# Cisco Firmware Upgrade Guide for Cellular Modems

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This guide provides information about upgrading Cisco cellular modem firmware on Cisco ISR and IR Routers.

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# Overview

Cisco Integrated Service Routers (ISRs) and IR Routers use the cellular modems from Sierra Wireless. The architecture of the router is such that there is a dependency between the firmware running on the modem and the version of Cisco IOS running on the router. Sierra Wireless builds a Cisco specific firmware package for the modems embedded in routers based on the firmware that has been certified by the carrier. This firmware that the modem runs on, undergoes a thorough testing in the Cisco lab to ensure a seamless integration and functioning between the modem firmware and Cisco IOS. Once evaluated, the firmware is then posted on the website from where the customers can download it.

# Firmware Package Information

The following table provides information about the firmware versions and packages based on modem type and the Cisco SKUs.

**Table 1 Firmware Versions and Packages for Cisco SKUs**

| SKU ID | Modem Type | Firmware Version | Applicable firmware package |
|---|---|---|---|
| EHWIC-4G-LTE-AU | MC7304 | 5.5.58.0 | MC7304_1102029_05.05.58.00_00_TELSTRA_005.014_000.spk |
| ■ EHWIC-4G-LTE-GB<br>■ IR829GW-LTE-GA-EK9 | MC7304 | 5.5.58.0 | MC7304_9999999_9902674_05.05.58.00_00_GENEU-4G_005.026_000.spk |
| ■ C819G-4G-GA-K9<br>■ C899G-LTE-GA-K9<br>■ C881G-4G-GA-K9<br>■ C887VAG-4G-GA-K9<br>■ C896VAG-LTE-GA-K9<br>■ C897VAG-LTE-GA-K9<br>■ C897VAMG-LTE-GA-K9<br>■ C898EAG-LTE-GA-K9<br>■ NIM-4G-LTE-GA<br>■ C819GW-4G-LTE-GA-EK9<br>■ IR829GW-LTE-GA-ZK9<br>■ IR809G-LTE-GA-K9<br>■ CGM-4G-LTE-GA | MC7304 | 5.5.58.0 | MC7304_1102029_05.05.58.00_00_TELSTRA_005.014_000.spk,<br>MC7304_9999999_9902674_05.05.58.00_00_GENEU-4G_005.026_000.spk |

**Table 1 Firmware Versions and Packages for Cisco SKUs**

| SKU ID | Modem Type | Firmware Version | Applicable firmware package |
|---|---|---|---|
| ■ EHWIC-4G-LTE-VZ<br>■ C819G-4G-VZ-K9<br>■ C819G-4G-ST-K9<br>■ C899G-LTE-VZ-K9<br>■ NIM-4G-LTE-VZ<br>■ IR829GW-LTE-VZ-AK9<br>■ R809G-LTE-VZ-K9 | MC7350 | 5.5.58.01 | MC7350_1102036_05.05.58.01_00_VZW_005.009_000.spk |
| ■ EHWIC-4G-LTE-ST<br>■ C899G-LTE-ST-K9<br>■ NIM-4G-LTE-ST | MC7350 | 5.5.58.01 | MC735X_9999999_9902350_05.05.58.01_00_SPRINT_005.031_000.spk |
| ■ EHWIC-4G-LTE-AT | MC7354 | 5.5.58.0 | MC7354_1102037_05.05.58.00_00_ATT_005.013_000.spk |
| ■ EHWIC-4G-LTE-CA | MC7354 | 5.5.58.0 | MC735X_9999999_9902574_05.05.58.00_00_GENNA_005.025_000.spk |
| ■ C819G-4G-NA-K9<br>■ C899G-LTE-NA-K9<br>■ NIM-4G-LTE-NA<br>■ IR829GW-LTE-NA-AK9<br>■ IR809G-LTE-NA-K9 | MC7354 | 5.5.58.0 | MC7354_1102037_05.05.58.00_00_ATT_005.013_000.spk,<br>MC735X_9999999_9902574_05.05.58.00_00_GENNA_005.025_000.spk |
| ■ C819GW-LTE-MNA-AK9<br>■ CGM-4G-LTE-MNA | MC7354 MNA | 5.5.58.x | MC7354MNA_1102407_05.05.58.01_00_VZW_005.006_000.spk,<br>MC735X_9999999_9902350_05.05.58.01_00_SPRINT_005.031_000.spk,<br>MC7354MNA_9999999_9902196_05.05.58.00_00_ATT_005.026_000.spk,<br>MC735X_9999999_9902574_05.05.58.00_00_GENNA_005.025_000.spk |

# Packages to be Upgraded on MC7304, MC7350 and MC7354 (non MNA) Modems Based on Carrier type

**Important Field Notice**

Please see the field advisory concerning the Mandatory firmware upgrade for all MC73xx Modems:

https://www.cisco.com/c/dam/en/us/td/docs/routers/access/interfaces/firmware/Customer_Advisory_GPS_Rollover_2019.pdf

To make sure that the modem's firmware and other settings are upgraded correctly, certain packages needs to be downloaded and upgraded on the modem. The upgrade steps for each package will be identical to the steps given in " Firmware Upgrade Procedure" section. Some modems and SKUs need only a single firmware upgrade and some require two, so it is important to identify the modem and SKU type and follow the corresponding sequence.

