling...
Verifying compatibility of destination media partitions...
Running newfs (3GB) on hard-disk media  / partition (ad1s1a)...
Copying '/dev/ad0s1a' to '/dev/ad1s1a' .. (this may take a few minutes)
The following filesystems were archived: /
```

request system snapshot (When the Partition Flag Is On)

```
 user@host>  request system snapshot partition
Performing preliminary partition checks ...
Partitioning ad0 ...
umount: /altroot: not currently mounted
Copying / to /altroot.. (this may take a few minutes)

The following filesystems were archived: / /config
```

request system snapshot (MX104 Routers When Media Device is Missing)

```
user@host > request system snapshot media usb0
error: usb0 media missing or invalid
```

request system snapshot (When Mirroring Is Enabled)

```
user@host>  request system snapshot
Snapshot is not possible since mirror-flash-on-disk is configured.
```

request system snapshot all-lcc (Routing Matrix)

```
user@host>  request system snapshot all-lcc
lcc0-re0:
--------------------------------------------------------------------------
Copying '/' to '/altroot' .. (this may take a few minutes)
Copying '/config' to '/altconfig' .. (this may take a few minutes)
The following filesystems were archived: / /config

lcc2-re0:
--------------------------------------------------------------------------
Copying '/' to '/altroot' .. (this may take a few minutes)
Copying '/config' to '/altconfig' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

request system snapshot all-members (Virtual Chassis)

```
user@switch>  request system snapshot all-members media internal

fpc0:
--------------------------------------------------------------------------
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
The following filesystems were archived: /

fpc1:
--------------------------------------------------------------------------
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
The following filesystems were archived: /

fpc2:
--------------------------------------------------------------------------
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
The following filesystems were archived: /
```

```
fpc3:
--------------------------------------------------------------------------
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
The following filesystems were archived: /

fpc4:
--------------------------------------------------------------------------
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
The following filesystems were archived: /

fpc5:
--------------------------------------------------------------------------
Copying '/dev/da0s2a' to '/dev/da0s1a' .. (this may take a few minutes)
The following filesystems were archived: /
```

Release Information

Command introduced before Junos OS Release 7.4.

Options <config-partition> and <root-partition> introduced in Junos OS Release 13.1 for M Series, MX Series, T Series, and TX Series routers.

Option media *usb-port-number* introduced in Junos OS Release 13.2 for MX104 routers.

Options <config-partition>, <root-partition>, and <slice> deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1

To determine which platforms support Junos OS with upgraded FreeBSD, see Feature Explorer and enter one of the following:

- For non-virtualized, enter **freebsd** and select **Junos kernel upgrade to FreeBSD 10+**.
- For virtualized, enter **virtualization** and select **Virtualization of the Routing Engine**.

Option <factory> deprecated in Junos OS Release 23.2R1.

Option <media internal> deprecated in Junos OS Release 23.2R1.

RELATED DOCUMENTATION

request system snapshot (Junos OS with Upgraded FreeBSD) | **735**

show system snapshot (Junos OS) | **860**

show system auto-snapshot | 850

request system snapshot (Junos OS with Upgraded FreeBSD)

IN THIS SECTION

Syntax

```
request system snapshot
<delete snapshot-name>
<load snapshot-name>
<media type>
<recovery>
```

Description

Junos OS with upgraded FreeBSD has two types of snapshots:

- Recovery snapshot

- Non-recovery snapshot

Recovery snapshots—Use the `request system snapshot recovery` command to create a recovery snapshot. The recovery snapshot contains copies of the packages and configuration taken at the time of the snapshot. The recovery snapshot is stored at **recovery.ufs** on the **/oam** volume.

QFX with TVP platforms do not support these commands.

CAUTION: Once the platform performs a Junos OS upgrade to an upgraded FreeBSD version, (Junos OS Release 15.1R1 or higher for most devices; or Junos OS Release 23.2R1 for the SRX300, SRX320, SRX340, SRX345, or SRX380 devices), Junos OS will automatically generate a recovery snapshot with the new Junos OS version. Thereafter, you should request a recovery snapshot every time you upgrade to a new software version.

Non-recovery snapshots—Use the `request system snapshot` command to create a non-recovery snapshot. The non-recovery snapshots are essentially lists of software components and configuration files, which can be helpful when major software or configuration changes are occurring and establishing a known stable system baseline is required.

On the device, back up the currently running and active file system partitions to standby partitions that are not running. Non-recovery snapshots are named **snap.*date.time*** and are stored in the **/packages/sets** directory.

After you run the `request system snapshot` command, you cannot return to the previous version of the software, because the running and backup copies of the software are identical.

Options

none — On the router or switch, back up the currently running and active file system partitions to standby partitions that are not running. Specifically, this creates a non-recovery snapshot named **snap.< date>.< time>** which is stored in **/packages/sets**.

delete *snapshot-name* — (Optional) Delete a specific non-recovery snapshot from **/packages/sets**. Wildcards are supported, so `request system snapshot delete snap*` deletes all snapshots.

load *snapshot-name* — (Optional) Load a specific snapshot from **/packages/sets**.

media *type* — (Optional) Specify the boot device the software is copied to:

- `usb`—(MX960 routers only) Copy software to the device connected to the USB port.

recovery Create a recovery snapshot and store it in the **/oam** volume.

Additional Information

Before upgrading the software on the device, when you have a known stable system, issue the `request system snapshot` command to back up the software, including the configuration, to the **/packages/sets** file systems. After you have upgraded the software on the router or switch and are satisfied that the new packages are successfully installed and running, issue the `request system snapshot` command again to back up the new software to the **/packages/sets** file systems.

CAUTION: After you have upgraded the software on the device and are satisfied that the new packages are successfully installed and running or if you have replaced one of the Routing Engines, you should also issue the `request system snapshot recovery` command to have a new updated recovery snapshot. Junos OS automatically recovers the Junos OS volume upon reboot, if considered defective, from the recovery snapshot, along with the configuration saved in the recovery snapshot.

The snapshot script (which is the script that generates output for non-recovery snapshots) does not generate XML output. In such cases, the <output> tag is used.

```
user@host> request system snapshot | display xml
<rpc-reply xmlns:junos="http://xml.juniper.net/junos/18.1I0/junos">
<output>
NOTICE: Snapshot snap.20180105.165049 created successfully
</output>
<cli>
<banner></banner>
</cli>
</rpc-reply>
```

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system snapshot recovery

```
user@host> request system snapshot recovery
Creating image ...
Compressing image . . .
Image size is 777MB
Recovery snapshot created successfully
```

request system snapshot

```
 user@host> request system snapshot
NOTICE: Snapshot snap.20190412.124526 created successfully
```

show system snapshot

```
user@host> show system snapshot
Non-recovery snapshots:
Snapshot snap.20190412.124526:
Location: /packages/sets/snap.20190412.124526
Creation date: Apr 12 12:45:26 2019
Junos version: 18.3R1.8

Total non-recovery snapshots: 1

Recovery Snapshots:
Snapshots available on the OAM volume:
recovery.ufs
Date created: Thu Mar 28 07:44:25 PDT 2019
Junos version: 18.3R1.8
```

```
Total recovery snapshots: 1
```

request system snapshot delete

```
user@host> request system snapshot delete snap.20150112.122106
NOTICE: Snapshot 'snap.20150112.122106'
deleted successfully
```

Release Information

Command introduced in Junos OS Release 15.1.

Command introduced for all platforms using Junos OS with upgraded FreeBSD. To find which platforms in which releases use Junos OS with upgraded FreeBSD, see Feature Explorer, enter **freebsd**, and select **Junos kernel upgrade to FreeBSD 10+**.

RELATED DOCUMENTATION

show system snapshot (Junos OS) | 860

request system software abort in-service-upgrade (ICU)

IN THIS SECTION

Syntax

```
request system software abort in-service-upgrade
```

Description

Use this command to terminate an in-band cluster upgrade (ICU).

This command must be issued from a router session other than the one on which you issued the `request system in-service-upgrade` command that launched the ICU. If an ICU is in progress, this command terminates it. If the node is being upgraded, this command will cancel the upgrade. This command is also helpful in recovering the node in case of a failed ICU.

We recommend that you use the command only when there is an issue with the ongoing session of ISSU. You may need to manually intervene to bring the system to sane state if after issuing the command the system does not recover from the terminate.

Options

This command has no options.

Required Privilege Level

view

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software abort in-service-upgrade

```
user@host> request system software abort in-service-upgrade
In-Service-Upgrade aborted
```

Release Information

Command introduced in Junos OS Release 15.1X49-D35.

RELATED DOCUMENTATION

Upgrading Devices in a Chassis Cluster Using ICU

request system software add (Junos OS)

IN THIS SECTION

Syntax

```
request system software add package-name
<best-effort-load>
<delay-restart>
<device-alias alias-name>
<force>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<satellite slot-id>
<set [package-name1 package-name2]>
<unlink>
<upgrade-group [all |upgrade-group-name]>
<upgrade-with-config>
<satellite slot-id>
<validate>
<version version-string>
```

Syntax (EX Series Switches)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<force>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<set [package-name1 package-name2]>
<upgrade-with-config>
<validate>
<validate-on-host hostname>
<validate-on-routing-engine routing-engine>
```

Syntax (TX Matrix Router)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<force>
<lcc number | scc>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<set [package-name1 package-name2]>
<unlink>
<upgrade-with-config>
<validate>
<validate-on-host hostname>
<validate-on-routing-engine routing-engine>
```

Syntax (TX Matrix Plus Router)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<force>
<lcc number | sfc number>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<set [package-name1 package-name2]>
<unlink>
<upgrade-with-config>
<validate>
<validate-on-host hostname>
<validate-on-routing-engine routing-engine>
```

Syntax (MX Series Router)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<device-alias alias-name>
<force>
<member member-id>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<satellite slot-id>
<set [package-name1 package-name2]>
<upgrade-group [all |upgrade-group-name]>
<unlink>
<upgrade-with-config>
<validate>
<version version-string>
```

```
<validate-on-host hostname>
<validate-on-routing-engine routing-engine>
```

Syntax (QFX Series)

```
request system software add package-name
<best-effort-load>
<component all>
<delay-restart>
<force>
<force-host>
<no-copy>
<partition>
<reboot>
<unlink>
<upgrade-with-config>
```

Syntax (OCX Series)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<force>
<force-host>
<no-copy>
<no-validate>
<reboot>
<unlink>
<upgrade-with-config>
<validate>
```

Description

Install a software package or bundle on the device.

We recommend that you always download the software image to **/var/tmp** only. On EX Series and QFX Series switches, you must use the **/var/tmp** directory. Other directories are not supported.

When you are upgrading to a different release of Junos OS, you usually use the `validate` option on this command. The `validate` option checks the candidate software against the current configuration of the device to ensure they are compatible. (Validate is the default behavior when the software package being added is a different release.) However, there are circumstances under which you cannot validate the running configuration in this way. One such circumstance is when you are upgrading to Junos OS with upgraded FreeBSD from Junos OS based on FreeBSD 6.1. Another such circumstance is when you are updating between different releases of Junos OS with upgraded FreeBSD, and the newest version of FreeBSD uses system calls that are not available in earlier versions of FreeBSD.

Therefore, for platforms already running an upgraded FreeBSD release, you cannot use the `validate` option when upgrading to Junos OS Release 21.2R1, because this release runs on FreeBSD release 12; previous releases with upgraded FreeBSD run either FreeBSD release 10 or 11.

For SRX300, SRX320, SRX340, SRX345, and SRX380 devices, when the release you want to upgrade or downgrade to uses a different FreeBSD release than the FreeBSD release currently running, you must use the `request system software add` *`package-name`* `partition no-copy no-validate reboot` command to upgrade or downgrade the software. FreeBSD release 6 and FreeBSD release 12 use different partitioning schemas, and so you must specify the additional options on the command. For example, Junos OS Release 23.2R1 runs on FreeBSD release 12 and Junos OS Release 22.4R2 runs on FreeBSD release 6.

If you are upgrading between releases that cannot use direct validation, you need to specify one of the following on the `request system software add` operational mode command when you upgrade:

- The `no-validate` option—this option does not validate the software package against the current configuration. Therefore, the current configuration might fail once you upgrade the system. Choose this option for the first time you upgrade a system to the newer version.
- The `validate-on-host` option—this option validates the software package by comparing it to the running configuration on a remote Junos OS host. Be sure to choose a host that you have already upgraded to the newer version of software.
- The `validate-on-routing-engine` option—(for systems with redundant REs) this option validates the software package by comparing it to the running configuration on a Routing Engine in the same chassis. Use this option when you have already upgraded the other Routing Engine to the newer version.

For information on valid filename and URL formats, see Format for Specifying Filenames and URLs in Junos OS CLI Commands.

Any configuration changes performed after inputting the `request system software add` command will be lost when the system reboots with an upgraded version of Junos OS.

Starting from Junos OS Release 17.2R1, PTX10008 routers do not support the `request system software add` command. Starting from Junos OS Release 17.4R1, PTX10016 routers do not support the `request system software add` command. Use the `request vmhost software add` command instead of the `request system software add` command on the PTX10008 and PTX10016 routers to install or upgrade the Junos OS software package or bundle on the router. See request vmhost software add.

When graceful Routing Engine switchover (GRES) is enabled on a device, you must perform a unified in-service software upgrade (ISSU) operation to update the software running on the device. With GRES enabled, if you attempt to perform a software upgrade by entering the `request system software add` *`package-name`* command, an error message is displayed stating that only in-service software upgrades are supported when GRES is configured. In such a case, you must either remove the GRES configuration before you attempt the upgrade or perform a unified ISSU.

Starting with Junos OS Release 15.1F3, the statement `request system software add` installs a software package for the guest OS only for the PTX5000 router with RE-DUO-C2600-16G, and for MX240, MX480, and MX960 routers with RE-S-1800X4-32G-S.

Starting with Junos OS Release 15.1F5, the statement `request system software add` installs a software package for the guest OS only for the MX2010 and MX2020 routers with REMX2K-1800-32G-S.

On these routers, in order to install both Junos software and host software packages, use the `request vmhost software add` command.

Options

package-name Location from which the software package or bundle is to be installed.

In Junos OS, *`package-name`* can be either the URL of a remote location or the pathname of a local package. But Junos OS Evolved does not support a remote iso for upgrade, so “URL” is removed from the help string in the CLI.

For example:

- **/var/tmp/*package-name*—**For a software package or bundle that is being installed from a local directory on the router or switch.
- ***protocol*://*hostname*/*pathname*/*package-name*—**For a software package or bundle that is to be downloaded and installed from a remote location. Replace ***protocol*** with one of the following:

- **ftp**—File Transfer Protocol.
  Use **ftp://*hostname*/*pathname*/*package-name***. To specify authentication credentials, use **ftp://<*username*>:<*password*>@*hostname*/*pathname*/*package-name***. To have the system prompt you for the password, specify `prompt` in place of the password. If a password is required, and you do not specify the password or `prompt`, an error message is displayed.

- **http**—Hypertext Transfer Protocol.
  Use **http://*hostname*/*pathname*/*package-name***. To specify authentication credentials, use **http://<*username*>:<*password*>@*hostname*/*pathname*/*package-name***. If a password is required and you omit it, you are prompted for it.

- **scp**—Secure copy (not available for limited editions).
  Use **scp://*hostname*/*pathname*/*package-name***. To specify authentication credentials, use **scp://<*username*>:<*password*>@*hostname*/*pathname*/*package-name***.

- The ***pathname*** in the protocol is the relative path to the user's home directory on the remote system and not the root directory.

- Do not use the **scp** protocol in the `request system software add` command to download and install a software package or bundle from a remote location. The previous statement does not apply to the QFabric switch. The software upgrade is handled by the management process (mgd), which does not support scp.
  Use the `file copy` command to copy the software package or bundle from the remote location to the **/var/tmp** directory on the hard disk:
  file copy scp://*source*/*package-name* /var/tmp
  Then install the software package or bundle using the `request system software add` command:
  request system software add /var/tmp/*package-name*

best-effort-load (Optional) Activate a partial load and treat parsing errors as warnings instead of errors.

component all (QFabric systems only) (Optional) Install the software package on all of the QFabric components.

delay-restart (Optional) Install a software package or bundle, but do not restart software processes.

device-alias *alias-name* (Junos Fusion only) (Optional) Install the satellite software package onto the specified satellite device using the satellite device's alias name.

force (Optional) Force the addition of the software package or bundle (ignore warnings).

force-host (Optional) Force the addition of the host software package or bundle (ignore warnings) on the QFX5100 device.

lcc *number* (TX Matrix routers and TX Matrix Plus routers only) (Optional) In a routing matrix based on the TX Matrix router, install a software package or bundle on a T640 router that is connected to the TX Matrix router. In a routing matrix based on the TX Matrix Plus router, install a software package or bundle on a router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

member *member-id* (MX Series routers only) (Optional) Install a software package on the specified Virtual Chassis member. Replace *member-id* with a value of 0 or 1.

partition (QFX3500 switches and SRX3xx devices only) (Optional) Format and repartition the media before installation.

satellite *slot-id* (Junos Fusion only) (Optional) Install the satellite software package onto the specified satellite device using the satellite devices FPC slot identifier.

scc (TX Matrix routers only) (Optional) Install a software package or bundle on a Routing Engine on a TX Matrix router (or switch-card chassis).

sfc *number* (TX Matrix Plus routers only) (Optional) Install a software package or bundle on a Routing Engine on a TX Matrix Plus router. Replace *number* with 0.

no-copy (Optional) Install a software package or bundle, but do not save copies of the package or bundle files.

no-validate (Optional) When loading a software package or bundle with a different release, suppress the default behavior of the `validate` option.

To upgrade to Junos OS Release 21.2R1, you cannot use the `validate` option. Instead, choose one of the following options:

- `no-validate`
- `validate-on-host`
- `validate-on-routing-engine`

Software packages from unidentified providers cannot be loaded. To authorize providers, include the `provider-id` statement at the `[edit system extensions provider]` hierarchy level.

re0 | re1

(Optional) On routers or switches that support dual or redundant Routing Engines, load a software package or bundle on the Routing Engine in slot 0 (re0) or the Routing Engine in slot 1 (re1).

reboot

(Optional) After adding the software package or bundle, reboot the system. On a QFabric switch, the software installation is not complete until you reboot the component for which you have installed the software.

set [*package-name1package-name2*]

(Mixed EX4200 and EX4500 Virtual Chassis, M Series, MX Series, and T Series routers only) (Optional) Install multiple packages at same time:

- In the case of mixed EX4200 and EX4500 Virtual Chassis, install two software packages—a package for an EX4200 switch and the same release of the package for an EX4500 switch—to upgrade all member switches in a mixed EX4200 and EX4500 Virtual Chassis.
- In the case of M Series, MX Series, and T Series routers, install multiple (two or more) software packages and software add-on packages at the same time. The variable ***package-name*** can either be a list of installation packages, each separated by a blank space, or the full URL to the directory or tar file containing the list of installation packages.

In each case, ***installation-package*** can either be a list of installation packages, each separated by a blank space, or the full URL to the directory or tar file containing the list of installation packages.

Use the `request system software add set` command to retain any SDK configuration by installing the SDK add-on packages along with the core Junos OS installation package.

unlink

(Optional) On M Series, T Series, and MX Series routers, use the unlink option to remove the software package from this directory after a successful upgrade is completed.

upgrade-group [all |*upgrade-group-name*]

(Junos Fusion only) (Required to configure a Junos Fusion using autoconversion or manual conversion) Associate a satellite software image with a satellite software upgrade group. The satellite software package is associated with the specified satellite software upgrade group using the *upgrade-group-name*, or for all satellite software upgrade groups in a Junos Fusion when the all keyword is specified.

A satellite software upgrade group is a group of satellite devices in a Junos Fusion that are designated to upgrade to the same satellite software version using the same satellite software package. See , *Understanding Software in a Junos Fusion Provider EdgeUnderstanding Software in a Junos Fusion Enterprise*, and *Managing Satellite Software Upgrade Groups in a Junos Fusion*.

upgrade-with-config

(Optional) Install one or more configuration files.

Configuration files specified with this option must have the extension **.text** or **.xml** and have the extension specified. Using the extension **.txt** will not work.

validate

(Optional) Validate the software package or bundle against the current configuration as a prerequisite to adding the software package or bundle. This is the default behavior when the software package or bundle being added is a different release.

To upgrade to Junos OS Release 21.2R1, you cannot use the `validate` option. Instead, choose one of the following options:

- `no-validate`
- `validate-on-host`
- `validate-on-routing-engine`

The `validate` option only works on systems that do not have `graceful-switchover` (*GRES*) enabled. To use the `validate` option on a system with GRES, either disable GRES for the duration of the installation, or install using the command `request system software in-service-upgrade` , which requires nonstop active routing *(NSR)* to be enabled when using GRES.

validate-on-host *hostname*

(Optional) Validate the software package by comparing it to the running configuration on a remote Junos OS host. Specify a host, replacing *hostname* with the remote hostname. You can optionally provide the username that will be used to log in to the remote host by specifying the hostname in the format `user@hostname`.

validate-on-routing-engine *routing-engine*	(Optional) Validate the software bundle or package by comparing it to the running configuration on a Junos OS Routing Engine on the same chassis. Specify a Routing Engine, replacing *routing-engine* with the routing engine name.

Additional Information

Before upgrading the software on the device, when you have a known stable system, issue the `request system snapshot` command to back up the software, including the configuration, to the **/altroot** and **/altconfig** file systems. After you have upgraded the software on the device and are satisfied that the new package or bundle is successfully installed and running, issue the `request system snapshot` command again to back up the new software to the **/altroot** and **/altconfig** file systems.

The `request system snapshot` command is currently not supported on the QFabric system. Also, you cannot add or install multiple packages on a QFabric system.

After you run the `request system snapshot` command, you cannot return to the previous version of the software because the running and backup copies of the software are identical.

If you are upgrading more than one package at the same time, delete the operating system package, jkernel, last. Add the operating system package, jkernel, first and the routing software package, jroute, last. If you are upgrading all packages at once, delete and add them in the following order:

```
user@host> request system software add /var/tmp/jbase
user@host> request system software add /var/tmp/jkernel
user@host> request system software add /var/tmp/jpfe
user@host> request system software add /var/tmp/jdocs
user@host> request system software add /var/tmp/jroute
user@host> request system software add /var/tmp/jcrypto
```

By default, when you issue the `request system software add` *package-name* command on a TX Matrix primary Routing Engine, all the T640 primary Routing Engines that are connected to it are upgraded to the same version of software. If you issue the same command on the TX Matrix backup Routing Engine, all the T640 backup Routing Engines that are connected to it are upgraded to the same version of software.

Likewise, when you issue the `request system software add` *package-name* command on a TX Matrix Plus primary Routing Engine, all the T1600 or T4000 primary Routing Engines that are connected to it are upgraded to the same version of software. If you issue the same command on the TX Matrix Plus backup Routing Engine, all the T1600 or T4000 backup Routing Engines that are connected to it are upgraded to the same version of software.

Before installing software on a device that has one or more custom YANG data models added to it, back up and remove the configuration data corresponding to the custom YANG data models from the active configuration. For more information see Managing YANG Packages and Configurations During a Software Upgrade or Downgrade.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software add validate

```
user@host> request system software add validate /var/tmp/ jinstall-7.2R1.7-domestic-signed.tgz
Checking compatibility with configuration
Initializing...
Using jbase-7.1R2.2
Using /var/tmp/jinstall-7.2R1.7-domestic-signed.tgz
Verified jinstall-7.2R1.7-domestic.tgz signed by PackageProduction_7_2_0
Using /var/validate/tmp/jinstall-signed/jinstall-7.2R1.7-domestic.tgz
Using /var/validate/tmp/jinstall/jbundle-7.2R1.7-domestic.tgz
Checking jbundle requirements on /
Using /var/validate/tmp/jbundle/jbase-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jkernel-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jcrypto-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jpfe-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jdocs-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jroute-7.2R1.7.tgz
Validating against /config/juniper.conf.gz
mgd: commit complete
Validation succeeded
Validating against /config/rescue.conf.gz
```

```
mgd: commit complete
Validation succeeded
Installing package '/var/tmp/jinstall-7.2R1.7-domestic-signed.tgz' ...
Verified jinstall-7.2R1.7-domestic.tgz signed by PackageProduction_7_2_0
Adding jinstall...

WARNING:     This package will load JUNOS 7.2R1.7 software.
WARNING:     It will save JUNOS configuration files, and SSH keys
WARNING:     (if configured), but erase all other files and information
WARNING:     stored on this machine.  It will attempt to preserve dumps
WARNING:     and log files, but this can not be guaranteed.  This is the
WARNING:     pre-installation stage and all the software is loaded when
WARNING:     you reboot the system.

Saving the config files ...
Installing the bootstrap installer ...

WARNING:     A REBOOT IS REQUIRED TO LOAD THIS SOFTWARE CORRECTLY. Use the
WARNING:     'request system reboot' command when software installation is
WARNING:     complete. To abort the installation, do not reboot your system,
WARNING:     instead use the 'request system software delete jinstall'
WARNING:     command as soon as this operation completes.

Saving package file in /var/sw/pkg/jinstall-7.2R1.7-domestic-signed.tgz ...
Saving state for rollback ...
```

request system software add /var/tmp/ no-validate

```
user@host> request system software add no-validate /var/tmp/junos-install-mx-x86-32-15.1R1.9.tgz
Installing package '/var/tmp/junos-install-mx-x86-32-15.1R1.9.tgz' ...
Verified manifest signed by PackageProductionEc_2015
Verified manifest signed by PackageProductionRSA_2015
Verified contents.iso
Verified issu-indb.tgz
Verified junos-x86-32.tgz
Verified kernel
Verified metatags
Verified package.xml
Verified pkgtools.tgz
camcontrol: not found
camcontrol: not found
```

```
Verified manifest signed by PackageProductionEc_2015
Saving the config files ...
NOTICE: uncommitted changes have been saved in /var/db/config/juniper.conf.pre-install
Saving package file in /var/sw/pkg/junos-install-x86-32-
domestic-20150618.043753_builder_junos_151_r1.tgz ...
Saving state for rollback ...
```

request system software add no-copy no-validate reboot

```
user@host> request system software add no-copy no-validate junos-install-srx-x86-64-17.3R1.tgz
reboot
Verified junos-install-srx-x86-64-17.3R1 signed by PackageProductionEc_2017 method
ECDSA256+SHA256
Verified manifest signed by PackageProductionEc_2017 method ECDSA256+SHA256
Checking PIC combinations
Verified fips-mode signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding fips-mode-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jail-runtime signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jail-runtime-x86-32-20170725.352915_builder_stable_10 ...
Verified jdocs signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jdocs-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jfirmware signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jfirmware-x86-32-17.3R1 ...
Verified jpfe-X signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jpfe-X-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jpfe-X960 signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jpfe-X960-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jpfe-common signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jpfe-common-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jpfe-fips signed by PackageProductionEc_2017 method ECDSA256+SHA256
Verified jpfe-wrlinux signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jpfe-wrlinux-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jsd-jet-1 signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jsd-x86-32-17.3R1-jet-1 ...
```

request system software add validate-on-host

```
user@host> request system software add validate-on-host user@xyz :/var/tmp/
jinstall-15.1-20150516_ib_15_2_psd.0-domestic-signed.tgz
user@host> request system software add validate-on-host user@xyz :/var/tmp/
```

```
jinstall-15.1-20150516_ib_15_2_psd.0-domestic-signed.tgz
Extracting JUNOS version from package...
Connecting to remote host xyz...
Password:
Sending configuration to xyz...
Validating configuration on xyz...
PACKAGETYPE: not found
Checking compatibility with configuration
Initializing...
Using jbase-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jruntime-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jkernel-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jroute-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jcrypto-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jweb-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using /var/packages/jtools-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using /var/tmp/config.tgz
Hardware Database regeneration succeeded
Validating against /config/juniper.conf.gz
mgd: warning: schema: init: 'logical-systems-vlans' contains-node 'juniper-config vlans': not
found
mgd: commit complete
Validation succeeded
Installing package '/var/tmp/jinstall-15.1-20150516_ib_15_2_psd.0-domestic-signed.tgz' ...
Verified jinstall-15.1-20150516_ib_15_2_psd.0-domestic.tgz signed by PackageDevelopmentEc_2015
Adding jinstall...

WARNING:     The software that is being installed has limited support.
WARNING:     Run 'file show /etc/notices/unsupported.txt' for details.


WARNING:     This package will load JUNOS 15.1-20150516_ib_15_2_psd.0 software.
WARNING:     It will save JUNOS configuration files, and SSH keys
WARNING:     (if configured), but erase all other files and information
WARNING:     stored on this machine.  It will attempt to preserve dumps
WARNING:     and log files, but this can not be guaranteed.  This is the
```

```
WARNING:     pre-installation stage and all the software is loaded when
WARNING:     you reboot the system.

Saving the config files ...
NOTICE: uncommitted changes have been saved in /var/db/config/juniper.conf.pre-install
Installing the bootstrap installer ...

WARNING:     A REBOOT IS REQUIRED TO LOAD THIS SOFTWARE CORRECTLY. Use the
WARNING:     'request system reboot' command when software installation is
WARNING:     complete. To abort the installation, do not reboot your system,
WARNING:     instead use the 'request system software delete jinstall'
WARNING:     command as soon as this operation completes.

Saving package file in /var/sw/pkg/jinstall-15.1-20150516_ib_15_2_psd.0-domestic-signed.tgz ...
Saving state for rollback ...
```

request system software add (Mixed EX4200 and EX4500 Virtual Chassis)

```
user@switch> request system software add set [/var/tmp/jinstall-ex-4200-11.1R1.1-domestic-
signed.tgz /var/tmp/jinstall-ex-4500-11.1R1.1-domestic-signed.tgz]
...
```

request system software add component all (QFabric Systems)

```
user@switch> request system software add /pbdata/packages/jinstall-qfabric-12.2X50-D1.3.rpm
component all
...
```

request system software add upgrade-group (Junos Fusion)

```
user@aggregation-device> request system software add /var/tmp/satellite-3.0R1.1-signed.tgz
upgrade-group group1
```

request system software add no-validate (SRX Series Firewall)

```
user@host> request system software add /var/tmp/junos-
srxsme-20.4I-20200810_dev_common.0.0833.tgz no-copy no-validate
Formatting alternate root (/dev/ad0s2a)...
/dev/ad0s2a: 600.0MB (1228732 sectors) block size 16384, fragment size 2048
        using 4 cylinder groups of 150.00MB, 9600 blks, 19200 inodes.
super-block backups (for fsck -b #) at:
32, 307232, 614432, 921632
Installing package '/altroot/cf/packages/install-tmp/junos-20.4I-20200810_dev_common.0.0833' ...
Verified junos-boot-srxsme.tgz signed by PackageDevelopmentECP256_2020 method ECDSA256+SHA256
Verified junos-srxsme-domestic signed by PackageDevelopmentECP256_2020 method ECDSA256+SHA256
Verified manifest signed by PackageDevelopmentECP256_2020 method ECDSA256+SHA256

WARNING:     The software that is being installed has limited support.
WARNING:     Run 'file show /etc/notices/unsupported.txt' for details.

