Installing and Upgrading Software

This chapter describes how to update software on the Cisco ASR 920 Series Router.

Upgrading Field Programmable Hardware Devices

Cisco IOS XE on Cisco ASR 920 Series Routers (ASR-920-24SZ-IM and ASR-920-12SZ-IM) support upgradeable firmware for field programmable hardware devices such as interface modules (IMs) and upgrades IM FPGA when ever there is an upgrade.

Cisco ASR 920 Series Router upgrades the HOFPGA when required and is indicated to the user through logs. Generally an upgrade is only necessary in cases where a system message indicates that an upgrade is required or a Cisco technical support representative suggests an upgrade.

The procedures in this chapter describe how to upgrade the firmware on Cisco ASR 920 Series Router.

File Systems on the Cisco ASR 920 Series Router

The table below provides a list of file systems that can be seen on the Cisco ASR 920 Series Router.

Table 1: File Systems

File System	Description
bootflash:	The boot flash memory file system.
cns:	The Cisco Networking Services file directory.
nvram:	Router NVRAM. You can copy the startup configuration to NVRAM or from NVRAM.

File System	Description
system:	The system memory file system, which includes the running configuration.
bin:	The archive file system.
tmpsys:	The temporary system files file system.
usb[0-1]:	The Universal Serial Bus (USB) flash drive file systems.

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

Restrictions

When you migrate to Cisco IOS-XE Release 3.18 SP, HOFPGA upgrade is mandatory and not optional. The router works for few minutes after the first reboot is complete and starts a second reboot without a notice.

System Requirements

The following sections describe the system requirements for the Cisco ASR 920 Series Router software:

Memory Recommendations

These are the recommendation for the routers for the Cisco IOS XE 3S images and packages:

- DRAM Memory—4 GB
- Software Image—asr920-universalk9_npe.bin—270 MB (ASR 920-24SZ-IM)
- Software Image—asr920-universalk9_npe.bin—300 MB (ASR 920-12SZ-IM)

ROMmon Version Requirements

Following are the recommended release versions for all ROMmon upgradeable components. For more information about ROMmon images, see Release Notes.

- ROMmon Release 15.6(24r)S for router ASR-920-12SZ-IM

- ROMmon Release 15.6(31r)S for routers ASR-920-12CZ-A, ASR-920-12CZ-D, ASR-920-4SZ-A, ASR-920-4SZ-D, ASR-920-10SZ-PD, ASR-920-24SZ-IM, ASR-920-24SZ-M, and ASR-920-24TZ-M

Bootflash Space Requirements

The dual-rate functionality requires a minimum of 10 MB available space in bootflash memory on Cisco ASR 920 Series Router (ASR-920-12CZ-A, ASR-920-12CZ-D, ASR-920-4SZ-A, ASR-920-4SZ-D, ASR-920-10SZ-PD), and ASR-920-12SZ-IM .

Determining the Software Version

The Cisco IOS XE image is stored as a bin file in a directory that is named with the Cisco IOS XE release. The image is stored on the system board bootflash device (bootflash:).

Note If you try to copy or archive upgrade beyond the bootflash memory capacity, the action aborts.

You can use the **show version** privileged EXEC command to see the software version that is running on your router. The second line of the display shows the version.

You can also use the **dir bootflash:** privileged EXEC command to see the names of other software images that you might have stored in bootflash.

Cisco IOS XE 3S to Cisco IOS Version Number Mapping

Each version of Cisco IOS XE 3S has an associated Cisco IOS version. The table below lists these mappings for Release 3.13.0S and forward.

Table 2: Cisco IOS XE 3S to Cisco IOS Version Number Mapping

Cisco IOS XE 3S Version	Cisco IOS Version
3.13.0S	15.4(3)S
3.14.0S	15.5(1)S

The Cisco ASR 920 Series Router does not support IOS XE versions prior to 3.13.0S.

Autogenerated Files and Directories

The table below provides a list and descriptions of autogenerated files on the router.

Caution Do not alter any autogenerated file in the bootflash: directory should not be deleted, renamed, moved, or altered in any way unless directed by customer support; altering these files can have unpredictable consequences for system performance.

