



Software Upgrade

This chapter explains how to upgrade the Cisco IOS image installed on the Cisco ASR 901 router.

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Selecting a Cisco IOS Image

When you select the Cisco IOS image for upgrade, consider the following:

- **Memory requirement**—The router should have sufficient disk or flash memory to store the Cisco IOS. The router should also have sufficient memory (DRAM) to run the Cisco IOS. The recommended logging buffer in DRAM ranges from 8 kilobytes to 64 kilobytes. If the router does not have sufficient memory (DRAM), the router will have boot problems when it boots through the new Cisco IOS.
- **Interfaces and modules support**—You must ensure that the new Cisco IOS supports all the interfaces and modules in the router.
- **Software feature support**—You must ensure that the new Cisco IOS supports the features used with the old Cisco IOS.
- **Security image**—ASR 901 does not support loading security images in the non-secure environment or node. Loading the security images affect the functionality.

Upgrading the Cisco IOS image

Complete the following steps to upgrade the Cisco IOS image:

Procedure

- Step 1** Download the Cisco IOS software image to the TFTP server.
Download the Cisco IOS software image onto your workstation or PC from the Download Software Area

(registered customers only).

Step 2 Identify the file system to copy the image.

The file system type 'flash' or 'disk' is used to store the Cisco IOS image. The **show file system** command lists the file systems available on the router. The file system should have sufficient space to store the Cisco IOS image. You can use the **show file system** or the **dir file_system** command in order to find the free space.

Example:

```
Router# show file system
File Systems:
Size (b)      Free (b)      Type  Flags  Prefixes
-----
262144       240157       nvram  rw     nvram:
-            -            opaque rw     system:
-            -            opaque rw     tmpsys:
-            -            opaque rw     null:
-            -            opaque ro     tar:
-            -            network rw     tftp:
-            -            opaque wo     syslog:
* 100401148   39104096     flash rw     flash:
67108860     67108860     flash rw     ramdisk:
-            -            network rw     rcp:
-            -            network rw     ftp:
-            -            network rw     http:
-            -            network rw     scp:
-            -            opaque ro     cns:
```

Step 3 Prepare for the upgrade.

You should consider these items before you upgrade the Cisco IOS:

- Store both the old Cisco IOS and the new Cisco IOS, if the router has sufficient memory. You can boot the router in the ROMMON mode and boot the old Cisco IOS, in case of boot failure with new Cisco IOS. This method saves time if you want to roll back the Cisco IOS.
- Backup the configuration from the router because some of the Cisco IOS releases add default configurations. This newly added configuration may conflict with your current configuration. Compare the configuration of the router after the Cisco IOS upgrade with the configuration backed up before the upgrade. If there are differences in the configuration, you must ensure they do not affect your requirements.

Step 4 Verify that the TFTP server has IP connectivity to the router.

The TFTP server must have a network connection to the router and must be able to ping the IP address of the router targeted for a TFTP software upgrade. In order to achieve this connection, the router interface and the TFTP server must have an IP address in the same range or a default gateway configured. Check the IP address of the TFTP server in order to verify this configuration.

Step 5 Copy the IOS Image from the TFTP server.

Before you copy the image, ensure that you have started the TFTP server software on your PC, and that you have the file name mentioned in the TFTP server root directory. Cisco recommends that you keep a backup of the router and access server configuration before you upgrade. The upgrade does not affect the configuration, which is stored in nonvolatile RAM [NVRAM]. However, this situation might happen if the right steps are not followed properly.

Example:

```
Router# copy tftp: flash:
```

```

Address or name of remote host []? 10.105.33.135
Source filename []? asr901-universalk9-mz.151-2.SNG
Destination filename [asr901-universalk9-mz.151-2.SNG]?
Accessing tftp://10.105.33.135/asr901-universalk9-mz.151-2.SNG...
Erase flash: before copying? [confirm]n
Loading asr901-universalk9-mz.151-2.SNG from 10.105.33.135 (via FastEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 30551884 bytes]
Verifying checksum... OK (0xC7E6)
30551884 bytes copied in 199.636 secs (153038 bytes/sec)
Router#

```

Step 6 Verify the Cisco IOS image in the file system.

Example:

```

Router# dir flash:
Directory of flash:/
 1  -rw-   30551884                   <no date>  asr901-universalk9-mz.151-2.SNG
100401148 bytes total (69849200 bytes free)
Router#

```

Router# verify flash:asr901-universalk9-mz.151-2.SNG

Example:

File system hash verification successful.

Step 7 Verify the Configuration Register.

Use the **show version** command to check the config-register value. The value is displayed in the last line of the show version output. It should be set to 0x2102.

Example:

```

Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# config-register 0x2102
Router(config)#^Z

```

Step 8 Verify the Boot Variable

The router tries to boot with the first file in the Flash. If the first file is not the Cisco IOS Software image, you need to configure a boot system statement in order to boot the specified image. If there is only one file in Flash and it is the Cisco IOS Software image, this step is not necessary.