JUNOS 20.4I-20200810_dev_common.0.0833 will become active at next reboot
WARNING: A reboot is required to load this software correctly
WARNING:     Use the 'request system reboot' command
WARNING:         when software installation is complete
Saving state for rollback ...

user@host> request system software add /var/tmp/junos-srxsme-19.4R1.3.tgz no-copy no-validate
WARNING: Package junos-19.4R1.3 version 19.4R1.3 is not compatible with current loader
WARNING: Automatic recovering loader, please wait ...
Upgrading Loader...
####################################
Verifying the loader image... OK
WARNING: The new boot firmware will take effect when the system is rebooted.
WARNING: Loader recover finish.
Formatting alternate root (/dev/ad0s1a)...
/dev/ad0s1a: 598.5MB (1225692 sectors) block size 16384, fragment size 2048
     using 4 cylinder groups of 149.62MB, 9576 blks, 19200 inodes.
super-block backups (for fsck -b #) at:
32, 306464, 612896, 919328
Installing package '/altroot/cf/packages/install-tmp/junos-19.4R1.3' ...
Verified junos-boot-srxsme-19.4R1.3.tgz signed by PackageProductionEc_2019 method
ECDSA256+SHA256
Verified junos-srxsme-19.4R1.3-domestic signed by PackageProductionEc_2019 method
ECDSA256+SHA256
Verified junos-boot-srxsme-19.4R1.3.tgz signed by PackageProductionEc_2019 method
```

```
ECDSA256+SHA256 V
erified junos-srxsme-19.4R1.3-domestic signed by PackageProductionEc_2019 method ECDSA256+SHA256
JUNOS 19.4R1.3 will become active at next reboot
WARNING: A reboot is required to load this software correctly
WARNING: Use the 'request system reboot' command
WARNING: when software installation is complete Saving state for rollback ...
```

request system software add (SRX Series Firewall)

```
user@host> request system software add /var/tmp/junos-srxsme-19.4R2.3.tgz
WARNING: Package junos-19.4R2.3 version 19.4R2.3 is not compatible with this system.
WARNING: Please install a package with veloadr support, 20.3 or higher.
```

Release Information

Command introduced before Junos OS Release 7.4.

`best-effort-load` and `unlink` options added in Junos OS Release 7.4.

`sfc` option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

`set [`*`package-name1package-name2`*`]` option added in Junos OS Release 11.1 for EX Series switches. Added in Junos OS Release 12.2 for M Series, MX Series, and T Series routers.

On EX Series switches, the `set [`*`package-name1package-name2`*`]` option allows you to install only two software packages on a mixed EX4200 and EX4500 Virtual Chassis. Whereas, on M Series, MX Series, and T Series routers, the `set [`*`package-name1package-name2package-name3`*`]` option allows you to install multiple software packages and software add-on packages at the same time.

`upgrade-with-config` and `upgrade-with-config-format` *`format`* options added in Junos OS Release 12.3 for M Series routers, MX Series routers, and T Series routers, EX Series Ethernet switches, and QFX Series devices.

`device-alias`, `satellite`, `upgrade-group`, and `version` options introduced in Junos OS Release 14.2R3 for Junos Fusion.

`validate-on-host` and `validate-on-routing-engine` options added in Junos OS Release 15.1F3 for PTX5000 routers and MX240, MX480, and MX960 routers.

`upgrade-with-config-format` *`format`* option deleted in Junos OS Release 16.1 for M Series routers, MX Series routers, and T Series routers, EX Series Ethernet switches, and QFX Series devices.

RELATED DOCUMENTATION

- *Format for Specifying Filenames and URLs in Junos OS CLI Commands*
- request system software rollback (Junos OS) | **783**
- request system storage cleanup (Junos OS) | **798**
- Installing Software Packages on QFX Series Devices (Junos OS) | **168**
- *Upgrading Software on a QFabric System*
- *Managing Satellite Software Upgrade Groups in a Junos Fusion*
- request system software add (Maintenance) | **760**
- Routing Matrix with a TX Matrix Plus Router Solutions Page

request system software add (Maintenance)

IN THIS SECTION

Syntax

```
request system software add package-name
```

Description

Use this command to install new software package on the device, for example: **request system software add junos-srxsme-10.0R2-domestic.tgz no-copy no-validate partition reboot**.

Options

- `delay-restart`—Install the software package but does not restart the software process.
- `best-effort-load`—Activate a partial load and treat parsing errors as warnings instead of errors.
- `no-copy`—Install the software package but does not saves the copies of package files.
- `no-validate`—Do not check the compatibility with current configuration before installation starts.
- `partition`—Format and re-partition the media before installation.
- `reboot`—Reboot the device after installation is completed.
- `unlink`—Remove the software package after successful installation.
- `validate`—Check the compatibility with current configuration before installation starts.

Required Privilege Level

maintenance

Release Information

Partition option introduced in the command in Junos OS Release 10.1.

request system software add optional://auto-snapshot

IN THIS SECTION

Syntax

```
request system software add optional://auto-snapshot
```

Description

Activates the optional auto-snapshot package to generate a recovery snapshot after the next reboot. Issue this command before you upgrade the software. Then, when the device reboots after the software upgrade, the system automatically generates a recovery snapshot. Enabling auto-snapshot ensures a recovery image for the latest installed image.

Additional Information

The `request system software add optional://auto-snapshot` command activates the auto-snapshot package. Auto-snapshot performs a recovery snapshot during the next reboot, and stores the recovery snapshot on the OAM volume.

Enabling auto-snapshot on an active Routing Engine might extend the time for the next reboot. Auto-snapshot uses system resources only during this reboot to generate the recovery snapshot. In this way, it avoids resource contention with other applications, such as the routing protocol process (rpd).

You can verify the results of auto-snapshot with the `show system snapshot` command after the software installation completes.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software add optional://auto-snapshot

```
user@host> request system software add optional://auto-snapshot
Verified auto-snapshot signed by PackageDevelopmentECP256_2022 method ECDSA256+SHA256
```

show system snapshot

```
user@host> show system snapshot

No non-recovery snapshots available on the Junos volume

Recovery Snapshots:
Snapshots available on the OAM volume:
recovery.ufs
Date created: Sat Sep  3 15:33:10 CEST 2022
Junos version: 22.1-20220902.421

Total recovery snapshots: 1
```

Release Information

Command introduced in Junos OS Release 22.1R2.

RELATED DOCUMENTATION

request system software add (Junos OS) | 741

request system software configuration-backup

IN THIS SECTION

Syntax

```
request system software configuration-backup (path)
```

Description

Use this command to save the currently active configuration and any installation-specific parameters such as a configuration that you have entered outside of the CLI, director group IP addresses, and the default partition IP address.

Options

path—(QFabric System) Provide the path to the location of the backup configuration files. You can save the backup configuration files to either a URL, local directory, remote server, or removable drive.

Required Privilege Level

configure—To enter configuration mode, but other required privilege levels depend on where the statement is located in the configuration hierarchy.

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software configuration-backup

```
user@switch request system software configuration-backup ftp://ftp.test.net/test
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100        4035     0    0    100 4035    0      138k --:--:-- --:--:-- --:--:--  0
```

Release Information

Command introduced in Junos OS Release 11.3.

RELATED DOCUMENTATION

request system software configuration-restore | 766

request system software configuration-restore

IN THIS SECTION

Syntax

```
request system software configuration-restore (path)
```

Description

Use this command to restore a previously saved configuration and any installation-specific parameters, such as a configuration that you have entered outside of the CLI, director group IP addresses, and the default partition IP address.

Options

`path`—(QFabric System) Provide the path to the location of the backup configuration files. The path can be to a local file, a file on an external flash drive, or an SCP or FTP destination.

Required Privilege Level

configure—To enter configuration mode, but other required privilege levels depend on where the statement is located in the configuration hierarchy.

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software configuration-restore

```
user@switch request system software configuration-restore ftp://ftp.test.net/test
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100  4035  100  4035    0     0   153k      0 --:--:-- --:--:-- --:--:-- 3803k
```

Release Information

Command introduced in Junos OS Release 11.3.

RELATED DOCUMENTATION

request system software configuration-backup | 764

Performing a QFabric System Recovery Installation on the Director Group

request system software delete (Junos OS)

IN THIS SECTION

Syntax

```
request system software delete software-package
<force>
<reboot>
<set [package-name package-name]>
<upgrade-group [all |upgrade-group-name]>
<version version-string>
```

Syntax (TX Matrix Router)

```
request system software delete software-package
<force>
<lcc number | scc>
<reboot>
<set [package-name package-name]>
```

Description

Use this command to remove a software package or bundle from the device.

CAUTION: Before removing a software package or bundle, make sure that you have already placed the new software package or bundle that you intend to load onto the device.

Options

software-package Software package or bundle name. You can see this software package name by using the `show system software` command. Type the software package name explicitly and do not use the tab key to auto-complete the command.

You can delete any or all of the following software bundles or packages:

- `jbase`—(Optional) Junos base software suite
- `jcrypto`—(Optional, in domestic version only) Junos security software
- `jdocs`—(Optional) Junos online documentation file
- `jkernel`—(Optional) Junos kernel software suite
- `jpfe`—(Optional) Junos Packet Forwarding Engine support
- `jroute`—(Optional) Junos routing software suite
- `junos`—(Optional) Junos base software

On EX Series switches, some of the package names are different than those listed. To see the list of packages that you can delete on an EX Series switch, enter the command **show system software**.

force (Optional) Ignore warnings and force removal of the software.

lcc *number* (TX Matrix routers and TX Matrix Plus routers only) (Optional) In a routing matrix, delete a software package or bundle on a T640 router indicated by `lcc` *`number`* that is connected to the TX Matrix router. In a routing matrix, delete a software package or bundle on a router indicated by `lcc` *`number`* that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

re0 | re1 (Optional) On routers or switches that support dual or redundant Routing Engines, delete a software package or bundle on the Routing Engine in slot 0 (re0) or the Routing Engine in slot 1 (re1).

reboot As of Junos OS 12.3 and greater, automatically reboot upon completing the `request system software delete` command.

scc (TX Matrix routers only) (Optional) Remove an extension or upgrade package from the TX Matrix router (or switch-card chassis).

set [*package-name package-name***]** (M Series, MX Series, and T Series routers only) (Optional) Install multiple software packages or software add-on packages at the same time.

sfc *number* (TX Matrix Plus routers only) (Optional) Remove an extension or upgrade package from the TX Matrix Plus router. Replace *number* with 0.

upgrade-group [all | *upgrade-group-name*] (Junos Fusion only) Delete the satellite software image association with the specified satellite software upgrade group.

A satellite software upgrade group is a group of satellite devices in the same Junos Fusion that are designated to upgrade to the same satellite software version using the same satellite software package.

version *version-string* (Junos Fusion only) (Optional) Delete a satellite software package association with a satellite software upgrade group by selecting the satellite software package's version.

Additional Information

Before upgrading the software on the router or switch, when you have a known stable system, issue the `request system snapshot` command to back up the software, including the configuration, to the /altroot and /altconfig file systems (on routers) or the /, /altroot, /config, /var, and /var/tmp file systems (on switches). After you have upgraded the software on the router or switch and are satisfied that the new packages are successfully installed and running, issue the `request system snapshot` command again to back up the new software to the /altroot and /altconfig file systems (on routers) or the /, /altroot, /config, /var, and /var/tmp file systems (on switches). After you run the `request system snapshot` command, you cannot return to the previous version of the software, because the running and backup copies of the software are identical.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software delete jdocs

The following example displays the system software packages before and after the `jdocs` package is deleted through the `request system software delete` command:

```
user@host> show system software
Information for jbase:

Comment:
JUNOS Base OS Software Suite [7.2R1.7]


Information for jcrypto:
```

```
Comment:
JUNOS Crypto Software Suite [7.2R1.7]


Information for jdocs:

Comment:
JUNOS Online Documentation [7.2R1.7]


Information for jkernel:

Comment:
JUNOS Kernel Software Suite [7.2R1.7]

...


user@host> show system software
Information for jbase:

Comment:
JUNOS Base OS Software Suite [7.2R1.7]


Information for jcrypto:

Comment:
JUNOS Crypto Software Suite [7.2R1.7]


Information for jkernel:

Comment:
JUNOS Kernel Software Suite [7.2R1.7]

...
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

`set [package-name package-name]` option added in Junos OS Release 12.2 for M Series, MX Series, and T Series routers.

`reboot` option introduced in Junos OS Release 12.3.

`upgrade-group`, and `version` options introduced in Junos OS Release 14.2R3 for Junos Fusion.

RELATED DOCUMENTATION

request system software add (Junos OS) | 741

request system software rollback (Junos OS) | 783

Routing Matrix with a TX Matrix Plus Router Solutions Page

request system software delete-backup

IN THIS SECTION

Syntax

```
request system software delete-backup
```

Description

(Junos OS only) Use this command to delete the backup image previously created. Junos OS keeps a backup image of the software that was previously installed so that you can downgrade to that version of the software if necessary. If you delete this image, you cannot downgrade to the particular version of the software. Note that this command does not perform any function on SRX Series Firewalls with the dual-root partitioning scheme (units that are shipped with Junos OS 10.0 version or later).

In devices running FreeBSD Release 12 or later, you cannot issue this command. To learn if your device is running FreeBSD Release 12 or later, issue the `show version` command and look for the `fbsd_builder_stable` string in the module names. If the string includes the number 12 or later, your device is running FreeBSD Release 12 or later.

Required Privilege Level

maintenance

Output Fields

Sample Output

request system software system-backup

```
user@host> request system software delete-backup
Delete backup system software package [yes,no]
```

Release Information

Command introduced in Junos OS Release 9.6R1.

RELATED DOCUMENTATION

request system software delete (Junos OS) | 768

request system software download

IN THIS SECTION

Syntax (QFabric System)

```
request system  software download path/package-name
```

Description

Use this command to download a software package from a location on the director device, mounted external USB flash drive, remote FTP or SCP location, or other location.

Options

path Location where the software package is located. For example:

- `/pbdata/packages/`*`package-name`*—For a software package that is being installed from a local directory on the switch.
- ***protocol*://*hostname*/*pathname*/*package-name***—For a software package or bundle that is to be downloaded and installed from a remote location. Replace *`protocol`* with one of the following:
  - `ftp`—File Transfer Protocol.
    Use **ftp://*hostname*/*pathname*/*package-name***. To specify authentication credentials, use **ftp://<*username*>:<*password*>@*hostname*/*pathname*/*package-name***. To have the system prompt you for the password, specify **prompt** in place of the password. If a password is required, and you do not specify the password or **prompt**, an error message is displayed.
  - `scp`—Secure copy (available only for Canada and U.S. version).
    Use **scp://*hostname*/*pathname*/*package-name***. To specify authentication credentials, use **scp://<*username*>:<*password*>@*hostname*/*pathname*/*package-name***.

Additional Information

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software download

```
user@switch> request system software download ftp://ftp.install-directory/jinstall-
qfabric-11.3X30.6.rpm
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100  186M  100  186M    0     0  18.4M      0  0:00:10  0:00:10 --:--:-- 18.6M
```

Release Information

Command introduced in Junos OS Release 11.3.

RELATED DOCUMENTATION

- request system software add (Junos OS) | 741
- request system software delete (Junos OS) | 768
- request system software rollback (Junos OS) | 783
- request system storage cleanup (Junos OS) | 798
- Installing Software Packages on QFX Series Devices (Junos OS) | 168

request system software recover-from-restore-point

IN THIS SECTION

Syntax

```
request system software recover-from-restore-point
```

Description

Use to command to rollback to a previously created restore-point.

Rolling back to a previously created restore-point might disrupt traffic, as both Director devices reboot from the restore-point partition.

Required Privilege Level

configure

Sample Output

request system software recover-from-restore-point

```
root@qfabric> request system software recover-from-restore-point
Start Restore
Checking if the restore-point exists
    LogVol00 has the root filesystem
    Found Restore-Point:  Fri Aug 15 07:42:39 UTC 2014 /dev/VolGroup00/LogVol03
    Mounting restore-volume LogVol03
Checking the sanity of restore-point
    Checking if the restore DB is present
    Checking if the restore grub is present
Checking the current state of the system
Checking the state of cluster services
Checking the inventory
Checking if the peer is reachable
    Checking if peer is reachable via Compute Node Monitor
    Successfully communicated with peer over 169.254.0.2
Intimating the peer to do stage INITIATE_PEER_INITIAL_STAGE of downgrade
Preparing the system to downgrade
Prepping all Junos devices
Checking status at Peer
    Downgrade first stage at peer concluded successfully
Initiating final stage of downgrade in peer
Intimating the peer to do stage INITIATE_PEER_FINAL_STAGE of downgrade
Modify loader to boot from restore-point
Move mount points to new filesystem
Force Reboot
Rebooting....
```

Release Information

Command introduced in Junos OS Release 14.1X53-D15.

RELATED DOCUMENTATION

request system software restore-point | 780

request system software restore-point

IN THIS SECTION

Syntax

```
request system software restore-point
```

Description

Use this command to create a restore-point. A restore-point is a snapshot of the software on the QFabric system as well as the configuration that can be rolled back to in cases where a software upgrade or configuration changes have made the QFabric system unstable or inoperable.

Required Privilege Level

configure

Sample Output

request system software restore-point

```
root@qfabric> request system software restore-point
Checking if director-device upgrade is currently in progress.
Checking VM status.
Checking for communication between director devices.
Checking inventory status of all components.
Checking Server INE passwords.
Checking FC passwords.
Checking CCPC passwords.
Checking FM-0 passwords.
Checking DRE-0 passwords.
Checking NW-NG-0 passwords.
Checking chassis alarms.
0
sent command to peer to start operation
sanity checks passed
Performing fdisk
restore partition created
creating restore partition on physical disk
device /dev/sda: start 0 size -388718592
gpt: 0 slices
dos: 4 slices
# 1:        63-   208844 (   208782 sectors,    106 MB)
# 2:    208845-1048771394 (1048562550 sectors, 536864 MB)
# 3: 1048771395-1146446594 ( 97675200 sectors,  50009 MB)
# 4: 1146446595-2146460714 (1000014120 sectors, 512007 MB)
performing physical volume creation
  Physical volume "/dev/sda4" successfully created
  "/dev/sda4" is a new physical volume of "476.84 GB"
  PV Name               /dev/sda4
extending volume group 00
  Volume group "VolGroup00" successfully extended
Creating Logical Volume
  Logical volume "LogVol03" created
  LV Name                /dev/VolGroup00/LogVol03
Restore volume selected is /dev/VolGroup00/LogVol03
Formatting restore volume
mke2fs 1.39 (29-May-2006)
```

```
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
62504960 inodes, 124993536 blocks
6249676 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=4294967296
3815 block groups
32768 blocks per group, 32768 fragments per group
16384 inodes per group
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
    4096000, 7962624, 11239424, 20480000, 23887872, 71663616, 78675968,
    102400000

Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

This filesystem will be automatically checked every 22 mounts or
180 days, whichever comes first.  Use tune2fs -c or -i to override.
/dev/VolGroup00/LogVol03: UUID="a9fafbaf-da3c-417f-bd53-def01fbf3936" SEC_TYPE="ext2"
TYPE="ext3"
Restore Volume mounted
backing up root filesystem..this will take a few minutes
Copying files from tmp..this may take a few minutes
Dumping databases...this may take a few minutes
backing up shared filesystem..this may take a few minutes
Restore point creation finished for dg0 on /dev/VolGroup00/LogVol03
waiting 10 mins for for peer dg to finish
Restore point creation success on both DGs
```

Release Information

Command introduced in Junos OS Release 14.1X53-D15.

RELATED DOCUMENTATION

request system software recover-from-restore-point | 778

request system software rollback (Junos OS)

IN THIS SECTION

Syntax

```
request system software rollback
```

Syntax (EX Series Switches)

```
request system software rollback
<all-members>
<local>
<member member-id>
<reboot>
```

Syntax (MX Series Router)

```
request system software rollback
<all-members>
<device-alias alias-name>
<local>
<member member-id
<reboot>
<satellite slot-id>
<upgrade-group [all |upgrade-group-name]>
```

Syntax (SRX Series Firewalls)

```
request system software rollback <node-id>
```

Syntax (TX Matrix Router)

```
request system software rollback
<lcc number | scc>
<reboot>
```

Syntax (TX Matrix Plus Router)

```
request system software rollback
<lcc number | sfc number>
<reboot>
```

Description

Use this command to revert to the last successfully installed package before the `request system software (add | delete)` command. It uses the copy stored in the **/var/sw/pkg** directory.

Additional Information

- On Junos Fusion, the `request system software rollback` command can be used to roll back the version of satellite software associated with a satellite software upgrade group. Rolling back the version of satellite software associated with a satellite software upgrade group triggers a satellite software upgrade.
- On M Series and T Series routers, if `request system software add` *`jinstall`* `reboot` was used for the previous installation, then `request system software rollback` has no effect. In this case, use `jinstall` to reinstall the required package.
- On M Series and T Series routers, if `request system software add` *`sdk1`* was used for the previous installation, then `request system software rollback` removes the last installed SDK package (`sdk1` in this example).
- On SRX Series Firewalls with dual root systems, when `request system software rollback` is run, the system switches to the alternate root. Each root can have a different version of Junos OS. Roll back takes each root back to the previously installed image.
- On SRX300, SRX320, SRX340, SRX345, and SRX380 devices, when the release you want to roll back to uses a different FreeBSD release than the FreeBSD release currently running, you need to use the `request system software add` *`package-name`* `partition no-copy no-validate reboot` command to downgrade the software instead of using the `request system software rollback` command. FreeBSD 6.1 and FreeBSD 12 use different partitioning schemas, and so you must treat the rollback as a downgrade instead. For example, Junos OS Release 23.2R1 runs on FreeBSD 12 and Junos OS Release 22.4R2 runs on FreeBSD 6.1. You must downgrade from Release 23.2R1 to Release 22.4R2; you cannot roll back.
- On QFX3500 and QFX3600 devices in a mixed Virtual Chassis, when the `request system software rollback` command is issued, the system does not rollback to the image stored in the alternate partition.
- On QFX5100 switches, the `reboot` option has been removed. To reboot the switch after a software rollback, issue the `request system reboot` command as a separate, secondary command.

Options

all-members (EX4200 switches and MX Series routers only) (Optional) Attempt to roll back to the previous set of packages on all members of the Virtual Chassis configuration.

device-alias *alias-name* (Junos Fusion only) (Optional) Rollback the satellite software package onto the specified satellite device using the satellite devices FPC slot identifier.

lcc *number* (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, attempt to roll back to the previous set of packages on a T640 router connected to the TX Matrix router. On a TX Matrix Plus router, attempt to roll back to the previous set of packages on a connected router connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local (EX4200 switches and MX Series routers only) (Optional) Attempt to roll back to the previous set of packages on the local Virtual Chassis member.

member *member-id* (EX4200 switches and MX Series routers only) (Optional) Attempt to roll back to the previous set of packages on the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.

node-id (SRX Series Firewalls only) Identification number of the chassis cluster node. It can be 0 or 1.

none For all versions of Junos OS up to and including Junos OS 11.4, revert to the set of software as of the last successful `request system software add`. As of Junos OS 12.1 and later, revert to the last known good state before the most recent `request system software (add | delete)` command.

reboot	(Optional) For Junos OS 12.3 and later, the system reboots automatically to complete the rollback. However, for Junos OS Evolved, you must explicitly specify the `reboot` option to complete the rollback.
satellite *slot-id*	(Junos Fusion only) (Optional) Roll back the satellite software package onto the specified satellite device using the satellite devices FPC slot identifier.
scc	(TX Matrix routers only) (Optional) Attempt to roll back to the previous set of packages on the TX Matrix router (or switch-card chassis).
sfc *number*	(TX Matrix Plus routers only) (Optional) Attempt to roll back to the previous set of packages on the TX Matrix Plus router. Replace *number* with 0.
upgrade-group [all | *upgrade-group-name*]	(Junos Fusion only) Roll back the satellite software image associated with the specified satellite software upgrade group, or for all satellite software upgrade groups in the Junos Fusion when `all` is entered.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software rollback

```
user@host> request system software rollback
Verified SHA1 checksum of ./jbase-7.2R1.7.tgz
Verified SHA1 checksum of ./jdocs-7.2R1.7.tgz
Verified SHA1 checksum of ./jroute-7.2R1.7.tgz
Installing package './jbase-7.2R1.7.tgz' ...
Available space: 35495 require: 7335
```

```
Installing package './jdocs-7.2R1.7.tgz' ...
Available space: 35339 require: 3497
Installing package './jroute-7.2R1.7.tgz' ...
Available space: 35238 require: 6976
NOTICE: uncommitted changes have been saved in /var/db/config/juniper.conf.pre-install
Reloading /config/juniper.conf.gz ...
Activating /config/juniper.conf.gz ...
mgd: commit complete
Restarting mgd ...
Restarting aprobed ...
Restarting apsd ...
Restarting cosd ...
Restarting fsad ...
Restarting fud ...
Restarting gcdrd ...
Restarting ilmid ...
Restarting irsd ...
Restarting l2tpd ...
Restarting mib2d ...
Restarting nasd ...
Restarting pppoed ...
Restarting rdd ...
Restarting rmopd ...
Restarting rtspd ...
Restarting sampled ...
Restarting serviced ...
Restarting snmpd ...
Restarting spd ...
Restarting vrrpd ...

WARNING: cli has been replaced by an updated version:
CLI release 7.2R1.7 built by builder on 2005-04-22 02:03:44 UTC
Restart cli using the new version ? [yes,no] (yes) yes

Restarting cli ...
user@host
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

Command behavior changed in Junos OS Release 12.1.

`reboot` option introduced in Junos OS Release 12.3.

`device-alias`, `satellite`, and `upgrade-group` options introduced in Junos OS Release 14.2R3 for Junos Fusion.

`force` option deprecated in Junos OS Release 15.1 for Junos OS with Upgraded FreeBSD.

To determine which platforms run Junos OS with Upgraded FreeBSD, see the table listing the platforms currently running Junos OS with upgraded FreeBSD in Release Information for Junos OS with Upgraded FreeBSD.

RELATED DOCUMENTATION

request system software delete (Junos OS) | **768**

request system configuration rescue delete

request system configuration rescue save

Routing Matrix with a TX Matrix Plus Router Solutions Page

request system software validate (Junos OS)

IN THIS SECTION

Syntax

```
request system software validate package-name
<on (host host <username username> | routing-engine routing-engine)>
<set [package-name package-name]>
<upgrade-with-config>
<upgrade-with-config-format format>
```

Syntax (TX Matrix Router)

```
request system software validate package-name
<lcc number | scc>
<on (host host <username username> | routing-engine routing-engine)>
<set [package-name package-name]>
<upgrade-with-config>
<upgrade-with-config-format format>
```

Syntax (TX Matrix Plus Router)

```
request system software validate package-name
<lcc number | sfc number>
<on (host host <username username> | routing-engine routing-engine)>
<set [package-name package-name]>
<upgrade-with-config>
<upgrade-with-config-format format>
```

Syntax (MX Series Router)

```
request system software validate <package-name>
<member member-id>
<on (host host <username username> | routing-engine routing-engine)>
<set [package-name package-name]>
<upgrade-with-config>
<upgrade-with-config-format format>
```

Description

Use this command to validate candidate software against the current configuration of the router, the switch, or a remote host.

Options

lcc *number*

(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, validate the software bundle or package on a specific T640 router (or line-card chassis) that is connected to the TX Matrix router. On a TX Matrix Plus router, validate the software bundle or package for a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

on (host *host*<username *username*> | routing-engine *routing-engine*)	(Optional) Validate the software bundle or package by comparing it to the running configuration on a remote host or Routing Engine. Specify either a host, replacing *host* with the remote hostname, or a Routing Engine, replacing *routing-engine* with the Routing Engine name. If you specify a remote host, you can optionally provide the username to be used to log in to the remote host.
member *member-id*	(MX Series routers only) (Optional) Validate the software bundle or package on the specified member of the Virtual Chassis configuration. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.
package-name	Name of the software bundle or package to test.
scc	(TX Matrix routers only) (Optional) Validate the software bundle or package for the TX Matrix router (or switch-card chassis).
set [*package-namepackage-name*]	(M Series, MX Series, T Series routers) (Optional) Install multiple software packages or software add-on packages at the same time.
sfc *number*	(TX Matrix Plus routers only) (Optional) Validate the software bundle or package for the TX Matrix Plus router.
upgrade-with-config	(Optional) Install one or more configuration files.
upgrade-with-config-format *format*	(Optional) Specify the configuration file fomat, `text` or `xml`. The default format is `text`. The `upgrade-with-config` and `upgrade-with-config-format` options are only available locally on the router or switch. In a routing matrix, the configuration is applied only to the local router and is not propagated to other routers. The options are validated during the validation process and applied to the router or switch during the upgrade process. If the upgrade process is successful, the options are removed from the configuration. If the upgrade process fails, the configuration file is renamed with the .failed suffix.

Additional Information

By default, when you issue the `request system software validate` command on a TX Matrix primary Routing Engine, all the T640 primary Routing Engines that are connected to it are validated. If you issue the same command on the TX Matrix backup Routing Engine, all the T640 backup Routing Engines that are connected to it are upgraded to the same version of software.

Likewise, if you issue the `request system software validate` command on a TX Matrix Plus primary Routing Engine, all the T1600 or T4000 primary Routing Engines that are connected to it are validated. If you issue the same command on a TX Matrix Plus backup Routing Engine, all the T1600 or T4000 backup Routing Engines that are connected to it are upgraded to the same version of software.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software validate (Successful Case)

```
user@host> request system software validate /var/sw/pkg/
jbundle-5.3I20020124_0520_sjg.tgz
Checking compatibility with configuration
Initializing...
Using /packages/jbase-5.3I20020122_1901_sjg
Using /var/sw/pkg/jbundle-5.3I20020124_0520_sjg.tgz
Using /var/chroot/var/tmp/jbundle/jbase-5.3I20020124_0520_sjg.tgz
Using /var/chroot/var/tmp/jbundle/jkernel-5.3I20020124_0520_sjg.tgz
Using /var/chroot/var/tmp/jbundle/jcrypto-5.3I20020124_0520_sjg.tgz
Using /var/chroot/var/tmp/jbundle/jpfe-5.3I20020124_0520_sjg.tgz
Using /var/chroot/var/tmp/jbundle/jdocs-5.3I20020124_0520_sjg.tgz
Using /var/chroot/var/tmp/jbundle/jroute-5.3I20020124_0520_sjg.tgz
Validating against /config/juniper.conf.gz
mgd: commit complete