- All MC7304 modems in GA or AU SKU deployed on Telstra network should upgrade it to MC7304_1102029_05.05.58.00_00_TELSTRA_005.014_000.spk
- For all MC7304 modems in GA or GB SKU deployed on networks other than Telstra, first upgrade with the package MC7304_1102029_05.05.58.00_00_TELSTRA_005.014_000.spk. Once this is successful, the modem then needs to be upgraded with the package MC7304_9999999_9902674_05.05.58.00_00_GENEU-4G_005.026_000.spk

  Note: For MC7304 modems in the C819GW-LTE-GA-EK9, users should reload the router after upgrading with the first package before proceeding onto the second firmware upgrade.
- For all MC7350 modems in ST SKU deployed on Sprint network, first upgrade to MC7350_1102036_05.05.58.01_00_VZW_005.009_000.spk. Once this is successful, the modem then needs to be upgraded with the package MC735X_9999999_9902350_05.05.58.01_00_SPRINT_005.031_000.spk.
- All MC7350 modems in VZ SKU deployed on Verizon network should upgrade it to MC7350_1102036_05.05.58.01_00_VZW_005.009_000.spk.
- For all MC7354 NA or CA SKU deployed on Canadian service provider networks, first upgrade to MC7354_1102037_05.05.58.00_00_ATT_005.013_000.spk. Once this is successful, the modem then needs to be upgraded with the package MC735X_9999999_9902574_05.05.58.00_00_GENNA_005.025_000.spk
- All MC7354 NA or AT SKU deployed on AT&T network should upgrade it to MC7354_1102037_05.05.58.00_00_ATT_005.013_000.spk.

# Packages to be Upgraded on MC7354MNA Modems Based on Carrier Type

- All MC7354 MNA modems in C819GW-LTE-MNA-AK9 deployed on Verizon networks should upgrade it to MC7354MNA_1102407_05.05.58.01_00_VZW_005.006_000.spk.
- For all MC7354 MNA modems in C819GW-LTE-MNA-AK9 deployed on Sprint networks, first upgrade with the package MC7354MNA_1102407_05.05.58.01_00_VZW_005.006_000.spk. Once this is successful, reload the router and then upgrade the modem with the package MC735X_9999999_9902350_05.05.58.01_00_SPRINT_005.031_000.spk.
- For all MC7354 MNA modems in C819GW-LTE-MNA-AK9 deployed on ATT networks, first upgrade with the package MC7354MNA_1102407_05.05.58.01_00_VZW_005.006_000.spk. Once this is successful, reload the router and then upgrade the modem with the package MC7354MNA_9999999_9902196_05.05.58.00_00_ATT_005.026_000.spk.
- For all MC7354 MNA modems in C819GW-LTE-MNA-AK9 deployed on Canadian SP networks, first upgrade with the package MC7354MNA_1102407_05.05.58.01_00_VZW_005.006_000.spk. Once this is successful, reload the router and then upgrade the modem with the package MC735X_9999999_9902574_05.05.58.00_00_GENNA_005.025_000.spk.

# Firmware Upgrade Procedure

The procedure to upgrade your firmware is different starting with IOS release 15.6(2)T.

## Upgrading the Modem Firmware on MC73xx Modems in Cisco ISR and IR Routers IOS 15.6(2)T and above

Perform the following steps to upgrade the modem firmware on MC73XX modems in routers starting on IOS 15.6(2)T and above.

1. Go to the Cisco web page to download the latest certified firmware for your carrier by going to the following location: Products -> Cisco Interfaces and Modules -> LTE Wireless WAN Interfaces. Boot the router with the Cisco IOS version 15.6(2).T or later.

2. . Create a directory in flash to host the firmware, which will be downloaded in step 3.

```
Router# mkdir TELSTRA_MC7304_05.05.58.00
 Create directory filename [TELSTRA_MC7304_05.05.58.00]? <enter>
 Created dir flash:/TELSTRA_MC7304_05.05.58.00
```

3. Download the firmware to the directory in the router flash over Ethernet/cellular /WAN interface. This can be done by hosting the firmware on an FTP or TFTP server, and connecting to that server via any WAN interface on the router. Below is a example showing the modem firmware downloaded onto the router flash over the GigabitEthernet interface:

```
Router# copy tftp flash
Address or name of remote host []? 223.255.254.254
Source filename []? /tftpboot/user/ MC7304_1102029_9903299_05.05.58.00_00_TELSTRA_005.010_000.spk
Destination filename [MC7304_1102029_9903299_05.05.58.00_00_TELSTRA_005.010_000.spk]?<enter>
/TELSTRA_MC7304_05.05.58.00/ MC7304_1102029_9903299_05.05.58.00_00_TELSTRA_005.010_000.spk
Accessing tftp://223.255.254.254//tftpboot/user/
MC7304_1102029_9903299_05.05.58.00_00_TELSTRA_005.010_000.spk...
Loading /tftpboot/user/ MC7304_1102029_9903299_05.05.58.00_00_TELSTRA_005.010_000.spk from
223.255.254.254 (via GigabitEthernet8):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 34886755 bytes]
34886755 bytes copied in 132.368 secs (263559 bytes/sec)
```

4. Verify that the firmware is available on the newly created directory inside router flash by using the following command:

```
dir flash:TELSTRA_MC7304_05.05.58.00
Directory of usbflash0:/TELSTRA_MC7304_05.05.58.00/

-rw-    34841143  Mar 17 2016 09:58:34 -08:00
MC7304_1102029_9903299_05.05.58.00_00_TELSTRA_005.010_000.spk

255537152 bytes total (13074432 bytes free)
```

5. Always ensure that the firmware upgrade CLI is executed from flash, and not from the newly created directory. The later will lead to a firmware upgrade failure.

