

# Software packaging and architecture

This chapter discusses the packaging and architecture of Cisco C8400 Series Secure Routers.


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## Consolidated packages

A consolidated package is a single image composed of individual software subpackage files. A single consolidated package file is a bootable file, and the Cisco C84XX Series Platforms can be run using the consolidated package.

Each consolidated package also contains a provisioning file. A provisioning file is used for booting in cases where the individual subpackages are extracted from the consolidated package, or optional subpackages are used to run the router.

- For each version of consolidated package, the RPIOS subpackage is always different among consolidated packages.
- A consolidated package file is a bootable file. If the router is configured to run using the complete consolidated package, boot the router using the consolidated package file. If the router is configured to run using individual subpackages, boot the router using the provisioning file. For additional information on the advantages and disadvantages of running a complete consolidated package, see the *Running the Cisco Catalyst 8500 Series Edge Platforms: An Overview* section .
- If you need to install optional subpackages, then you must boot the router using the individual subpackage provisioning file method.

## Individual software subpackages

This section provides an overview of subpackages and the purpose of each individual subpackage. Every consolidated package will have all of these individual subpackages.

*Table 1: Individual SubPackages*

| SubPackage | Purpose |
|---|---|
| RPBase | Provides the operating system software for the Route Processor. |
| RPControl | Controls the control plane processes that interface between the IOS process and the rest of the platform. |
| RPAccess | Exports processing of restricted components, such as Secure Socket Layer (SSL), Secure Shell (SSH), and other security features. |
| RPIOS | Provides the Cisco IOS kernel, which is where IOS features are stored and run.<br>Each consolidated package has a different RPIOS. |

- Individual subpackages cannot be downloaded from Cisco.com individually. To get these individual subpackages, users must download a consolidated package and then extract the individual subpackages from the consolidated package using the command-line interface.
- If the router is being run using individual subpackages instead of being run using a complete consolidated package, the router must be booted using a provisioning file. A provisioning file is included in all consolidated packages and is extracted from the image along with the individual subpackages whenever individual subpackages are extracted

# Provision files

**Note** You must use the provisioning files to manage the boot process if you need to install optional subpackages.

Provisioning files manage the boot process when the device is configured to run using individual subpackages or optional subpackages. When individual subpackages are being used to run the device, it is configured to boot the provisioning file. The provisioning file manages the bootup of each individual subpackage.

Provisioning files are extracted automatically when individual subpackage files are extracted from a consolidated package.

Provisioning files are not necessary for running the router using the complete consolidated package; if you want to run the router using the complete consolidated package, simply boot the router using the consolidated package file.

- Each consolidated package contains two provisioning files. One of the provisioning files is always named “packages.conf”, while the other provisioning file will have a name based on the consolidated package naming structure. In any consolidated package, both provisioning files perform the exact same function.
- In most cases, the “packages.conf” provisioning file should be used to boot the router. Configuring the router to boot using this file is generally easier because the router can be configured to boot using “packages.conf”, so no changes have to be made to the boot statement when Cisco IOS XE is upgraded (the **boot system** *file-system*:**packages.conf** configuration command can remain unmodified before and after an upgrade).

- The provisioning file and individual subpackage files must be kept in the same directory. The provisioning file does not work properly if the individual subpackage files are in other directories.
- The provisioning filename can be renamed; the individual subpackage filenames cannot be renamed.
- After placing the provisioning file and the individual subpackage files in a directory and booting the router, it is highly advisable not to rename, delete, or alter any of these files. Renaming, deleting, or altering the files can lead to unpredictable router problems and behaviors.

# Upgrade field programmable hardware devices

A hardware programmable package file used to upgrade field programmable hardware devices is released as needed . A package file is provided for the field programmable device to customers in cases where a field upgrade is required. If the device contains an incompatible version of the hardware programmable firmware, then that firmware may need to be upgraded.

Generally an upgrade is only necessary in cases where a system message indicates one of the field programmable devices on the device needs an upgrade or a Cisco technical support representative suggests an upgrade.

# Processes

Cisco IOS XE has numerous components that run entirely as separate processes . This modular architecture increases network resiliency by distributing operating responsibility among separate processes rather than relying on Cisco IOS software for all operations.

## IOS process

The Cisco C8400 Series Secure Router run on a distributed software architecture that moves many operating system responsibilities out of the IOS process. In this architecture, IOS, which previously was responsible for almost all of the internal software processes, now runs as one of many Linux processes while allowing other Linux processes to share responsibility for running the router. This architecture allows for better allocation of memory so the router can run more efficiently.

## Dual IOS processes

The Cisco C8400 Series Routers run on a dual IOS process model that allows for increased high availability at all times.

Using SSO, a second IOS process can also be enabled . On a router configured with dual Route Processors, the second IOS process runs on the standby Route Processor.

The state of these dual IOS processes can be checked by entering the **show platform** command. A second IOS process increases fault tolerance. In the event of an active IOS failure, the second IOS process immediately becomes the active IOS process with little to no service disruption.

## File systems

This table provides a list of file systems that can be seen on the Cisco C8400 Series Secure Router.

*Table 2: File systems*

| File System | Description |
|---|---|
| bootflash: | The boot flash memory file system on the active RP. |
| cns: | The Cisco Networking Services file directory. |
| harddisk: | The hard disk file system on the active RP. |
| nvram: | Router NVRAM. You can copy the startup configuration to NVRAM or from NVRAM. |
| obfl: | The file system for Onboard Failure Logging files. |
| system: | The system memory file system, which includes the running configuration. |
| tar: | The archive file system. |
| tmpsys: | The temporary system files file system. |
| usb[0-1]: | The Universal Serial Bus (USB) flash drive file systems on the router. |

If you run into a file system not listed in the above table, enter the**?** help option or see the **copy** command reference for additional information on that file system.

# Autogenerated file directories and files

This table provides a list and descriptions of autogenerated files :

*Table 3: Autogenerated files*

| File or Directory | Description |
|---|---|
| crashinfo files | A crashinfo file may appear in the bootflash: or harddisk: file system.<br>These files provide descriptive information of a crash and may be useful for tuning or troubleshooting purposes, but the files are not part of router operations and can be erased without impacting the functioning of the router. |
| core directory | The storage area for.core files.<br>If this directory is erased, it will automatically regenerate itself at bootup. The .core files in this directory can be erased without impacting any router functionality, but the directory itself should not be erased. |
| lost+found directory | This directory is created on bootup if a system check is performed. Its appearance is completely normal and does not indicate any issues with the router. |
| tracelogs directory | The storage area for trace files.<br>Trace files are useful for troubleshooting. Trace files, however, are not part of router operations and can be erased without impacting the router’s performance. |