Table 3: Autogenerated Files

File or Directory	Description
crashinfo files	A crashinfo file may appear in the bootflash: file system. Crashinfo files are useful for tuning and troubleshooting, but are not related to router operations: you can erase them without impacting the router's performance.

File or Directory	Description
core files	The bootflash/core directory is the storage area for .core files. **Caution** Do not erase or move the core directory.
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 files	The storage area for trace files is bootflash/tracelogs. Trace files are useful for troubleshooting; you can access trace files using diagnostic mode to gather information related to the IOS XE failure. **Caution** Do not erase or move the tracelog directory.

Upgrading the Router Software

Downloading an Image

Download the image to the bootflash. For information on downloading images see, Loading and Managing System Images Configuration Guide.

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Caution   Ensure that you have chosen an upgrade image that is supported by your current software version.

✎

Note   Before upgrading from Cisco IOS XE 3.13.0S to 3.14.0S, we recommend that you disable the following CLI on router: platform trace runtime slot 0 bay 0 process iomd module all-modules level info

The routers are shipped with the latest software image installed. Follow the instructions in this section if you need to reinstall or upgrade the software image.

Before installing your router software, make sure that you have archived copies of the current Cisco IOS XE release and the Cisco IOS XE release to which you are upgrading. You should keep these archived images until you have upgraded all devices in the network to the new Cisco IOS XE image and until you have verified that the new Cisco IOS XE image works properly in your network.

Cisco routinely removes old Cisco IOS XE versions from Cisco.com. See End of Sale and End of Life Products at this URL: http://www.cisco.com/en/US/products/sw/iosswrel/prod_category_end_of_life.html.

You can copy the software image file on the bootflash memory to the appropriate TFTP directory on a host by using the **copy bootflash: tftp:** privileged EXEC command. You can also configure the router as a TFTP server to copy files from one router to another without using an external TFTP server by using the **tftp-server** global configuration command. For more information about the **tftp-server** command, see the "Basic File Transfer Services Commands" section of the Cisco IOS Configuration Fundamentals Command Reference at this URL: http://www.cisco.com/en/US/docs/ios/fundamentals/command/reference/cf_book.html.

This procedure is for copying the combined bin file to the router. You copy the file to the router from a TFTP server and extract the files. You can download an image file and replace or keep the current image.

To download software, follow these steps:

Procedure

Step 1 Locate the software image file:
   a) If you are a registered customer, go to this URL and log in:
      http://software.cisco.com/download/navigator.html.
   b) Navigate to **Routers** > **Service Provider Edge Routers**.
   c) Navigate to your router model.
   d) Click IOS XE Software, then select the latest IOS XE release.

   Note   When you select a crypto graphic image, you must also accept the terms and conditions of using crypto graphic images.

Step 2 Download the image to a TFTP server and make sure that the server is properly configured.

Step 3 Log into the router through the console port or a Telnet session.

Step 4 If Gigabit Ethernet (GE) port 0 is used as management interface, check the connectivity to TFTP server using the following CLI:

```
Router# ping vrf Mgmt-intf tftp-server-address
```

For more information about assigning an IP address and default gateway to the router, refer to the software configuration guide for this release.

Step 5 Download the image file from the TFTP server to the router by entering this privileged EXEC command:

```
Router# copy tftp://location/directory/filename.bin bootflash:
```

   • For // location, specify the IP address of the TFTP server.

   • For / directory / image-name .bin, specify the directory (optional) and the image to download. Directory and image names are case sensitive.

This example shows how to download an image from a TFTP server at 192.0.2.1 and to overwrite the image on the router:

```
Router# copy tftp://192.0.2.1/image-name.bin bootflash:
```

The installation process extracts the bin file with all the files and the IOS XE image, and sets the BOOT directory to the created directory in bootflash memory. The process takes approximately 5 to 10 minutes, and at some stages might appear to have stopped.

Step 6 Set the image path in the boot variables and configure the router to autoboot as follows:

```
Router# configure terminal
Router(config)# config-register 0x2102 (! 0x2102 sets the router for autoboot)
Router(config)# boot system bootflash:image-name.bin (! sets the image to be loaded in the
 next reload)
```

Step 7 Verify the boot variables set on the router using the following CLI:

```
Router# show bootvar
BOOT variable = bootflash:asr920-universalk9_npe.bin ,12;
CONFIG_FILE variable does not exist
```

```
BOOTLDR variable does not exist
Configuration register is 0x0 (! will be 0x2102 at next reload)
```

Step 8   Save the configuration and reload the router.

```
Router# reload
```

After the installation, the router is running the universal image. To install a purchased license with increased capabilities, see *Software Activation Configuration Guide*. To purchase a license, contact Cisco.

