

## Chapter 1

# JUNOS Software Media and Packages

Your routing platform comes with JUNOS software installed on it. When you power on the router, all software starts automatically. You simply need to configure the software so that the router will be ready to participate in the network.

The software is installed on the router's flash disk (a nonrotating drive) and hard disk (a rotating disk). A copy of the software also is provided on removable media, either a PC Card, which can be inserted into the router's drive or card slot. By default, when you power on the router, it runs the copy of the software that is installed on the flash disk.

You can upgrade the router software as new features are added or software problems are fixed. You normally obtain new software by downloading the images from the Juniper Support Web page onto your router or onto another system on your local network. Then you install the software upgrade on the router's flash disk and hard disk. You can also copy the software onto the removable media.

Juniper Networks routing platforms run only binaries supplied by Juniper Networks. Each JUNOS software image includes a digitally signed manifest of executables, which are registered with the system only if the signature can be validated. JUNOS software will not execute any binary without a registered fingerprint. This feature protects the system against unauthorized software and activity that might compromise the integrity of your router.



**NOTE:** JUNOS Release 7.2 and later releases include a digitally signed manifest of executables. JUNOS Release 7.5 and later releases require these signed manifests to enable execution of binaries.

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## JUNOS Software Versions

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You can download the JUNOS software from the Juniper Networks Support Web page by selecting one of the following editions:

- Canada and U.S.—JUNOS software for customers in the United States and Canada. This edition includes high-encryption capabilities for data leaving the router.
- Worldwide—JUNOS software for all other customers. This edition does not include any high-encryption capabilities for data leaving the router.
- JUNOS-FIPS—JUNOS software which provides advanced network security for customers who need software tools to configure a network of Juniper Networks routers in a Federal Information Processing Standards (FIPS) 140-2 environment. For more information about JUNOS-FIPS, see “FIPS 140-2 Security Compliance” on page 2.

### **FIPS 140-2 Security Compliance**

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

- Upgrade package to convert JUNOS 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



**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 router, you cannot configure passwords unless they meet this standard.

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JUNOS-FIPS has special installation and configuration requirements. Installation procedures include downloading the FIPS software package from [www.juniper.net](http://www.juniper.net). For detailed guidelines on how installation and configuration procedures differ between JUNOS and JUNOS-FIPS 140-2, see the *Secure Configuration Guide for Common Criteria and JUNOS-FIPS*.

## JUNOS Software Release Numbers

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The JUNOS software release number represents a particular revision of the software that runs on a Juniper Networks routing platform, for example, JUNOS 7.5, 7.6 or 8.0. Each JUNOS software release has certain new features that compliment the software processes that support Internet routing protocols, control the router's interfaces and the router chassis itself, and allow router system management. On the Juniper Support Web page, you select to download JUNOS software for a particular JUNOS software release number.

The software release number is also reflected in the installation package filename. The following is an example of how the software release name is formatted in the installation package filename:

```
jinstall-JUNOS-m.nZx.x-domestic-signed.tgz
```

```
jinstall-8.0R1.10-domestic-signed.tgz
```

*m.n* is two integers that represent the software release number; *m* denotes the major release number.

*Z* is a capital letter that indicates the type of software release. In most cases, it is an *R*, to indicate that this is released software. If you are involved in testing prereleased software, this letter might be an *A* (fore alpha-level software), *B* (for beta-level software), or *I* (a capital letter *I*; for internal test, or experimental versions of software).

*x.x* is the software build number and spin number.

## JUNOS Software Installation Packages

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The JUNOS software from the Juniper Support Web page provides three installation packages. A *package* is a collection of files that make up a software component.

- **Install Package—jinstall**—A package used to upgrade from JUNOS Release 7.x to 8.x or 8.x to 8.x when the software becomes damaged. If you upgrade from 7.x to 8.x using **jinstall**, use **jbundle** for subsequent upgrades or downgrades. The **jinstall** package completely reinstalls the software. It rebuilds the JUNOS file system only and retains configuration information from the previous version. However, logs and other types of auxiliary information may be erased during installation. For more information about installing the JUNOS software using the **jinstall** package, see “Reinstalling the Software Using jinstall” on page 35.

- **Software Bundle—`jbundle`**—A package used to downgrade from Release 8.x. `jbundle` is also used to upgrade or downgrade between minor versions of the JUNOS software. `jbundle` modifies the smallest set of files needed to change to the new software version. Use the `jbundle` package only when instructed by a Juniper Networks support representative.