WARNING: cli has been replaced by an updated version:
CLI release 5.3I0 built by sjg on 2002-01-24 05:23:53 UTC
Restart cli using the new version ? [yes,no] (yes)
```

request system software validate (Failure Case)

```
user@host> request system software validate 6.3/
Pushing bundle to lcc0-re0
error: Failed to transfer package to lcc0-re0


user@host> request system software validate test
Pushing bundle to lcc0-re0
Pushing bundle to lcc2-re0

lcc0-re0:
gzip: stdin: not in gzip format
tar: child returned status 1
ERROR: Not a valid package: /var/tmp/test
```

Release Information

Command introduced before Junos OS Release 7.4.

`sfc` option introduced for the TX Matrix Plus router in Junos OS Release 9.6.

`set [`*`package-namepackage-name`*`]` option added in Junos OS Release 12.2 for M Series, MX Series, T Series routers.

`upgrade-with-config` and `upgrade-with-config-format` *`format`* options added in Junos OS Release 12.3 for M Series routers, MX Series routers, and T Series routers.

`on (host` *`host`*`<username` *`username`*`> | routing-engine` *`routing-engine`*`)` option introduced in Junos OS Release 13.3, Junos OS Release 14.1, and Junos OS Release 15.1.

RELATED DOCUMENTATION

request system software delete (Junos OS) | **768**

request system software rollback (Junos OS) | **783**

Routing Matrix with a TX Matrix Plus Router Solutions Page

request system software validate in-service-upgrade

request system software validate on (Junos OS with Upgraded FreeBSD)

IN THIS SECTION

Syntax

```
request system software validate on
<host host-name [ username user-name ]>
<routing-engine (re0 | re1)>
```

Description

Use this command to validate the current configuration on a Routing Engine that is not running Junos OS with upgraded FreeBSD or a remote host.

Direct validation of a running configuration is not possible on a device running Junos OS with upgraded FreeBSD. Nevertheless, validation is an important step in the installation of an upgraded operating system. This command allows validation on a device that is not running Junos OS with upgraded FreeBSD.

Options

The specific options available are:

host *host-name* **[username** *user-name* **]**	Validate the current configuration on a remote host. The host-name is resolved through DNS. Optionally, you can supply a username to employ on the remote host. If you omit the username option, the currently logged-in user-name is sent to the remote host.
routing-engine (re0 | re1)	Validate the current configuration on another Routing Engine on the same device. The other Routing Engine cannot be running Junos OS with upgraded FreeBSD or the validation does not succeed.

Additional Information

If the authenticity of the remote host cannot be established, you are prompted to continue the validation or not. If you choose not to continue, the validation process does not take place.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software validate on host

```
user@host> request system software validate on host remote-validator
The authenticity of host 'remote-validator (192.168.164.174)' can't be established.
ECDSA key fingerprint is 73:d0:78:ce:8d:09:aa:92:4c:ce:45:52:1d:76:86:b5.
```

```
Are you sure you want to continue connecting (yes/no)? yes
Password:
**********

Sending /var/tmp/config.tgz to remote-validator...
Validating /var/tmp/config.tgz on remote-validator...
Checking compatibility with configuration
Initializing...
Using jbase-15.1-20150416.2
Verified manifest signed by PackageDevelopmentEc_2015
Using jruntime-15.1-20150416.2
Verified manifest signed by PackageDevelopmentEc_2015
Using jkernel-15.1-20150416.2
Verified manifest signed by PackageDevelopmentEc_2015
Using jroute-15.1-20150416.2
Verified manifest signed by PackageDevelopmentEc_2015
Using jcrypto-15.1-20150416.2
Verified manifest signed by PackageDevelopmentEc_2015
Using jweb-15.1-20150416.2
Verified manifest signed by PackageDevelopmentEc_2015
Using /var/tmp/config.tgz
Hardware Database regeneration succeeded
Validating against /config/juniper.conf.gz
mgd: warning: schema: init: 'logical-systems-vlans' contains-node 'juniper-config vlans': not
found
mgd: commit complete
Validation succeeded
```

request system software validate on routing-engine

```
user@host> request system software validate on routing-engine re1

Sending /var/tmp/config.tgz to re1...
Validating /var/tmp/config.tgz on re1...
Checking compatibility with configuration
Initializing...
Using jbase-15.1-20150416.2
Verified manifest signed by PackageDevelopmentEc_2015
Using jruntime-15.1-20150416.2
Verified manifest signed by PackageDevelopmentEc_2015
Using jkernel-15.1-20150416.2
```

```
Verified manifest signed by PackageDevelopmentEc_2015
Using jroute-15.1-20150416.2
Verified manifest signed by PackageDevelopmentEc_2015
Using jcrypto-15.1-20150416.2
Verified manifest signed by PackageDevelopmentEc_2015
Using jweb-15.1-20150416.2
Verified manifest signed by PackageDevelopmentEc_2015
Using /var/tmp/config.tgz
Hardware Database regeneration succeeded
Validating against /config/juniper.conf.gz
mgd: warning: schema: init: 'logical-systems-vlans' contains-node 'juniper-config vlans': not
found
mgd: commit complete
Validation succeeded
```

Release Information

Command introduced in Junos OS Release 15.1 for supported platforms. See Feature Explorer.

RELATED DOCUMENTATION

- request system reboot (Junos OS with Upgraded FreeBSD) | **708**
- show system snapshot (Junos OS with Upgraded FreeBSD) | **865**
- Release Information for Junos OS with Upgraded FreeBSD

request system storage cleanup (Junos OS)

IN THIS SECTION

Syntax

```
request system storage cleanup
<dry-run>
<no-confirm>
<re0  | re1 | routing-engine (backup | both | local | master | other)>
```

Syntax (EX Series Switches)

```
request system storage cleanup
<all-members>
<dry-run>
<local>
<member member-id>
<no-confirm>
<re0  | re1 | routing-engine (backup | both | local | master | other)>
<satellite [slot-id slot-id |device-alias  alias-name]>
```

Syntax (MX Series Router)

```
request system storage cleanup
<all-members>
<dry-run>
<local>
<member member-id>
<no-confirm>
<re0  | re1 | routing-engine (backup | both | local | master | other)>
<satellite [slot-id slot-id |device-alias  alias-name]>
```

Syntax (QFX Series)

```
request system storage cleanup
<component (serial number | UUID | all)>
<director-group name>
<dry-run>
<infrastructure name>
<interconnect-device name>
<name-tag name-tag>
<no-confirm>
<node-group name>
<prune>
<qfabric (component name) | dry-run | name-tag | repository)>
<repository (core | log)>
<re0  | re1 | routing-engine (backup | both | local | master | other)>
```

Syntax (SRX Series)

```
request system storage cleanup
<dry-run>
<no-confirm>
<re0  | re1 | routing-engine (backup | both | local | master | other)>
```

Description

Use this command to free storage space on the router or switch by rotating log files and proposing a list of files for deletion. On a QFabric system, you can delete debug files located on individual devices or on the entire QFabric system.

Options

all-members (EX4200 switches and MX Series routers only) (Optional) Delete files on the Virtual Chassis primary Routing Engine only.

To delete files on the other members of the Virtual Chassis configuration, log in to each backup Routing Engine and delete the files using the `request system storage cleanup local` command.

component (*UUID* | *serial number* | all) (QFabric systems only) (Optional) Delete files located on individual QFabric system devices or on the entire QFabric system.

director-group *name* (QFabric systems only) (Optional) Delete files on the director group.

dry-run (Optional) List files proposed for deletion (without deleting them).

infrastructure *name* (QFabric systems only) (Optional) Delete files on the fabric control Routing Engine and fabric manager Routing Engine.

interconnect-device *name* (QFabric systems only) (Optional) Delete files on the Interconnect device.

local (EX4200 switches and MX Series routers only) (Optional) Delete files on the local Virtual Chassis member.

member *member-id* (EX4200 switches and MX Series routers only) (Optional) Delete files on the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.

name-tag *name-tag* (QFabric systems only) (Optional) Delete debug files that match a specific regular expression.

node-group *name* (QFabric systems only) (Optional) Delete files on the Node group.

no-confirm (Optional) Do not ask for confirmation before doing the cleanup.

prune — (QFabric systems only) (Optional) Delete debug files located in either the core or log debug repositories of a QFabric system device.

qfabric component *name* — (QFabric systems only) (Optional) Delete debug files located in the debug repositories of a QFabric system device.

(re0 | re1 | routing-engine (backup | both | local | master | other)) — (Optional) Request operation on system storage on RE0, RE1, or on specified Routing Engine by these classifications: backup, both, local, primary, or other.

When Routing Engine is specified, the below message is shown before listing the files and deleting them.

```
Please check the list of files to be deleted using the dry-run option.
i.e.
request system storage cleanup dry-run
Do you want to proceed ? [yes,no] (no)
```

repository (core | log) — (QFabric systems only) (Optional) Specify the repository on the QFabric system device for which you want to delete debug files.

satellite [slot-id *slot-id* | device-alias *alias-name*] — (Junos Fusion only) (Optional) Specify the satellite device in the Junos Fusion by FPC ID or device alias name for which you want to delete debug files.

Additional Information

If logging is configured and being used, the `dry-run` option rotates the log files. In that case, the output displays the message “Currently rotating log files, please wait.” If no logging is currently under way, the output displays only a list of files to delete.

Required Privilege Level

maintenance

Output Fields

Table 35 on page 803 describes the output fields for the `request system storage cleanup` command. Output fields are listed in the approximate order in which they appear.

Table 35: request system storage cleanup Output Fields

Field Name	Field Description
`List of files to delete:`	Shows list of files available for deletion.
`Size`	Size of the core-dump file.
`Date`	Last core-dump file modification date and time.
`Name`	Name of the core-dump file.
`Directory to delete:`	Shows list of directories available for deletion.
`Repository scope:`	Repository where core-dump files and log files are stored. The core-dump files are located in the `core` repository, and the log files are located in the `log` repository. The default `Repository scope` is shared since both the `core` and `log` repositories are shared by all of the QFabric system devices.
`Repository head:`	Name of the top-level repository location.
`Repository name:`	Name of the repository: `core` or `log`.
`Creating list of debug artifacts to be removed under:`	Shows location of files available for deletion.
`List of debug artifacts to be removed under:`	Shows list of files available for deletion.

Sample Output

request system storage cleanup dry-run

```
user@host> request system storage cleanup dry-run
Currently rotating log files, please wait.
This operation can take up to a minute.

List of files to delete:

         Size Date         Name
  11.4K Mar  8 15:00 /var/log/messages.1.gz
  7245B Feb  5 15:00 /var/log/messages.3.gz
  11.8K Feb 22 13:00 /var/log/messages.2.gz
  3926B Mar 16 13:57 /var/log/messages.0.gz
  3962B Feb 22 12:47 /var/log/sampled.1.gz
  4146B Mar  8 12:20 /var/log/sampled.0.gz
  4708B Dec 21 11:39 /var/log/sampled.2.gz
  7068B Jan 16 18:00 /var/log/messages.4.gz
  13.7K Dec 27 22:00 /var/log/messages.5.gz
   890B Feb 22 17:22 /var/tmp/sampled.pkts
  65.8M Oct 26 09:10 /var/sw/pkg/jinstall-7.4R1.7-export-signed.tgz
  63.1M Oct 26 09:13 /var/sw/pkg/jbundle-7.4R1.7.tgz
```

request system storage cleanup

```
user@host> request system storage cleanup
Currently rotating log files, please wait.
This operation can take up to a minute.

List of files to delete:

         Size Date         Name
  11.4K Mar  8 15:00 /var/log/messages.1.gz
  7245B Feb  5 15:00 /var/log/messages.3.gz
  11.8K Feb 22 13:00 /var/log/messages.2.gz
  3926B Mar 16 13:57 /var/log/messages.0.gz
  11.6K Mar  8 15:00 /var/log/messages.5.gz
  7254B Feb  5 15:00 /var/log/messages.6.gz
  12.9K Feb 22 13:00 /var/log/messages.8.gz
```

```
  3726B Mar 16 13:57 /var/log/messages.7.gz
  3962B Feb 22 12:47 /var/log/sampled.1.gz
  4146B Mar  8 12:20 /var/log/sampled.0.gz
  4708B Dec 21 11:39 /var/log/sampled.2.gz
  7068B Jan 16 18:00 /var/log/messages.4.gz
  13.7K Dec 27 22:00 /var/log/messages.5.gz
   890B Feb 22 17:22 /var/tmp/sampled.pkts
  65.8M Oct 26 09:10 /var/sw/pkg/jinstall-7.4R1.7-export-signed.tgz
  63.1M Oct 26 09:13 /var/sw/pkg/jbundle-7.4R1.7.tgz

Delete these files ? [yes,no] (yes)
```

request system storage cleanup director-group (QFabric Systems)

```
user@switch> request system storage cleanup director-group
List of files to delete:

         Size Date         Name
4.0K   2011-11-07 05:16:29  /tmp/2064.sfcauth
4.0K   2011-11-07 05:07:34  /tmp/30804.sfcauth
4.0K   2011-11-07 04:13:41  /tmp/26792.sfcauth
4.0K   2011-11-07 04:13:39  /tmp/26432.sfcauth
0      2011-11-07 07:45:40  /tmp/cluster_cleanup.log
1.3M   2011-11-07 07:39:11  /tmp/cn_monitor.20111107-052401.log
4.0K   2011-11-07 07:36:29  /tmp/clustat.28019.log
4.0K   2011-11-07 07:36:29  /tmp/clustat_x.28019.log
9.6M   2011-11-07 05:30:24  /tmp/sfc.2.log
4.0K   2011-11-07 05:28:11  /tmp/mgd-init.1320672491.log
248K   2011-11-07 05:19:24  /tmp/cn_monitor.20111107-045111.log
4.0K   2011-11-07 05:17:18  /tmp/clustat.3401.log
4.0K   2011-11-07 05:17:18  /tmp/clustat_x.3401.log
8.0K   2011-11-07 04:58:25  /tmp/mgd-init.1320670633.log
0      2011-11-07 04:54:01  /tmp/mysql_db_install_5.1.37.log
4.0K   2011-11-07 04:52:08  /tmp/cn_send.log
0      2011-11-07 04:52:00  /tmp/init_eth0.log
4.0K   2011-11-07 04:49:35  /tmp/install_interfaces.sh.log
4.0K   2011-11-07 04:48:15  /tmp/bootstrap.sh.log
160K   2011-11-07 04:47:43  /tmp/bootstrap_cleanup.log
38M    2011-11-07 04:42:42  /tmp/cn_monitor.20111104-110308.log
4.0K   2011-11-07 04:38:47  /tmp/clustat.30913.log
4.0K   2011-11-07 04:38:47  /tmp/clustat_x.30913.log
```

```
4.0K   2011-11-07 04:38:03  /tmp/dcf_upgrade.sh.remove.log
4.0K   2011-11-07 04:38:03  /tmp/peer_update.log
4.0K   2011-11-07 04:38:02  /tmp/dcf_upgrade.log
4.0K   2011-11-07 04:38:02  /tmp/perl_mark_upgrade.log
8.0K   2011-11-07 04:13:42  /tmp/install_dcf_rpm.log
4.0K   2011-11-07 04:13:06  /tmp/00_cleanup.sh.1320667986.log
0      2011-11-07 04:13:06  /tmp/ccif_patch_4410_4450.sh.1320667986.log
4.0K   2011-11-07 04:13:06  /tmp/dcf-tools.sh.1320667986.log
0      2011-11-07 04:13:06  /tmp/initial.sh.1320667986.log
0      2011-11-07 04:13:06  /tmp/inventory.sh.1320667986.log
4.0K   2011-11-07 04:13:06  /tmp/qf-db.sh.1320667986.log
4.0K   2011-11-07 04:13:06  /tmp/sfc.sh.1320667986.log
8.0K   2011-11-07 04:13:05  /tmp/jinstall-qfabric.log
8.0K   2011-11-04 11:10:24  /tmp/mgd-init.1320430192.log
4.0K   2011-11-04 11:07:03  /tmp/mysql_dcf_db_install.log
8.0K   2011-11-04 10:55:07  /tmp/ccif_patch_4410_4450.sh.1320429307.log
8.0K   2011-11-04 10:55:07  /tmp/initial.sh.1320429307.log
4.0K   2011-11-04 10:55:07  /tmp/inventory.sh.1320429307.log
8.0K   2011-11-04 10:55:07  /tmp/sfc.sh.1320429307.log
4.0K   2011-11-04 10:54:09  /tmp/ks-script-Ax0tz5.log
4.0K   2011-11-07 04:13:06  /tmp//sfc.sh.1320667986.log
8.0K   2011-11-04 10:55:07  /tmp//sfc.sh.1320429307.log

Directory to delete:
45M    2011-11-08 10:57:43  /tmp/sfc-captures

List of files to delete:

         Size Date          Name
4.0K   2011-11-08 05:47:47  /tmp/5713.sfcauth
4.0K   2011-11-08 05:14:32  /tmp/14494.sfcauth
4.0K   2011-11-08 05:11:47  /tmp/9978.sfcauth
4.0K   2011-11-08 05:09:37  /tmp/6128.sfcauth
4.0K   2011-11-08 05:04:28  /tmp/29703.sfcauth
4.0K   2011-11-07 11:59:10  /tmp/7811.sfcauth
4.0K   2011-11-07 11:36:08  /tmp/32415.sfcauth
4.0K   2011-11-07 11:30:30  /tmp/22406.sfcauth
4.0K   2011-11-07 11:24:37  /tmp/12131.sfcauth
4.0K   2011-11-07 10:48:42  /tmp/12687.sfcauth
4.0K   2011-11-07 09:27:20  /tmp/31082.sfcauth
4.0K   2011-11-07 07:33:58  /tmp/14633.sfcauth
4.0K   2011-11-07 05:08:25  /tmp/15447.sfcauth
4.0K   2011-11-07 04:12:29  /tmp/26874.sfcauth
```

```
4.0K   2011-11-07 04:12:27  /tmp/26713.sfcauth
4.0K   2011-11-07 03:49:17  /tmp/17691.sfcauth
4.0K   2011-11-05 01:32:23  /tmp/5716.sfcauth
4.0K   2011-11-07 08:00:17  /tmp/sfcsnmpd.log
4.0K   2011-11-07 07:57:50  /tmp/cluster_cleanup.log
824K   2011-11-07 07:38:37  /tmp/cn_monitor.20111107-053643.log
4.0K   2011-11-07 07:36:30  /tmp/clustat.18399.log
4.0K   2011-11-07 07:36:30  /tmp/clustat_x.18399.log
4.0K   2011-11-07 07:35:47  /tmp/command_lock.log
4.0K   2011-11-07 05:39:54  /tmp/mgd-init.1320673194.log
92K    2011-11-07 05:19:25  /tmp/cn_monitor.20111107-050412.log
4.0K   2011-11-07 05:17:20  /tmp/clustat.30115.log
4.0K   2011-11-07 05:17:20  /tmp/clustat_x.30115.log
8.0K   2011-11-07 05:08:07  /tmp/mgd-init.1320671241.log
4.0K   2011-11-07 05:04:57  /tmp/cn_send.log
0      2011-11-07 05:04:52  /tmp/init_eth0.log
4.0K   2011-11-07 05:02:38  /tmp/install_interfaces.sh.log
4.0K   2011-11-07 05:01:19  /tmp/bootstrap.sh.log
160K   2011-11-07 05:00:47  /tmp/bootstrap_cleanup.log
28M    2011-11-07 04:42:27  /tmp/cn_monitor.20111104-112954.log
4.0K   2011-11-07 04:38:49  /tmp/clustat.6780.log
4.0K   2011-11-07 04:38:49  /tmp/clustat_x.6780.log
4.0K   2011-11-07 04:38:05  /tmp/issue_event.log
4.0K   2011-11-07 04:38:05  /tmp/peer_upgrade_reboot.log
12K    2011-11-07 04:38:05  /tmp/primary_update.log
4.0K   2011-11-07 04:38:04  /tmp/dcf_upgrade.sh.remove.log
4.0K   2011-11-07 04:38:04  /tmp/peer_rexec_upgrade.log
4.0K   2011-11-07 04:13:42  /tmp/peer_install_dcf_rpm.log
4.0K   2011-11-07 04:11:57  /tmp/dcf-tools.sh.1320667917.log
0      2011-11-07 04:11:57  /tmp/initial.sh.1320667917.log
0      2011-11-07 04:11:57  /tmp/inventory.sh.1320667917.log
4.0K   2011-11-07 04:11:57  /tmp/qf-db.sh.1320667917.log
4.0K   2011-11-07 04:11:57  /tmp/sfc.sh.1320667917.log
4.0K   2011-11-07 04:11:56  /tmp/00_cleanup.sh.1320667916.log
0      2011-11-07 04:11:56  /tmp/ccif_patch_4410_4450.sh.1320667916.log
8.0K   2011-11-07 04:11:56  /tmp/jinstall-qfabric.log
4.0K   2011-11-07 04:11:33  /tmp/dcf_upgrade.log
8.0K   2011-11-04 11:53:12  /tmp/mgd-init.1320432782.log
8.0K   2011-11-04 11:06:17  /tmp/ccif_patch_4410_4450.sh.1320429977.log
8.0K   2011-11-04 11:06:17  /tmp/initial.sh.1320429977.log
4.0K   2011-11-04 11:06:17  /tmp/inventory.sh.1320429977.log
8.0K   2011-11-04 11:06:17  /tmp/sfc.sh.1320429977.log
4.0K   2011-11-04 11:05:19  /tmp/ks-script-_tnWeb.log
```

```
4.0K   2011-11-07 04:11:57  /tmp//sfc.sh.1320667917.log
8.0K   2011-11-04 11:06:17  /tmp//sfc.sh.1320429977.log

Directory to delete:
49M    2011-11-08 10:45:20  /tmp/sfc-captures
```

request system storage cleanup infrastructure device-name (QFabric Systems)

```
user@switch> request system storage cleanup infrastructure FC
re0:
--------------------------------------------------------------------------

List of files to delete:

         Size Date         Name
   139B Nov  8 19:03 /var/log/default-log-messages.0.gz
  5602B Nov  8 19:03 /var/log/messages.0.gz
  28.4K Nov  8 10:15 /var/log/messages.1.gz
  35.2K Nov  7 13:45 /var/log/messages.2.gz
   207B Nov  7 16:02 /var/log/wtmp.0.gz
    27B Nov  7 12:14 /var/log/wtmp.1.gz
 184.4M Nov  7 12:16 /var/sw/pkg/jinstall-dc-re-11.3I20111104_1216_dc-builder-domestic-signed.tgz
 124.0K Nov  7 15:59 /var/tmp/gres-tp/env.dat
     0B Nov  7 12:57 /var/tmp/gres-tp/lock
   155B Nov  7 16:02 /var/tmp/krt_gencfg_filter.txt
     0B Nov  7 12:35 /var/tmp/last_ccif_update
  1217B Nov  7 12:15 /var/tmp/loader.conf.preinstall
 184.4M Nov  6 07:11 /var/tmp/mchassis-install.tgz
  10.8M Nov  7 12:16 /var/tmp/preinstall/bootstrap-install-11.3I20111104_1216_dc-builder.tar
  57.4K Nov  7 12:16 /var/tmp/preinstall/configs-11.3I20111104_1216_dc-builder.tgz
   259B Nov  7 12:16 /var/tmp/preinstall/install.conf
 734.3K Nov  4 13:46 /var/tmp/preinstall/jboot-dc-re-11.3I20111104_1216_dc-builder.tgz
 177.8M Nov  7 12:16 /var/tmp/preinstall/jbundle-dc-re-11.3I20111104_1216_dc-builder-domestic.tgz
   124B Nov  7 12:15 /var/tmp/preinstall/metatags
  1217B Nov  7 12:16 /var/tmp/preinstall_boot_loader.conf
     0B Nov  7 16:02 /var/tmp/rtsdb/if-rtsdb
```

request system storage cleanup interconnect-device device-name (QFabric Systems)

```
user@switch> request system storage cleanup interconnect IC
re1:
--------------------------------------------------------------------------

List of files to delete:

         Size Date         Name
    11B Nov  7 15:55 /var/jail/tmp/alarmd.ts
   128B Nov  8 19:06 /var/log/default-log-messages.0.gz
  9965B Nov  8 19:06 /var/log/messages.0.gz
  15.8K Nov  8 12:30 /var/log/messages.1.gz
  15.8K Nov  8 11:00 /var/log/messages.2.gz
  15.7K Nov  8 07:30 /var/log/messages.3.gz
  15.8K Nov  8 04:00 /var/log/messages.4.gz
  15.7K Nov  8 00:30 /var/log/messages.5.gz
  18.7K Nov  7 21:00 /var/log/messages.6.gz
  17.6K Nov  7 19:00 /var/log/messages.7.gz
  58.3K Nov  7 16:00 /var/log/messages.8.gz
  20.3K Nov  7 15:15 /var/log/messages.9.gz
    90B Nov  7 15:41 /var/log/wtmp.0.gz
    57B Nov  7 12:41 /var/log/wtmp.1.gz
 124.0K Nov  7 15:42 /var/tmp/gres-tp/env.dat
     0B Nov  7 12:40 /var/tmp/gres-tp/lock
     0B Nov  7 12:41 /var/tmp/if-rtsdb/env.lck
  12.0K Nov  7 15:41 /var/tmp/if-rtsdb/env.mem
 132.0K Nov  7 15:55 /var/tmp/if-rtsdb/shm_usr1.mem
2688.0K Nov  7 15:41 /var/tmp/if-rtsdb/shm_usr2.mem
2048.0K Nov  7 15:41 /var/tmp/if-rtsdb/trace.mem
   730B Nov  7 19:57 /var/tmp/juniper.conf+.gz
   155B Nov  7 15:53 /var/tmp/krt_gencfg_filter.txt
     0B Nov  7 15:41 /var/tmp/rtsdb/if-rtsdb

re0:
--------------------------------------------------------------------------

List of files to delete:

         Size Date         Name
    11B Nov  7 15:55 /var/jail/tmp/alarmd.ts
   121B Nov  8 19:06 /var/log/default-log-messages.0.gz
```

```
  16.7K Nov  8 19:06 /var/log/messages.0.gz
  22.2K Nov  8 17:45 /var/log/messages.1.gz
  K Nov  8 17:00 /var/log/messages.2.gz
  21.6K Nov  8 16:00 /var/log/messages.3.gz
  17.9K Nov  8 14:30 /var/log/messages.4.gz
  19.4K Nov  8 13:30 /var/log/messages.5.gz
  18.2K Nov  8 12:30 /var/log/messages.6.gz
  20.4K Nov  8 11:30 /var/log/messages.7.gz
  21.4K Nov  8 10:15 /var/log/messages.8.gz
  21.0K Nov  8 09:00 /var/log/messages.9.gz
  19.9K Nov  8 08:13 /var/log/snmp-traps.0.gz
   203B Nov  8 15:36 /var/log/wtmp.0.gz
    57B Nov  7 12:41 /var/log/wtmp.1.gz
 124.0K Nov  7 15:42 /var/tmp/gres-tp/env.dat
     0B Nov  7 12:40 /var/tmp/gres-tp/lock
     0B Nov  7 12:41 /var/tmp/if-rtsdb/env.lck
  12.0K Nov  7 15:41 /var/tmp/if-rtsdb/env.mem
 132.0K Nov  7 15:55 /var/tmp/if-rtsdb/shm_usr1.mem
2688.0K Nov  7 15:41 /var/tmp/if-rtsdb/shm_usr2.mem
2048.0K Nov  7 15:41 /var/tmp/if-rtsdb/trace.mem
   727B Nov  7 15:54 /var/tmp/juniper.conf+.gz
   155B Nov  7 15:55 /var/tmp/krt_gencfg_filter.txt
     0B Nov  7 15:41 /var/tmp/rtsdb/if-rtsdb
```

request system storage cleanup node-group group-name (QFabric Systems)

```
user@switch> request system storage cleanup node-group NW-NG
BBAK0372:
------------------------------------------------------------------------------

List of files to delete:

         Size Date         Name
   126B Nov  8 19:07 /var/log/default-log-messages.0.gz
   179B Nov  7 13:32 /var/log/install.0.gz
  22.9K Nov  8 19:07 /var/log/messages.0.gz
  26.5K Nov  8 17:30 /var/log/messages.1.gz
  20.5K Nov  8 13:15 /var/log/messages.2.gz
  33.2K Nov  7 17:45 /var/log/messages.3.gz
  35.5K Nov  7 15:45 /var/log/messages.4.gz
   339B Nov  8 17:10 /var/log/wtmp.0.gz
```

```
    58B Nov  7 12:40 /var/log/wtmp.1.gz
 124.0K Nov  8 17:08 /var/tmp/gres-tp/env.dat
     0B Nov  7 12:39 /var/tmp/gres-tp/lock
     0B Nov  7 12:59 /var/tmp/if-rtsdb/env.lck
  12.0K Nov  8 17:09 /var/tmp/if-rtsdb/env.mem
2688.0K Nov  8 17:09 /var/tmp/if-rtsdb/shm_usr1.mem
 132.0K Nov  8 17:09 /var/tmp/if-rtsdb/shm_usr2.mem
2048.0K Nov  8 17:09 /var/tmp/if-rtsdb/trace.mem
  1082B Nov  8 17:09 /var/tmp/juniper.conf+.gz
   155B Nov  7 17:39 /var/tmp/krt_gencfg_filter.txt
     0B Nov  8 17:09 /var/tmp/rtsdb/if-rtsdb

EE3093:
--------------------------------------------------------------------------

List of files to delete:

         Size Date         Name
    11B Nov  8 17:33 /var/jail/tmp/alarmd.ts
   119B Nov  8 19:08 /var/log/default-log-messages.0.gz
   180B Nov  7 17:41 /var/log/install.0.gz
   178B Nov  7 13:32 /var/log/install.1.gz
  2739B Nov  8 19:08 /var/log/messages.0.gz
  29.8K Nov  8 18:45 /var/log/messages.1.gz
  31.8K Nov  8 17:15 /var/log/messages.2.gz
  20.6K Nov  8 16:00 /var/log/messages.3.gz
  15.4K Nov  8 10:15 /var/log/messages.4.gz
  15.4K Nov  8 02:15 /var/log/messages.5.gz
  25.5K Nov  7 20:45 /var/log/messages.6.gz
  48.0K Nov  7 17:45 /var/log/messages.7.gz
  32.8K Nov  7 13:45 /var/log/messages.8.gz
   684B Nov  8 17:02 /var/log/wtmp.0.gz
    58B Nov  7 12:40 /var/log/wtmp.1.gz
 124.0K Nov  7 17:34 /var/tmp/gres-tp/env.dat
     0B Nov  7 12:40 /var/tmp/gres-tp/lock
     0B Nov  7 12:59 /var/tmp/if-rtsdb/env.lck
  12.0K Nov  7 17:39 /var/tmp/if-rtsdb/env.mem
2688.0K Nov  7 17:39 /var/tmp/if-rtsdb/shm_usr1.mem
 132.0K Nov  7 17:40 /var/tmp/if-rtsdb/shm_usr2.mem
2048.0K Nov  7 17:39 /var/tmp/if-rtsdb/trace.mem
   155B Nov  7 17:40 /var/tmp/krt_gencfg_filter.txt
     0B Nov  7 17:39 /var/tmp/rtsdb/if-rtsdb
```

request system storage cleanup qfabric component device-name (QFabric Systems)

```
user@switch> request system storage cleanup qfabric component Test
Repository type: regular
Repository head: /pbstorage
Creating list of debug artifacts to be removed under: /pbstorage/rdumps/Test
Removing debug artifacts ... (press control C to abort)
Removing /pbstorage/rdumps/Test/cosd.core.0.0.05162011123308.gz ... done
Removing /pbstorage/rdumps/Test/cosd.core.1.0.05162011123614.gz ... done
Removing /pbstorage/rdumps/Test/cosd.core.2.0.05162011123920.gz ... done
Removing /pbstorage/rdumps/Test/livekcore.05132011163930.gz ... done
Removing /pbstorage/rdumps/Test/tnetd.core.0.1057.05162011124500.gz ... done
Removing /pbstorage/rdumps/Test/vmcore.05132011120528.gz ... done
Removing /pbstorage/rdumps/Test/vmcore.kz ... done
Creating list of debug artifacts to be removed under: /pbstorage/rlogs/Test
Removing debug artifacts ... (press control C to abort)
Removing /pbstorage/rlogs/Test/kdumpinfo.05132011120528 ... done
Removing /pbstorage/rlogs/Test/kernel.tarball.0.1039.05122011234415.tgz ... done
Removing /pbstorage/rlogs/Test/kernel.tarball.1.1039.05132011175544.tgz ... done
Removing /pbstorage/rlogs/Test/tnetd.tarball.0.1057.05162011175453.tgz ... done
```

request system storage cleanup qfabric component device-name repository core (QFabric Systems)

```
user@switch> request system storage cleanup qfabric component Test repository core
Repository scope: shared
Repository head: /pbdata/export
Repository name: core
Creating list of debug artifacts to be removed under: /pbdata/export/rdumps/Test
NOTE: core repository under /pbdata/export/rdumps/Test empty
```

request system storage cleanup qfabric component all (QFabric Systems)

```
user@switch> request system storage cleanup qfabric component all
Repository scope: shared
Repository head: /pbdata/export
Creating list of debug artifacts to be removed under: /pbdata/export/rdumps
NOTE: core repository under /pbdata/export/rdumps/all empty
Creating list of debug artifacts to be removed under: /pbdata/export/rlogs
```

```
List of debug artifacts to clean up ... (press control C to abort)
/pbdata/export/rlogs/73747cd8-0710-11e1-b6a4-00e081c5297e/install-11072011125819.log
/pbdata/export/rlogs/77116f18-0710-11e1-a2a0-00e081c5297e/install-11072011125819.log
/pbdata/export/rlogs/BBAK0372/install-11072011121538.log
/pbdata/export/rlogs/BBAK0394/install-11072011121532.log
/pbdata/export/rlogs/EE3093/install-11072011121536.log
/pbdata/export/rlogs/WS001/YN5999/install-11072011121644.log
/pbdata/export/rlogs/WS001/YW3803/install-11072011122429.log
/pbdata/export/rlogs/cd78871a-0710-11e1-878e-00e081c5297e/install-11072011125932.log
/pbdata/export/rlogs/d0afda1e-0710-11e1-a1d0-00e081c5297e/install-11072011125930.log
/pbdata/export/rlogs/d0afda1e-0710-11e1-a1d0-00e081c5297e/install-11072011133211.log
/pbdata/export/rlogs/d0afda1e-0710-11e1-a1d0-00e081c5297e/install-11072011155302.log
/pbdata/export/rlogs/d31ab7a6-0710-11e1-ad1b-00e081c5297e/install-11072011125931.log
/pbdata/export/rlogs/d4d0f254-0710-11e1-90c3-00e081c5297e/install-11072011125932.log
```

Release Information

Command introduced in Junos OS Release 7.4.

`dry-run` option introduced in Junos OS Release 7.6.

`satellite` option introduced in Junos OS Release 14.2R3.

`no-confirm` and `(re0 |re1 | routing-engine (backup | both | local | master | other))` options introduced in Junos OS 17.3R1.

request system storage cleanup (SRX Series)

IN THIS SECTION

Syntax

```
request system storage cleanup <dry-run>
```

Description

Use this command to free storage space on the device by rotating log files and proposing a list of files for deletion.

Options

dry-run (Optional) List files proposed for deletion (without deleting them).

Additional Information

If logging is configured and being used, the `dry-run` option rotates the log files. In that case, the output displays the message “Currently rotating log files, please wait.” If no logging is currently under way, the output displays only a list of files to delete.

Required Privilege Level

maintenance

Output Fields

Table 36 on page 815 describes the output fields for the `request system storage cleanup` command. Output fields are listed in the approximate order in which they appear.

Table 36: request system storage cleanup Output Fields

Field Name	Field Description
`List of files to delete:`	Shows list of files available for deletion.
`Size`	Size of the core-dump file.
`Date`	Last core-dump file modification date and time.
`Name`	Name of the core-dump file.

Sample Output

request system storage cleanup dry-run

```
user@host> request system storage cleanup dry-run
List of files to delete:

         Size Date         Name
    11B Jul 14 22:51 /var/jail/tmp/alarmd.ts
  84.3K Jul 20 22:09 /var/log/chassisd.0.gz
  83.0K Jul 20 04:35 /var/log/chassisd.1.gz
  84.0K Jul 19 10:52 /var/log/chassisd.2.gz
  90.4K Jul 18 17:16 /var/log/chassisd.3.gz
  91.8K Jul 20 04:30 /var/log/hostlogs/auth.log.1.gz
  93.1K Jul 17 05:45 /var/log/hostlogs/auth.log.2.gz
  97.6K Jun  7 01:30 /var/log/hostlogs/auth.log.3.gz
  92.0K Apr 25 15:15 /var/log/hostlogs/auth.log.4.gz
  78.0K Jul 21 05:44 /var/log/hostlogs/daemon.log.1.gz
  78.6K Jul 21 02:59 /var/log/hostlogs/daemon.log.2.gz
```

```
 78.5K Jul 21 00:14 /var/log/hostlogs/daemon.log.3.gz
 78.8K Jul 20 21:30 /var/log/hostlogs/daemon.log.4.gz
 58.7K Jul 21 05:14 /var/log/hostlogs/debug.1.gz
 58.5K Jul 21 00:59 /var/log/hostlogs/debug.2.gz
 58.7K Jul 20 20:44 /var/log/hostlogs/debug.3.gz
 58.7K Jul 20 16:29 /var/log/hostlogs/debug.4.gz
166.9K Jul 13 00:33 /var/log/hostlogs/kern.log.1.gz
166.5K Jun  1 02:32 /var/log/hostlogs/kern.log.2.gz
163.5K May  5 00:03 /var/log/hostlogs/kern.log.3.gz
152.3K Mar  2 23:23 /var/log/hostlogs/kern.log.4.gz
260.0K Apr 13 10:28 /var/log/hostlogs/lcmd.log.1.gz
257.3K Mar  7 00:38 /var/log/hostlogs/lcmd.log.2.gz
240.8K Feb  7 19:45 /var/log/hostlogs/lcmd.log.3.gz
241.1K Feb  7 14:00 /var/log/hostlogs/lcmd.log.4.gz
370.6K Jul 21 00:45 /var/log/hostlogs/syslog.1.gz
370.9K Jul 20 12:30 /var/log/hostlogs/syslog.2.gz
370.4K Jul 20 00:15 /var/log/hostlogs/syslog.3.gz
370.2K Jul 19 12:00 /var/log/hostlogs/syslog.4.gz
 55.0K Jul 14 22:50 /var/log/hostlogs/vjunos0.log.1.gz
 1467B Oct 28  2015 /var/log/install.0.gz
119.9K Jul 21 07:37 /var/log/messages.0.gz
147.4K May 27 01:30 /var/log/messages.1.gz
 71.4K Apr 14 11:19 /var/log/messages.2.gz
 90.7K Feb 28 14:15 /var/log/messages.3.gz
 10.1K Jan 12  2016 /var/log/messages.4.gz
 55.1K Jan  6  2016 /var/log/messages.5.gz
 81.5K Dec  1  2015 /var/log/messages.6.gz
 43.3K Oct 28  2015 /var/log/messages.7.gz
 54.8K Oct 20  2015 /var/log/messages.8.gz
 35.8K Oct 19  2015 /var/log/messages.9.gz
 12.4K Jul 21 07:37 /var/log/security.0.gz
 59.4K Jul 19 01:30 /var/log/security.1.gz
 51.8K Apr 25 10:00 /var/log/security.2.gz
 43.6K Apr 14 11:19 /var/log/security.3.gz
 52.7K Apr  5 02:15 /var/log/security.4.gz
 54.4K Mar 25 17:15 /var/log/security.5.gz
 51.9K Mar 16 05:15 /var/log/security.6.gz
 52.0K Mar  5 02:15 /var/log/security.7.gz
 53.4K Feb 22 22:15 /var/log/security.8.gz
 55.6K Feb 13 13:00 /var/log/security.9.gz
 4063B Jul 14 22:51 /var/tmp/cleanup-pkgs.log
    0B Jul 14 22:51 /var/tmp/eedebug_bin_file
 50.9K Feb  8 20:33 /var/tmp/event_tags.php
```

```
    34B Jul 14 22:51 /var/tmp/gksdchk.log
 124.0K Apr 26 06:12 /var/tmp/gres-tp/env.dat
     0B Oct  9  2015 /var/tmp/gres-tp/lock
     4B Jul 14 22:52 /var/tmp/idp_license_info
    46B Jul 14 22:51 /var/tmp/kmdchk.log
    57B Jul 14 22:51 /var/tmp/krt_rpf_filter.txt
    30B Jul 14 22:53 /var/tmp/policy_status
     0B Jul 14 22:51 /var/tmp/rtsdb/if-rtsdb
   349B Jul 14 22:51 /var/tmp/sd-upgrade/debug_log
     0B Oct  9  2015 /var/tmp/spu_kmd_init
    53B Feb  7 23:11 /var/tmp/vjunos-install.log
     0B Jul 14 22:51 /var/tmp/vpn_tunnel_orig.id
```

request system storage cleanup

```
user@host> request system storage cleanup
List of files to delete:

         Size Date         Name
    11B Oct 28 23:40 /var/jail/tmp/alarmd.ts
  92.4K Jan 11 17:12 /var/log/chassisd.0.gz
  92.4K Jan 11 06:06 /var/log/chassisd.1.gz
  92.5K Jan 10 19:00 /var/log/chassisd.2.gz
  92.5K Jan 10 07:53 /var/log/chassisd.3.gz
  92.2K Jan 10 15:00 /var/log/hostlogs/auth.log.1.gz
  92.2K Jan  1 18:45 /var/log/hostlogs/auth.log.2.gz
  92.1K Jan  4 17:30 /var/log/hostlogs/auth.log.3.gz
  92.2K Jan  1 18:45 /var/log/hostlogs/auth.log.4.gz
  79.0K Jan 12 01:59 /var/log/hostlogs/daemon.log.1.gz
  78.8K Jan 11 23:15 /var/log/hostlogs/daemon.log.2.gz
  78.7K Jan 11 20:30 /var/log/hostlogs/daemon.log.3.gz
  79.1K Jan 11 17:44 /var/log/hostlogs/daemon.log.4.gz
  59.1K Jan 11 21:59 /var/log/hostlogs/debug.1.gz
  59.2K Jan 11 17:44 /var/log/hostlogs/debug.2.gz
  59.2K Jan 11 13:29 /var/log/hostlogs/debug.3.gz
  59.3K Jan 11 09:14 /var/log/hostlogs/debug.4.gz
 186.6K Oct 20 16:31 /var/log/hostlogs/kern.log.1.gz
 238.3K Jan 11 23:15 /var/log/hostlogs/lcmd.log.1.gz
 238.4K Jan 11 17:30 /var/log/hostlogs/lcmd.log.2.gz
 238.6K Jan 11 11:45 /var/log/hostlogs/lcmd.log.3.gz
 238.5K Jan 11 06:00 /var/log/hostlogs/lcmd.log.4.gz
```

```
  372.5K Jan 11 17:00 /var/log/hostlogs/syslog.1.gz
  372.5K Jan 11 04:45 /var/log/hostlogs/syslog.2.gz
  371.9K Jan 10 16:30 /var/log/hostlogs/syslog.3.gz
  372.7K Jan 10 04:15 /var/log/hostlogs/syslog.4.gz
   10.1K Jan 12 02:03 /var/log/messages.0.gz
   55.1K Jan  6 21:25 /var/log/messages.1.gz
   81.5K Dec  1 21:30 /var/log/messages.2.gz


Delete these files ? [yes,no] (no)
```

Release Information

Command introduced in Junos OS Release 9.2.

RELATED DOCUMENTATION

- Cleaning Up Files with the CLI

request system zeroize (Junos OS)

IN THIS SECTION

Syntax

```
request system zeroize
<media>
<local>
```

Description

Use this command to remove all configuration information on the Routing Engines and reset all key values on the device where you run the command.

- If the device has dual Routing Engines, the command is broadcast to all Routing Engines on the device.
- In a Virtual Chassis or Virtual Chassis Fabric (VCF) composed of EX Series switches (except EX8200 Virtual Chassis) or QFX Series switches, this command operates only on the member switch where you run the command, even if that switch is in the primary Routing Engine role. The command is not forwarded to the backup Routing Engine member or to member switches in the line-card role. To apply this command to more than one member of an EX Series or QFX Series Virtual Chassis or VCF, we recommend you remove and disconnect each of those members from the Virtual Chassis or VCF, and then run the command on each isolated switch individually.

This command removes all data files, including customized configuration and log files, by unlinking the files from their directories. The command removes all user-created files from the system, including all plain-text passwords, secrets, and private keys for SSH, local encryption, local authentication, IPsec, RADIUS, TACACS+, and SNMP.

This command reboots the device and sets it to the factory default configuration. After the reboot, you cannot access the device through the management Ethernet interface. Log in through the console as `root` and start the Junos OS CLI by typing `cli` at the prompt.

If the configuration contains the `commit synchronize` statement at the `[edit system]` hierarchy level, and you issue a `commit` in the primary Routing Engine, the primary configuration is automatically synchronized with the backup. If the backup Routing Engine is down when you issue the `commit`, the Junos OS displays a warning and commits the candidate configuration in the primary Routing Engine. When the backup Routing Engine comes up, its configuration will automatically be synchronized with the primary. A newly inserted backup Routing Engine or a Routing Engine that comes up after running the `request system zeroize` command also automatically synchronizes its configuration with the primary Routing Engine configuration.

Starting with Junos OS Release 15.1F3, the `request system zeroize` command removes all configuration information on the guest OS for the PTX5000 router with RE-DUO-C2600-16G, and MX240, MX480, and MX960 with RE-S-1800X4-32G-S.

Starting with Junos OS Release 15.1F5, the `request system zeroize` command removes all configuration information on the guest OS for the MX2010 and MX2020 with REMX2K-1800-32G-S.

On these routers, in order to remove all configuration information on both guest OS and host OS, use the `request vmhost zeroize` command.

To completely erase user-created data so that it is unrecoverable, use the `media` option.

Options

media (Optional) In addition to removing all configuration and log files, causes memory and the media to be scrubbed, removing all traces of any user-created files. Every storage device attached to the system is scrubbed, including disks, flash drives, removable USBs, and so on. The duration of the scrubbing process is dependent on the size of the media being erased. As a result, the `request system zeroize media` operation can take considerably more time than the `request system zeroize` operation. However, the critical security parameters are all removed at the beginning of the process.

On QFX Series platforms running Junos OS Release 14.1X53 or earlier, the `media` option is not available. On QFX Series platforms running releases later than Junos OS Release 14.1X53 that do not have the upgraded FreeBSD kernel (10+), the `media` option is available, but if you use it, the system will issue a warning that the `media` option is not supported and will continue with the zeroize operation. On platforms that are not QFX Series platforms, the `media` option is not available in Junos OS Release 17.2 or later with Junos with upgraded FreeBSD.

local (Optional) Remove all the configuration information and restore all the key values on the active Routing Engine.

CAUTION: The `local` option is not available on devices that run Junos OS Evolved, so if you execute `request system zeroize` on those devices and they have dual Routing Engines, all Routing Engines on the local chassis are rebooted. See the Junos® OS Evolved Software Installation and Upgrade Guide.

Specifying this option has no effect on switches in a Virtual Chassis or VCF composed of EX Series switches (except EX8200 Virtual Chassis) or QFX switches, because in these configurations, the `request system zeroize` command only operates locally by default.

Required Privilege Level

maintenance

Sample Output

request system zeroize

```
user@host> request system zeroize
warning: System will be rebooted and may not boot without configuration
Erase all data, including configuration and log files? [yes,no] (no) yes


0 1 1 0 0 0 done

syncing disks... All buffers synced.
Uptime: 5d19h20m26s
recorded reboot as normal shutdown
Rebooting...

U-Boot 1.1.6 (Mar 11 2011 - 04:39:06)

Board: EX4200-24T 2.11
EPLD:  Version 6.0 (0x85)
DRAM:  Initializing (1024 MB)
FLASH: 8 MB

Firmware Version: --- 01.00.00 ---
USB:   scanning bus for devices... 2 USB Device(s) found
       scanning bus for storage devices... 1 Storage Device(s) found

ELF file is 32 bit
Consoles: U-Boot console

FreeBSD/PowerPC U-Boot bootstrap loader, Revision 2.4
(user@device.example.net, Fri Mar 11 03:03:36 UTC 2011)
Memory: 1024MB
bootsequencing is enabled
bootsuccess is set
```

```
new boot device = disk0s1:
Loading /boot/defaults/loader.conf
/kernel data=0x915c84+0xa1260 syms=[0x4+0x7cbd0+0x4+0xb1c19]


Hit [Enter] to boot immediately, or space bar for command prompt.
Booting [/kernel]...
Kernel entry at 0x800000e0 ...
GDB: no debug ports present
KDB: debugger backends: ddb
KDB: current backend: ddb
Copyright (c) 1996-2011, Juniper Networks, Inc.
All rights reserved.
Copyright (c) 1992-2006 The FreeBSD Project.
Copyright (c) 1979, 1980, 1983, 1986, 1988, 1989, 1991, 1992, 1993, 1994
        The Regents of the University of California. All rights reserved.
JUNOS 11.1R1.8 #0: 2011-03-09 20:14:25 UTC
    user@device.example.net:/volume/build/junos/11.1/release/11.1R1.8/obj-powerpc/bsd/kernels/
        JUNIPER-EX/kernel
Timecounter "decrementer" frequency 50000000 Hz quality 0
cpu0: Freescale e500v2 core revision 2.2
cpu0: HID0 80004080
...
```

Release Information

Command introduced before Junos OS Release 9.0.

Option `media` added in Junos OS Release 11.4 for EX Series switches.

Option `local` added in Junos OS Release 14.1.

RELATED DOCUMENTATION

request system snapshot (Junos OS with FreeBSD Prior to Release 10) | **721**

Reverting to the Default Factory Configuration for the EX Series Switch

Reverting to the Rescue Configuration for the EX Series Switch

Reverting to the Default Factory Configuration

Reverting to the Rescue Configuration

Reverting to the Default Factory Configuration by Using the request system zeroize Command

rollback

IN THIS SECTION

Syntax

```
rollback <number | rescue | revision revision-string>
```

Description

Return to a previously committed configuration. The software saves the last 50 committed configurations, including the rollback number, date, time, and name of the user who issued the `commit` configuration command.

The currently operational configuration is stored in the file **juniper.conf**, and the last three committed configurations are stored in the files **juniper.conf.1**, **juniper.conf.2**, and **juniper.conf.3**. These four files are located in the directory **/config**, which is on the router's flash drive. The remaining 46 previous committed configurations, the files **juniper.conf.4** through **juniper.conf.49**, are stored in the directory **/var/db/config**, which is on the router's hard disk.

During rollback, the configuration you specify is loaded from the associated file. Only objects in the rollback configuration that differ from the previously loaded configuration are marked as changed (equivalent to `load update`).

Options

none	(Optional) Return to the most recently saved configuration.
number	(Optional) Configuration to return to. The range of values is from 0 through 49. The most recently saved configuration is number 0, and the oldest saved configuration is number 49. The default is 0.
rescue	(Optional) Return to the rescue configuration.
revision ***revision-string***	(Option) Use a configuration revision identifier to rollback to a specific configuration. Use the *show system commit include-configuration-revision* command to view the configuration revision identifier for each revision.

Required Privilege Level

rollback—To roll back to configurations other than the one most recently committed.

Release Information

Command introduced before Junos OS Release 7.4.

Option `revision` introduced in Junos OS Release 20.4R1 and Junos OS Evolved Release 20.4R1.

show app-engine crash

IN THIS SECTION

Syntax

```
show app-engine crash
<compute-cluster compute-cluster-name>
<compute-cluster compute-cluster-name compute-node compute-node-name>
```

Description

Displays information regarding crashes on the Junos V App Engine or host OS. The command displays the list of files present in the **/var/crash/** directory, as well as some core files located in the **/var/tmp/** directory.

Options

- `compute-cluster` *`compute-cluster-name`* `compute-node` *`compute-node-name`*—Name of the compute cluster and compute node. On QFX switches with a host OS, the default compute cluster and compute node names are default-cluster and default-node, and the command applies to the host OS by default.

Additional Information

In the operational mode of the CLI when you type **?** for a name, for example a compute-node name, you would expect to get a list of available compute nodes plus the option to type in a name not listed. This is the auto-complete feature in the CLI. However, in JunosV App Engine, ,if you specify compute cluster and compute node in the operational command, the auto-complete works only if the compute cluster is put before the compute node.

For commands with an optional `compute-cluster` *`compute-cluster-name`* option, if that option is omitted, the command will be executed on all compute nodes of all compute clusters. For commands with an optional `compute-node` *`compute-node-name`* option, if that option is omitted, the command will be executed on all compute nodes of the specified compute cluster.

Required Privilege Level

view

Output Fields

For a description of the output fields, see Table 37 on page 826. Output fields are listed in the approximate order in which they appear.

Table 37: show app-engine crash Output Fields

Field Name	Field Description
`Compute Cluster`	Name of compute cluster.
`Compute Node`	Name of compute node.
`Crash Info`	List of core files.

Sample Output

show app-engine crash (QFX5100 Switches)

```
user@host> show app-engine crash

Compute cluster: default-cluster

  Compute node: default-node
```

```
Crash Info
==========
total 0
```

Release Information

Command introduced in Junos OS Release 13.2X51-D15.

RELATED DOCUMENTATION

request app-engine file-copy (crash | log) from-jhost to-vjunos | 659

show app-engine logs

IN THIS SECTION

Syntax

```
show app-engine logs
<compute-cluster compute-cluster-name>
<compute-cluster compute-cluster-name compute-node compute-node-name>
```

Description

Displays log files regarding the state of the specified Guest VM or host OS, located in the **/var/log/** directory.

Options

- `compute-cluster` *`compute-cluster-name`* `compute-node` *`compute-node-name`*—Name of the compute cluster and name of the compute node. On QFX switches with a host OS, the default compute cluster and compute node names are default-cluster and default-node, and the command applies to the host OS by default.

Additional Information

In the operational mode of the CLI when you type **?** for a name, for example a compute-node name, you would expect to get a list of available compute nodes plus the option to type in a name not listed. This is the auto-complete feature in the CLI. However, in JunosV App Engine, if you specify compute cluster and compute node in the operational command, the auto-complete works only if the compute cluster is put before the compute node.

For commands with an optional `compute-cluster` *`compute-cluster-name`* option, if that option is omitted, the command will be executed on all compute nodes of all compute clusters. For commands with an optional `compute-node` *`compute-node-name`* option, if that option is omitted, the command will be executed on all compute nodes of the specified compute cluster.

Required Privilege Level

view

Output Fields

For a description of the output fields, see Table 38 on page 829. Output fields are listed in the approximate order in which they appear.

Table 38: show app-engine logs Output Fields

Field Name	Field Description
Compute Cluster	Name of compute cluster.
Compute Node	Name of compute node.
Logs Info	List of log files.

Sample Output

show app-engine logs (QFX5100 Switches)

```
user@host> show app-engine logs
Compute cluster: default-cluster

  Compute node: default-node

   Logs Info
   =========
   total 1012
   drwxr-xr-x 2 root root   4096 Feb  2 13:53 audit
   -rw-r--r-- 1 root root      0 Feb  2 13:59 named.log
   -rw-r--r-- 1 root root      0 Feb  2 15:30 btmp
```

```
drwxr-xr-x 2 root root   4096 Feb  2 17:11 ntpstats
-rw------- 1 root root      0 Feb  2 17:27 tallylog
drwxr-xr-x 2 root root   4096 Feb  7 10:10 stap-server
-rw------- 1 root root      0 Feb  7 10:16 spooler
-rw------- 1 root root      0 Feb  7 10:16 maillog
-rw------- 1 root root      0 Feb  7 10:16 boot.log
drwxr-xr-x 5 root root   4096 Feb  7 10:16 libvirt
drwxr-x--- 2 root root   4096 Feb  7 10:16 watchdog
-rw-r--r-- 1 root root  41693 Feb 10 04:27 dmesg.old
drwxr-xr-x 2 root root   4096 Feb 10 04:30 sa
-rw-r--r-- 1 root root  41693 Feb 10 09:35 dmesg
-rw-rw-r-- 1 root root   1193 Feb 10 09:47 vjunos_install_log
-rw-rw-r-- 1 root utmp 141312 Feb 10 10:08 wtmp
-rw------- 1 root root  25514 Feb 10 10:08 secure
-rw-r--r-- 1 root root    292 Feb 10 10:08 lastlog
-rw------- 1 root root 338593 Feb 10 10:17
cron
-rw-r--r-- 1 root root 383229 Feb 10 10:17 messages
```

Release Information

Command introduced in Junos OS Release 13.2X51-D15.

RELATED DOCUMENTATION

request app-engine file-copy (crash | log) from-jhost to-vjunos | 659

show chassis usb storage

IN THIS SECTION

Syntax

```
show chassis usb storage
```

Description

This command displays the current status of any USB storage device and whether the USB ports are enabled or disabled.

Required Privilege Level

view

Sample Output

show chassis hardware detail

```
user@host> show chassis hardware detail
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                BV4911AA0005      SRX240H2-POE
Routing Engine   REV 01   750-043613   AAEC1923          RE-SRX240H2-POE
  usb0 (addr 1)  DWC OTG root hub 0    vendor 0x0000     uhub0
  usb0 (addr 2)  product 0x005a 90     vendor 0x0409     uhub1
  usb0 (addr 3)  ST72682  High Speed Mode 64218 STMicroelectronics umass0
```

```
  usb0 (addr 4)  Mass Storage Device 4096 JetFlash       umass1
FPC 0                                                    FPC
  PIC 0                                                  16x GE Base PIC
Power Supply 0
```

show chassis usb storage

```
user@host> show chassis usb storage
USB Disabled
```

Release Information

Command introduced in Junos OS Release 11.4 R2.

RELATED DOCUMENTATION

- Installing Junos OS on SRX Series Firewalls Using a USB Flash Drive | 268

show system autoinstallation status

IN THIS SECTION

Syntax

```
show system autoinstallation status
```

Description

This command displays autoinstallation status information (ACX Series routers, and EX Series switches only).

Options

This command has no options.

Required Privilege Level

view

Output Fields

Table 39 on page 834 describes the output fields for the `show system autoinstallation status` command. Output fields are listed in the approximate order in which they appear.

Table 39: show system autoinstallation status Output Fields

Field Name	Field Description

`Autoinstallation status`	Display autoinstallation status information:
	• `Last committed file`—File last committed for autoinstallation configuration.
	• `Configuration server of last committed file`—IP address or URL of the server configured to retrieve configuration information for the last committed configuration file.
	• `Interface`—Interface configured for autoinstallation.
	  • `Name`—Name of the interface.
	  • `State`—Interface state.
	• `Address acquisition`—Display IP address acquired and protocol used for acquisition upon startup.
	  • `Protocol`—Protocol used for acquisition: BOOTP/DHCP or RARP.
	  • `Acquired address`—IP address acquired from the DHCP server.

Sample Output

show system autoinstallation status

```
user@host> show system autoinstallation status
Autoinstallation status:
Master state: Active
Last committed file: None
Configuration server of last committed file: 10.0.0.0
Interface:
  Name: ge-0/0/1
  State: None
  Address acquisition:
    Protocol: DHCP Client
    Acquired address: None
```

```
    Protocol: RARP Client
    Acquired address: None
```

Release Information

Command introduced before Junos OS Release 7.4.

Command supported in Junos OS Release 12.2 for ACX Series Universal Metro Routers.

RELATED DOCUMENTATION

- ACX Series Autoinstallation Overview | 569
- Before You Begin Autoinstallation on an ACX Series Universal Metro Router | 571
- Autoinstallation Configuration of ACX Series Universal Metro Routers | 572
- USB Autoinstallation on ACX Series Routers | 574
- Verifying Autoinstallation on ACX Series Universal Metro Routers | 573
- *autoinstallation*

show system autorecovery state

IN THIS SECTION

Syntax

```
show system autorecovery state
```

Description

This command perform checks and show status of all autorecovered items.

In devices running FreeBSD Release 12 or later, you cannot back up data with the autorecovery feature. Instead, back up data using snapshots. To learn if your device is running FreeBSD Release 12 or later, issue the `show version` command and look for the `fbsd_builder_stable` string in the module names. If the string includes the number 12 or later, your device is running FreeBSD Release 12 or later.

Required Privilege Level

view

Output Fields

Table 40 on page 836 lists the output fields for the `show system autorecovery state` command. Output fields are listed in the approximate order in which they appear.

Table 40: show system autorecovery state Output Fields

Field Name	Field Description
`File`	The name of the file on which autorecovery checks are performed.
`Slice`	The disk partition on which autorecovery checks are performed.
`Recovery Information`	Indicates whether autorecovery information for the file or slice has been saved.

Table 40: show system autorecovery state Output Fields *(Continued)*

Field Name	Field Description
`Integrity Check`	Displays the status of the file's integrity check (passed or failed).
`Action / Status`	Displays the status of the item, or the action required to be taken for that item.

Sample Output

show system autorecovery state

```
user@host> show system autorecovery state

Configuration:
File             Recovery Information    Integrity Check    Action / Status
rescue.conf.gz   Saved                   Passed             None
Licenses:
File             Recovery Information    Integrity Check    Action / Status
JUNOS282736.lic  Saved                   Passed             None
JUNOS282737.lic  Not Saved               Not checked        Requires save
BSD Labels:
Slice            Recovery Information    Integrity Check    Action / Status
s1               Saved                   Passed             None
s2               Saved                   Passed             None
s3               Saved                   Passed             None
s4               Saved                   Passed             None
```

Release Information

Command introduced in Junos OS Release 15.1X49-D35.

RELATED DOCUMENTATION

request system autorecovery state | 661

show system boot-messages

IN THIS SECTION

Syntax

```
show system boot-messages
```

Syntax (EX Series Switches)

```
show system boot-messages
<all-members>
```

```
<local>
<member member-id>
```

Syntax (TX Matrix Router)

```
show system boot-messages
<all-chassis | all-lcc | lcc number | scc>
```

Syntax (TX Matrix Plus Router)

```
show system boot-messages
<all-chassis | all-lcc | lcc number | sfc number>
```

Syntax (MX Series Router)

```
show system boot-messages
<all-members>
<local>
<member member-id>
```

Syntax (QFX Series)

```
show system boot-messages
infrastructure name | interconnect-device name | node-group name
```

Description

This command displays initial messages generated by the system kernel upon startup. These messages are the contents of **/var/run/dmesg.boot**.

Options

none — Display all boot time messages.

all-chassis — (TX Matrix routers and TX Matrix Plus routers only) (Optional) Display boot time messages for all of the chassis.

all-lcc — (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display boot time messages for all T640 routers connected to a TX Matrix router. On a TX Matrix Plus router, display boot time messages for all connected T1600 or T4000 LCCs.

all-members — (EX4200 switches and MX Series routers only) (Optional) Display boot time messages on all members of the Virtual Chassis configuration.

infrastructure *name* — (QFabric systems only) (Optional) Display boot time messages on the fabric control Routing Engine or fabric manager Routing engines.

interconnect-device *name* — (QFabric systems only) (Optional) Display boot time messages on the Interconnect device.

lcc *number* — (TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display boot time messages for a specific T640 router connected to a TX Matrix router. On a TX Matrix Plus router, display boot time messages for a specific router connected to a TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local	(EX4200 switches and MX Series routers only) (Optional) Display boot time messages on the local Virtual Chassis member.
member *member-id*	(EX4200 switches and MX Series routers only) (Optional) Display boot time messages on the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.
node-group *name*	(QFabric systems only) (Optional) Display boot time messages on the Node group.
scc	(TX Matrix routers only) (Optional) Display boot time messages for the TX Matrix router (or switch-card chassis).
sfc *number*	(TX Matrix Plus routers only) (Optional) Display boot time messages for the TX Matrix Plus router. Replace *number* with 0.

Additional Information

By default, when you issue the `show system boot-messages` command on the primary Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the primary Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

Required Privilege Level

view

Sample Output

show system boot-messages (TX Matrix Router)

```
user@host> show system boot-messages
Copyright (c) 1992-1998 FreeBSD Inc.
Copyright (c) 1996-2000 Juniper Networks, Inc.
All rights reserved.
Copyright (c) 1982, 1986, 1989, 1991, 1993
        The Regents of the University of California.  All rights reserved.

