

Upgrading the Cisco IOS XE Software

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Prerequisites for the Software Upgrade Process

This section describes how to upgrade the Cisco IOS XE software for an existing Cisco CSR 1000v or Cisco ISRv installation on a VM. For information on installing a new Cisco CSR 1000v, see Cisco CSR 1000v Series Cloud Services Router Overview.

This procedure is for upgrading to a new software version on the same VM only. It does not describe how to install or rehost an existing router running the same or upgraded software version on a different VM.



Note

The router does not support In-Service Software Upgrade (ISSU).



Note

(Cisco IOS XE Everest 16.5 and later) On Amazon Web Services (AWS), you can use the Cisco CSR 1000v .bin file to upgrade the version of the router, without having to recreate the AWS EC2 instance from a new AMI.



Note

(Cisco IOS XE Everest 16.4 and earlier) On Amazon Web Services (AWS), you cannot use the Cisco CSR 1000v .bin file to upgrade AMIs obtained from AWS. You must create a new AMI instance and migrate your configuration and licenses.



Note

(Cisco IOS XE Fuji 16.7 or later) On Microsoft Azure, to do an in-place upgrade of the Cisco CSR 1000v .bin file you must follow the steps in Upgrading a Cisco IOS XE Image on Microsoft Azure. This is within the Configuring Cisco CSR 1000v on Microsoft Azure section of the Cisco CSR 1000v Deployment Guide for Microsoft Azure.



Note

(Cisco IOS XE Everest 16.6 and earlier) On Microsoft Azure, you cannot use the Cisco CSR 1000v .bin file to upgrade a Cisco CSR1000v instance. You must re-deploy a new instance from the Microsoft Azure Portal and migrate your configuration and licenses.



Caution

If upgrading to Cisco IOS XE Release 3.11S from an earlier release, we recommend that you update your configuration to remove the GigabitEthernet0 management interface before upgrading. Because the GigabitEthernet0 interface is no longer supported beginning with Cisco IOS XE Release 3.11S, you will receive system errors if the upgraded configuration includes this interface. If downgrading from Cisco IOS XE Release 3.11S to an earlier release, note also that the management interface will need to change to GigabitEthernet0 for the earlier release.

Be sure to complete the following prerequisites for upgrading the Cisco IOS XE version of the router software image:

Read the Cisco CSR 1000v Series Cloud Services Router Release Notes to verify the following:

- This is a note about the compatibility between the hypervisor vendor and Cisco IOS XE version. If you
 want to upgrade to a new hypervisor version not supported by your current version of Cisco IOS XE on
 the Cisco CSR 1000v/ISRv, you need to upgrade the version before upgrading to the new hypervisor
 version.
- System requirements for the x86 hardware that may differ from those of the currently running on the router.
- Memory requirements of the VM for the Cisco CSR 1000v/ISRv software image.



Note

If the new router's version requires more memory than your previous version, you must increase the memory allocation on the VM before beginning the upgrade process.

- Software features supported on the upgraded Cisco IOS XE version.
- · Any upgrade restrictions.

Obtain the Cisco CSR 1000v/ISRv software image from Cisco.com. For the Cisco CSR 1000v, see Obtaining the Cisco CSR 1000v VM Image .



Note

You must use the .bin file to upgrade or downgrade your software. The .iso and .ova files are used for first-time installation only.

Saving Backup Copies of Your Old System Image and Configuration

To avoid unexpected downtime in the event you encounter serious problems using a new system image or startup configuration, we recommend that you save backup copies of your current startup configuration file and Cisco IOS XE software system image file on a server.

For more detailed information, see the "Managing Configuration Files" chapter in the Managing Configuration Files Configuration Guide, Cisco IOS XE Everest 16.6.

To save backup copies of the startup configuration file and the system image file, complete the following steps.