**NOTE:** You cannot use the `jbundle` package to upgrade from JUNOS 5.x to JUNOS 7.x. For more information about how to upgrade from Release 5.x or later to 7.x or later, see the Knowledge Base Asset # 24602 on the Juniper Networks Support Web site at <http://www.juniper.net/support>.

- **J-Series Install Bundle—`junos-jseries`**—A package used to install the JUNOS-J-series software on J-series Services routing platforms. `jweb`, the J-Web package within this bundle and the `jinstall` and `jbundle` packages contains the J-Web graphical user interface software for managing J-series, M-series, and T-series routing platforms.

## Individual Software Packages Within `jinstall` and `jbundle`

The `jinstall` and `jbundle` packages consists of the following individual packages:

- `kernel`—Kernel and network tools package, which contains the operating system.
- `base`—Base package, which contains additions to the operating system.
- `route`—Routing package, which contains the software that runs on the Routing Engine.
- `pf`—Software that runs on the Packet Forwarding Engine.
- `docs`—Documentation package, which contains the documentation for the software.
- `crypto`—Encryption package, which contains security software (domestic version).
- `jweb`—J-Web package, which contains the graphical user interface software for J-series, M-series, and T-series routing platforms.

## Software Package Information Security

All JUNOS 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 Release 7.0 and a later version.
- The SHA-1 checksum is used when you upgrade or downgrade between JUNOS Release 6.4 and a later version.

- The MD5 checksum is used when you upgrade or downgrade between JUNOS Release 6.3 or earlier and a later version.

## Storage Media

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The router has three forms of storage media, and each comes preinstalled with JUNOS system software:

- Flash disk, which is a nonrotating drive.
- Hard disk, which is a rotating drive. This drive also is used to store system log files and diagnostic dump files.
- Removable media, either a PC Card or an LS-120 floppy disk.

Table 5 specifies the storage media names by Routing Engine. The storage media device names are displayed when the router boots.

**Table 5: Device Names**

Device	Flash Disk	Hard Disk	Removable Media
Routing Engine 200 (RE-M40) (CLI Name = RE1)	ad0	ad2	adf0
Routing Engine 333 (CLI Name = RE2)	ad0	ad1	ad3
Routing Engine 600 (CLI Name = RE3)	ad0	ad1	ad3
Routing Engine 1600 (CLI Name = RE4)	ad0	ad1	ad3 and ad4
Routing Engine 400 (CLI Name = RE5)	ad0	ad1	ad3

## Boot Devices

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The router can boot from the flash disk, the hard disk, or a removable medium. The disk from which the router boots is called the *primary boot device*, and the other disk is the *alternate boot device*.



**NOTE:** If the router boots from an alternate boot device, a yellow alarm lights the LED on the router's craft interface.

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## Boot Sequence

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The router attempts to boot from three devices in this order:

- Removable medium, if one is installed
- Flash disk
- Hard disk

Most router models normally boot from the flash disk. The M7i router is not always shipped with a flash disk, and normally boots from a removable PC Card installed in a slot in its Routing Engine.



**NOTE:** To reinstall the JUNOS software, you boot the router from the removable media. Do not insert the removable media during normal operations. The router does not operate normally when it is booted from the removable media.

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When the router boots from the storage media (flash disk, hard disk, or removable media) it expands its search in the `/config` directory of the routing platform for the following files in the following order: `juniper.conf` (the main configuration file), `rescue.conf` (the rescue configuration file), and `juniper.conf.1` (the first rollback configuration file). When the search finds the first configuration file that can be loaded properly, the file loads and the search ends. If none of the files can be loaded properly, the routing platform does not function properly.

If the router boots from an alternate boot device, the JUNOS software displays a message indicating this when you log in to the router. For example, this message shows that the software booted from the hard disk (`/dev/ad2s1a`):

```
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).
```

The default boot order for the M7i Internet router is different from other Juniper Networks routers, because the default configuration of the Routing Engine on the M7i router does not include an internal compact flash disk.

If the Routing Engine does not have an internal compact flash disk, two copies of the JUNOS software are preinstalled on the router: one on a PC Card that can be inserted into the slot in the Routing Engine faceplate, and one on a rotating hard disk in the Routing Engine. When the router boots, it first attempts to access the software image on the PC Card. If a PC Card is not inserted into the Routing Engine or the attempt otherwise fails, the router tries the hard disk.

If the Routing Engine has an internal compact flash disk, three copies of the JUNOS software are preinstalled on the router. When the router boots, it first attempts to access the image on the PC Card. If a PC Card is not inserted into the Routing Engine or the attempt otherwise fails, the router next tries the flash disk, and finally the hard disk.