JUNOS 4.1-20000216-Zf8469 #0: 2000-02-16 12:57:28 UTC
    builder@device1.example.com:/p/build/20000216-0905/4.1/release_kernel/sys/compil
e/GENERIC
CPU: Pentium Pro (332.55-MHz 686-class CPU)
  Origin = "GenuineIntel"  Id = 0x66a  Stepping=10
  Features=0x183f9ff<FPU,VME,DE,PSE,TSC,MSR,PAE,MCE,CX8,SEP,MTRR,PGE,MCA,CMOV,<b
16>,<b17>,MMX,<b24>>
Teknor CPU Card Recognized
real memory  = 805306368 (786432K bytes)
avail memory = 786280448 (767852K bytes)
Probing for devices on PCI bus 0:
chip0 <generic PCI bridge (vendor=8086 device=7192 subclass=0)> rev 3 class 6000
0 on pci0:0:0
chip1 <Intel 82371AB PCI-ISA bridge> rev 1 class 60100 on pci0:7:0
chip2 <Intel 82371AB IDE interface> rev 1 class 10180 on pci0:7:1
chip3 <Intel 82371AB USB interface> rev 1 class c0300 int d irq 11 on pci0:7:2
smb0 <Intel 82371AB SMB controller> rev 1 class 68000 on pci0:7:3
pcic0 <TI PCI-1131 PCI-CardBus Bridge> rev 1 class 60700 int a irq 15 on pci0:13
:0
TI1131 PCI Config Reg: [pci only][FUNC0 pci int]
pcic1 <TI PCI-1131 PCI-CardBus Bridge> rev 1 class 60700 int b irq 12 on pci0:13
:1
TI1131 PCI Config Reg: [pci only][FUNC1 pci int]
fxp0 <Intel EtherExpress Pro 10/100B Ethernet> rev 8 class 20000 int a irq 12 on
 pci0:16:0
chip4 <generic PCI bridge (vendor=1011 device=0022 subclass=4)> rev 4 class 6040
0 on pci0:17:0
fxp1 <Intel EtherExpress Pro 10/100B Ethernet> rev 8 class 20000 int a irq 10 on
 pci0:19:0
Probing for devices on PCI bus 1:
```

```
mcs0 <Miscellaneous Control Subsystem> rev 12 class ff0000 int a irq 12 on pci1:
13:0
fxp2 <Intel EtherExpress Pro 10/100B Ethernet> rev 8 class 20000 int a irq 10 on
 pci1:14:0
Probing for devices on the ISA bus:
sc0 at 0x60-0x6f irq 1 on motherboard
sc0: EGA color <16 virtual consoles, flags=0x0>
ed0 not found at 0x300
ed1 not found at 0x280
ed2 not found at 0x340
psm0 not found at 0x60
sio0 at 0x3f8-0x3ff irq 4 flags 0x20010 on isa
sio0: type 16550A, console
sio1 at 0x3e8-0x3ef irq 5 flags 0x20000 on isa
sio1: type 16550A
sio2 at 0x2f8-0x2ff irq 3 flags 0x20000 on isa
sio2: type 16550A
pcic0 at 0x3e0-0x3e1 on isa
PC-Card ctlr(0) TI PCI-1131 [CardBus bridge mode] (5 mem & 2 I/O windows)
pcic0: slot 0 controller I/O address 0x3e0
npx0 flags 0x1 on motherboard
npx0: INT 16 interface
fdc0: direction bit not set
fdc0: cmd 3 failed at out byte 1 of 3
fdc0 not found at 0x3f0
wdc0 at 0x1f0-0x1f7 irq 14 on isa
wdc0: unit 0 (wd0): <SunDisk SQFXB-80>, single-sector-i/o
wd0: 76MB (156672 sectors), 612 cyls, 8 heads, 32 S/T, 512 B/S
wdc0: unit 1 (wd1): <IBM-DCXA-210000>
wd1: 8063MB (16514064 sectors), 16383 cyls, 16 heads, 63 S/T, 512 B/S
wdc1 not found at 0x170
wdc2 not found at 0x180
ep0 not found at 0x300
fxp0: Ethernet address 00:a0:a5:12:05:5a
fxp1: Ethernet address 00:a0:a5:12:05:59
fxp2: Ethernet address 02:00:00:00:00:01
swapon: adding /dev/wd1s1b as swap device
Automatic reboot in progress...
/dev/rwd0s1a: clean, 16599 free (95 frags, 2063 blocks, 0.1% fragmentation)
/dev/rwd0s1e: clean, 9233 free (9 frags, 1153 blocks, 0.1% fragmentation)
/dev/rwd0s1a: clean, 16599 free (95 frags, 2063 blocks, 0.1% fragmentation)
/dev/rwd1s1f: clean, 4301055 free (335 frags, 537590 blocks, 0.0% fragmentation)
```

show system boot-messages lcc (TX Matrix Router)

```
user@host> show system boot-messages lcc 2
lcc2-re0:
--------------------------------------------------------------------------
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JUNOS 7.0-20040912.0 #0: 2004-09-12 09:16:32 UTC

builder@device1.example.com:/build/benten-b/7.0/20040912.0/obj-i386/sys/compile/JUNIPER
Timecounter "i8254"  frequency 1193182 Hz
Timecounter "TSC"  frequency 601368936 Hz
CPU: Pentium III/Pentium III Xeon/Celeron (601.37-MHz 686-class CPU)
  Origin = "GenuineIntel"  Id = 0x68a  Stepping = 10

Features=0x387f9ff<FPU,VME,DE,PSE,TSC,MSR,PAE,MCE,CX8,SEP,MTRR,PGE,MCA,CMOV,PAT,PSE36,PN,MMX,FXSR
,SSE>
real memory  = 2147467264 (2097136K bytes)
sio0: gdb debugging port
avail memory = 2084040704 (2035196K bytes)
Preloaded elf kernel "kernel" at 0xc06d9000.
DEVFS: ready for devices
Pentium Pro MTRR support enabled
md0: Malloc disk
DRAM Data Integrity Mode: ECC Mode with h/w scrubbing
npx0: <math processor> on motherboard
npx0: INT 16 interface
pcib0: <ServerWorks NB6635 3.0LE host to PCI bridge> on motherboard
pci0: <PCI bus> on pcib0
pcic-pci0: <TI PCI-1410 PCI-CardBus Bridge> irq 15 at device 1.0 on pci0
pcic-pci0: TI12XX PCI Config Reg: [pwr save][pci only]
fxp0: <Intel Embedded 10/100 Ethernet> port 0x1000-0x103f mem
0xfb800000-0xfb81ffff,0xfb820000-0xfb820fff irq 9 at device 3.0 on pci0
fxp1: <Intel Embedded 10/100 Ethernet> port 0x1040-0x107f mem
0xfb840000-0xfb85ffff,0xfb821000-0xfb821fff irq 11 at device 4.0 on pci0
...
```

show system boot-messages (TX Matrix Plus Router)

```
user@host> show system boot-messages
sfc0-re0:
------------------------------------------------------------------------
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JUNOS 9.6B3.3 #0: 2009-06-17 19:52:08 UTC
    builder@device1.example.com:/volume/build/junos/9.6/release/9.6B3.3/obj-i386/bsd/sys/compile/
JUNIPER
MPTable:  Timecounter "i8254" frequency 1193182 Hz quality 0 CPU: Intel(R) Xeon(R) CPU
L5238  @ 2.66GHz (2660.01-MHz 686-class CPU)   Origin = "GenuineIntel"  Id = 0x1067a  Stepping =
10   Features=0xbfebfbff
...
lcc1-re0:
------------------------------------------------------------------------
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JUNOS 9.6-20090617.0 #0: 2009-06-17 04:15:14 UTC
    builder@device1.example.com:/volume/build/junos/9.6/production/20090617.0/obj-i386/bsd/sys/
compile/JUNIPER
Timecounter "i8254" frequency 1193182 Hz quality 0
CPU: Intel(R) Xeon(R) CPU                  @ 1.86GHz (1862.01-MHz 686-class CPU)
  Origin = "GenuineIntel"  Id = 0x1067a  Stepping = 10
  Features=0xbfebfbff
...
```

show system boot-messages (QFX3500 Switch)

```
user@switch> show system boot-messages
getmemsize: msgbufp[size=32768] = 0x81d07fe4

System physical memory distribution:
--------------------------------------------------------------------------------
```

```
Total physical memory: 4160749568 (3968 MB)
Physical memory used: 3472883712 (3312 MB)
Physical memory allocated to kernel: 2130706432 (2032 MB)
Physical memory allocated to user BTLB: 1342177280 (1280 MB)
------------------------------------------------------------------------------

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JUNOS 11.1I #0: 2010-09-17 19:18:07 UTC
    user@device1.example.com:/c/user/DEV_QFX_SI_BRANCH/03/20100917.399988/
obj-xlr/bsd/sys/compile/JUNIPER-DCTOR
WARNING: debug.mpsafenet forced to 0 as ipsec requires Giant
JUNOS 11.1I #0: 2010-09-17 19:18:07 UTC
    user@device1.example.com:/c/user/DEV_QFX_SI_BRANCH/03/20100917.399988/
obj-xlr/bsd/sys/compile/JUNIPER-DCTOR
real memory  = 3472883712 (3312MB)
avail memory = 1708171264 (1629MB)
cpuid: 0, btlb_cpumap:0xffffffff8
FreeBSD/SMP: Multiprocessor System Detected: 12 CPUs
ETHERNET SOCKET BRIDGE initialising
Initializing QFX platform properties ..
cpu0 on motherboard
: RMI's XLR CPU Rev. 0.3 with no FPU implemented
        L1 Cache: I size 32kb(32 line), D size 32kb(32 line), eight way.
        L2 Cache: Size 1024kb, eight way
pic_lbus0: <XLR Local Bus>
pic_lbus0: <XLR Local Bus> on motherboard
Enter qfx control ethernet probe addr:0xc5eeec00
gmac4: <XLR GMAC GE Ethernet> on pic_lbus0
me0: Ethernet address 00:1d:b5:f7:68:40
Enter qfx control ethernet probe addr:0xc5eeeb40
gmac5: <XLR GMAC GE Ethernet> on pic_lbus0
me1: Ethernet address 00:1d:b5:f7:68:41
Enter qfx control ethernet probe addr:0xc5eeea80
gmac6: <XLR GMAC GE Ethernet> on pic_lbus0
me1: Ethernet address 00:1d:b5:f7:68:42
sio0 on pic_lbus0
Entering sioattach
sio0: type 16550A, console
xls_setup_intr: skip irq 3, xlr regs are set up somewhere else.
```

```
gblmem0 on pic_lbus0
ehci0: <RMI XLS USB 2.0 controller> on pic_lbus0
ehci_bus_attach: allocated resource.  tag=1, base=bef24000
xls_ehci_init: endian hardware swapping NOT enabled.
usb0: EHCI version 1.0
usb0 on ehci0
usb0: USB revision 2.0
uhub0: vendor 0x0000 EHCI root hub, class 9/0, rev 2.00/1.00, addr 1
uhub0: 2 ports with 2 removable, self powered
umass0: USB USBFlashDrive, rev 2.00/11.00, addr 2
pcib0: PCIe link 0 up
pcib0: PCIe link 2 up
pcib0: PCIe link 3 up
pcib0: <XLS PCI Host Controller> on pic_lbus0
pci0: <PCI bus> on pcib0
pcib1: <PCI-PCI bridge> at device 0.0 on pci0
pci1: <PCI bus> on pcib1
pci1: <network, ethernet> at device 0.0 (no driver attached)
pcib2: <PCI-PCI bridge> at device 1.0 on pci0
pcib3: <PCI-PCI bridge> at device 2.0 on pci0
pci2: <PCI bus> on pcib3
pci2: <network, ethernet> at device 0.0 (no driver attached)
pcib4: <PCI-PCI bridge> at device 3.0 on pci0
pci3: <PCI bus> on pcib4
pci3: <network, ethernet> at device 0.0 (no driver attached)
cfi device address space at 0xbc000000
cfi0: <AMD/Fujitsu - 8MB> on pic_lbus0
cfi device address space at 0xbc000000
i2c0: <I2C bus controller> on pic_lbus0
i2c1: <I2C bus controller> on pic_lbus0
qfx_fmn0 on pic_lbus0
pool offset 1503776768
xlr_lbus0: <XLR Local Bus Controller> on motherboard
qfx_bcpld_probe[124]
qfx_bcpld_probe[138]: dev_type=0x0
qfx_bcpld_probe[124]
qfx_bcpld0: QFX BCPLD probe success
qfx_bcpld0qfx_bcpld_attach[174]
qfx_bcpld_attach[207] : bus_space_tag=0x0, bus_space_handle=0xbd900000
qfx_bcpld_probe[124]
qfx_bcpld1: QFX BCPLD probe success
qfx_bcpld1qfx_bcpld_attach[174]
tor_bcpld_slave_attach[1245] : bus_space_tag=0x0, bus_space_handle=0xbda00000
```

```
Initializing product: 96 ..
bmeb: bmeb_lib_init done 0xc60a5000, addr 0x809c99a0
bme0:Virtual BME driver initializing
Timecounter "mips" frequency 1200000000 Hz quality 0
Timecounter "xlr_pic_timer" frequency 66666666 Hz quality 1
Timecounters tick every 1.000 msec
Loading the NETPFE fc module
IPsec: Initialized Security Association Processing.
SMP: AP CPU #3 Launched!
SMP: AP CPU #1 Launched!
SMP: AP CPU #2 Launched!
SMP: AP CPU #4 Launched!
SMP: AP CPU #5 Launched!
SMP: AP CPU #7 Launched!
SMP: AP CPU #6 Launched!
SMP: AP CPU #11 Launched!
SMP: AP CPU #10 Launched!
SMP: AP CPU #9 Launched!
SMP: AP CPU #8 Launched!
da0 at umass-sim0 bus 0 target 0 lun 0
da0: <USB USBFlashDrive 1100> Removable Direct Access SCSI-0 device
da0: 40.000MB/s transfers
da0: 3920MB (8028160 512 byte sectors: 255H 63S/T 499C)
Trying to mount root from ufs:/dev/da0s1a
```

show system boot-messages (SRX300)

```
user@host> show system boot-messages |no-more
kld_map_v: 0x8ff80000, kld_map_p: 0x0
Running in PARTITIONED TLB MODE
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JUNOS 21.2R3-S2.9 #0: 2022-07-16 04:20:05 UTC
    builder@example1.juniper.net:/volume/build/junos/21.2/release/21.2R3-S2.9/obj/bsd6/octeon/
junos/bsd/kernels/JSRXNLE/kernel
can't re-use a leaf (perf_mon)!
can't re-use a leaf (threshold)!
```

```
can't re-use a leaf (debug)!
JUNOS 21.2R3-S2.9 #0: 2022-07-16 04:20:05 UTC
    builder@example1.juniper.net:/volume/build/junos/21.2/release/21.2R3-S2.9/obj/bsd6/octeon/
junos/bsd/kernels/JSRXNLE/kernel
real memory  = 4294967296 (4194304K bytes) avail memory = 2286268416 (2180MB)
FreeBSD/SMP: Multiprocessor System Detected: 2 CPUs Security policy loaded: Junos MAC/veriexec
(mac_veriexec) Security policy loaded: JUNOS MAC/pcap (mac_pcap) Security policy loaded: JUNOS
MAC/runasnonroot (mac_runasnonroot) MAC/veriexec fingerprint module loaded: SHA1 MAC/veriexec
fingerprint module loaded: SHA256
netisr_init: forcing maxthreads from 4 to 2
random: <Software, Yarrow> initialized
cpu0 on motherboard
: CAVIUM's OCTEON 70XX/71XX CPU Rev. 0.2 with no FPU implemented
        L1 Cache: I size 78kb(128 line), D size 32kb(128 line), thirty two way.
        L2 Cache: Size 512kb, 4 way
obio0 on motherboard
uart0: <Octeon-16550 channel 0> on obio0
uart0: console (9600,n,8,1)
twsi0 on obio0
set clock 0x49
xhci0: <Cavium Octeon 7xxx xHCI Host Driver> on obio0
usb0: <USB bus for xHCI Controller> on xhci0
usb0: USB revision 3.0
uhub0: vendor 0x0000 XHCI root hub, class 9/0, rev 3.00/1.00, addr 1
uhub0: 2 ports with 2 removable, self powered
xhci1: <Cavium Octeon 7xxx xHCI Host Driver> on obio0
usb1: <USB bus for xHCI Controller> on xhci1
usb1: USB revision 3.0
uhub1: vendor 0x0000 XHCI root hub, class 9/0, rev 3.00/1.00, addr 1
uhub1: 2 ports with 2 removable, self powered
cpld0 on obio0
pcib0: <Cavium on-chip PCIe HOST bridge> on obio0 Disabling Octeon big bar support
pcib0: Initialized controller
pci0: <PCI bus> on pcib0
pci0: <network, ethernet> at device 0.0 (no driver attached)
pci0: <network, ethernet> at device 0.1 (no driver attached)
gblmem0 on obio0
octpkt0: <Octeon RGMII> on obio0
boot_bus0 on obio0
cfi0: <Macronix MX25L64 - 8MB> on boot_bus0
cfi1: <Macronix MX25L64 - 8MB> on boot_bus0
umass0: ATP Electronics ATP CG eUSB, rev 2.00/11.00, addr 2 Timecounter "mips" frequency
1200000000 Hz quality 0
```

```
da0 at umass-sim0 bus 0 target 0 lun 0
da0: <ATP ATP CG eUSB 1100> Fixed Direct Access SCSI-4 device
da0: 40.000MB/s transfers
da0: 7672MB (15712256 512 byte sectors: 255H 63S/T 978C)
random: unblocking device.
hwpmc: OCTEON/4/64/0x1ff<INT,USR,SYS,EDG,THR,REA,WRI,INV,QUA>
Trying to mount root from ufs:/dev/da0s1a
WARNING: / was not properly dismounted
WARNING: / was not properly dismounted
WARNING: R/W mount of /cf/var denied.  Filesystem is not clean - run fsck

LPC bus driver
lpcbus0 on cpld0
tpm0: <Trusted Platform Module> on lpcbus0
tpm: IFX SLB 9660 TT 1.2 rev 0x10
```

Release Information

Command introduced before Junos OS Release 7.4.

sfc option introduced for the TX Matrix Plus router in Junos OS Release 9.6.

RELATED DOCUMENTATION

Routing Matrix with a TX Matrix Plus Router Solutions Page

show system auto-snapshot

IN THIS SECTION

Syntax

```
show system auto-snapshot
```

Description

This command displays automatic snapshot status information.

Options

This command has no options.

Required Privilege Level

view

Output Fields

Table 41 on page 852 describes the output fields for the `show system auto-snapshot` command. Output fields are listed in the approximate order in which they appear.

Table 41: show system auto-snapshot status Output Fields

Field Name	Field Description
`Auto-snapshot configuration`	Status of the configuration: • Enabled—If the system reboots from the alternate partition, the automatic snapshot feature automatically takes a snapshot of the alternate partition and copies it onto the primary partition. • Disabled—The system does not automatically take a snapshot of the alternate partition. You must use the manual snapshot command, `request system snapshot`, to take a snapshot of one partition and copy it onto the other.
`Auto-snapshot state`	Status of the automatic snapshot procedure: • `Completed`—The automatic snapshot procedure has completed copying the alternate partition to the primary partition and the alarm has been cleared. • `Disabled`—The automatic snapshot procedure is inactive. • `In progress`—The automatic snapshot procedure is in progress. It takes about 10 to 15 minutes to complete, depending upon disk size.

Sample Output

show system auto-snapshot

```
user@switch> show system auto-snapshot

Auto-snapshot Configuration: Enabled
Auto-snapshot State: Disabled
```

Release Information

Command introduced in Junos OS Release 12.3.

RELATED DOCUMENTATION

Configuring Dual-Root Partitions | 422

show system download

IN THIS SECTION

Syntax

```
show system download <download-id>
```

Description

This command displays a brief summary of all the download instances along with their current state and extent of progress. If a `download-id` is provided, the command displays a detailed report of the particular download instance.

Options

- `download-id`—(Optional) The ID number of the download instance.

Required Privilege Level

view

Output Fields

Table 42 on page 854 lists the output fields for the `show system download` command. Output fields are listed in the approximate order in which they appear.

Table 42: show system download Output Fields

Field Name	Field Description
`ID`	Displays the download identification number.
`Status`	Displays the state of a particular download.
`Start Time`	Displays the start time of a particular download.
`Progress`	Displays the percentage of a download that has been completed.
`URL`	Displays the URL from which the file was downloaded.

Sample Output

show system download

```
user@host> show system download
Download Status Information:
ID  Status      Start Time       Progress  URL
1   Active      May 4 06:28:36   5%        ftp://ftp-server//tftpboot/1m_file
2   Active      May 4 06:29:07   3%        ftp://ftp-server//tftpboot/5m_file
3   Error       May 4 06:29:22   Unknown   ftp://ftp-server//tftpboot/badfile
```

```
4   Completed   May 4 06:29:40   100%      ftp://ftp-server//tftpboot/smallfile
```

show system download 1

```
user@host> show system download 1

Download ID     : 1
Status          : Active
Progress        : 6%
URL             : ftp://ftp-server//tftpboot/1m_file
Local Path      : /var/tmp/1m_file
Maximum Rate    : 1k
Creation Time   : May 4 06:28:36
Scheduled Time  : May 4 06:28:36
Start Time      : May 4 06:28:37
Error Count     : 0
```

Release Information

Command introduced in Junos OS Release 15.1X49-D35.

RELATED DOCUMENTATION

request system download start | 676

show system login lockout

IN THIS SECTION

Syntax

```
show system login lockout
```

Description

This command displays the usernames locked after unsuccessful login attempts.

Required Privilege Level

view and system

Output Fields

Table 43 on page 856 lists the output fields for the `show system login lockout` command. Output fields are listed in the approximate order in which they appear.

Table 43: show system login lockout

Field Name	Field Description	Level of Output
`User`	Username	All levels

Table 43: show system login lockout *(Continued)*

Field Name	Field Description	Level of Output
`Lockout start`	Date and time the username was locked	All levels
`Lockout end`	Date and time the username was unlocked	All levels

Sample Output

show system login lockout

```
user@host> show system login lockout

User                 Lockout start           Lockout end
root                 2011-05-11 09:11:15 UTC 2011-05-11 09:13:15 UTC
```

Release Information

Command introduced in Junos OS Release 11.2.

RELATED DOCUMENTATION

retry-options

clear system login lockout | 655

show system rollback

IN THIS SECTION

Syntax

```
show system rollback number
<compare number | configuration-revision>
```

Description

This command displays the contents of a previously committed configuration, or the differences between two previously committed configurations.

The `show system rollback` command is an operational mode command and cannot be issued with `run` from configuration mode.

Options

number	Number of a configuration to view. The output displays the configuration. The range of values is 0 through 49.

compare *number*	(Optional) Number of another previously committed (rollback) configuration to compare to rollback *number*. The output displays the differences between the two configurations. The range of values is 0 through 49.
configuration-revision	(Optional) Display corresponding configuration revision for this rollback number.

Required Privilege Level

view

Sample Output

show system rollback compare

```
user@host> show system rollback 3 compare 1
[edit]
+  interfaces {
+      ge-1/1/1 {
+          unit 0 {
+              family inet {
+                  filter {
+                      input mf_plp;
+                  }
+                  address 10.1.1.1/10;
+              }
+          }
+      }
+      ge-1/2/1 {
+          unit 0 {
+              family inet {
+                  filter {
+                      input mf_plp;
+                  }
+                  address 10.1.1.1/10;
+              }
+          }
+      }
```

```
+      ge-1/3/0 {
+          unit 0 {
+              family inet {
+                  filter {
+                      input mf_plp;
+                  }
+                  address 10.1.1.1/10;
+              }
+          }
+      }
+}
```

show system rollback configuration-revision

```
user@host> show system rollback 0 configuration-revision
The corresponding configuration revision is: re0-1596379942-3
```

Release Information

Command introduced before Junos OS Release 7.4.

Option `configuration-revision` introduced in Junos OS Release 20.4R1 and Junos OS Evolved Release 20.4R1.

show system snapshot (Junos OS)

IN THIS SECTION

Syntax

```
show system snapshot
```

Syntax (EX Series Switches)

```
show system snapshot
<all-members | local | member member-id>
<media (external | internal)>
```

Description

This command displays information about the backup software:

- On the routers, this command display information about the backup software, which is located in the **/altroot**, and **/altconfig** file systems or on the alternate media.
- On the switches, this command display information about the backup of the root file system **(/)** and directories **/altroot**,**/config**, **/var**, and **/var/tmp**, which are located either on an external USB flash drive or in internal flash memory.

  To back up software, use the `request system snapshot` command.

Options

none — Display information about the backup software.

all-members | local | member *member-id* — (EX Series switch Virtual Chassis only) (Optional) Display the snapshot in a Virtual Chassis:

- all-members—Display the snapshot for all members of the Virtual Chassis.
- local—Display the snapshot on the member of the Virtual Chassis that you are currently logged into.
- member *member-id*—Display the snapshot for the specified member of the Virtual Chassis.

media (external | internal) — (EX Series switch only) (Optional) Display the destination media location for the snapshot. The `external` option specifies the snapshot on an external mass storage device, such as a USB flash drive. The `internal` option specifies the snapshot on an internal memory source, such as internal flash memory. If no additional options are specified, the command displays the snapshot stored in both slices.

Required Privilege Level

view

Output Fields

Table 44 on page 862 lists the output fields for the `show system snapshot` command. Output fields are listed in the approximate order in which they appear.

Table 44: show system snapshot Output Fields

Field Name	Field Description
`Creation date`	Date and time of the last snapshot.

Table 44: show system snapshot Output Fields *(Continued)*

Field Name	Field Description
JUNOS version on snapshot	Junos OS release number of individual software packages.

Sample Output

show system snapshot (Router)

```
user@host> show system snapshot
Information for snapshot on hard-disk
Creation date: Oct 5 13:53:29 2005
JUNOS version on snapshot:
  jbase  : 7.3R2.5
  jcrypto: 7.3R2.5
  jdocs  : 7.3R2.5
  jkernel: 7.3R2.5
  jpfe   : M40-7.3R2.5
  jroute : 7.3R2.5
```

show system snapshot media external (Switch)

```
user@switch> show system snapshot media external
Information for snapshot on       external (/dev/da1s1a) (backup)
Creation date: Mar 19 03:37:18 2012
JUNOS version on snapshot:
  jbase  : ex-12.1I20120111_0048_user
  jcrypto-ex: 12.1I20120111_0048_user
  jdocs-ex: 12.1I20120111_0048_user
  jroute-ex: 12.1I20120111_0048_user
  jswitch-ex: 12.1I20120111_0048_user
  jweb-ex: 12.1I20120111_0048_user
Information for snapshot on       external (/dev/da1s2a) (primary)
Creation date: Mar 19 03:38:25 2012
JUNOS version on snapshot:
```