SUMMARY STEPS

- 1. enable
- 2. copy nvram:startup-config {ftp: | rcp: | tftp:}
- 3. dir bootflash:
- 4. copy bootflash: {ftp: | rcp: | tftp:}

DETAILED STEPS

| | Command or Action | Purpose |
|--------|---|---|
| Step 1 | enable | Enables privileged EXEC mode. |
| | Example: | • Enter your password if prompted. |
| | Router> enable | |
| Step 2 | copy nvram:startup-config {ftp: rcp: tftp:} | Copies the startup configuration file to a server. |
| | Example: | The configuration file copy can serve as a backup copy. |
| | Router# copy nvram:startup-config ftp: | • Enter the destination URL when prompted. |
| Step 3 | dir bootflash: | Displays the layout and contents of a bootflash memory file |
| | Example: | system. bootflash: is aliased onto flash: . |
| | · | • Learn the name of the system image file. |
| | Router# dir bootflash: | |
| Step 4 | copy bootflash: {ftp: rcp: tftp:} | Copies a file from bootflash memory to a server. |
| | Example: | Copy the system image file to a server. This file can serve as a backup copy. |
| | Router# copy bootflash: ftp: | |

| Command or Action | Purpose |
|-------------------|--|
| | Enter the bootflash memory partition number if prompted. |
| | Enter the filename and destination URL when prompted. |

What to do next

The following example shows the startup configuration being copied to a TFTP server:

```
Router# copy nvram:startup-config tftp:

Remote host[]? 192.0.2.1

Name of configuration file to write [rtr2-confg]? rtr2-config-b4upgrade

Write file rtr2-confg-b4upgrade on host 192.0.0.1?[confirm] <cr>
![OK]
```

The following example uses the **dir bootflash:** command in privileged EXEC mode to learn the name of the system image file and the **copy bootflash: tftp:** command in privileged EXEC mode to copy the system image to a TFTP server. The router uses the default username and password.

```
Router# dir bootflash:
Directory of bootflash:/

1 -rw- 48311224 Mar 2 1901 11:32:50 +00:00 csr1000v-universalk9-mz.SSA.XFR_20090407

2 -rw- 983 Feb 14 2021 12:41:52 +00:00 running-config
260173824 bytes total (211668992 bytes free)
Router# copy bootflash: tftp:
Source filename [running-config]?
Address or name of remote host []? 192.0.2.1
Destination filename [router-confg]? running-config
983 bytes copied in 0.048 secs (20479 bytes/sec)
Router#
```

Using TFTP or Remote Copy Protocol to Copy the System Image into Boot Flash Memory

The following details the logistics of upgrading the system image:

Install a TFTP server or an RCP server application on a TCP/IP-ready workstation or PC. Many third-party vendors provide free TFTP server software, which you can find by searching for "TFTP server" in a web search engine.

If you use TFTP:

- Configure the TFTP application to operate as a TFTP server, not a TFTP client.
- Specify the outbound file directory to which you will download and store the system image.

- Download the new Cisco IOS XE software image into the workstation or PC.
- Verify that the TFTP or RCP server has IP connectivity to the router. If you cannot successfully ping between the TFTP or RCP server and the router, either configure a default gateway on the router or make sure that the router and server each have an IP address in the same network or subnet.

SUMMARY STEPS

- 1. enable
- **2.** Use one of the following commands to copy a file from a server to bootflash memory:
 - copy tftp bootflash:
 - · copy rcp bootflash
- **3.** When prompted, enter the IP address of the TFTP or RCP server:
- **4.** When prompted, enter the filename of the Cisco IOS software image to be installed:
- **5.** When prompted, enter the filename as you want it to appear on the router. Typically, the same filename is entered as was used in the previous step.
- **6.** If an error message appears that says, "Not enough space on device," do the following:
- **7.** If the error message does not appear, enter **no** when prompted to erase the bootflash memory before copying:

DETAILED STEPS

Step 1 enable

Use this command to enter privileged EXEC mode. Enter your password if prompted:

Example:

Router> enable

Password: <password>

Router#

- **Step 2** Use one of the following commands to copy a file from a server to bootflash memory:
 - copy tftp bootflash:
 - · copy rcp bootflash

Example:

Router# copy tftp bootflash:

Step 3 When prompted, enter the IP address of the TFTP or RCP server:

Example:

Address or name of remote host []? 10.10.10.2

Step 4 When prompted, enter the filename of the Cisco IOS software image to be installed:

Source filename ? csr1000v-universalk9.03.10.00.S.153-3.S-ext.SPA.bin

Note The filename is case sensitive.

Step 5 When prompted, enter the filename as you want it to appear on the router. Typically, the same filename is entered as was used in the previous step.

Example:

Destination filename ? csr1000v-universalk9.03.10.00.S.153-3.S-ext.SPA.bin

- **Step 6** If an error message appears that says, "Not enough space on device," do the following:
 - If you are certain that all the files in bootflash memory should be erased, enter **y** when prompted twice to confirm that bootflash memory will be erased before copying:

Example:

```
Accessing tftp://10.10.10.2/csr1000v-universalk9.03.10.00.S.153-3.S-ext.SPA.bin... Erase bootflash: before copying? [confirm] y

Erasing the flash filesystem will remove all files! Continue? [confirm] y

Erasing device...
```

- If you are not certain that all files in bootflash memory should be erased, press Ctrl-Z.
- **Step 7** If the error message does not appear, enter **no** when prompted to erase the bootflash memory before copying:

Example:

```
Accessing tftp://10.10.10.2/csr1000v-universalk9.03.10.00.S.153-3.S-ext.SPA.bin... Erase bootflash: before copying? [confirm] no
```

Loading the New System Image from the Cisco IOS XE Software

SUMMARY STEPS

- 1. dir bootflash:
- 2. configure terminal
- 3. no boot system
- **4. boot system bootflash:** *system-image-filename*.bin
- **5.** (Optional) Repeat the previous step to specify the order in which the router should attempt to load any backup system images.
- 6. exit
- 7. write
- 8. show version
- **9.** If the last digit in the configuration register is 0 or 1, proceed to the next step. However, if the last digit in the configuration register is between 2 and F, proceed to the step "copy running-config startup-config" below.

- 10. configure terminal
- 11. config-register 0x2102
- **12**. exit
- 13. copy running-config startup-config
- **14.** write memory
- 15. reload
- **16.** When prompted to save the system configuration, enter **no**:
- **17.** When prompted to confirm the reload, enter y:
- 18. show version

DETAILED STEPS

Step 1 dir bootflash:

Use this command to display a list of all files and directories in bootflash memory:

Example:

Router# dir bootflash:

```
Directory of bootflash:/
3 -rw- 6458388 Mar 01 1993 00:00:58 csr1000v.tmp
1580 -rw- 6462268 Mar 06 1993 06:14:02 csr1000v-ata
63930368 bytes total (51007488 bytes free)
```

Step 2 configure terminal

Use this command to enter global configuration mode:

Example:

```
Router# configure terminal
Router(config)#
```

Step 3 no boot system

Use this command to delete all entries in the bootable image list, which specifies the order in which the router attempts to load the system images at the next system reload or power cycle:

Example:

```
Router(config) # no boot system
```

Step 4 boot system bootflash: system-image-filename.bin

Note If the new system image is the first file or the only file displayed in the **dir bootflash:** command output in Step 1, you do not need to perform this step.

Use this command to load the new system image after the next system reload or power cycle. For example:

```
Router(config) # boot system bootflash:
csr1000v-universalk9.03.10.00.S.153-3.S-ext.SPA.bin
```

Step 5 (Optional) Repeat the previous step to specify the order in which the router should attempt to load any backup system images.