Upgrading the ROMMON on router

The router has two ROMMON regions (ROM0 and ROM1). We recommend that the upgrade is performed on both the regions.

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Caution   To avoid actions that might make your system unable to boot, read this entire section before starting the upgrade.

Follow the procedure to upgrade the ROMMON image:

Procedure

Step 1   Check the router bootup ROMMON region (ROM0 or ROM1). The example, shows the router boots up from ROM0 region.

Example:

```
Router# show rom-monitor r0
System Bootstrap, Version 15.4(3r)S4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2014 by cisco Systems, Inc.
```

Step 2   Copy the ROMMON image to the bootflash on the router.

Example:

```
Router# copy tftp://location/directory/asr920-rommon-15.4.3r.S4-upgrade.pkg bootflash:
```

Step 3   Use the upgrade rom-monitor filename bootflash:asr920-rommon-15.4.3r.S4-upgrade.pkg R0 command to upgrade the version.

R0 represents router in slot0 of the chassis. Step 3 upgrades the ROMMON region of the router that is not used (ROM1 region) as ROM 0 region is used (in this procedure) in Step 1 to boot up the router.

Step 4   Reload the router.

Example:

```
Router# upgrade rom-monitor filename bootflash:asr920-rommon-15.4.3r.S4-upgrade.pkg r0
Upgrade rom-monitor on Route-Processor 0
Target copying rom-monitor image file
Checking upgrade image...
```

```
1966080+0 records in
3840+0 records out
Upgrade image MD5 signature is 712184b6ef336f40263222175255f475
Burning upgrade partition...
1966080+0 records in
1966080+0 records out
CChecking upgrade partition...
1966080+0 records in
1966080+0 records out
Upgrade flash partition MD5 signature is 712184b6ef336f40263222175255f475
ROMMON upgrade complete.
To make the new ROMMON permanent, you must restart the RP.
```

Step 5   Reload the router again to confirm bootup from upgraded ROMMON region ROM1.

Example:

```
Router# reload
System configuration has been modified. Save? [yes/no]: y
Building configuration...
[OK]
Proceed with reload? [confirm]
Jul 24 09:56:34.510: %SYS-5-RELOAD: Reload requested by console. Reload Reason: Reload
Command.Jul 24 15:27:03.205 R0/0: %PMAN-5-EXITACTION: Process manager is exiting: process
exit with reload chassis code
System Bootstrap, Version 12.2(20140211:085836) [pbalakan-sb_romver_16 130], DEVELOPMENT
SOFTWARE
Copyright (c) 1994-2012 by cisco Systems, Inc.
Compiled Fri 28-Mar-14 18:57 by pbalakan-sb_romver_16
Boot ROM1
Last reset cause: RSP-Board
```

Step 6   Repeat Step 3 to Step 5 to update the other region on the RSP (ROM0) region in this procedure).

Note   We recommend that both region ROM0 a.ndROM1 are upgraded.

Verifying the Upgrade

Use the show platform command to verify the ROMMON upgrade.

```
Router# show platform
Chassis type: ASR-920-12CZ-A
Slot      Type                State                 Insert time (ago)
--------- ------------------- --------------------- -----------------
 0/0      12xGE-2x10GE-FIXED  ok                    00:18:41
R0        ASR-920-12CZ-A      ok, active            00:20:39
F0                            ok, active            00:20:39
P0        ASR920-PSU0         ok                    never
P1        ASR920-PSU1         ps, fail              never
P2        ASR920-FAN          ok                    never
Slot      CPLD Version        Firmware Version
--------- ------------------- -------------------------------------
R0        14080701            15.4(3r)S4
F0        14080701            15.4(3r)S4
```

Use the show rom-monitor r0 command to check the rommon version on the router.

```
Router# show rom-monitor r0
System Bootstrap, Version 15.4(3r)S4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2014 by cisco Systems, Inc.
```