```
  jbase  : ex-12.2I20120305_2240_user
  jcrypto-ex: 12.2I20120305_2240_user
  jdocs-ex: 12.2I20120305_2240_user
  jroute-ex: 12.2I20120305_2240_user
  jswitch-ex: 12.2I20120305_2240_user
  jweb-ex: 12.2I20120305_2240_user
```

show system snapshot media internal (Switch)

```
user@switch> show system snapshot media internal
Information for snapshot on internal (/dev/da0s1a) (backup)
Creation date: Mar 14 05:01:02 2011
JUNOS version on snapshot:
  jbase  : 11.1R1.9
  jcrypto-ex: 11.1R1.9
  jdocs-ex: 11.1R1.9
  jkernel-ex: 11.1R1.9
  jroute-ex: 11.1R1.9
  jswitch-ex: 11.1R1.9
  jweb-ex: 11.1R1.9
  jpfe-ex42x: 11.1R1.9
Information for snapshot on internal (/dev/da0s2a) (primary)
Creation date: Mar 30 08:46:27 2011
JUNOS version on snapshot:
  jbase  : 11.2-20110330.0
  jcrypto-ex: 11.2-20110330.0
  jdocs-ex: 11.2-20110330.0
  jkernel-ex: 11.2-20110330.0
  jroute-ex: 11.2-20110330.0
  jswitch-ex: 11.2-20110330.0
  jweb-ex: 11.2-20110330.0
  jpfe-ex42x: 11.2-20110330.0
```

Release Information

Command introduced in Junos OS Release 7.6.

Option `slice` deprecated for Junos OS with Upgraded FreeBSD in Junos OS Release 15.1. You can find which platforms run Junos OS with Upgraded FreeBSD here: Release Information for Junos OS with Upgraded FreeBSD.

RELATED DOCUMENTATION

request system snapshot (Junos OS with FreeBSD Prior to Release 10) | 721

show system snapshot (Junos OS with Upgraded FreeBSD)

IN THIS SECTION

Syntax

```
show system snapshot
```

Description

This command displays information about the non-recovery backup software, which is located in the **junos** file system on the hard disk drive or solid-state drive (SSD).

This command displays information about recovery snapshot after the non-recovery information.

To back up software, use the `request system snapshot` command.

Required Privilege Level

view

Output Fields

When you enter this command, you are provided feedback on the status of your request. If there are no snapshots available, the command returns null output.

Sample Output

show system snapshot

```
user@host> show system snapshot
Snapshot snap.20141219.122106:
Location: /packages/sets/snap.20141219.122106
Creation date: Dec 19 12:21:06 2014
Junos version: 15.1-20141216_ib_15_1_psd.0
```

Sample Output

show system snapshot (updated as of Junos OS Release 17.2)

```
user@host> show system snapshot
Non-recovery snapshots:

Snapshot snap.20170112.105151:
Location: /packages/sets/snap.20170112.105151
Creation date: Jan 12 10:51:51 2017
Junos version: 17.2I20170112_0239

Snapshot snap.20170112.112307:
Location: /packages/sets/snap.20170112.112307
Creation date: Jan 12 11:23:07 2017
Junos version: 17.2I20170112_0239

Snapshot snap.20170112.112314:
Location: /packages/sets/snap.20170112.112314
Creation date: Jan 12 11:23:14 2017
Junos version: 17.2I20170112_0239

Total non-recovery snapshots:        3

Recovery Snapshots:
Snapshots available on the OAM volume:
recovery.ufs
Date created: Wed Jan 11 15:59:35 PST 2017
Junos version: 17.2I20170111_2242

Total recovery snapshots: 1
```

Release Information

Command introduced starting in Junos OS Release 15.1 for supported platforms. See Feature Explorer.

Output for recovery snapshots provided in Junos Release 17.2 for all the devices using Junos OS with upgraded FreeBSD.

RELATED DOCUMENTATION

- request system snapshot (Junos OS with Upgraded FreeBSD) | 735
- request system reboot (Junos OS with Upgraded FreeBSD) | 708
- Release Information for Junos OS with Upgraded FreeBSD

show system snapshot media

IN THIS SECTION

Syntax

```
show system snapshot < media (compact-flash | external | harddisk | internal | usb) >
```

Description

This command displays information about the partitioning scheme present on the media. Information for only one root is displayed for single-root partitioning, whereas information for both roots is displayed for dual-root partitioning.

Options

- compact-flash— Show snapshot information from the CompactFlash card. (Supported on SRX5400, SRX5600, SRX5800)
- external— Show snapshot information from the external CompactFlash card. (Not supported on SRX5000 line devices)
- hard-disk— Show snapshot information from the Hard Disk. (Supported on SRX5400, SRX5600, SRX5800)
- internal— Show snapshot information from internal media. (Not supported on SRX5000 line devices)
- usb— Show snapshot information from device connected to USB port.

Required Privilege Level

View

Output Fields

Table 45 on page 869 lists the output fields for the `show system snapshot media` command. Output fields are listed in the approximate order in which they appear.

Table 45: show system snapshot media Output Fields

Field Name	Field Description
`Creation date`	Date and time of the last snapshot.
`JUNOS version on snapshot`	Junos OS release number of individual software packages.

Sample Output

show system snapshot media compact-flash

```
show system snapshot media compact-flash
Information for snapshot on compact-flash (ad0s1)
Creation date: Aug 21 11:58:14 2017
JUNOS version on snapshot:
  junos  : 12.3X48-D40.5-domestic
```

show system snapshot media external

```
show system snapshot media external
Information for snapshot on      external (/dev/da1s2a) (primary)
Creation date: Apr 9 09:41:16 2018
JUNOS version on snapshot:
  junos  : 12.3X48-D40.5-domestic
Information for snapshot on       external (/dev/da1s1a) (backup)
Creation date: Apr 9 09:41:16 2018
JUNOS version on snapshot:
  junos  : 12.3X48-D40.5-domestic
```

show system snapshot media internal

```
show system snapshot media internal
Information for snapshot on       internal (/dev/da0s1a) (primary)
Creation date: Jan 15 10:43:26 2010
JUNOS version on snapshot:
  junos  : 10.1B3-domestic
Information for snapshot on       internal (/dev/da0s2a) (backup)
Creation date: Jan 15 10:15:32 2010
JUNOS version on snapshot:
  junos  : 10.2-20100112.0-domestic
```

show system snapshot media usb

```
show system snapshot media usb
Information for snapshot on usb (da0s1)
Creation date: Apr 9 08:44:46 2018
JUNOS version on snapshot:
  junos  : 12.3X48-D40.5-domestic
```

show system snapshot media hard-disk

```
show system snapshot media hard-disk
Information for snapshot on hard-disk (ad2s1)
Creation date: Apr 9 16:40:18 2018
JUNOS version on snapshot:
  junos  : 12.3X48-D40.5-domestic
```

Release Information

Command introduced in Junos OS Release 10.2 .

RELATED DOCUMENTATION

Creating a Snapshot and Using It to Boot an SRX Series Firewall | 15

show system software restore-point-status

IN THIS SECTION

Syntax

```
show system software restore-point-status
```

Description

This command displays the status of the restore-point for QFabric system. A restore-point contains both a snapshot of the software and a configuration file.

You can create only one restore-point. When you create a new restore-point, the existing restore-point, if available, is erased.

Required Privilege Level

view

Output Fields

Table 46 on page 873 lists the output fields for the `show system software restore-point status` command. Output fields are listed in the approximate order in which they appear.

Table 46: show system software restore-point status Output Fields

Field Name	Field Description
Member	Name of the Director device.
Creation Time	Time when the restore-point was created.
Status	Status of restore-point creation.
Restore volume	Name and path to restore volume used to create the restore-point.

Sample Output

show system software restore-point status

```
user@qfabric> show system software restore-point status
Member        Creation Time            Status        Restore volume
------        -------------            -----        ---------------
dg0        Aug 15 07:42:39 2014        success        /dev/VolGroup00/LogVol03
dg1        Aug 15 07:42:27 2014        success        /dev/VolGroup00/LogVol03
```

Release Information

Command introduced in Junos OS Release 14.1X53-D15.

RELATED DOCUMENTATION

request system software restore-point | 780

show system software usb-software-version

IN THIS SECTION

Syntax

```
show system software usb-software-version
```

Description

This comamnd displays the version of software present on a standard USB installer key attached to each Director Group (DG) device (QFabric systems only).

Additional Information

When issuing the **show system software usb-software-version** command, the USB installer key must be attached to the DGs.

The format of the USB installer key (including partitions) must conform to the standard specifications of the Juniper-provided USB installer.

A Juniper-provided or Juniper-recommended USB installer device must have the following partitions:

```
Device     Boot      Start         End      Blocks      Id   System
/dev/sdb1   *           1             75      295244      4    FAT16 <32M
/dev/sdb2               76           709     2496058   83  Linux
```

Required Privilege Level

view

Output Fields

Table 47 on page 875 lists the output fields for the `show system software usb-software-version` command. Output fields are listed in the approximate order in which they appear.

Table 47: show system software usb-software-version Output Fields

Field Name	Field Description
`Node`	Node supporting the device.
`Device`	Device on which the software is present.
`Version`	Version of the software present.
`Filename`	Software filename.

Sample Output

show system software usb-software-version

```
user@host> show system software usb-software-version

  NODE     DEVICE
VERSION                                              FILENAME
  ----     ------
-------                                              --------
   dg0   /dev/sdb     14.1-20160516_x141X53_vjqfd.0     jinstall-
qfabric-14.1-20160516_x141X53_vjqfd.0.rpm
   dg1   /dev/sdb     14.1-20160516_x141X53_vjqfd.0     jinstall-
qfabric-14.1-20160516_x141X53_vjqfd.0.rpm
```

Release Information

Command introduced in Junos OS Release 14.1X53-D40.

RELATED DOCUMENTATION

Performing a Nonstop Software Upgrade on the QFabric System

Verifying Nonstop Software Upgrade for QFabric Systems

Upgrading Software on a QFabric System

show system storage partitions

IN THIS SECTION

Syntax (EX Series)

```
show system storage partitions
<all-members>
<local>
<member member-id>
```

Syntax (SRX Series)

```
show system storage partitions
```

Description

This command displays information about the disk partitioning scheme.

Options

none	Display partition information.

`all-members`	(Virtual Chassis systems only) (Optional) Display partition information for all members of the Virtual Chassis.
`local`	(Virtual Chassis systems only) (Optional) Display partition information for the local Virtual Chassis member.
`member` *`member-id`*	(Virtual Chassis systems only) (Optional) Display partition information for the specified member of the Virtual Chassis configuration.

Required Privilege Level

view

Output Fields

Table 48 on page 878 describes the output fields for the `show system storage partitions` command. Output fields are listed in the approximate order in which they appear.

Table 48: show system storage partitions Output Fields

Field Name	Field Description
Boot Media	Media (internal or external) from which the switch was booted.
Active Partition	Name of the active root partition.
Backup Partition	Name of the backup (alternate) root partition.
Currently booted from	Partition from which the switch was last booted.

Table 48: show system storage partitions Output Fields *(Continued)*

Field Name	Field Description
Partitions information	Information about partitions on the boot media: • Partition—Partition identifier. • Size—Size of partition. • Mountpoint—Directory on which the partition is mounted.

Sample Output

show system storage partitions (EX Series)

```
user@switch> show system storage partitions
fpc0:
--------------------------------------------------------------------------
Boot Media: internal (da0)
Active Partition: da0s1a
Backup Partition: da0s2a
Currently booted from: active (da0s1a)

Partitions information:
  Partition  Size   Mountpoint
  s1a        184M   /
  s2a        184M   altroot
  s3d        369M   /var/tmp
  s3e        123M   /var
  s4d        62M    /config
  s4e               unused (backup config)
```

show system storage partitions (SRX Series, Dual Root Partitioning)

```
show system storage partitions
Boot Media: internal (da0)
```

```
Active Partition: da0s2a
Backup Partition: da0s1a
Currently booted from: active (da0s2a)

Partitions Information:
  Partition  Size   Mountpoint
      s1a    293M   altroot
      s2a    293M   /
      s3e    24M    /config
      s3f    342M   /var
      s4a    30M    recovery
```

show system storage partitions (SRX Series, Single Root Partitioning)

```
show system storage partitions
Boot Media: internal (da0)
Partitions Information:
  Partition  Size   Mountpoint
      s1a    898M   /
      s1e    24M    /config
      s1f    61M    /var
```

show system storage partitions (SRX Series, USB)

```
show system storage partitions
Boot Media: usb (da1)
Active Partition: da1s1a
Backup Partition: da1s2a
Currently booted from: active (da1s1a)

Partitions Information:
  Partition  Size   Mountpoint
      s1a    293M   /
      s2a    293M   altroot
      s3e    24M    /config
      s3f    342M   /var
      s4a    30M    recovery
```

Release Information

Command introduced in Junos OS Release 15.1X49-D35.

RELATED DOCUMENTATION

Verifying Junos OS and Boot Loader Software Versions on an EX Series Switch | 101

Example: Installing Junos OS on SRX Series Firewalls Using the Partition Option | 258

[EX] Switch boots from backup root partition after file system corruption occurred on the primary root partition

show version (Junos OS)

IN THIS SECTION

Syntax

```
show version
<brief | detail>
```

Syntax (EX Series Switches)

```
show version
<all-members>
<brief | detail>
<local>
<member member-id>
```

Syntax (MX Series Router)

```
show version
<brief | detail>
<all-members>
<local>
<member member-id>
```

Syntax (QFX Series)

```
show version
<brief | detail>
<component component-name | all>
```

Syntax (SRX Series)

```
show version
<brief | detail>
<node node-id | local | primary>
```

Description

Display the hostname and version information about the software running on the router or switch.

Beginning in Junos OS Release 13.3, the `show version` command output includes the `Junos` field that displays the Junos OS version, including any selective upgrade (JSU) packages, running on the device. This field provides a consistent means of identifying the Junos OS version, rather than extracting that information from the list of installed sub-packages.

Table 49: Common Package Prefixes for Junos OS

Junos OS Package Prefix	Junos OS Architecture
jinstall-*	Junos OS for M Series, MX Series, and T Series, routers
junos-install-*	Junos OS based on an upgraded FreeBSD kernel instead of older versions of FreeBSD
junos-vmhost-install-*	Junos OS with upgraded FreeBSD on a VM Host

Options

none Display standard information about the hostname and version of the software running on the router or switch.

brief | detail (Optional) Display the specified level of output.

all-members (EX4200 switches and MX Series routers only) (Optional) Display standard information about the hostname and version of the software running on all members of the Virtual Chassis configuration.

component all (QFabric systems only) (Optional) Display the host name and version information about the software running on all the components on the QFabric system.

component *component-name* (QFabric systems only) (Optional) Display the host name and version information about the software running on a specific QFabric system component. Replace *component-name* with the name of the QFabric system component. The *component-name* can be the name of a diagnostics Routing Engine, Director group,

	fabric control Routing Engine, fabric manager Routing Engine, Interconnect device, or Node group.
local	(EX4200 switches and MX Series routers only) (Optional) Display standard information about the hostname and version of the software running on the local Virtual Chassis member.
member *member-id*	(EX4200 switches and MX Series routers only) (Optional) Display standard information about the hostname and version of the software running on the specified member of the Virtual Chassis configuration. For EX4200 switches, replace *member-id* with a value from 0 through 9. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.
node (all | *node-name)*	(Optional) Display version information for the specified node or all nodes.
primary	(SRX Series only) Display the software version on the primary node.

Required Privilege Level

view

Release Information

Command introduced before Junos OS Release 7.4.

15

CHAPTER

VM Host Administration Commands

request vmhost cleanup

IN THIS SECTION

Syntax

```
request vmhost cleanup
invoke-on;
(re0 | re1);
routing engine;
```

Description

Clean up temporary files, crash generated files, and log files located in the **/var/tmp**, **/var/crash**, and **/var/log directories respectively** on the host OS.

NOTE: You can clean up files of any format in the **/var/tmp** and **/var/crash** location. However, you can cleanup only the .gz format files in the **/var/log/** location.

Options

none—Clean up temporary files, crash generated files, and log files located in the **/var/tmp**, **/var/crash**, and **/var/log directories** on the host OS running on the Routing Engine on the local Virtual Chassis member.

invoke-on

(Optional) Clean up temporary files, crash generated files, and log files on all the Routing Engines or the other Routing Engine.

Clean up files in **/var/tmp**, **/var/crash**, and **/var/log** on the host OS running on a router that has dual Routing Engines. You can use the `all-routing-engine` option to clean up the files in these directories on the host OS running on all the Routing Engines or the `other-routing-engine` option to clean up the files in these directories on the host OS running on the other Routing Engine. If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

re0 | re1

(Optional) On devices that support dual or redundant Routing Engines, clean up files in **/var/tmp**, **/var/crash**, and **/var/log** on the host OS running on the Routing Engine in slot 0 (`re0`) or the Routing Engine in slot 1 (`re1`).

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

routing-engine

(Optional) Specify the Routing Engine for which the files in **/var/tmp**, **/var/crash**, and **/var/log** on the host OS are to be cleaned up. The following options are available:

- `backup`—Backup Routing Engine.
- `both`—Primary and backup Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

maintenance

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

request system storage cleanup (Junos OS) | 798

request vmhost copy jnode-to-vjunos

IN THIS SECTION

Syntax

```
request vmhost copy jnode-to-vjunos from-jnode host-filename to-vjunos junos-filename
```

Description

Copy files from Linux host to Junos OS.

Options

`from-jnode` *`host-filename`*	Name of the host file to be copied.
`to-vjunos` *`junos-filename`*	Name of the Junos OS file to which the host file is copied.

Required Privilege Level

maintenance

Release Information

Command introduced in Junos OS Release 18.4R1 on Enhanced Automation variants of Junos OS. For more information, see *Overview of Junos Automation Enhancements on Devices Running Junos OS with Enhanced Automation*.

RELATED DOCUMENTATION

request vmhost copy vjunos-to-jnode | 889

request vmhost copy vjunos-to-jnode

IN THIS SECTION

Syntax

```
request vmhost copy vjunos-to-jnode from-vjunos junos-filename to-jnode host-filename
```

Description

Copy files from Junos OS to Linux host.

Options

from-vjunos *junos-filename*	Name of the Junos OS file to be copied.
to-jnode *host-filename*	Name of the host file to which to copy the file.

Required Privilege Level

maintenance

Release Information

Command introduced in Junos OS Release 18.4R1 on Enhanced Automation variants of Junos OS. For more information, see *Overview of Junos Automation Enhancements on Devices Running Junos OS with Enhanced Automation*.

RELATED DOCUMENTATION

request vmhost copy jnode-to-vjunos | 888

request vmhost file-copy

IN THIS SECTION

Syntax

```
request vmhost file-copy
             from-jnode filename
              crash;
              invoke-on;
              log (invoke-on | to-vjunos);
              to-vjunos directory/<filename>
```

Description

Copy crash files or log files from the host OS to Junos OS. You can use these files for analysis and debugging purposes.

Options

crash	Files in **/var/crash** on the host.
from-jnode *filename*	Name of the host file to be copied.
log	Files in **/var/log** on the host.
to-vjunos *directory/<filename>*	Name of the JUNOS directory/<filename> to which the host file is copied.

Additional Information

You can use the `show vmhost crash` and `show vmhost logs` commands to list or identify the files in the host OS to be copied to Junos OS.

Required Privilege Level

maintenance

Sample Output

request vmhost file-copy

```
user@host> request vmhost file-copy from-jnode messages log to-vjunos /var/tmp/linux_log_file
-rw-r-----  1 root  wheel    7253996 Mar 2  23:08 /var/tmp/linux_log_file
total files: 1
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

Command introduced in Junos OS Release 18.1R1 for NFX150 devices.

Command introduced in Junos OS Release 18.4R1 for NFX250 (NG) devices.

Command introduced in Junos OS Release 19.1R1 for NFX350 devices.

request vmhost halt

IN THIS SECTION

Syntax

```
request vmhost halt
<re0 | re1>
<routing-engine>
```

Description

Stop the host OS and Junos OS running on the device.

Options

none—Stop the host OS and Junos OS on the device.

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, stop the host OS and Junos OS running on the Routing Engine in slot 0 (`re0`) or the Routing Engine in slot 1 (`re1`).

routing-engine (Optional) Specify the Routing Engine on which the host OS and Junos OS needs to be stopped. The following options are available:

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

- `backup`—Backup Routing Engine.
- `both`—Primary and backup Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

maintenance

Sample Output

request vmhost halt

```
request vmhost halt
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

request system halt

vmhost | **640**

request vmhost hard-disk-test

IN THIS SECTION

Syntax

```
request vmhost hard-disk-test {disk disk-name|long|short|show-status}
```

Description

Run memory and diagnostics monitoring test on the solid-state drive (SSD). The test output provides information about the various attributes of the SSD that is help monitor the status of the hard disk memory.

Options

disk *disk-name*	Name of the SSD.
long	Run extended Self-Monitoring, Analysis and Reporting Technology (SMART) tests of the SSD.
short	Run short SMART tests of the SSD.
show-status	Display the status of the test.

Required Privilege Level

maintenance

Sample Output

request vmhost hard-disk-test

```
user@host> request vmhost hard-disk-test show-status disk /dev/sda
smartctl 5.42 2014-07-28 r3460 [x86_64-linux-3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt] (local
```

```
build)Copyright (C) 2002-11 by Bruce Allen, http://smartmontools.sourceforge.net

=== START OF INFORMATION SECTION ===
Model Family:     StorFly Slim Sata SSD
Device Model:     StorFly VSF202CC050G-JUN
Serial Number:    P1T13003443810130041
Firmware Version: 0729-000
User Capacity:    50,020,540,416 bytes [50.0 GB]
Sector Size:      512 bytes logical/physical
Device is:        In smartctl database [for details use: -P show]
ATA Version is:   8
ATA Standard is:  ACS-2 (revision not indicated)
Local Time is:    Fri Jun 17 17:30:57 2016 IST
SMART support is: Available - device has SMART capability.
SMART support is: Enabled

=== START OF READ SMART DATA SECTION ===
SMART overall-health self-assessment test result: PASSED

General SMART Values:
Offline data collection status:  (0x02) Offline data collection activity
                                        was completed without error.
                                        Auto Offline Data Collection: Disabled.
Self-test execution status:      (   0) The previous self-test routine completed
                                        without error or no self-test has ever
                                        been run.


...
...
...
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

vmhost | 640

request vmhost power-off

IN THIS SECTION

Syntax

```
request vmhost power-off
<other routing-engine>
```

Description

Power off the Routing Engine on which Junos OS and the host OS are running. In a PTX3000, the Routing and Control Board is powered off.

NOTE: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

Options

none—Power off the Routing Engine immediately.

other-routing-engine (Optional) Power off the other Routing Engine on which the Junos OS and the host OS are running. For example, if you issue the command from the primary Routing Engine, the backup Routing Engine is powered off. Similarly, if you issue the command from the backup Routing Engine, the primary Routing Engine is powered off.

Required Privilege Level

maintenance

Sample Output

request vmhost power-off

```
request vmhost power-off
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

request system power-off

vmhost | 640

request vmhost power-on

IN THIS SECTION

Syntax

```
request vmhost power-on other-routing-engine
```

Description

Power on the Routing Engine on which Junos OS and the host OS are running. In a PTX3000, the Routing and Control Board is powered on.

Options

other-routing-engine Power on the other Routing Engine on which the Junos OS and the host OS are running. For example, if you issue the command from the primary Routing Engine, the backup Routing Engine is powered on. Similarly, if you issue the command from the backup Routing Engine, the primary Routing Engine is powered on.

NOTE: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

Required Privilege Level

maintenance

Sample Output

request vmhost power-on

```
user@host> request vmhost power-on other-routing-engine
Routing Engine 1 power-on initiated, use "show chassis routing-engine" to verify
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

request vmhost power-off | 898

request vmhost reboot | 902

request vmhost reboot

IN THIS SECTION

Syntax

```
request vmhost reboot
<disk1>
<disk2>
<network>
<re0 | re1>
<routing engine>
<usb>
```

Description

Reboot both the Junos OS and the host OS running on the device.

Options

none—Reboot the device software immediately.

disk1 (Optional) Reboot both Junos OS and the host OS on the Routing Engine and boot the Routing Engine from the primary disk.

disk2 (Optional) Reboot both Junos OS and the host OS on the Routing Engine and boot the Routing Engine from backup disk.

network (Optional) Reboot both Junos OS and the host OS on the Routing Engine and boot the Routing Engine from network by using the PXE boot method.

re0 | re1 (Optional) On routers that support dual or redundant Routing Engines, reboot both Junos OS and the host OS on the Routing Engine in slot 0 (`re0`) or on the the Routing Engine in slot 1 (`re1`).

routing-engine (Optional) Specify the Routing Engine on which Junos OS and the host OS are to be rebooted. The following options are available:

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

- `backup`—Backup Routing Engine.
- `both`—Both Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

usb (Optional) Reboot both Junos OS and the host OS on the Routing Engine using the USB installation media.

Required Privilege Level

maintenance

Sample Output

request vmhost reboot

```
request vmhost reboot
<disk1>
<disk2>
<in>
<network>
<usb>
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

request system reboot (Junos OS) | 697

request vmhost power-on | 900

request vmhost snapshot

IN THIS SECTION

Syntax

```
request vmhost snapshot
<partition>
<re0 | re1>
<recovery>
<routing-engine>
```

Description

Create a recovery snapshot of the currently running and active file system partitions on the backup disk to recover the primary disk in case of failure.

On the device, back up the snapshot of the host OS image along with the Junos OS image. In case of failure of the primary disk, you can boot from the image available in the backup disk and then recover the primary disk with the snapshot created using the `recovery` option.

Options

none—Create a snapshot from the current disk to the target disk without partitioning the target disk. Contents on target disk is lost.

partition (Optional) Create a snapshot from the current disk to target disk and partition the target disk. Contents on the target disk are lost

re0 | re1 (Optional) Create a snapshot from the current disk to target disk and partition the target disk on Routing Engine in slot 0 (`re0`) or on the Routing Engine in slot 1 (`re1`). The snapshot is taken without partitioning the target disk on corresponding Routing Engines. Contents on the target disk on the Routing Engines are lost.

For PTX1000 routers, since there is only one RE, re0|re1 is not supported.

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

recovery (Optional) Recover the primary disk from the snapshot content stored in the backup disk. This option is applicable only when the Routing engine is booted from backup disk. Contents in the primary disk are lost.

routing-engine (Optional) Specify the Routing Engine on which the snapshot is to be created. The following options are available:

- `backup`—Backup Routing Engine.
- `both`—Both Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—Other Routing Engine.

Required Privilege Level

maintenance

Sample Output

request vmhost snapshot

```
user@host> request vmhost snapshot
warning: Existing data on the target may be lost
Proceed ? [yes,no] (no) yes

warning: Proceeding with vmhost snapshot
Current root details,           Device sda, Label: jrootb_P, Partition: sda4
Snapshot admin context from current boot disk to target disk ...
```

```
Proceeding with snapshot on secondary disk
Mounting device in preparation for snapshot...
Cleaning up target disk for snapshot ...
Creating snapshot on target disk from current boot disk ...
Snapshot created on secondary disk.
Software snapshot done
```

request vmhost snapshot recovery

```
user@host> request vmhost snapshot recovery
warning: Existing data on the target may be lost
Proceed ? [yes,no] (no) yes

warning: Proceeding with vmhost snapshot
Current root details,           Device sdb, Label: jrootb_S, Partition: sdb4
Snapshot admin context from current boot disk to target disk ...
Proceeding with snapshot on primary disk
Mounting device in preparation for snapshot...
Cleaning up target disk for snapshot ...
Creating snapshot on target disk from current boot disk ...
Primary disk is recovered now. Please issue "request vmhost reboot" to boot from the primary
disk.
Software snapshot done
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

show vmhost snapshot | 954

request vmhost software abort in-service-upgrade

IN THIS SECTION

Syntax

```
request vmhost software abort in-service-upgrade
```

Description

Terminate unified in-service software upgrade (unified ISSU). The unified ISSU must be in progress and you must issue this command from a router session other than the one on which you issued the `request vmhost software in-service-upgrade` command to launch the unified ISSU.

Options

in-service-upgrade	Terminate unified ISSU.

Required Privilege Level

maintenance

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

request system software abort

request vmhost software in-service-upgrade | 914

request vmhost software add

IN THIS SECTION

MX Series

```
request vmhost software add package-name
<no-validate>
<re0 | re1>
<reboot>
<set [package-names]>
```

PTX Series

```
request vmhost software add package-name
<in>
<log_collector.sh>
<no-validate>
<reboot>
<set [package-names]>
<unlink>
<upgrade-to-model>
```

Description

Install Junos OS and host software packages on the device.

For installing the host software as well as Junos OS, specify the package name **junos-vmhost-install-*x*.tgz** in the `request vmhost software add` command. Junos OS installation alone can be achieved by specifying the regular package name **junos-install-*x*.tgz** in the `request system software add` command. However, installation using the vmhost package is recommended as it upgrades both the host software and Junos OS.

To upgrade to Junos OS Release 21.2R1, you must include the `no-validate` option when using this command to install the package.

NOTE: You must load the PTX1000, PTX10008, PTX10016, PTX10002-60C, and QFX10002-60C devices only with **junos-vmhost-install-*x*.tgz** package using the `request vmhost`

`software add` command. The **junos-vmhost-install-*x*.tgz** package upgrades both the host software and Junos OS. The PTX1000, PTX10008, PTX10016, PTX10002-60C, and QFX10002-60C devices do not support Junos only upgrade. If you try to load Junos only image, then these devices go down or vmhost commands do not work or the device state is unpredictable.

Options

none—Install Junos OS and host software packages on the Routing Engine on the local Virtual Chassis member.

package-name Location from which the software package or bundle is to be installed. For example:

- **/var/tmp/*package-name*—**For a software package or bundle that is being installed from a local directory on the device.
- ***protocol*://*hostname*/*pathname*/*package-name*—**For a software package or bundle that is to be downloaded and installed from a remote location. Replace ***protocol*** with one of the following:
  - **ftp**—File Transfer Protocol (FTP).
    Use **ftp://*hostname*/*pathname*/*package-name***. To specify authentication credentials, use **ftp://<*username*>:<*password*>@*hostname*/*pathname*/*package-name***. To have the system prompt you for the password, specify `prompt` in place of the password. If a password is required, and you do not specify the password or `prompt`, an error message is displayed.
  - **http**—Hypertext Transfer Protocol (HTTP).
    Use **http://*hostname*/*pathname*/*package-name***. To specify authentication credentials, use **http://<*username*>:<*password*>@*hostname*/*pathname*/*package-name***. If a password is required and you omit it, you are prompted for it.
  - **scp**—Secure Copy Protcol (SCP)(not available for limited editions).
    Use **scp://*hostname*/*pathname*/*package-name***. To specify authentication credentials, use **scp://<*username*>:<*password*>@*hostname*/*pathname*/*package-name***.