   Correct:

```
Router#pwd
flash0:/
```

   Incorrect:

```
Router#pwd
flash0:/TELSTRA_MC7304_05.05.58.00/
```

6. Initiate a modem firmware upgrade using the microcode reload command. Ex : *Router# microcode reload cellular 0 lte modem-provision flash:<directory>?*

```
Router# microcode reload cellular 0 0 modem-provision flash: TELSTRA_MC7304_05.05.58.00
Reload microcode? [confirm]
Log status of firmware download in router flash?[confirm]
Firmware download status will be logged in usbflash0:fwlogfile
Microcode Reload Process launched for hwic slot=0; hw type=0x721
Router#
*****************************************************
 The interface will be Shut Down for Firmware Upgrade
 This will terminate any active data connections.
*****************************************************
Sending cmd=ifconfig eth0 20.20.20.2 up to Linux
*****************************************************
 Modem will be upgraded!
 Upgrade process will take up to 15 minutes. During
 this time the modem will be unusable.
 Please do not remove power or reload the router during
 the upgrade process.
*****************************************************
*Mar 17 10:02:50.971 PST: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
*Mar 17 10:02:51.971 PST: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed
state to up
*Mar 17 10:02:52.959 PST: %LINK-5-CHANGED: Interface Cellular0/0/0, changed state to
administratively down
*Mar 17 10:02:52.959 PST: %LINK-5-CHANGED: Interface Cellular0/0/1, changed state to
administratively down
*Mar 17 10:02:52.959 PST: %LINK-5-CHANGED: Interface Cellular0/0/3, changed state to
administratively down
Sending F/W[MC7304_1102029_9903299_05.05.58.00_00_TELSTRA_005.010_000.spk] to the card [34841143
bytes]:
Firmware file: MC7304_1102029_9903299_05.05.58.00_00_TELSTRA_005.010_000.spk sent to the card

The current modem F/W App Version: SWI9X15C_05.05.58.00 r27038 carmd-fwbuild1 2015/03/04 21:30:23
The current modem F/W Boot Version: SWI9X15C_05.05.58.00 r27038 carmd-fwbuild1 2015/03/04 18:38:46
The current modem Carrier String: 1
The current modem Device ID: MC7304
The current modem Package Identifier: 1102029_9903299_MC7304_05.05.53.00_00_Cisco_005.009_000
The current modem SKU ID: 1102029
Firmware Upgrade is in Progress...
*Mar 17 10:03:33.683 PST: %CELLWAN-2-MODEM_DOWN: Modem in HWIC slot 0/0 is DOWN
*Mar 17 10:04:06.443 PST: %CELLWAN-2-MODEM_DOWN: Modem in HWIC slot 0/0 is DOWN
F/W Upgrade: Firmware Upgrade has Completed Successfully
*Mar 17 10:06:10.243 PST: %CELLWAN-2-MODEM_UP: Modem in HWIC slot 0/0 is now UP
*Mar 17 10:07:00.443 PST: %CELLWAN-2-MODEM_RADIO: Cellular0/0/0 Modem radio has been turned on
```

7. After the firmware upgrade is complete, reload the router. Some modem types require multiple firmware upgrades, please complete all the firmware upgrades before reloading the router.

## Upgrading the Modem Firmware on MC73xx Modems in Cisco ISRs and IR routers pre IOS 15.6(2)T

Perform the following steps to upgrade the modem firmware on MC73XX modems in routers except Cisco 819GW-LTE-xx-xK9 SKUs.

1. Go to the Cisco web page to download the latest certified firmware for your carrier by going to the following location: Products -> Cisco Interfaces and Modules -> LTE Wireless WAN Interfaces. Boot the router with the Cisco IOS version 15.5(1).T1 or later. This is the minimum IOS version needed for the 5.5.58.0 modem firmware.

2. Download the firmware to the router flash over Ethernet or cellular or any other WAN interface. This can be done by hosting the firmware on an FTP or TFTP server and reaching to that server via any WAN interface on the router. Below is a sample for the same where the modem firmware is downloaded onto the router flash over the GigabitEthernet interface:

```
Router #copy tftp flash
Address or name of remote host []? 223.255.254.254
Source filename []?
/tftpboot/keitdsou/Mizuno_firmwares/MC7350/MC7350_9999999_99ares/MC7350/MC735X_9999999_9902350_05.0
5.58.01_00_SPRINT_005.031_000.spk
Destination filename [MC735X_9999999_9902350_05.05.58.01_00_SPRINT_005.031_000.spk]?
Accessing
tftp://223.255.254.254//tftpboot/user/Mizuno_firmwares/MC7350/MC735X_9999999_9902350_05.05.58.01_00
_SPRINT_005.031_000.spk...
Loading
/tftpboot/user/Mizuno_firmwares/MC7350/MC735X_9999999_9902350_05.05.58.01_00_SPRINT_005.031_000.spk
from 223.255.254.254 (via GigabitEthernet8):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 34886755 bytes]
34886755 bytes copied in 132.368 secs (263559 bytes/sec)
```

3. Verify that the firmware is available on the router flash by using the **dir flash** command.

```
Router#dir flash: | inc MC7350
4  -rw-    34886755  Apr 24 2015 16:50:14 +00:00
MC735X_9999999_9902350_05.05.58.01_00_SPRINT_005.031_000.spk
```

