Software installation reference

This chapter contains the following sections:

Software installation requirements

Installing software on the router involves installing a consolidated package (bootable image) that consists of a bundle of subpackages, each controlling a different set of functions.

Upgrade software during a scheduled maintenance period when service interruption is acceptable. After upgrading the software, reboot the router to apply changes.

Cisco software licenses

Cisco software licensing is a system that enables activation and validation of Cisco IOS software feature sets through specific processes and components.

- Licenses can be used to enable consolidated packages, technology packages, or individual features.
- License files are stored in the bootflash of the router.
- The IR8100 uses Smart Licensing Using Policy (SLP) for license management.

Understanding Cisco software licensing

Cisco software licensing consists of processes and components to activate Cisco IOS software feature sets by obtaining and validating Cisco software licenses.

Consolidated packages

Consolidated packages are image-based licenses used to activate all subsystems on the IR8100 router that correspond to a specific license. These licenses are enforced only at boot time.

- Image-based licenses help bring up all subsystems related to the license.
- Licenses are enforced only during the router's boot process.
- Not all IOS-XE features may apply to the IR8100; some features may not be implemented or appropriate for this platform.

Available consolidated packages and feature applicability

To obtain software images for the IR8100 router, See Cisco Software Download page.

The following image-based licenses can be pre-installed on the IR8100 router:

- Network-Essentials
- Network-Advantage

Note All of the IOS-XE feature set may not apply to the IR8100. Some features may not have been implemented yet, or are not appropriate for this platform. Details of the Network-Essentials and Network-Advantage contents can be found in the IR8100 product data sheet.

Network-Essentials packages

The Network-Essentials and Network-Essentials_npe technology is a baseline networking feature.

- The **Network-Essentials** technology package includes baseline features and supports security features.
- The **Network-Essentials_npe** package includes all features of Network-Essentials except payload encryption functionality.
- The **Network-Essentials_npe** is available only in the Network-Essentials_npe image and helps fulfill export restriction requirements.

Differences between Network-Essentials and Network-Essentials_npe packages

The main difference between the Network-Essentials and Network-Essentials_npe packages is the presence or absence of payload encryption features such as IPsec and Secure VPN.

Network-Advantage packages

Network-Advantage is a Cisco technology that provides advanced network features.

- The **Network-Advantage** technology package includes all crypto features.
- The **Network-Advantage_npe** package (npe = No Payload Encryption) includes all features of **Network-Advantage** except payload-encryption functionality.

- The **Network-Advantage_npe** package is available only in the **Network-Advantage_npe** image to fulfill export restriction requirements.

Feature differences between Network-Advantage and Network-Advantage_npe

The main difference between the **Network-Advantage** and **Network-Advantage_npe** packages is the set of payload-encryption-enabling features such as IPsec and Secure VPN.

Related documentation

For further information on software licenses, see the Smart Licensing chapter.

Install Cisco IOS XE release

When the device boots up with the Cisco IOS XE image for the first time, it checks the installed version of the ROMmon and upgrades it if the system is running an older version. During the upgrade, do not power cycle the device. The system automatically power cycles the device after the new ROMmon is installed.

After the installation, the system boots up with the Cisco IOS XE image as normal.

Note When the device boots up for the first time and the device requires an upgrade, the entire boot process may take several minutes. This process is longer than a normal boot because of the ROMmon upgrade.

Procedure

Step 1 Use the **configure terminal** command to enter global configuration mode and set the boot system, configuration register, and exit.

Example:

```
Router# configure terminal
Router(config)# boot sys
bootflash:ir8100-universalk9.BLD_V175_THROTTLE_LATEST_20210221_233814_V17_5_0_172.SSA.bin
Router(config)# config-register 0x2102
Router(config)# exit
Router#
```

Step 2 Use the **show romvar** command to verify the ROMmon variables and license configuration.

Example:

```
Router# show romvar
ROMMON variables:
PS1 = rommon ! >
THRPUT =
LICENSE_BOOT_LEVEL = network-advantage,all:IR8100;
RET_2_RTS =
CONSOLE_LOCK = 0
BOOT =
flash:ir8100-universalk9.BLD_V175_THROTTLE_LATEST_20210221_233814_V17_5_0_172.SSA.bin,12;
BSI = 0
```

```
RET_2_RCALTS =
RANDOM_NUM = 1294606670
```

Step 3 Use the **show running-config | include license** command to display all lines in the running configuration that contain the word "license".

Example:

```
Router# show running-config | include license
no license feature hseck9
license udi pid IR8140H-P-K9 sn FDO2441J91D
license boot level network-advantage
Router#
```

Step 4 Use the **reload ?** command to display the available reload options.