NOTE:

- The ***pathname*** in the protocol is the relative path to the user's home directory on the remote system and not the root directory.
- Do not use the **scp** protocol in the `request vmhost software add` command to download and install a software package or bundle from a remote location. The software upgrade is handled by the mgd process that does not support SCP.

  To install a software package or bundle from a remote location:

  1. Use the `file copy` command to copy the software package or bundle from the remote location to the **/var/tmp** directory on the hard disk:
     file copy scp://*source/package-name* /var/tmp
  2. Install the software package or bundle by using the `request vmhost software add` command:
     request vmhost software add /var/tmp/*package-name*

no-validate (Optional) When loading a software package or bundle with a different release, suppress the default behavior of the `validate` option.

To upgrade to Junos OS Release 21.2R1, you must include the `no-validate` option when using this command to install the package.

re0 | re1 (Optional) Load a software package or bundle on the Routing Engine in slot 0 (`re0`) or the Routing Engine in slot 1 (`re1`).

NOTE: The option `re1` is not supported on the PTX1000 Packet Transport Router.

reboot (Optional) After adding the software package or bundle, reboot the system.

set [*package-names*] (Optional)

Additional Information

Before upgrading the software on the device, when you have a known stable system, issue the `request vmhost snapshot` command to back up the software. After you have upgraded the software on the device and are satisfied that the new package or bundle is successfully installed and running, issue the `request vmhost snapshot` command again to back up the new software to the backup disk.

After you run the `request vmhost snapshot` command, you cannot return to the previous version of the snapshot, because the previous snapshot is replaced by the new snapshot.

Before installing software on a device that has one or more custom YANG data models added to it, back up and remove the configuration data corresponding to the custom YANG data models from the active configuration. For more information see "Managing YANG Packages and Configurations During a Software Upgrade or Downgrade" on page 119.

Required Privilege Level

maintenance

Sample Output

request vmhost software add (Multiple Packages)

```
user@host> request vmhost software add set [/var/tmp/junos-vmhost-install-ptx-
x86-64-15.1F-20160518.0.tgz /var/tmp/junos-vmhost-jdiag-15.1F-20160518.0.tgz no-validate
Verified /var/tmp/junos-vmhost-install-ptx-x86-64-15.1F-20160518.0.tgz signed by
PackageDevelopmentEc_2016
Copied the config and other data to the aux disk.
Transfer junos-host-upgrade.sh
Transfer Done
Transfer /packages/db/pkginst.7286/junos-vmhost-install*.tgz
Transfer Done
Starting upgrade...
Preparing for upgrade...
/tmp/pkg-1dX/unpack/install/
...
...
..
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

request system software add (Junos OS) | 741

request vmhost software rollback | 919

request vmhost software in-service-upgrade

IN THIS SECTION

Syntax

```
request vmhost software in-service-upgrade package-name
< no-old-master-upgrade>
< reboot>
< verbose>
```

Description

Perform a unified in-service software upgrade (ISSU). A unified ISSU enables you to upgrade from one Junos OS release and host OS release to another with no disruption on the control plane and with minimal disruption of traffic. For an unified ISSU, graceful Routing Engine switchover (GRES) and nonstop active routing (NSR) must be enabled.

Starting inJunos OS Release 18.2R1, MX10003 routers support unified in-service software upgrade (ISSU) using `request vmhost software in-service-upgrade` command. MX10003 does not support upgrading Junos OS only image using request system software in-service-upgrade command.

NOTE: On MX10003 routers:

- ISSU is not supported on MACsec MIC (JNP-MIC1-MACSEC).
- ISSU is not supported for the interfaces that are configured with 1-Gigabit Ethernet mode. If ISSU upgrade is carried out in 1-Gigabit Ethernet mode, then the behavior is unexpected and traffic loss can be expected.
- ISSU is not supported on timing protocols (like, Precision Time Protocol and Synchronous Ethernet), MACsec protocols, and BBE protocols. If these protocols are already enabled, then it will not work after ISSU is enabled.
- The MAC statistics (retrieved using *show interfaces extensive* command) are reset during ISSU which means that the MAC statistics does not provide the correct statistics after ISSU.

Options

package-name Location from which the software package or bundle is to be installed. For example:

- `/var/tmp/`*`package-name`*— For a software package or bundle that is being installed from a local directory on the router.
- *`protocol`*`://`*`hostname/pathname/package-name`*—For a software package or bundle that is to be downloaded and installed from a remote location. Replace *`protocol`* with one of the following:
  - `ftp`—File Transfer Protocol (FTP).

- `http`—Hypertext Transfer Protocol (HTTP).
- `scp`—Secure Copy Protocol (SCP) (not available for limited editions).

no-old-master-upgrade (Optional) When the `no-old-master-upgrade` option is included, after the backup Routing Engine is rebooted with the new software package and a switchover occurs to make it the new primary Routing Engine, the former primary (new backup) Routing Engine is not upgraded to the new software. In this case, you must manually upgrade the former primary (new backup) Routing Engine. If you do not include the `no-old-master-upgrade` option, the system automatically upgrades the former primary Routing Engine.

reboot (Optional) Automatically reboot the former primary (new backup) Routing Engine after the ISSU. If you don not include the `reboot` option in the command, you must manually reboot the former primary (new backup) Routing Engine by using the `request vmhost reboot` command.

verbose (Optional) (MX Series) Use this option to display the daemon related information during the upgrade.

Additional Information

The following conditions apply to unified ISSU:

- Unified ISSU is not supported on every platform. For a list of supported platforms, see Unified ISSU System Requirements.
- Unsupported PICs are restarted during a unified ISSU on certain routing devices.
- During a unified ISSU, any unsupported protocols running on the device causes packet loss.
- During a unified ISSU, you cannot bring any PICs online or take them offline on certain routing devices.

Required Privilege Level

maintenance

Sample Output

request vmhost software in-service-upgrade

```
user@host> request vmhost software in-service-upgrade
/var/tmp/junos-vmhost-install-ptx-x86-64-15.1F5.6.tgz reboot
Chassis ISSU Check Done
[Feb 24 01:12:09]: Starting VMHOST ISSU
[Feb 24 01:12:09]:ISSU: Validating Image
FPC 2 will be offlined (In-Service-Upgrade not supported)
FPC 11 will be offlined (In-Service-Upgrade not supported)
MIC 11/0 will be offlined (In-Service-Upgrade not supported)
Do you want to continue with these actions being taken ? [yes,no] (no) yes
Junos Validation begin. Procedure will take few minutes.
  ...
  ...
```

Sample Output

request vmhost software in-service-upgrade verbose

```
user@host> request vmhost software in-service-upgrade verbose

  ...
  ...
Oct 26 15:20:02 [INFO ] Verified py-extensions signed by PackageDevelopmentEc_2017 method
ECDSA256+SHA256
Oct 26 15:20:02 [INFO ] Adding py-extensions-
x86-32-20171024.002108_builder_release_174_throttle ...
Oct 26 15:20:02 [INFO ] Verified vrr-mx signed by PackageDevelopmentEc_2017 method
ECDSA256+SHA256
Oct 26 15:20:02 [INFO ] NOTICE: 'pending' set will be activated at next reboot...
Oct 26 15:20:02 [INFO ] [Oct 26 02:36:10]:ISSU: Installing package /var/tmp/junos-install-mx-
x86-64-17.4-20171024.0.tgz on re1 done
Oct 26 15:20:02 [INFO ] [Oct 26 02:36:10]:ISSU: Rebooting Backup RE
Oct 26 15:20:02 [INFO ]
Oct 26 15:20:02 [INFO ] Rebooting re1
```

```
Oct 26 15:20:02 [INFO ] [Oct 26 02:36:11]:ISSU: Backup RE Prepare Done
Oct 26 15:20:02 [INFO ] [Oct 26 02:36:11]:ISSU: Waiting for Backup RE reboot
Oct 26 15:20:02 [INFO ] [Oct 26 02:39:26]:ISSU: Backup RE reboot done. Backup RE is up
Oct 26 15:20:02 [INFO ] [Oct 26 02:39:26]:ISSU: Waiting for Backup RE state synchronization
Oct 26 15:20:02 [INFO ] [Oct 26 02:39:51]:ISSU: Backup RE state synchronization done
Oct 26 15:20:02 [INFO ] [Oct 26 02:39:51]:ISSU: GRES operational
Oct 26 15:20:02 [INFO ] [Oct 26 02:40:52]: "Initiating Chassis In-Service-Upgrade"
Oct 26 15:20:02 [INFO ] Chassis ISSU Started
Oct 26 15:20:02 [INFO ] [Oct 26 02:40:57]:ISSU: Preparing Daemons
Oct 26 15:20:02 [INFO ] [Oct 26 02:40:57]: Daemon [rpd] transitioned to READY state
Oct 26 15:20:02 [INFO ] [Oct 26 02:40:57]: Daemon [lfmd] transitioned to READY state
Oct 26 15:20:02 [INFO ] [Oct 26 02:40:57]: Daemon [l2cpd] transitioned to READY state
Oct 26 15:20:02 [INFO ] [Oct 26 02:40:57]: Daemon [smid] transitioned to READY state
Oct 26 15:20:02 [INFO ] [Oct 26 02:40:57]: Daemon [bfdd] transitioned to READY state
Oct 26 15:20:02 [INFO ] [Oct 26 02:41:17]:ISSU: Daemons Ready for ISSU
Oct 26 15:20:02 [INFO ] [Oct 26 02:41:17]: Daemon [apsd] transitioned to READY state
Oct 26 15:20:02 [INFO ] [Oct 26 02:41:22]:ISSU: Offline Incompatible FRUs
Oct 26 15:20:02 [INFO ] [Oct 26 02:41:27]:ISSU: Starting Upgrade for FRUs
Oct 26 15:20:02 [INFO ] [Oct 26 02:41:27]: [FPC 1] None -> Prepare
Oct 26 15:20:02 [INFO ] [Oct 26 02:41:48]: [FPC 1] Prepare -> Ready for Reboot
Oct 26 15:20:02 [INFO ] [Oct 26 02:41:52]: [FPC 1] Ready for Reboot -> Reboot
Oct 26 15:20:02 [INFO ] [Oct 26 02:42:01]: [FPC 1] Reboot -> Blob Resync
Oct 26 15:20:02 [INFO ] [Oct 26 02:42:28]: [FPC 1] Blob Resync -> Ready Software State Sync
Oct 26 15:20:02 [INFO ] [Oct 26 02:42:32]: [FPC 1] Ready Software State Sync -> Software State
Sync
Oct 26 15:20:02 [INFO ] [Oct 26 02:44:02]: [FPC 1] Software State Sync -> Ready Hardware State
Sync
Oct 26 15:20:02 [INFO ] [Oct 26 02:44:02]: [FPC 1] Ready Hardware State Sync -> Hardware State
Sync
Oct 26 15:20:02 [INFO ] [Oct 26 02:47:07]: [FPC 1] Hardware State Sync -> Reconnected
Oct 26 15:20:02 [INFO ] [Oct 26 02:47:07]:ISSU: FRU Upgrade Done
Oct 26 15:20:02 [INFO ] [Oct 26 02:47:07]:ISSU: Preparing for Switchover
Oct 26 15:20:02 [INFO ] [Oct 26 02:47:07]: Daemon [lfmd] transitioned to SWITCHOVER_READY state
Oct 26 15:20:02 [INFO ] [Oct 26 02:47:07]: Daemon [rpd] transitioned to SWITCHOVER_READY state
Oct 26 15:20:02 [INFO ] [Oct 26 02:47:07]: Daemon [l2cpd] transitioned to SWITCHOVER_READY state
Oct 26 15:20:02 [INFO ] [Oct 26 02:47:07]: Daemon [smid] transitioned to SWITCHOVER_READY state
Oct 26 15:20:02 [INFO ] [Oct 26 02:47:07]: Daemon [bfdd] transitioned to SWITCHOVER_READY state
Oct 26 15:20:02 [INFO ] [Oct 26 02:47:27]: Daemon [apsd] transitioned to SWITCHOVER_READY state
Oct 26 15:20:02 [INFO ] [Oct 26 02:47:29]: Checking In-Service-Upgrade status
Oct 26 15:20:02 [INFO ]   Item           Status                  Reason
Oct 26 15:20:02 [INFO ]   FPC 1          Online (ISSU)
Oct 26 15:20:02 [INFO ] Resolving mastership...
Oct 26 15:20:02 [INFO ] Complete. The other routing engine becomes the master.
```

```
Oct 26 15:20:02 [INFO ] [Oct 26 02:47:30]:ISSU: RE switchover Done
Oct 26 15:20:02 [INFO ] [Oct 26 02:47:30]:ISSU: Upgrading Old Master RE
Oct 26 15:20:02 [INFO ] Verified junos-install-mx-x86-64-17.4-20171024.0 signed by
PackageDevelopmentEc_2017 method ECDSA256+SHA256
Oct 26 15:20:02 [INFO ] Verified manifest signed by PackageDevelopmentEc_2017 method
ECDSA256+SHA256
  ...
    ...
```

Release Information

Command introduced in Junos OS Release 15.1F3.

Option introduced in Junos OS Release 18.2R1 for the MX Series routers.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

request system software in-service-upgrade

request vmhost software rollback

IN THIS SECTION

Syntax

```
request vmhost  software rollback
<re0 | re1>
<routing-engine>
```

Description

Roll back the Junos OS and the host OS software packages to the previous versions. You can revert to the previous versions of software packages that were loaded at the last successful `request vmhost software add` command.

Options

none—Roll back the software packages of the Routing Engine on the local Virtual Chassis member.

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, roll back the software packages in Routing Engine in slot 0 (`re0`) or software packages in the Routing Engine in slot 1 (`re1`).

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

routing-engine (Optional) Specify the Routing Engine on which the software packages needs to be rolled back to the previous set of software packages. The following options are available:

- `backup`—Backup Routing Engine.

- both—Both Routing Engines.
- local—Routing Engine on the local Virtual Chassis member.
- master—Primary Routing Engine.
- other—Other Routing Engine.

Required Privilege Level

maintenance

Output Fields

Sample Output

request vmhost software rollback

```
request vmhost  software rollback
<reboot>
```

command-name

```
user@host> request vmhost software rollback
Current root details,         Device sda, Label: jrootp_P, Partition: sda3
Finding alternate root for rollback
Rollback to software on jrootb_P ...
sh /etc/install/mk-mtre-rollback.sh jrootb_P b
Mounting device in preparation for rollback...
Updating boot partition for rollback...
Rollback complete, please reboot the node for it to take effect.
Cmos Write successfull
```

```
Cmos Write successfull for Boot_retry
Cmos Write successfull for Boot_retry
```

command-name

```
user@host> show vmhost version
Current root details,         Device sda, Label: jrootp_P, Partition: sda3
Current boot disk: Primary
Current root set: p
UEFI     Version: NGRE_v00.53.00.01

Primary Disk, Upgrade Time: Wed Feb 24 17:51:53 UTC 2016
    Pending reboot.

Version: set p
VMHost Version: 2.951
VMHost Root: vmhost-x86_64-15.1I20160210_2212_builder
VMHost Core: vmhost-core-x86_64-15.1I20160210_2212_builder
kernel: 3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt
Junos Disk: junos-install-x86-64-15.1F5.5

Version: set b
VMHost Version: 2.953
VMHost Root: vmhost-x86_64-15.1F520160222_1052_builder
VMHost Core: vmhost-core-x86_64-15.1F520160222_1052_builder
kernel: 3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt
Junos Disk: junos-install-x86-64-15.1F5.6
```

command-name

```
user@host> request vmhost reboot
Reboot the vmhost ? [yes,no] (no) yes

warning: Rebooting re1
Initiating vmhost reboot...  ok
Initiating Junos shutdown...  shutdown: [pid 9733]
Shutdown NOW!
ok
Junos shutdown is in progress...
```

```
*** FINAL System shutdown message from root@nikon1 ***

System going down IMMEDIATELY
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

request vmhost software add | 909

request vmhost software abort in-service-upgrade | 908

request vmhost software validate

IN THIS SECTION

Syntax

```
request vmhost software validate package-name
```

Description

Verify and validate the software package compatibility with the current configuration of the router.

Required Privilege Level

maintenance

Sample Output

request vmhost software validate

```
request vmhost software validate
<package-name>
<log_collector.sh>
```

Release Information

Statement introduced in Junos OS Release 18.4R1

NOTE: The command is supported on the routers with RE-MX-X6, RE-MX-X8, and RE-PTX-X8 Routing Engines with VM host support only.

RELATED DOCUMENTATION

request system software abort

request vmhost software in-service-upgrade | 914

request vmhost zeroize

IN THIS SECTION

Syntax

```
request vmhost zeroize
<re0 | re1>
<routing-engine>
```

Description

Remove all configuration information on the Routing Engines and reset all key values. If the device has dual Routing Engines, the command is broadcast to both Routing Engines on the device. The command removes all data files, including customized configuration and log files, by unlinking the files from their directories. The command removes all user-created files from the system including all plain-text passwords, secrets, and private keys for SSH, local encryption, local authentication, IPsec, RADIUS, TACACS+, and SNMP.

This command reboots the device and sets it to the factory-default configuration. After the reboot, you cannot access the device through the management Ethernet interface. Log in through the console as the root user and start the Junos OS CLI by typing **cli** at the prompt.

Options

none—Remove all configuration information on all the Routing Engines and reset all key values.

re0 | re1 (Optional) Remove all configuration information on the Routing Engine in slot 0 (`re0`) or the Routing Engine in slot 1 (`re1`).

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

routing-engine (Optional) Remove all configuration information on the specified Routing Engine. The following options are available:

- `backup`—Backup Routing Engine.
- `both`—Both Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Master Routing Engine.
- `other`—Other Routing Engine.

Required Privilege Level

maintenance

Sample Output

request vmhost zeroize

```
user@host> request vmhost zeroize
VMHost Zeroization : Erase all data, including configuration and log files ? [yes,no] (no) yes

re0:
--------------------------------------------------------------------------
warning: Vmhost will reboot and may not boot without configuration
warning: Proceeding with vmhost zeroize
Zeroise secondary internal disk ...
Proceeding with zeroize on secondary disk
Mounting device in preparation for zeroize...
Cleaning up target disk for zeroize ...
Zeroize done on target disk.
Zeroize of secondary disk completed
Zeroize primary internal disk ...
Proceeding with zeroize on primary disk
Mounting device in preparation for zeroize...
Cleaning up target disk for zeroize ...
Zeroize done on target disk.
Zeroize of primary disk completed
Zeroize done
mv: cannot stat '/tmp/zero-UytUWY/tgt_jlvmrootfs/etc/fstab': No such file or directory mv:
cannot stat '/tmp/zero-UytUWY/fstab': No such file or directory mv: cannot stat '/tmp/
zero-6gvrWj/tgt_jlvmrootfs/etc/fstab': No such file or directory mv: cannot stat '/tmp/
zero-6gvrWj/fstab': No such file or directory
warning: Proceeding with vmhost reboot

*** FINAL System shutdown message from root@user ***

System going down IMMEDIATELY


Initiating vmhost reboot...  ok
Initiating Junos shutdown...  shutdown: [pid 8565]
Shutdown NOW!
ok
Junos shutdown is in progress...
Shutdown NOW!
```

```
System shutdown time has arrived\x07\x07

re1:
--------------------------------------------------------------------------
warning: Vmhost will reboot and may not boot without configuration
warning: Proceeding with vmhost zeroize
Zeroise secondary internal disk ...
Proceeding with zeroize on secondary disk
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

request vmhost snapshot | 904

16
CHAPTER

VM Host Monitoring Commands

show vmhost bridge

IN THIS SECTION

Syntax

```
show vmhost bridge
<invoke-on>
<re0 | re1>
<routing engine>
```

Syntax

Description

Display bridge table information. The bridge table provides information about the interfaces used for communication between host and guest operating systems.

Options

invoke-on (Optional) Display the bridge table information of Routing Engines on a device that has dual or redundant Routing Engines. You can use the `all-routing-engine` option to display the bridge table information of all the Routing Engines or the `other-routing-engine` option to display the bridge table information of the other Routing Engine. For example, If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, display bridge table information about the Routing Engine in slot 0 (`re0`) or the Routing Engine in slot 1 (`re1`).

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

routing-engine (Optional) Specify the Routing Engine for which the bridge information is to be displayed. The following options are available:

- `backup`—Backup Routing Engine.
- `both`—Primary and the backup Routing Engines.
- `local`— Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

view

Sample Output

show vmhost bridge

```
user@host> show vmhost bridge
Compute cluster: rainier-re-cc
Compute node: rainier-re-cn
Bridge Table
 ============
bridge name              bridge id           STP enabled     interfaces
   jnpr-int-br          8000.bee5a8cfdb9a       no              tap1
   virbr0               8000.52540051f94b       yes             virbr0-nic
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

show vmhost crash

IN THIS SECTION

Syntax

```
show vmhost crash
```

Description

Display the number of times the host OS crashed. The crash dumps are available at **/var/crash**.

Required Privilege Level

view

Sample Output

show vmhost crash

```
user@host> show vmhost crash
Compute cluster: rainier-re-cc

  Compute node: rainier-re-cn

   Crash Info
   ==========
   total 0
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

show system core-dumps

show vmhost hard-disk-test

IN THIS SECTION

Syntax

```
show vmhost hard-disk -test { disk disk-name | status}
```

Description

Display memory and diagnostics monitoring test status on the solid-state drive (SSD). The test output provides information about the various attributes of the SSD that help to monitor the status of the hard disk memory. This command should be used only after initiating the disk test with the `request vmhost hard-disk-test` command.

Options

disk *disk-name*	Display the name of the SSD.
status	Display the status of the test.

Required Privilege Level

maintenance

Sample Output

show vmhost hard-disk-test

```
user@host> show vmhost hard-disk-test status disk /dev/sda
smartctl 5.42 2014-07-28 r3460 [x86_64-linux-3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt] (local
build)
Copyright (C) 2002-11 by Bruce Allen, http://smartmontools.sourceforge.net

=== START OF INFORMATION SECTION ===
Model Family:     UNIGEN SATA SSD
Device Model:     SATA SSD
Serial Number:    3AF607410C3800117282
Firmware Version: S9FM01.3
User Capacity:    64,023,257,088 bytes [64.0 GB]
Sector Size:      512 bytes logical/physical
Device is:        In smartctl database [for details use: -P show]
ATA Version is:   8
ATA Standard is:  ACS-3 (revision not indicated)
Local Time is:    Sun Jan  8 08:02:22 2017 UTC
SMART support is: Available - device has SMART capability.
SMART support is: Enabled

=== START OF READ SMART DATA SECTION ===
SMART overall-health self-assessment test result: PASSED
```

```
General SMART Values:
Offline data collection status:  (0x00) Offline data collection activity
                                        was never started.
                                        Auto Offline Data Collection: Disabled.
Self-test execution status:      (   0) The previous self-test routine completed
                                        without error or no self-test has ever
                                        been run.
Total time to complete Offline
data collection:                (   30) seconds.
Offline data collection
capabilities:                    (0x1b) SMART execute Offline immediate.
                                        Auto Offline data collection on/off support.
                                        Suspend Offline collection upon new
...
...
...
```

Release Information

Command introduced in Junos OS Release 17.2R1.

RELATED DOCUMENTATION

request vmhost hard-disk-test | 895

show vmhost hardware

IN THIS SECTION

Syntax

```
show vmhost hardware
<invoke-on>
<re0 | re1>
<routing engine>
```

Description

Display details of RAM and solid-state drives (SSDs) installed in the Routing Engine.

Options

none (Optional) Display information about hardware.

invoke-on (Optional) Display the details of RAM and solid-state drives (SSDs) installed on a device that has dual Routing Engines. You can use the `all-routing-engine` option to display the hardware information of all the Routing Engines or the `other-routing-engine` option to display the hardware information of the other Routing Engine. For example, if you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, display hardware information about the Routing Engine in slot 0 (`re0`) or the Routing Engine in slot 1 (`re1`).

routing-engine (Optional) Specify the Routing Engine for which the details of the installed RAM and solid-state drives (SSDs) is to be displayed. The following options are available:

NOTE: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

- `backup`—Backup Routing Engine.
- `both`—Primary and backup Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`— If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

view

Sample Output

show vmhost hardware

```
user@host> show vmhost hardware
Compute cluster: rainier-re-cc

  Compute node: rainier-re-cn
   Hardware inventory:

   Item    Capacity  Part number          Serial number        Description
   DIMM 0  16384 MB  36ADS2G72PZ-2G1A1    0x0CF49320           DDR4 2133 MHz
   DIMM 1  16384 MB  36ADS2G72PZ-2G1A1    0x0CF4934C           DDR4 2133 MHz
   DIMM 2  16384 MB  36ADS2G72PZ-2G1A1    0x0CF49329           DDR4 2133 MHz
   DIMM 3  16384 MB  36ADS2G72PZ-2G1A1    0x0CF49352           DDR4 2133 MHz
```

```
    Disk1   50.0  GB  StorFly-VSF202CC050G  P1T13003443810130041  SLIM SATA SSD
    Disk2   50.0  GB  StorFly-VSF202CC050G  P1T13003443810130012  SLIM SATA SSD
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

show chassis hardware

show vmhost information

IN THIS SECTION

Syntax

```
show vmhost information
<invoke-on>
```

```
<re0 | re1>
<routing engine>
```

Description

Display information about the host—such as IP address of the host Routing Engine, host OS version, model number or name of the Routing Engine, and so on.

Options

invoke-on (Optional) Display information about the host on a device that has dual Routing Engines. You can use the `all-routing-engine` option to display information about the host of all the Routing Engines or the `other-routing-engine` option to display the information about the host of the other Routing Engine. If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine .

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, display information about the host of Routing Engine in slot 0 (`re0`) or the Routing Engine in slot 1 (`re1`).

routing-engine (Optional) Specify the Routing Engine for which the information about the host is to be displayed. The following options are available:

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

- `backup`—Backup Routing Engine.
- `both`—Primary and the backup Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

view

Sample Output

show vmhost information

```
user@host> show vmhost information
Compute cluster: rainier-re-cc
  Compute node       Model           Kernel release                 Machine    Management IP
  rainier-re-cn      RAINIER         3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt x86_64 192.168.1.2/24
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

show vmhost logs

IN THIS SECTION

Syntax

```
show vmhost logs
<re0 | re1>
<routing engine>
```

Description

Display trace logs information of the host OS.

Options

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, display trace logs information of the host os running on the Routing Engine in slot 0 (`re0`) or the Routing Engine in slot 1 (`re1`).

routing-engine (Optional) Specify the Routing Engine for which the trace logs information of the host OS is to be displayed. The following options are available:

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

- `backup`—Backup Routing Engine.
- `both`—Primary and the backup Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.

- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

view

Sample Output

show vmhost logs

```
show vmhost logs
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

show vmhost management-if

IN THIS SECTION

Syntax

```
show vmhost management-if
```

Description

Display the administrative status, speed and operational mode of the host interface eth0, which serves as a management interface.

Required Privilege Level

view

Sample Output

show vmhost management-if

```
user@host> show vmhost management-if
Administrative status: Up
Link status: Up
Link speed: 1000Mb/s
Link operational mode: Full
```

Release Information

Command introduced in Junos OS Release 15.1F6.

NOTE: The command is supported on the routers with RE-MX-X6, RE-MX-X8, and RE-PTX-X8 Routing Engines only.

show vmhost netstat

IN THIS SECTION

Syntax

```
show vmhost netstat
<invoke-on>
<re0 | re1>
<routing engine>
```

Description

Display network statistics information for the host OS. The statistics contains information related to the interfaces used for the communication between the host and the guest, such as the IP address of the destination, IP address of the gateway, mask, flags, and so on.

Options

invoke-on (Optional) Display the network statistics for the host OS on a device that has dual Routing Engines. You can use the `all-routing-engine` option to display the network statistics information for the host OS running on all the Routing Engines or the `other-routing-engine` option to display the network statistics information for the host OS running on the other Routing Engine. For example, If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine .

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, display the network statistics information for the host OS running on the Routing Engine in slot 0 (`re0`) or the Routing Engine in slot 1 (`re1`).

routing-engine (Optional) Specify the Routing Engine for which the network statistics information for the host OS is to be displayed. The following options are available:

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

- `backup`—Backup Routing Engine.
- `both`—Primary and the backup Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

view

Sample Output

show vmhost netstat

```
user@host> show vmhost netstat
Compute cluster: rainier-re-cc

  Compute node: rainier-re-cn

   Netstat
   =======
   Kernel IP routing table
   Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
   0.0.0.0         10.216.63.254   0.0.0.0         UG        0 0          0 eth0
   10.216.48.0     0.0.0.0         255.255.240.0   U         0 0          0 eth0
   192.168.1.0     0.0.0.0         255.255.255.0   U         0 0          0 jnpr-int-br
   192.168.122.0   0.0.0.0         255.255.255.0   U         0 0          0 virbr0
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

show vmhost processes

IN THIS SECTION

Syntax

```
show vmhost processes
<invoke-on>
<re0 | re1>
<routing engine>
```

Description

Display information about the host processes that are running on the device.

Options

invoke-on (Optional) Display information about the host processes that are running on a device with dual Routing Engines. You can use the `all-routing-engine` option to display information about the host processes running on all the Routing Engines or the `other-routing-engine` option to display information about the host processes running on the other Routing Engine. For

example, If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine .

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, display information about the host processes running on the Routing Engine in slot 0 (re0) or on the Routing Engine in slot 1 (re1).

routing-engine (Optional) Specify the Routing Engine for which the information about the host processes is to be displayed. The following options are available:

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

- `backup`—Backup Routing Engine.
- `both`—Primary and the backup Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

view

Sample Output

show vmhost processes

```
user@host> show vmhost processes
Compute cluster: rainier-re-cc

  Compute node: rainier-re-cn
   UID        PID  PPID  C STIME TTY          TIME CMD
```

```
root         1     0  0 21:56 ?        00:00:02 init [3]
root         2     0  0 21:56 ?        00:00:00 [kthreadd]
root         3     2  0 21:56 ?        00:00:04 [ksoftirqd/0]
root         5     2  0 21:56 ?        00:00:00 [kworker/0:0H]
root         7     2  0 21:56 ?        00:00:00 [posixcputmr/0]
root         8     2  0 21:56 ?        00:00:00 [kclksetdelayd]
root         9     2  0 21:56 ?        00:00:00 [rcub/0]
root        10     2  0 21:56 ?        00:00:04 [rcu_preempt]
root        11     2  0 21:56 ?        00:00:00 [rcu_sched]
root        12     2  0 21:56 ?        00:00:00 [rcu_bh]
root        13     2  0 21:56 ?        00:00:03 [rcuc/0]
root        14     2  0 21:56 ?        00:00:00 [kcmosdelayd]
root        15     2  0 21:56 ?        00:00:00 [migration/0]
root        16     2  0 21:56 ?        00:00:00 [migration/1]
root        17     2  0 21:56 ?        00:00:03 [rcuc/1]
root        18     2  0 21:56 ?        00:00:04 [ksoftirqd/1]
root        19     2  0 21:56 ?        00:00:00 [posixcputmr/1]
root        20     2  0 21:56 ?        00:00:00 [kworker/1:0]
root        21     2  0 21:56 ?        00:00:00 [kworker/1:0H]
root        22     2  0 21:56 ?        00:00:00 [migration/2]
root        23     2  0 21:56 ?        00:00:10 [rcuc/2]
root        24     2  0 21:56 ?        00:00:02 [ksoftirqd/2]
root        25     2  0 21:56 ?        00:00:00 [posixcputmr/2]
root        26     2  0 21:56 ?        00:00:00 [kworker/2:0]
root        27     2  0 21:56 ?        00:00:00 [kworker/2:0H]
root        28     2  0 21:56 ?        00:00:00 [migration/3]
root        29     2  0 21:56 ?        00:00:01 [rcuc/3]
root        30     2  0 21:56 ?        00:00:01 [ksoftirqd/3]
root        31     2  0 21:56 ?        00:00:00 [posixcputmr/3]
root        32     2  0 21:56 ?        00:00:00 [kworker/3:0]
root        33     2  0 21:56 ?        00:00:00 [kworker/3:0H]
root        34     2  0 21:56 ?        00:00:00 [migration/4]
root        35     2  0 21:56 ?        00:00:01 [rcuc/4]
root        36     2  0 21:56 ?        00:00:01 [ksoftirqd/4]
root        37     2  0 21:56 ?        00:00:00 [posixcputmr/4]
root        38     2  0 21:56 ?        00:00:00 [kworker/4:0]
root        39     2  0 21:56 ?        00:00:00 [kworker/4:0H]
root        40     2  0 21:56 ?        00:00:00 [migration/5]
root        41     2  0 21:56 ?        00:00:01 [rcuc/5]
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

show system processes

show vmhost resource-usage

IN THIS SECTION

Syntax

```
show vmhost resource-usage
<invoke-on>
<re0 | re1>
<routing engine>
```

Description

Display the current usage of solid-state drive (SSD), RAM, and CPU resources of the host OS.

Options

invoke-on (Optional) Display information about resources used by the host OS running on a device that has dual Routing Engines. You can use the `all-routing-engine` option to display information about resources used by the host OS on all the Routing Engines or the `other-routing-engine` option to display information about resources used by the host OS on the other Routing Engine. For example, If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, display information about resources used by the host OS on the Routing Engine in slot 0 (re0) or on the Routing Engine in slot 1 (re1).

routing-engine (Optional) Specify the Routing Engine for which the information about resources used by the host OS is to be displayed. The following options are available:

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

- `backup`—Backup Routing Engine.
- `both`—Primary and the backup Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

view

Sample Output

show vmhost resource-usage

```
user@host> show vmhost resource-usage
Compute cluster: rainier-re-cc

  Compute node: rainier-re-cn
   CPU Usage
   =========
   23:15:09   CPU  %usr  %nice    %sys %iowait   %irq   %soft  %steal  %guest   %idle
   23:15:09   all  0.36   0.00    1.16    0.07   0.00    0.01   0.00   74.07   24.34
   23:15:09   0    1.42   0.00    4.46    0.28   0.00    0.03   0.00    0.00   93.81
   23:15:09   1    1.43   0.00    3.87    0.30   0.00    0.03   0.00    0.00   94.38
   23:15:09   2    0.02   0.00    0.42    0.00   0.00    0.01   0.00   98.33    1.22
   23:15:09   3    0.00   0.00    0.14    0.00   0.00    0.00   0.00   98.65    1.21
   23:15:09   4    0.00   0.00    0.09    0.00   0.00    0.00   0.00   98.71    1.19
   23:15:09   5    0.00   0.00    0.10    0.00   0.00    0.00   0.00   98.71    1.19
   23:15:09   6    0.00   0.00    0.11    0.00   0.00    0.00   0.00   98.70    1.19
   23:15:09   7    0.00   0.00    0.12    0.00   0.00    0.00   0.00   98.68    1.19

   Memory Usage
   ============
                total       used       free     shared    buffers     cached
   Mem:         63851      51388      12462          0         35        123
   Swap:            0          0          0

   Disk Usage
   ==========
   Filesystem                   Size  Used Avail Use% Mounted on
   rootfs                       3.3G  127M  3.0G   5% /
   /dev/sda4                    2.0G  1.7G  166M  91% /.old
   tmpfs                         32G  1.2M   32G   1% /.old/run
   none                          32G  4.0K   32G   1% /.old/dev
   tmpfs                         32G     0   32G   0% /.old/tmp
   tmpfs                         32G     0   32G   0% /.old/tdev
   /dev/mapper/jvg_P-jlvmrootrw  3.3G  127M  3.0G   5% /.old/tdev/.union/.s
   unionfs                      3.3G  127M  3.0G   5% /
   none                          32G  4.0K   32G   1% /dev
   tmpfs                         32G  180K   32G   1% /run
   tmpfs                         32G  8.0K   32G   1% /var/volatile
```

```
/dev/mapper/jvg_P-jlvmjunos    32G   13G   18G  43% /junos
/dev/mapper/jvg_P-jlvmvm      6.1G  2.7G  3.1G  47% /vm
/dev/mapper/jvg_P-jlvmspare   287M  2.1M  266M   1% /spare
cgroup                         32G     0   32G   0% /sys/fs/cgroup
unionfs                       3.3G  127M  3.0G   5% /run/named-chroot/etc/bind
tmpfs                          32G  180K   32G   1% /run/named-chroot/var/run/named
tmpfs                          32G  180K   32G   1% /run/named-chroot/var/run/bind
unionfs                       3.3G  127M  3.0G   5% /run/named-chroot/var/cache/bind
unionfs                       3.3G  127M  3.0G   5% /run/named-chroot/etc/localtime
none                           32G  4.0K   32G   1% /run/named-chroot/dev/random
none                           32G  4.0K   32G   1% /run/named-chroot/dev/zero
none                           32G  4.0K   32G   1% /run/named-chroot/dev/null
```

It is normal to see 100 percentage or close to 100 percentage of CPU usage in the `%guest` column in the `CPU Usage` section.

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

show vmhost snapshot

IN THIS SECTION

Syntax

```
show vmhost snapshot
<invoke-on>
<re0 | re1>
<routing engine>
```

Description

Display snapshot details including Linux host kernel version, software version, and other package version details for both the sets of software in the backup disk.

Options

invoke-on (Optional) Display the host snapshot information of Routing Engines on a device that has dual Routing Engines. You can use the `all-routing-engine` option to display the host snapshot information of all the Routing Engines or the `other-routing-engine` option to display the host snapshot information of the other Routing Engine. For example, If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, display host snapshot information about the Routing Engine in slot 0 (`re0`) or the Routing Engine in slot 1 (`re1`).

routing-engine (Optional) Specify the Routing Engine for which the host snapshot details is to be displayed. The following options are available:

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

- `backup`—Backup Routing Engine.
- `both`—Primary and backup Routing Engines.

- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

view

Sample Output

show vmhost snapshot

```
user@host> show vmhost snapshot
UEFI    Version: NGRE_v00.53.00.01

Secondary Disk, Snapshot Time: Tue Dec  8 19:49:09 UTC 2015

Version: set p
VMHost Version: 2.897
VMHost Root: vmhost-x86_64-15.1I20151203_0011_rbu-builder
VMHost Core: vmhost-core-x86_64-15.1I20151203_0011_rbu-builder
kernel: 3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt
Junos Disk: junos-install-x86-64-15.1F-20151204.0

Version: set b
VMHost Version: 2.897
VMHost Root: vmhost-x86_64-15.1I20151203_0011_rbu-builder
VMHost Core: vmhost-core-x86_64-15.1I20151203_0011_rbu-builder
kernel: 3.10.79-ovp-rt74-WR6.0.0.20_preempt-rt
Junos Disk: junos-install-x86-64-15.1F-20151204.0
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

- request vmhost software rollback | 919
- request vmhost snapshot | 904

show vmhost status

IN THIS SECTION

Syntax

```
show vmhost status
<invoke-on>
<re0 | re1>
<routing engine>
```

Description

Display information about the status of communication between the host OS and the guest OS. The following status outputs are displayed:

- `Online`—Communication between the host OS and the guest OS is good.
- `Offline`—Communication with the host is lost. Any state other than `Online` is considered as `Offline`.

Options

invoke-on (Optional) Display the status of communication between the host OS and the guest OS running on a router with dual Routing Engines. You can use the `all-routing-engine` option to display the status of host-to-guest communication on all the Routing Engines or the `other-routing-engine` option to display the status of host-to-guest communication on the other Routing Engine. For example, If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, display the status of communication between the host OS and the guest OS on the Routing Engine in slot 0 (`re0`) or on the Routing Engine in slot 1 (`re1`).

routing-engine (Optional) Specify the Routing Engine for which the status of communication between the host OS and the guest OS is to be displayed. The following options are available:

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

- `backup`—Backup Routing Engine.
- `both`—Primary and backup Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

view

Sample Output

show vmhost status

```
user@host> show vmhost status
Compute cluster: rainier-re-cc
  Compute Node: rainier-re-cn, Online
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

show vmhost uptime

IN THIS SECTION

Syntax

```
show vmhost uptime
<invoke-on>
<re0 | re1>
<routing engine>
```

Description

Display the current time and information such as how long the host OS has been running, number of users, average load, and reason for the last reboot that occurred.

Options

invoke-on (Optional) Display the uptime information about the host on a device with dual Routing Engines. You can use the `all-routing-engine` option to display the uptime information about the host on all the Routing Engines or the `other-routing-engine` option to display the uptime information about the host on the other Routing Engine. For example, If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, display the uptime information about the hoston the Routing Engine in slot 0 (`re0`) or on the Routing Engine in slot 1 (`re1`).

routing-engine (Optional) Specify the Routing Engine for which the uptime information about the host is to be displayed. The following options are available:

NOTE: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

- `backup`—Backup Routing Engine.
- `both`—Primary and backup Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

view

Sample Output

show vmhost uptime

```
show vmhost uptime
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

RELATED DOCUMENTATION

show chassis routing-engine

show vmhost version

IN THIS SECTION

Syntax

```
show vmhost version
        invoke-on;
        (re0 | re1);
         routing engine {
            backup;
            both;
            local;
            master;
            other;
}
```

Description

Display host version information including Linux host kernel version, host software version, and other package version details for both the sets of software in the primary disk.

Options

invoke-on (Optional) Display the version information of the host running on a device with dual Routing Engines. You can use the `all-routing-engine` option to display the version information of the host software running on all the Routing Engines or the `other-routing-engine` option to display the version information of the host software running on other Routing Engine. For example, If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

re0 | re1 (Optional) On devices that support dual or redundant Routing Engines, display version information of the host software on the Routing Engine in slot 0 (re0) or on the Routing Engine in slot 1 (re1).

routing-engine (Optional) Specify the Routing Engine for which the version information of the host software is to be displayed. The following options are available:

> **NOTE**: The QFX10002-60C and PTX10002-60C devices do not have primary and backup routing engines.

- `backup`—Backup Routing Engine.
- `both`—Primary and backup Routing Engines.
- `local`—Routing Engine on the local Virtual Chassis member.
- `master`—Primary Routing Engine.
- `other`—If you issue the command from the primary Routing Engine, the backup Routing Engine is referred to as the other Routing Engine.

Required Privilege Level

view

Sample Output

show vmhost version

```
user@host>show vmhost version
Current root details,         Device sda, Label: jrootp_P, Partition: sda3
Current boot disk: Primary
Current root set: p
UEFI Version: CICL_P_BUG1_00.23.01

Primary Disk, Upgrade Time: Wed Mar  1 16:35:37 PST 2023

Version: set p
VMHost Version: 7.2648
VMHost Root: vmhost-x86_64-22.2R3-20230129_2258_builder
VMHost Core: vmhost-core-x86-64-22.2R3.9
kernel: 5.2.60-rt15-LTS19
Junos Disk: junos-install-mx-x86-64-22.2R3.9

Version: set b
VMHost Version: 7.2648
VMHost Root: vmhost-x86_64-22.2R3-20230129_2258_builder
VMHost Core: vmhost-core-x86-64-22.2R3.10
kernel: 5.2.60-rt15-LTS19
Junos Disk: junos-install-mx-x86-64-22.2R3.10
```

Release Information

Command introduced in Junos OS Release 15.1F3.

NOTE: PTX3000 router supports the Routing and Control Board, RCBPTX.

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CHAPTER

Configuration Statements from Junos SDK Guide

control-cores

IN THIS SECTION

Syntax

```
control-cores control-number;
```

Hierarchy Level

```
[edit chassis fpc slot-number pic pic-number adaptive-services service-package extension-provider]
```

Description

Configure control cores. Any cores not configured as either control or data cores are treated as user cores. When the number of control cores is changed, the PIC reboots.

Options

control-number—Number of control cores. At least one core must be a control core.

- **Range:** 1 through 8

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.0.

RELATED DOCUMENTATION

data-cores | 969

data-cores

IN THIS SECTION

Syntax

```
data-cores data-number;
```

Hierarchy Level

```
[edit chassis fpc slot-number pic pic-number adaptive-services service-package extension-provider]
```

Description

Configure data cores. Any cores not configured as either data or control cores are treated as user cores. When the number of data cores is changed, the PIC reboots.

Options

data-number—Number of data cores. Although it is not mandatory to dedicate any cores as data cores, it is advisable, depending on the nature of the application, to dedicate a minimum of five as data cores to achieve good performance.

- **Range:** 0 through 7

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.0.

RELATED DOCUMENTATION

control-cores | 968

data-flow-affinity

IN THIS SECTION

Syntax

```
data-flow-affinity {
    hash-key (layer-3 | layer-4);
}
```

Hierarchy Level

```
[edit chassis fpc slot-number pic pic-number adaptive-services service-package extension-provider]
```

Description

Enable flow affinity distribution for packets over data CPUs on the PIC. Once enabled, the default behavior distributing data packets changes from a round-robin distribution to a flow affinity distribution based on a hash distribution. Adding or deleting this statement causes the PIC to reboot.

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.5.

destination (Chassis)

IN THIS SECTION

Syntax

```
destination destination;
```

Hierarchy Level

```
[edit chassis fpc slot-number pic pic-number adaptive-services service-package extension-
provider syslog facility]
```

Description

Configure where log messages go. By default, all messages go to the **/var/log** directory on the Routing Engine. Enhancements to the existing infrastructure make debugging on the Multiservices PIC easier by giving the user the option of redirecting log messages. When the `syslog destination` statement is configured to redirect the log messages, you can use the `set system syslog` command, a command available in the native Junos OS CLI, to override the syslog settings made on the Multiservices PIC.

Options

destination—Choose one of the following options:

- `routing-engine`—Forward log messages to the Routing Engine.
- `pic-console`—Forward log messages to the console of the PIC.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 10.1.

RELATED DOCUMENTATION

extension-provider | 974

extension-provider

IN THIS SECTION

Syntax

```
extension-provider {
    control-cores control-number;
    data-cores data-number;
    data-flow-affinity {
        hash-key (layer-3 | layer-4);
    }
    forwarding-db-size size;
    object-cache-size size;
    package package-name;
    policy-db-size size;
    syslog {
        facility {
```

```
            severity;
            destination destination;
        }
    }
    wired-max-processes num-procs;
    wired-process-mem-size mem-size;
}
```

Hierarchy Level

```
[edit chassis fpc slot-number pic pic-number adaptive-services service-package]
```

Description

Configure an application on a PIC.

CAUTION: Do not configure these settings unless it is specified you should do so. The default settings work under most normal scenarios. Unneeded settings can cause negative effects.

NOTE: The PICs of MS-MPC and MS-MIC support only `extension-provider` service-package.

When the `extension-provider` statement is first configured, the PIC reboots.

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.0.

forwarding-db-size

IN THIS SECTION

Syntax

```
forwarding-db-size size;
```

Hierarchy Level

```
[edit chassis fpc slot-number pic pic-number adaptive-services service-package extension-provider]
```

Description

Configure the size of the forwarding database (FDB). When this setting is changed, the PIC reboots.

NOTE: You need to enable the `forwarding-options sampling` statement for the FDB to be created.

Options

size—Size of the FDB, in megabytes (MB). The size of the FDB and the size of the policy database together must be smaller than the size of the object cache.

- **Range:** 0 through 12879 MB

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.2.

RELATED DOCUMENTATION

policy-db-size | 986

wired-process-mem-size | 1004

object-cache-size | 983

hash-key (Chassis)

IN THIS SECTION

Syntax

```
hash-key (layer-3 | layer-4);
```

Hierarchy Level

```
[edit chassis fpc slot-number pic pic-number adaptive-services service-package extension-
provider data-flow-affinity]
```

Description

Set the hashing distribution of flow affinity. This is an optional setting. Once the `data-flow-affinity` statement is enabled, you may need to choose the hashing distribution. Modifying this statement causes the PIC to reboot.

Default

If you do not configure the `hash-key` statement, the hashing distribution is 5-tuple hashing, or `layer-4`.

Options

`layer-3`—3-tuple hashing (source IP address, destination IP address, and IP protocol).

`layer-4`—5-tuple hashing (3-tuple plus source and destination TCP or UDP ports).

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 10.2.

RELATED DOCUMENTATION

extension-provider | 974

ip-address-owner

IN THIS SECTION

Syntax

```
ip-address-owner owner;
```

Hierarchy Level

```
[edit interfaces interface-name unit logical-unit-number]
```

Description

Define the owner for IP addresses hosted on an ms- interface. This statement is used to specify that the steering of control plane packets to the Multiservices PIC be preserved. The provider of your application or its user documentation will tell you when you need to set this configuration.

Options

owner Owner of the IP address for the interface. There are two options:

- Values:

  routing-engine IP address defined on the interface is hosted by the Routing Engine. This option is not used.

`service-plane` IP address defined on the interface is hosted by the service plane. This option is used to preserve the packet steering behavior built into your application. The provider of your application or its user documentation will tell you when you need to set this configuration.

Required Privilege Level

view

Release Information

Statement introduced in Junos OS Release 13.2R1.

jdaf

IN THIS SECTION

Syntax

```
jdaf {
    routing-instances [ routing-instance-names ];
}
```

Hierarchy Level

```
[edit services]
```

Description

Configure Juniper distributed application framework (JDAF).

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 14.1.

object-cache-size

IN THIS SECTION

Syntax

```
object-cache-size value;
```

Hierarchy Level

```
[edit chassis fpc slot-number pic pic-number adaptive-services service-package extension-provider]
```

Description

Configure the size of the object cache. When this setting is changed, the PIC reboots.

Options

value—Amount of object cache, in MB. Only values in increments of 128 MB are allowed.

- **Range:** For Multiservices 100 PIC, range is 128 MB through 512 MB. If the `wired-process-mem-size` statement at the same hierarchy level has a value of 512 MB, the maximum value for this statement is 128 MB.
- **Range:** For Multiservices 400 PIC, range is 128 MB through 1280 MB. If the `wired-process-mem-size` statement at the same hierarchy level has a value of 512 MB, the maximum value for this statement is 512 MB.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.0.

RELATED DOCUMENTATION

forwarding-db-size | 976

policy-db-size | 986

wired-process-mem-size | 1004

package (Loading on PIC)

IN THIS SECTION

Syntax

```
package package-name;
```

Hierarchy Level

```
[edit chassis fpc slot-number pic pic-number adaptive-services service-package extension-provider]
```

Description

Identify a package to be loaded on the PIC. When a package is added or removed, the PIC reboots.

Options

package-name—Name of the package to be loaded on the PIC. There can be up to eight packages loaded on a PIC; however, only one data package is allowed per PIC. An error message is displayed if more than eight packages are specified.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.1.

policy-db-size

IN THIS SECTION

Syntax

```
policy-db-size size;
```

Hierarchy Level

```
[edit chassis fpc slot-number pic pic-number adaptive-services service-package extension-provider]
```

Description

Configure the size of the policy database. When this setting is changed, the PIC reboots.

NOTE: At least one data core must be configured to configure the size of the policy database.

Options

size—Size of the policy database, in megabytes (MB). The size of the forwarding database and the size of the policy database together must be smaller than the size of the object cache.

- **Range:** 0 through 1279 MB

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.3.

RELATED DOCUMENTATION

forwarding-db-size | 976

object-cache-size | 983

wired-process-mem-size | 1004

process-monitor

IN THIS SECTION

Syntax

```
process-monitor {
    disable;
    traceoptions {
        file filename files number match regex size size (world-readable | no-world-readable);
        flag flag;
        level level;
        no-remote-trace;
    }
}
```

Hierarchy Level

```
[edit system processes]
```

Description

Configure tracing options for the process health monitor process (pmond).

NOTE: Starting with Junos OS Release 15.1R2, the pmond process is enabled by default on the Routing Engines of MX Series routers, even when no service interfaces are configured.

Options

`disable`—Disable the process health monitor process.

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

admin—To view this statement in the configuration.

admin-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.0.

RELATED DOCUMENTATION

traceoptions (Process Monitor) | 997

resource-cleanup

IN THIS SECTION

Syntax

```
resource-cleanup {
    disable;
    traceoptions {
        file filename files number match regex size size (world-readable | no-world-readable);
        flag flag;
        level level;
        no-remote-trace;
    }
}
```

Hierarchy Level

```
[edit system processes]
```

Description

Selectively turn on or off the debugging of trace messages for the resource cleanup process.

Options

`disable`—Disable the resource cleanup process.

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

trace—To view this statement in the configuration.

trace-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.3.

RELATED DOCUMENTATION

traceoptions (Resource Cleanup) | 1000

routing-instances

IN THIS SECTION

Syntax

```
routing-instances [ routing-instance-names ];
```

Hierarchy Level

```
[edit services jdaf]
```

Description

Configure the routing instances on which Juniper Distributed Application Framework (JDAF) is enabled. If the `jdaf` statement is not configured, then JDAF is disabled.

Options

routing-instances [*routing-instance-names*]	Name or names of routing instances for JDAF clients. If multiple names are being configured, these can be set as an open set of values.

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 14.1.

RELATED DOCUMENTATION

jdaf | 981

service-order

IN THIS SECTION

Syntax

```
service-order {
    forward-flow [ service-name1 service-name2 ];
    reverse-flow [ service-name1 service-name2 ];
}
```

Hierarchy Level

```
[edit services service-set service-set-name]
```

Description

Define the order of services in service set to be applied to traffic coming to the PIC.

NOTE: If the `extension-service` statement is specified, the `service-order` statement is mandatory.

Options

`forward-flow`—Order of services in service set to be applied in forward flow.

`reverse-flow`—Order of services in service set to be applied in reverse flow. If you want the order to be the reverse of that specified for forward flow, this is optional. However, if, for example, you want the order to be the same regardless of direction of flow, you must include this statement. (The exception to this is for the sampling service set type. If a service set is a sampling service set and the reverse-flow service order is not configured, all sampled traffic is considered to be forward traffic.)

Required Privilege Level

system—To view this statement in the configuration.

system-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.3.

RELATED DOCUMENTATION

- extension-service

syslog (Chassis)

IN THIS SECTION

Syntax

```
syslog {
    facility {
        severity;
        destination destination;
    }
}
```

Hierarchy Level

```
[edit chassis fpc slot-number pic pic-number adaptive-services service-package extension-provider]
```

Description

Enable PIC system logging to record or view system log messages on a specific PIC. The system log information is passed to the kernel for logging in the **/var/log** directory.

Options

facility—Group of messages that are either generated by the same software process or concern a similar condition or activity. Possible values include the following: `daemon`, `external`, `kernel`, and `pfe`.

severity—Classification of effect on functioning. Possible values are the following options:

- `any`—Include all severity levels.
- `none`—Disable logging of the associated facility to a destination.
- `emergency`—System panic or other condition that causes the routing platform to stop functioning.
- `alert`—Conditions that require immediate correction, such as a corrupted system database.
- `critical`—Critical conditions, such as hard errors.
- `error`—Error conditions that generally have less serious consequences than errors in the emergency, alert, and critical levels.
- `warning`—Conditions that warrant monitoring.
- `notice`—Conditions that are not errors but might warrant special handling.
- `info`—Events or nonerror conditions of interest.

The remaining statement is explained separately. See CLI Explorer.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.2.

Options `daemon` and `kernel` (for *`facility`*) introduced in Junos OS Release 9.5.

traceoptions (Process Monitor)

IN THIS SECTION

Syntax

```
traceoptions {
    file filename files number match regex size size (world-readable | no-world-readable);
    flag flag;
    level level;
    no-remote-trace;
}
```

Hierarchy Level

```
[edit system processes process-monitor]
```

Description

Enable tracing options for the process health monitor process (pmond).

NOTE: Starting with Junos OS Release 15.1R2, the pmond process is enabled by default on the Routing Engines of MX Series routers, even when no service interfaces are configured.

Options

file *filename*
Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. To include the `file` statement, you must specify a filename.

files *number*
(Optional) Maximum number of trace files. When a trace file named `trace-file` reaches its maximum size, it is renamed `trace-file.0`, then `trace-file.1`, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum number of files, you also must specify a maximum file size with the `size` option.

flag *flag*
Specify which tracing operation to perform. To specify more than one tracing operation, include multiple `flag` statements. You can include the following flags:

- `all`—Enable all trace options flags.
- `events`—Trace process state change and cleanup events.
- `gencfg`—Trace GENCFG blobs recorded for cleanup.
- `module`—Trace module code.
- `sysvsem`—Trace SYSV semaphores recorded for cleanup.
- `sysvshm`—Trace SYSV shared memory segments recorded for cleanup.
- `tracking`—Trace tracking code.
- `ui`—Trace user interface operations.

level *level*
Specify the level of debugging output:

- `all`—Match all levels.
- `error`—Match error conditions.
- `info`—Match informational messages.
- `notice`—Match conditions that warrant special handling (but are not errors).
- `verbose`—Match verbose messages.
- `warning`—Match warning messages.

`match` ***`regex`*** (Optional) Refine the output to include lines that contain the regular expression.

`no-remote-trace` Disable remote tracing.

`size` ***`size`*** (Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you also must specify a maximum number of trace files with the `files` *`number`* option.

- **Syntax:** `xk` to specify KB, `xm` to specify MB, or `xg` to specify GB
- **Range:** 10 KB through 1 GB
- **Default:** 128 KB

`world-readable | no-world-readable` (Optional). Grant all users permission to read log files, or restrict the permission only to the `root` user and users who have the Junos `maintenance` permission.

Required Privilege Level

trace—To view this statement in the configuration.

trace-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.0.

traceoptions (Resource Cleanup)

IN THIS SECTION

Syntax

```
traceoptions {
    file filename files number match regex size size (world-readable | no-world-readable);
    flag flag;
    level level;
    no-remote-trace;
}
```

Hierarchy Level

```
[edit system processes resource-cleanup]
```

Description

Enable debugging tracing for resource cleanup process.

Options

file *filename* — Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. To include the `file statement`, you must specify a filename.

files *number* — (Optional) Maximum number of trace files. When a trace file named `trace-file` reaches its maximum size, it is renamed `trace-file.0`, then `trace-file.1`, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum number of files, you also must specify a maximum file size with the `size` option.

flag *flag* — Specify which tracing operation to perform. To specify more than one tracing operation, include multiple `flag` statements. You can include the following flags:

- `all`—Enable all trace options flags.
- `events`—Trace process state change and cleanup events.
- `gencfg`-—Trace GENCFG blobs recorded for cleanup.
- `module`—Trace module code.
- `sysvsem`—Trace SYSV semaphores recorded for cleanup.
- `sysvshm`—Trace SYSV shared memory segments recorded for cleanup.
- `tracking`—Trace tracking code.
- `ui`—Trace user interface operations.

level *level* — Specify the level of debugging output:

- `all`—Match all levels.
- `error`—Match error conditions.
- `info`—Match informational messages.
- `notice`—Match conditions that warrant special handling (but are not errors).
- `verbose`—Match verbose messages.
- `warning`—Match warning messages.

match *regex* — (Optional) Refine the output to include lines that contain the regular expression.

no-remote-trace	Disable remote tracing.
size *size*	(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you also must specify a maximum number of trace files with the `files` *number* option.

- **Syntax:** `xk` to specify KB, `xm` to specify MB, or `xg` to specify GB
- **Range:** 10 KB through 1 GB
- **Default:** 128 KB

world-readable | no-world-readable	(Optional). Grant all users permission to read log files, or restrict the permission only to the `root` user and users who have the Junos `maintenance` permission.

Required Privilege Level

trace—To view this statement in the configuration.

trace-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.3.

wired-max-processes

IN THIS SECTION

Syntax

```
wired-max-processes num-procs;
```

Hierarchy Level

```
[edit chassis fpc slot-number pic slot-number adaptive-services service-package extension-provider]
```

Description

Configure the number of processes that use wired process memory. Performance can degrade if a process uses memory beyond its Big TLB memory. If this setting is changed, the PIC will reboot.

Options

num-procs Number of processes that use the reserved wired process memory.

- **Range:** 1 through 8

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 11.4.

RELATED DOCUMENTATION

wired-process-mem-size | 1004
forwarding-db-size | 976
object-cache-size | 983
policy-db-size | 986

wired-process-mem-size

IN THIS SECTION

Syntax

```
wired-process-mem-size mem-size;
```

Hierarchy Level

```
[edit chassis fpc slot-number pic pic-number adaptive-services service-package extension-provider]
```

Description

Configure the size of the reserved wired process memory. You can also configure object cache. If this setting is changed, the PIC reboots.

Options

megabytes—Size of the reserved wired process memory, in MB. The only size you can set for this statement is 512 MB.

- **Default:** 512 MB
- **Range:** 0 through 512 MB

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced in Junos OS Release 9.3.

RELATED DOCUMENTATION

forwarding-db-size | 976

object-cache-size | 983