4. Initiate a modem firmware upgrade using the **microcode reload** command.

```
Router#microcode reload cellular 0 0 modem-provision
flash:MC735X_9999999_9902350_05.05.58.01_00_SPRINT_005.031_000.spk
Reload microcode? [confirm]
Log status of firmware download in router flash?[confirm]
Firmware download status will be logged in flash:fwlogfile-1
Microcode Reload Process launched for Cellular 278201480; hw type = 0x6F3
Router#
The interface will be Shut Down for Firmware Upgrade
This will terminate any active data connections.
Modem radio has been turned off
Modem will be upgraded!
Upgrade process will take up to 15 minutes. During
this time the modem will be unusable.
Please do not remove poyour or reload the router during
the upgrade process.
Sending F/W[MC735X_9999999_9902350_05.05.58.01_00_SPRINT_005.031_000.spk] to the card [34886755
bytes]:
Firmware file: MC735X_9999999_9902350_05.05.58.01_00_SPRINT_005.031_000.spk sent to the card
The current modem F/W App Version: SWI9X15C_05.05.58.01 r27044 carmd-fwbuild1 2015/03/05 00:02:40
The current modem F/W Boot Version: SWI9X15C_05.05.58.01 r27044 carmd-fwbuild1 2015/03/05 00:02:40
The current modem Carrier String: 11
The current modem Device ID: MC7350
The current modem Package Identifier: 1102036_9903208_MC7350_05.05.53.01_00_Cisco_005.003_000
The current modem SKU ID: 1102036
Firmware Upgrade is in Progress...
*Apr 24 17:06:33.230: %CISCO800-2-MODEM_DOWN: Cellular0 modem is now DOWN.
F/W Upgrade: Firmware Upgrade has Completed Successfully
*Apr 24 17:07:12.262: %CISCO800-2-MODEM_UP: Cellular0 modem is now UP
Modem radio has been turned on
```

5. After the firmware upgrade is complete, reload the router. For some of the modems that require multiple firmware upgrades, please complete all the firmware upgrades before reloading the router.

# Upgrading the Modem Firmware Manually for MC7430 Modem

For MC74XX modems and the later versions, firmware will be provided as two separate files. The two files are firmware file with .cwe extension, and Cisco (OEM) PRI file with .nvu extension. The supported Cisco IOS software for this firmware upgrade procedure is 15.6(2)T1 and later versions.

Two types of firmware upgrades are possible depending on the requirements.

- Upgrading firmware file and carrier PRI file.
- Upgrading only the Cisco OEM PRI file which is used to upgrade from the old Cisco OEM PRI file to the new Cisco OEM PRI file.

You should download only the required files for each firmware upgrade procedure. As part of the firmware upgrade, you need to create a directory in the router flash. The directory should contain only the required files for the specific firmware upgrade procedure. For example, if you are upgrading only the oem provisioning file, the directory should only contain the oem provisioning file.

**Note:** You should always execute the firmware upgrade command from flash. If you execute the firmware upgrade command inside a directory or folder the firmware upgrade may fail.

**Note:** You should reload the router after the modem firmware upgrade.

**Note:** When you create a directory in the flash for firmware upgrade, you shouldn't create any subdirectories under the directory.

**Caution**: Do **NOT** create a folder named "firmware" for the flash directory. IOS already creates a folder with that name for other firmware updates, and the upgrade will fail.

## Upgrading Firmware File and Carrier PRI file

Perform the following steps to manually upgrade the firmware file and carrier PRI file for MC74XX modem.

1. Go to the following Cisco web page to download the latest certified firmware for your carrier which can be found under the path: **Products -> Cisco Interfaces and Modules -> LTE Wireless WAN Interfaces**

   http://software.cisco.com/download/navigator.html

2. Download the firmware files to the router flash over Ethernet or cellular or any other WAN interface. This can be done by hosting the firmware files on a FTP or TFTP server and reaching to that server via any WAN interface on the router.

3. Create a directory in the flash. Do **NOT** use the directory name "firmware", otherwise the update will fail.

```
Router# mkdir Package_02.14.03.00_Telstra_002.013_000
Create directory filename [Package_02.14.03.00_Telstra_002.013_000] Y?
Created dir flash:/Package_02.14.03.00_Telstra_002.013_000
```

4. Copy the firmware files to the created directory in the flash. Before you copy the firmware, make sure that the files are available in a TFTP server.

```
Router# copy tftp flash:/Package_02.14.03.00_Telstra_002.013_000
```

5. Ensure that the firmware file (CWE) and carrier PRI file (NVU) have the same version and both files are available under the same directory.

```
Router# dir flash:Package_02.14.03.00_Telstra_002.013_000
Directory of flash:/Package_02.14.03.00_Telstra_002.013_000/
25 -rw- 5942 Apr 22 2016 18:11:48 +00:00
7430_02.14.03.00_Telstra_002.013_000.nvu
26 -rw- 64316979 Apr 22 2016 18:15:52 +00:00 74XX_02.14.03.00.cwe
```

**Note:** For example, *74XX_02.14.03.00.cwe* and *7430_02.14.03 _TELSTRA_001.nvu* is a valid combination, but *74XX_02.14.03.00.cwe* and *7430_02.08.02.000_TELSTRA_001.nvu* is not a valid combination. Similarly, *74XX_02.14.03.00.cwe* and *7430_02.14.03 _GENERIC_001.nvu* is also a valid combination

6. Initiate the firmware upgrade process using the **microcode reload cellular** command. When you use this command, provide the directory name instead of firmware file name.

   For EHWIC-LTE-LA, EHWIC-LTE-JN, and EHWIC-LTE-CI

   ```
   Router# microcode reload cellular 0 slot_number modem-provision flash:/ directory
   ```

   For C898EAG-LTE-LA-K9, C897VAG-LTE-LA-K9, C899G-LTE-LA-K9, C819G-LTE-LA-K9

   ```
   Router# microcode reload cellular 0 0 modem-provision flash:/ directory
   ```

## Upgrading only the Cisco OEM PRI File

Perform the following steps to manually upgrade the Cisco OEM PRI file for MC74XX modem.

1. Perform the steps from 1 to 4 in " Upgrading Firmware File and Carrier PRI file" .

2. Check the versions of old OEM PRI and the new OEM PRI and ensure that the old PRI is available. Use the **show cell** *slot* **hardware** command to check the OEM PRI version.