Example:

```
Router# reload ?
/noverify  Don't verify file signature before reload.
/verify    Verify file signature before reload.
at         Reload at a specific time/date
cancel     Cancel pending reload
in         Reload after a time interval
pause      Pause during reload
reason     Reload reason
<cr>       <cr>
```

Step 5 Use the **reload /verify** command to verify the image and reload the device.

Example:

```
Router# reload /verify
Verifying file integrity of
bootflash:ir8100-universalk9.BLD_V175_THROTTLE_LATEST_20210221_233814_V17_5_0_172.SSA.bin.....
.....Computed
Hash SHA1 : AA480FF5DDA5077A9FF99CABCB176E37E7DBD4F6
Starting image verification
Hash Computation: 100%Done!
Computed Hash SHA2: f2aaa17b3aaa4bb6573e1947976e1086
9a835fb36a48fbc3a8653224af5dab7f
383387a559ee35242830697ceae4a6c0
5add53a956a0dce109df80cb03c9c8b9
Embedded Hash SHA2: f2aaa17b3aaa4bb6573e1947976e1086
9a835fb36a48fbc3a8653224af5dab7f
383387a559ee35242830697ceae4a6c0
5add53a956a0dce109df80cb03c9c8b9
Digital signature successfully verified in file
bootflash:ir8100-universalk9.BLD_V175_THROTTLE_LATEST_20210221_233814_V17_5_0_172.SSA.bin
Signature Verified
Proceed with reload? [confirm]
*Jul  9 06:43:37.910: %SYS-5-RELOAD: Reload requested by console. Reload Reason: Reload
Command.
Jul  9 14:43:59.134: %PMAN-5-EXITACTION: R0/0: pvp: Process manager is exiting: process
exit with reload chassis code
watchdog watchdog0: watchdog did not stop!
reboot: Restarting system
Press RETURN to get started!
```

ROMMON image software packages

A ROMMON image is a software package used by ROM Monitor (ROMMON) software on a router. The software package is separate from the consolidated package normally used to boot the router.

- ROMMON images are independent software packages for the ROM Monitor.
- They are separate from the main consolidated package used to boot the router.
- ROMMON images can be upgraded independently of the main software package.

ROMMON Image Release and Upgrade Information

An independent ROMMON image (software package) may occasionally be released and the router can be upgraded with the new ROMMON software. For detailed instructions, see the documentation that accompanies the ROMMON image.

Note A new version of the ROMMON image is not necessarily released at the same time as a consolidated package for a router.

File systems

The table provides a list of file systems that can be seen on the Cisco IR8100 router.

Table 1: Router File Systems.1.a

File System	Description
bootflash:	Boot flash memory file system.
cns:	Cisco Networking Services file directory.
crashinfo:	Directory or Filename
flash:	Alias to the boot flash memory file system.
msata:	Directory or Filename
null:	Directory or Filename

Table 2: Router File Systems.1.b

File System	Description
nvram:	Router NVRAM. You can copy the startup configuration to NVRAM or from NVRAM.
system:	System memory file system, which includes the running configuration.

File System	Description
tar:	Archive file system.
tmpsys:	Temporary system files file system.
webui:	Directory or Filename

Use the **?** help option if you find a file system that is not listed in the provided tables.

Autogenerated file directories and files

This section discusses the autogenerated files and directories that can be created, and how the files in these directories can be managed.

Table 3: Autogenerated files

File or directory	Description
crashinfo files	Crashinfo files can appear in the bootflash: file system. These files provide descriptive information of a crash and may be useful for tuning or troubleshooting purposes. However, the files are not part of router operations, and can be erased without impacting the functioning of the router.
core directory	Storage area for .core files. 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.
managed 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. Trace files are useful for troubleshooting. If the Cisco IOS process fails, for instance, users or troubleshooting personnel can access trace files using diagnostic mode to gather information related to the Cisco IOS failure. Trace files are not part of router operations; you can erase them without affecting the router's performance.

Key points about autogenerated directories

Important information about autogenerated directories include:

- Autogenerated files on the bootflash: directory should not be deleted, renamed, moved, or altered in any way unless directed by Cisco customer support.

Note Altering autogenerating files on the bootflash: may have unpredictable consequences for system performance.

- Crashinfo files and files in the core and tracelogs directory can be deleted.

Flash storage

Subpackages are installed to local media storage, such as flash.

For flash storage, use the **dir bootflash:** command to list the file names.

Note Flash storage is required for successful operation of a router.

Related documentation

This topic provides references to further information on software licenses and feature license installation.

For more information on software licenses, see the Smart Licensing Chapter.

For further information on obtaining and installing feature licenses, see Configuring the Cisco IOS Software Activation Feature .