Step 6 exit

Use this command to exit global configuration mode:

Example:

```
Router(config)# exit
Router#
```

Step 7 write

or

write memory

Example:

```
Router# write memory
```

Note

This step is required beginning with Cisco IOS XE Release 3.9S if upgrading to a later version. Entering the **write** or **write memory** command updates the GRUB menu list of images available on the bootflash disk

Step 8 show version

Use this command to display the configuration register setting:

Example:

```
Router# show version
Cisco Internetwork Operating System Software
.
.
.
Configuration register is 0x0
```

Router#

Step 9 If the last digit in the configuration register is 0 or 1, proceed to the next step. However, if the last digit in the configuration register is between 2 and F, proceed to the step "copy running-config startup-config" below.

Step 10 configure terminal

Use this command to enter global configuration mode:

Example:

```
Router# configure terminal Router(config)#
```

Step 11 config-register 0x2102

Use this command to set the configuration register so that, after the next system reload or power cycle, the router loads a system image from the **boot system** commands in the startup configuration file:

```
Router(config) # config-register 0x2102
```

Note

The 0x2102 value is the default configuration register setting. If you didn't change this setting from the default, this step is not required.

Step 12 exit

Use this command to exit global configuration mode:

Example:

```
Router(config) # exit
Router#
```

Step 13 copy running-config startup-config

Use this command to copy the running configuration to the startup configuration:

Example:

```
Router# copy running-config startup-config
```

Step 14 write memory

Note

This step is required beginning with Cisco IOS XE Release 3.9S if upgrading to a later version. Entering the **write memory** command updates the GRUB menu list of images available on the bootflash disk.

Step 15 reload

Use this command to reload the operating system:

Example:

```
Router# reload
```

Step 16 When prompted to save the system configuration, enter **no**:

Example:

```
System configuration has been modified. Save? [yes/no]: no
```

Step 17 When prompted to confirm the reload, enter y:

Example:

```
Proceed with reload? [confirm] y
```

Step 18 show version

Use this command to verify that the router loaded the proper system image:

```
Router# show version

00:22:25: %SYS-5-CONFIG_I: Configured from console by console
Cisco Internetwork Operating System Software
.
.
.
System returned to ROM by reload
```

```
System image file is "bootflash: csr1000v-universalk9.03.10.00.S.153-3.S-ext.SPA.bin"
```

Loading the New System Image from GRUB Mode

To load the new system image from GRand Unified Bootloader (GRUB) mode, follow these steps, beginning in EXEC mode.

SUMMARY STEPS

- 1. dir bootflash:
- 2. configure terminal
- **3. boot system bootflash:** *system-image-filename*.bin
- 4. do write
- 5. config-register 0x0000
- **6.** At the **grub>** prompt, enter ESC to access the GRUB menu.
- 7. Select the .bin file to upgrade the software image on the router to the new version.
- **8.** Press **Enter** to boot the selected image to begin the upgrade process.

DETAILED STEPS

Step 1 dir bootflash:

Use this command to display a list of all files and directories in bootflash memory:

Example:

```
Router# dir bootflash:
```

```
Directory of bootflash:/
3 -rw- 6458388 Mar 01 1993 00:00:58 csr1000v.tmp
1580 -rw- 6462268 Mar 06 1993 06:14:02 csr1000v-ata
63930368 bytes total (51007488 bytes free)
```

Step 2 configure terminal

Use this command to enter global configuration mode:

Example:

```
Router# configure terminal
Router(config)#
```

Step 3 boot system bootflash: system-image-filename.bin

Note If the new system image is the first file or the only file displayed in the **dir bootflash:** command output, you do not need to perform this step.

Use this command to load the new system image after the next system reload or power cycle. For example:

```
Router(config) # boot system bootflash: csr1000v-universalk9.03.10.00.S.153-3.S-ext.SPA.bin
```

Step 4 do write

or

do write memory

Example:

```
Router(config) # do write memory
```

Note

This step is required beginning with Cisco IOS XE Release 3.9S if upgrading to a later version. Entering the **do write** or **do write memory** command updates the GRUB menu list of images available on the bootflash disk

Step 5 config-register 0x0000

Use this command to enter GRUB mode.