   ```
   Router# dir flash:OEM_PRI_Cisco_000.007
   Directory of flash:/OEM_PRI_Cisco_000.007/
   33 -rw- 8852 Jun 23 2016 10:19:14 -07:00
   MC7430_1102644_9904934_02.14.03.00_00_Cisco_000.007_000.nvu
   1048281088 bytes total (554991616 bytes free)
   ```

3. Initiate the firmware upgrade process using the **microcode reload cellular** command. When you use this command, provide the directory name instead of firmware file name.

   For EHWIC-LTE-LA, EHWIC-LTE-JN, and EHWIC-LTE-CI

   ```
   Router# microcode reload cellular 0 slot_number modem-provision flash:/ directory
   ```

   For C898EAG-LTE-LA-K9, C897VAG-LTE-LA-K9, C899G-LTE-LA-K9, and C819G-LTE-LA-K9

   ```
   Router# microcode reload cellular 0 0 modem-provision flash:/ directory
   ```

   For C819GW-LTE-LA-CK9, C819GW-LTE-LA-QK9, C819GW-LTE-LA-NK9

   ```
   Router# microcode reload cellular 0 lte modem-provision flash:/ directory
   ```

4. Once the firmware upgrade begins, wait for a few minutes. The firmware upgrade may take upto 7 minutes. The following message will be displayed if the firmware upgrade is successful.

   For EHWIC-LTE-LA, EHWIC-LTE-JN, EHWIC-LTE-CI, C898EAG-LTE-LA-K9, C897VAG-LTE-LA-K9, C899G-LTE-LA-K9, and C819G-LTE-LA-K9

   ```
   F/W Upgrade: Firmware Upgrade has Completed Successfully
   ```

   For C819GW-LTE-LA-CK9, C819GW-LTE-LA-QK9, C819GW-LTE-LA-NK9

   ```
   Firmware download successful!
   Please wait for the modem to come up, this may take few minutes.
   ```

5. Once the message indicates a successful upgrade, wait for 2 minutes till the modem comes up.

6. After the firmware upgrade, reload the router and verify that you have the latest firmware.

```
Router# show cellular 0 hardware
Modem Firmware Version = SWI9X30C_02.14.03.00
Modem Firmware built = 2016/03/28 14:34:14
Hardware Version = 0.2
Device Model ID: MC7430
International Mobile Subscriber Identity (IMSI) = 123456700002704
International Mobile Equipment Identity (IMEI) = 359074060002542
Integrated Circuit Card ID (ICCID) = 8952530076180182704
Mobile Subscriber Integrated Services
Digital Network-Number (MSISDN) =
Modem Status = Modem Online
Current Modem Temperature = 55 deg C
PRI SKU ID = 1102644, PRI version = 002.012, Carrier = Generic
OEM PRI version = 000.007
```

**Note:** You should reload the router after the modem firmware upgrade, regardless of the upgrade is a success or failure.

7. After the firmware upgrade, as well as after the reload, the modem status should be online. Check whether the modem status is online.

```
Router# show cellular 0/0/0 radio
Radio power mode = online
LTE Rx Channel Number = 9410
LTE Tx Channel Number = 27410
LTE Band = 28
LTE Bandwidth = 20 MHz
Current RSSI = -61 dBm
Current RSRP = -95 dBm
Current RSRQ = -11 dB
Current SNR = 4.8 dB
Radio Access Technology(RAT) Preference = AUTO
Radio Access Technology(RAT) Selected = LTE
```

## Example: Upgrading MC7430 Modem Firmware File and Carrier PRI file

This example shows the firmware and carrier file upgrade of MC7430 modem the using the **microcode reload cellular** command. In this example, firmware files are downloaded to the Package_02.14.03.00_Telstra_002.013_000 directory.

```
Router_2951# microcode reload cellular 0 0 modem-provision flash:
Package_02.14.03.00_Telstra_002.013_000
Reload microcode? [confirm]
Log status of firmware download in router flash?[confirm]
Firmware download status will be logged in flash0:fwlogfile
Microcode Reload Process launched for hwic slot=0; hw type=0x721
Router_2951#
*****************************************************
 The interface will be Shut Down for Firmware Upgrade
 This will terminate any active data connections.
*****************************************************
Sending cmd=ifconfig eth0 20.20.20.2 up to Linux
*****************************************************
 Modem will be upgraded!
 Upgrade process will take up to 15 minutes. During
 this time the modem will be unusable.
 Please do not remove power or reload the router during
 the upgrade process.
*****************************************************
Router_2951#
*Jan 28 09:51:05.577 PST: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
UA_2951#
```

```
*Jan 28 09:51:06.577 PST: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to
up
*Jan 28 09:51:07.561 PST: %LINK-5-CHANGED: Interface Cellular0/0/0, changed state to administratively
down
*Jan 28 09:51:07.565 PST: %LINK-5-CHANGED: Interface Cellular0/0/1, changed state to administratively
down
*Jan 28 09:51:07.565 PST: %LINK-5-CHANGED: Interface Cellular0/0/3, changed state to administratively
down
Router_2951#
The current modem F/W App Version: SWI9X30C_02.05.07.00
The current modem F/W Boot Version: SWI9X30C_02.05.07.00
The current modem Carrier String: 1
The current modem Device ID: MC7430
The current modem Package Identifier:
The current modem SKU ID: 1102644
Router_2951#
Firmware Upgrade is in Progress...
Router_2951#
*Jan 28 09:51:27.105 PST: %CELLWAN-2-MODEM_DOWN: Modem in HWIC slot 0/0 is DOWN
Router_2951#
F/W Upgrade: Firmware Upgrade has Completed Successfully
```

## Firmware packages for MC74XX modems

The following tables shows the SKUs and applicable firmware information for each.