Software Upgrade Example

The following section provide a sample of software upgrade on the router.

```
Router# show bootvar
BOOT variable = bootflash:asr920-universalk9_npe.bin,12;
CONFIG_FILE variable does not exist
BOOTLDR variable does not exist
Configuration register is 0x0 (will be 0x2102 at next reload)
Router# reload
Proceed with reload? [confirm]
*Nov 14 04:29:15.051: %SYS-5-RELOAD: Reload requested by vmalshet on console. Reload Reason:
 Reload Command.Nov 14 04:29:38.446 R0/0: %PMAN-5-EXITACTION: Process manage
System Bootstrap, Version 15.4(3r)S4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2014 by cisco Systems, Inc.
Compiled Fri 20-Jun-14 17:24 by alnguyen
Boot ROM1
Last reset cause: RSP-Board
UEA platform with 2097152 Kbytes of main memory
Located asr920-universalk9_npe.bin
Image size 266349176 inode num 27, bks cnt 65027 blk size 8*512
########################################################################################################################################################################################
Boot image size = 266349176 (0xfe02a78) bytes
Package header rev 0 structure detected
Calculating SHA-1 hash...done
validate_package: SHA-1 hash:
        calculated 424f2b4a:ea7da21d:397efd55:db10f40e:7a6250e8
        expected   424f2b4a:ea7da21d:397efd55:db10f40e:7a6250e8
Image validated
Passing control to the main image..
%IOSXEBOOT-4-DEBUG_CONF: (rp/0): File /bootflash/debug.conf is absent, ignoring
            Restricted Rights Legend
Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.
           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706
Cisco IOS Software, ASR920 Software (PPC_LINUX_IOSD-UNIVERSALK9_NPE-M), Experimental Version
 15.5(20141015:140327) [v155_1_s_xe314_throttle-sourdutt-xe314_cortina 184]
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Tue 28-Oct-14 13:46 by sourdutt
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documentation or "License Notice" file accompanying the IOS-XE software,
or the applicable URL provided on the flyer accompanying the IOS-XE
software.
```

```
 Tmpdisk creation successful, status = 0
flashfs[16]: 0 files, 1 directories
flashfs[16]: 0 orphaned files, 0 orphaned directories
flashfs[16]: Total bytes: 1935360
flashfs[16]: Bytes used: 1024
flashfs[16]: Bytes available: 1934336
This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please contact us by sending email to
export@cisco.com.
cisco ASR-920-12CZ-A (Freescale P2020) processor (revision 1.0 GHz) with 687183K/6147K bytes
 of memory.
Processor board ID CAT1748U1GQ
12 Gigabit Ethernet interfaces
2 Ten Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
2097152K bytes of physical memory.
1328927K bytes of SD flash at bootflash:.
Press RETURN to get started!
Router# show version
Cisco IOS XE Software, Version 2014-10-28_13.50_sourdutt
Cisco IOS Software, ASR920 Software (PPC_LINUX_IOSD-UNIVERSALK9_NPE-M), Experimental Version
 15.5(20141015:140327) [v155_1_s_xe314_throttle-sourdutt-xe314_cortina 184]
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Compiled Tue 28-Oct-14 13:46 by sourdutt
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GPL code under the terms of GPL Version 2.0.  For more details, see the
documentation or "License Notice" file accompanying the IOS-XE software,
or the applicable URL provided on the flyer accompanying the IOS-XE
software.
ROM: IOS-XE ROMMON
StrikerI uptime is 21 minutes
Uptime for this control processor is 25 minutes
System returned to ROM by reload
System image file is "bootflash:asr920-universalk9_npe.bin"
Last reload reason: Reload Command
This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please contact us by sending email to
export@cisco.com.
License Level: advancedmetroipaccess
License Type: Smart License
Next reload license Level: advancedmetroipaccess
cisco ASR-920-12CZ-A (Freescale P2020) processor (revision 1.0 GHz) with 687183K/6147K bytes
```

```
 of memory.
Processor board ID CAT1748U1GQ
12 Gigabit Ethernet interfaces
2 Ten Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
2097152K bytes of physical memory.
1328927K bytes of SD flash at bootflash:.
Configuration register is 0x2102
```