Example:

```

Router#show run | inc boot
boot-start-marker
boot system flash asr901-universalk9-mz.151-2.SNG.fc1
boot-end-marker
Router#
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#no boot system
Router(config)#boot system flash asr901-universalk9-mz.151-2.SNG
Router(config)#end
Router#
Router#show run | inc boot
boot-start-marker
boot system flash asr901-universalk9-mz.151-2.SNG

```

```
boot-end-marker
Router#
```

Step 9 Save the configuration and reload the router.

Example:

```
Router# write memory
Router# reload
Proceed with reload? [confirm]
Jul 24 20:17:07.787: %SYS-5-RELOAD: Reload requested by console. Reload Reason:
Reload Command.
```

Step 10 Verify the Cisco IOS upgrade.

After the reload is complete, the router should run the desired Cisco IOS Software image. Use the **show version** command in order to verify the Cisco IOS software.

Example:

```
Router# show version
Cisco IOS Software, 901 Software (ASR901-UNIVERSALK9-M), Version 15.1(2)SNG, RELEASE SOFTWARE
(fc3)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2011 by Cisco Systems, Inc.
Compiled Thu 27-Oct-11 15:52 by prod_rel_team
ROM: System Bootstrap, Version 15.1(2r)SNG, RELEASE SOFTWARE (fc1)
ASR901 uptime is 4 minutes
System returned to ROM by reload at 13:11:07 UTC Wed Apr 19 2000
System image file is "tftp://10.105.33.135/rajuvenk/asr901-universalk9-mz.151-2.SNG.bin"
Last reload type: Normal Reload
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: Permanent
Next reload license Level: AdvancedMetroIPAccess
Cisco ASR901-E (P2020) processor (revision 1.0) with 393216K/131072K bytes of memory.
Processor board ID CAT1529U01P
P2020 CPU at 792MHz, E500v2 core, 512KB L2 Cache
1 FastEthernet interface
12 Gigabit Ethernet interfaces
1 terminal line
256K bytes of non-volatile configuration memory.
98304K bytes of processor board System flash (Read/Write)
65536K bytes of processor board RAM Disk (Read/Write)
Configuration register is 0x2102
```

Auto Upgrading the MCU

Upgradable MCU is bundled with the IOS image. You can upgrade the MCU using one of the following ways:

- MCU Auto upgrade can be enabled or disabled by setting the ROMMON variable `AUTO_UPGRADE_ROMMON` to `TRUE` or `FALSE`:

- From the ROMMON:

```
rommon> AUTO_UPGRADE_MCU=TRUE | FALSE
```

- From the IOS:

```
Router# upgrade mcu preference [enable | disable]
```

Once the MCU is upgraded, the router is not reloaded. Subsequent reload versions are compared; if the versions are same, then the MCU is not upgraded.

- If the `AUTO_UPGRADE_ROMMON` variable is set to `FALSE`, then the MCU can be upgraded as follows:

```
Router# upgrade mcu file flash:image.hex
```

Manually Upgrading the ROMMON

Complete the following steps to manually upgrade the router ROMMON:

Procedure

- Step 1** Load the IOS image.
- Step 2** Copy the upgradable ROMMON file `ASR901_RM2.srec`, to the flash memory.
- Step 3** Upgrade the ROMMON using the following command:

```
Router# upgrade rom-monitor file flash:ASR901_RM2.srec
```

The router reloads and comes up with upgradable ROMMON.

- Step 4** Check the status of the currently running ROMMON using any one of the following commands:

- From the ROMMON:
 - `rommon>rommon-pref readonly`
- From the IOS:
 - `router>show rom-monitor`

Note While upgrade is in progress, if something goes wrong like power-off or power cyclers removed, or if the erase program is not done properly, you can reset the board. It falls back to the read-only rommon.

What to do next

After the ROMMON upgrade, if you need to fall back to either the read-only ROMMON, or the upgrade ROMMON, use any one of the following commands:

- From the IOS:

```
Router# upgrade rom-monitor preference readonly | upgrade
```

- From the ROMMON:

```
rommon> rommon-pref readonly
```

Auto Upgrade of ROMMON

Upgradable rommon is bundled with the IOS image. You can do an auto upgrade of the ROMMON using one of the following ways:

- Rommon Auto upgrade can be enabled or disabled with by setting the rommon variable `AUTO_UPGRADE_ROMMON` to `TRUE` or `FALSE` using the following commands:

- From the ROMMON:

```
rommon> AUTO_UPGRADE_ROMMON=TRUE | FALSE
```

- From the IOS:

```
Router# upgrade rom-monitor preference autoupgrade enable | disable
```

By default, the upgrade variable is set to be `TRUE`.

Once the ROMMON is upgraded, the IOS falls back to the ROMMON. Subsequent reload versions are compared; if the version is the same, then the ROMMON will not be upgraded.

- If the `AUTO_UPGRADE_ROMMON` variable is set to `FALSE`, use the following command in IOS, to upgrade:

```
Router# upgrade rom-monitor internal
```