**Table 2 MC7430 Firmware**

| SKU ID | Modem Type | Firmware Version | Applicable firmware package |
|---|---|---|---|
| EHWIC-LTE-LA<br>EHWIC-LTE-JN<br>EHWIC-LTE-CI<br>C898EAG-LTE-LA-K9<br>C897VAG-LTE-LA-K9<br>C819GW-LTE-LA-CK9,<br>C819GW-LTE-LA-QK9<br>C819GW-LTE-LA-NK9,<br>C899G-LTE-LA-K9,<br>C819G-LTE-LA-K9<br>IR829GW-LTE-LA-QK9<br>IR829GW-LTE-LA-DK9<br>IR829GW-LTE-LA-ZK9<br>IR829GW-LTE-LA-FK9<br>IR829GW-LTE-LA-KK9<br>IR829GW-LTE-LA-CK9<br>IR829GW-LTE-LA-CK9<br>IR829GW-LTE-LA-NK9<br>IR829GW-LTE-LA-NK9 | MC7430 | 02.14.03.00<br>and<br>02.20.03.00 | **FW-7430-LTE-AU (Telstra)**<br>Firmware package: 74XX_02.14.03.00.cwe<br>Carrier PRI : 7430_02.14.03.00_Telstra_002.013_000.nvu<br>**FW-7430-LTE-JN (NTT Docomo)**<br>Firmware package: 74XX_02.20.03.00.cwe<br>Carrier PRI : 7430_02.20.03.00_DoCoMo_000.015_000.nvu<br>**FW-7430-LTE-GN (Generic)**<br>Firmware package: 74XX_02.14.03.00.cwe<br>Carrier PRI : 7430_02.14.03.00_Generic_002.012_000.nvu<br>**FW-7430-LTE-SB (Softbank)**<br>Firmware package: 74XX_02.20.03.00.cwe<br>Carrier PRI : 7430_02.20.03.00_Softbank_000.007_000.nvu<br>**FW-7430-LTE-KD (KDDI)**<br>Firmware package: 74XX_02.20.03.00.cwe<br>Carrier PRI : 7430_02.20.03.00_KDDI_000.008_000.nvu<br>**OEM-PRI-MC7430**<br>MC7430_1102644_9904934_02.14.03.00_00_Cisco_000.007_000.nvu |

**Table 3 MC7455 Mobile Firmware**

| SKU ID | Modem Type | Firmware Version | Applicable firmware package |
|---|---|---|---|
| IR829-2LTE-EA-BK9<br><br>IR829-2LTE-EA-EK9 | MC7455 Mobile | 02.20.03.00 | **R829-2LTE-EA-BK9 (Verizon)**<br><br>Firmware package: 74XX_02.20.03.00.cwe<br><br>Carrier PRI :<br><br>7455_02.20.03.00_Verizon_002.024_000.nvu<br><br>**IR829-2LTE-EA-BK9 (ATT)**<br><br>Firmware package: 74XX_02.20.03.00.cwe<br><br>Carrier PRI :<br><br>7455_02.20.03.00_ATT_002.019_000.nvu<br><br>**IR829-2LTE-EA-EK9 (Generic)**<br><br>Firmware package: 74XX_02.20.03.00.cwe<br><br>Carrier PRI :<br><br>7455_02.20.03.00_Generic_002.017_000.nvu<br><br>**OEM-PRI-MC7455**<br><br>MC7455MOBILE_1103084_9906233_02.14.03.00_00_Cisco_000.004_000.nvu |

## Upgrading the Modem Firmware on Cisco 819GW-LTE-xx-xK9 SKUs

Perform the following steps to upgrade the modem firmware on MC73XX modems in Cisco 819GW-LTE-xx-xK9 SKUs.

1. Go to the Cisco web page and download the latest certified firmware for your carrier which can be found under the path: Products -> Cisco Interfaces and Modules -> LTE Wireless WAN Interfaces.

2. Load the router with Cisco IOS version 15.5(2)T or later. After the router boot-up, use the following commands to disable SIM fail over.

```
Router# configure terminal?
Router(config)# controller cellular 0
Router(config-controller)# lte sim max-retry 0
Router(config-controller) end?
```

3. Create a directory in the flash.

```
Router# mkdir att_firmware?
Create directory filename [att_firmware] Y?
Created dir flash:/att_firmware?
```

4. Copy the firmware file to the created directory. Before you copy the firmware, make sure that the file is available in a TFTP server. Use the following command to copy the firmware file from a TFTP server to flash directory.

```
Router# copy tftp flash:/att_firmware?
After you copy the firmware, use the dir command to see the file information.
Router#dir flash:att_firmware ?
```

```
Directory of flash:/att_firmware/?
6 -rw- 34836997 Apr 22 2015 23:09:38 +00:00
MC7354_9999999_9902196_05.05.58.00_00_ATT_005.026_000.spk?983154688 bytes total (594329600 bytes
free)??
```

5. Initiate the firmware upgrade process using the **microcode reload cellular** command. When you use this command, do not include the firmware file name and instead only include the directory name.

```
Router# microcode reload cellular 0 lte modem-provision flash:<directory>?
```

6. After the firmware upgrade, reload the router to verify that you have the latest firmware.

   Note: You should reload the router after the modem firmware upgrade regardless of the upgrade is a success or failure.

7. After the router reload, if the firmware was updated successfully, configure the router to use the correct SIM slot using the following CLIs.

```
Router# configure terminal?
Router(config)# controller cellular 0
Router(config-controller)# lte sim primary slot <0-1>
```

## Upgrading the Modem Firmware for Global Customers Except C819GW-LTE-GA-EK9 SKUs

This section applies only to SKUs with MC7304 modems that are currently running 5.5.26.02 global firmware and already deployed in the field. There was an issue in the modem firmware when the profiles configured on the modem were not preserved after the modem firmware upgrade. As a result of this, the modem may not attach to the cellular LTE network or may not be able to establish a data bearer on other cellular networks after the modem firmware upgrade. This may results in the cellular interface not having an ip address.