The following shows an example of entering GRUB mode.

Example:

Step 6 At the **grub>** prompt, enter ESC to access the GRUB menu.

The GRUB menu displays, showing the images that are available to boot.

Select the image to boot the router from using the up and down arrow key. To return to the GRUB prompt, enter the letter **c**.

- **Step 7** Select the .bin file to upgrade the software image on the router to the new version.
- **Step 8** Press **Enter** to boot the selected image to begin the upgrade process.

Saving Backup Copies of Your New System Image and Configuration

To aid file recovery and to minimize downtime in the event of file corruption, we recommend that you save backup copies of the startup configuration file and the Cisco IOS software system image file on a server.



Tip

Do not erase any existing backup copies of your configuration and system image that you saved before upgrading your system image. If you encounter serious problems using your new system image or startup configuration, you can quickly revert to the previous working configuration and system image.

To save backup copies of the startup configuration file and the system image file, complete the following steps.

SUMMARY STEPS

- 1. enable
- 2. copy nvram:startup-config {ftp: | rcp: | tftp:}
- 3. dir bootflash:
- 4. copy bootflash: {ftp: | rcp: | tftp:}

DETAILED STEPS

| | Command or Action | Purpose |
|--------|---|---|
| Step 1 | enable | Enables privileged EXEC mode. |
| | Example: | • Enter your password if prompted. |
| | Router> enable | |
| Step 2 | copy nvram:startup-config {ftp: rcp: tftp:} | Copies the startup configuration file to a server. |
| | Example: | The configuration file copy serves as a backup copy. |
| | Router# copy nvram:startup-config ftp: | • Enter the destination URL when prompted. |
| Step 3 | dir bootflash: | Displays the layout and contents of a bootflash memory file |
| | Example: | system. |
| | Router# dir bootflash: | Write down the name of the system image file. |

| | Command or Action | Purpose |
|--------|---------------------------------------|---|
| Step 4 | copy bootflash: {ftp: rcp: tftp:} | Copies a file from bootflash memory to a server. |
| | Example: | • Copy the system image file to a server to serve as a backup copy. |
| | Router# copy bootflash: ftp: | Enter the bootflash memory partition number if prompted. |
| | | Enter the filename and destination URL when prompted. |

What to do next

The following example shows the startup configuration being copied to a TFTP server:

```
Router# copy nvram:startup-config tftp:

Remote host[]? 172.16.101.101

Name of configuration file to write [rtr2-confg]? <cr>
Write file rtr2-confg on host 172.16.101.101?[confirm] <cr>
![OK]
```

The following example uses the **dir bootflash:** privileged EXEC command to obtain the name of the system image file and the **copy bootflash: tftp:** privileged EXEC command to copy the system image to a TFTP server. The router uses the default username and password.

```
Router# dir bootflash:
```

```
System flash directory:
File Length Name/status
1 4137888 csr1000v-universalk9.03.10.00.S.153-3.S-ext.SPA.bin
[4137952 bytes used, 12639264 available, 16777216 total]
16384K bytes of processor board System flash (Read/Write) \
Router# copy bootflash: tftp:

IP address of remote host [255.255.255.255]? 192.0.2.1
filename to write on tftp host? csr1000v-advernterprisek9-mz
writing csr1000v-universalk9.03.10.00.S.153-3.S-ext.SPA!!!!...
successful ftp write.
```

Rebooting the Cisco CSR 1000v

Once you have copied the new system image into bootflash memory, loaded the new system image and saved a backup copy of the new system image and configuration, you need to reboot the VM. See your VM vendor documentation for more information about rebooting the VM. After rebooting, the router VM should include the new system image with a newly installed version of the Cisco IOS XE software.

Rebooting the Cisco CSR 1000v