This issue has now been fixed in the 5.5.58.0 modem firmware. However since the fix s provided in the 5.5.58.0 firmware, customers upgrading from firmware version 5.5.26.02 to 5.5.58.0 will still see this issue if the profiles were deleted after the firmware upgrade. As a result, the profiles need to be reconfigured back onto the modem using the **cellular** *slot_number* **lte profile create** *profile_number apn_name apn_authentication_type apn_type* command.

This example shows upgrading the firmware for global SKUs.

```
Router#cellular 0 lte profile create 1 test none ipv4
 Profile 5 will be created with the following values:
 PDP type = IPv4
 APN = test
 Authentication = NONE
 Are you sure? [confirm]
 Profile 5 written to modem
```

In case of customers who configure the cellular interface as a secondary WAN interface, or customers with out of band access to the routers from interfaces other than the cellular interface, they would have to log back into the router and re-configure the profile names using the CLI.

For customers with Cellular interface as their primary WAN and only access to the routers, there is a TCL script which will upgrade the routers and also re-write the profile names to the modem after the firmware upgrade has been completed. Please follow the steps in " Upgrading Global GA and GB SKUs Using TCL Script" to configure, install and run the script on the routers.

## Upgrading Global GA and GB SKUs Using TCL Script

The TCL is designed only for global SKUs, to upgrade the modem with the firmware packages listed in the section, " Upgrading the Modem Firmware for Global Customers Except C819GW-LTE-GA-EK9 SKUs" , reconfigure the profiles onto the modem, and then reload the router. Please delete the script from the running configuration after the router boots up. The scripts has some minimum requirements that need to be fulfilled before it begins the upgrade, like booting up

with the IOS version provided in step 1 and having the firmware files on the router flash (step 5). Users will also have to edit the script and add the profile information into the script as explained in step 3 depending on the number and type of profiles configured on the modem before firmware upgrade. If the script does not successfully upgrade the firmware or reconfigure the profile, please contact Cisco TAC team.

1. Download the 15.5(1)T1 IOS image from the Cisco web site and boot the router with this image.
2. Download the fw_upgrade.tcl script from Cisco Website at Products -> Cisco Interfaces and Modules -> LTE Wireless WAN Interfaces -> Cisco Wireless WAN MC73XX Interface for Global and Australia.
3. Open the script in vi editor or similar editor. Search for the section " # USER INPUT HERE #" in the script and edit the next few lines based on the instructions as follows:
   a. set cell_int *slot_number*. Replace *slot_number* with the 0 if the router that the upgrade is being done on is a Cisco 800 Series router like c819, c881, c887, c896, c897, c898 or c899. Replace with 0/0/0, 0/1/0, 0/2/0 or 0/3/0 for Cisco EHWICs based on the slot in which the EHWIC that needs to be upgraded, is inserted.
   b. set profile_str(1) cellular *slot_number* lte profile create *profile_number apn_name authentication_type username password apn_type* "

   Replace all the variables with the profile information. The script has provisions for configuring 3 profiles. You could add more lines or remove the extra profile configuration lines depending on the number of profiles that need to be configured. For example, if the user wants to have 3 profiles configured after the firmware upgrade, the script would contain the following lines:

```
set profile_str(1) "cellular 0/3/0 lte profile create 1 test_apn1 chap username1
 pass1 ipv4"
 set profile_str(2) "cellular 0/3/0 lte profile create 2 test_apn2 none ipv6"
 set profile_str(3) "cellular 0/3/0 lte profile create 3 test_apn3 pap_chap us
 er3 pass3 ipv4v6"
```

4. Save the script and copy the script to the router flash.
5. Copy the following 2 firmware files to the flash:

   MC7304_1102029_9903299_05.05.58.00_00_TELSTRA_005.010_000.spk

   MC7304_9999999_9902674_05.05.58.00_00_GENEU-4G_005.026_000.spk
6. Copy the following lines onto the running configuration.

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#event manager environment q "
Router(config)#event manager environment sysboot_time 180
Router(config)#event manager environment run 1
Router(config)#event manager directory user policy "flash:/"
Router(config)# event manager  scheduler script thread class N number 1
Router(config)# event manager policy fw_upgrade.tcl class N authorization bypass
Router(config)#end
```

7. Once the configuration is entered, the script will start in 180 seconds and start the modem firmware upgrade. It can take up to 20 minutes for the total upgrade to be completed followed by the reload. Please do not issue any commands related to the cellular interface during the upgrade.
8. Once the router boots up with the successfully upgraded firmware and the configured profiles, please delete the *fw_upgrade.tcl* script from the router flash. Also, please delete all the configurations performed in step6 and also the highlighted CLIs as follows:

```
Router# configure terminal
 Enter configuration commands, one per line.  End with CNTL/Z.
```

```
 Router(config)#no event manager environment q "
 Router(config)#no event manager environment sysboot_time 180
 Router(config)#no event manager environment run 1
 Router(config)#no event manager directory user policy "flash:/"
 Router(config)#no event manager  scheduler script thread class N number 1
 Router(config)#no event manager policy fw_upgrade.tcl class N authorization bypass
Router(config)#event manager scheduler suspend
Router(config)#end
Router#event manager scheduler suspend
```

## Sample Output of Script Execution:

This is a sample output of the TCL script.

```
Router#
000316: *Jul 31 06:08:58.532: %HA_EM-6-LOG: fw_validation.tcl: Inside procedure cmd: {show cellular
0/3/0 h | i Modem Firmware Version}
000317: *Jul 31 06:08:59.004: %HA_EM-6-LOG: fw_validation.tcl: FW Validation Pass: FW Version:
SWI9X15C_05.05.58.00 is Latest
000318: *Jul 31 06:08:59.364: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {show cellular 0/0/0
h | i Modem Firmware Version}
000319: *Jul 31 06:08:59.832: %HA_EM-6-LOG: fw_upgrade.tcl: Step 1: Check FW_Version is not Latest:
Pass
000320: *Jul 31 06:08:59.832: %HA_EM-6-LOG: fw_upgrade.tcl: Step 2: Check IOS Version is Latest
000321: *Jul 31 06:08:59.832: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {show version | i
Version}
000322: *Jul 31 06:09:00.592: %HA_EM-6-LOG: fw_upgrade.tcl: Command: {show version | i Version}: and
Output: {Cisco IOS Software, C2900 Software (C2900-UNIVERSALK9-M), Version 15.5(1)T1, RELEASE S
*****************************************************
 The interface will be Shut Down for Firmware Upgrade
 This will terminate any active data connections.
*****************************************************OFTWARE (fc2)
ROM: System Bootstrap, Version 15.0(1r)M1, RELEASE SOFTWARE (fc1)
Router#
000323: *Jul 31 06:09:00.592: %HA_EM-6-LOG: fw_upgrade.tcl: Step 2: Check IOS Version is Latest: Pass
000324: *Jul 31 06:09:00.592: %HA_EM-6-LOG: fw_upgrade.tcl: Step 3: Check Flash for FW Packages
000325: *Jul 31 06:09:00.592: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {show flash: | count
MC7304_1102029_9903299_05.05.58.00_00_TELSTRA_005.010_000.spk}
000326: *Jul 31 06:09:01.052: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {show flash: | count
MC7304_9999999_9902674_05.05.58.00_00_GENEU-4G_005.026_000.spk}
000327: *Jul 31 06:09:01.512: %HA_EM-6-LOG: fw_upgrade.tcl: Step 3: Check Flash for FW Packages: Pass
000328: *Jul 31 06:09:01.512: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {microcode reload
cellular 0 0 modem-provision flash:MC7304_1102029_9903299_05.05.58.00_00_TELSTRA_005.010_000.spk}
000329: *Jul 31 06:09:04.064: %LINK-5-CHANGED: Interface Cellular0/0/0, changed state to
administratively down
000330: *Jul 31 06:09:04.064: %LINK-5-CHANGED: Interface Cellular0/0/1, changed state to
administratively down
000331: *Jul 31 06:09:04.064: %LINK-5-CHANGED: Interface Cellular0/0/3, changed state to
administratively down
000332: *Jul 31 06:09:27.324: %CELLWAN-2-MODEM_DOWN: Modem in HWIC slot 0/0 is DOWN
000333: *Jul 31 06:09:52.432: %CELLWAN-2-MODEM_DOWN: Modem in HWIC slot 0/0 is DOWN
000334: *Jul 31 06:11:46.312: %CELLWAN-2-MODEM_UP: Modem in HWIC slot 0/0 is now UP
*****************************************************
 The interface will be Shut Down for Firmware Upgrade
 This will terminate any active data connections.
*****************************************************
000338: *Jul 31 06:17:22.168: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {show cellular 0/0/0
h | i Modem Firmware Version}
000339: *Jul 31 06:17:22.616: %HA_EM-6-LOG: fw_upgrade.tcl: Step 4: Upgrade FW Image and Verify:
MC7304_1102029_9903299_05.05.58.00_00_TELSTRA_005.010_000.spk: Pass
000340: *Jul 31 06:17:22.616: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {microcode reload
cellular 0 0 modem-provision flash:MC7304_9999999_9902674_05.05.58.00_00_GENEU-4G_005.026_000.spk
}
```

```
000342: *Jul 31 06:17:25.168: %LINK-5-CHANGED: Interface Cellular0/0/0, changed state to
administratively down
000343: *Jul 31 06:17:25.172: %LINK-5-CHANGED: Interface Cellular0/0/1, changed state to
administratively down
000344: *Jul 31 06:17:25.172: %LINK-5-CHANGED: Interface Cellular0/0/3, changed state to
administratively down
Router#
000345: *Jul 31 06:25:43.268: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {show cellular 0/0/0
h | i Modem Firmware Version}
000346: *Jul 31 06:25:43.716: %HA_EM-6-LOG: fw_upgrade.tcl: Step 4: Upgrade FW Image and Verify:
MC7304_9999999_9902674_05.05.58.00_00_GENEU-4G_005.026_000.spk: Pass
000347: *Jul 31 06:25:43.716: %HA_EM-6-LOG: fw_upgrade.tcl: Step 4: Upgrade FW Image and Verify: Pass
000348: *Jul 31 06:25:43.716: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {cellular 0/0/0 lte
profile create 1 mobility-de1 chap user1 pass1 ipv4
}
000349: *Jul 31 06:25:54.364: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {cellular 0/0/0 lte
profile create 2 mobility-de2 pap user11 pass11 ipv6
}
000350: *Jul 31 06:26:05.012: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {cellular 0/0/0 lte
profile create 3 mobility-de3 pap_chap user3 pass3 ipv4v6
}
000351: *Jul 31 06:26:15.660: %HA_EM-6-LOG: fw_upgrade.tcl: Configure Profiles on Router: Pass
000352: *Jul 31 06:26:15.660: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {no event manager
policy fw_upgrade.tcl class N authorization bypass} {event manager scheduler suspend}
000353: *Jul 31 06:26:26.220: %HA_EM-6-LOG: fw_upgrade.tcl: Suspend EEM Policy on Router: Pass
000354: *Jul 31 06:26:26.220: %HA_EM-6-LOG: fw_upgrade.tcl: Inside procedure cmd: {write memory}
000355: *Jul 31 06:26:29.476: %HA_EM-6-LOG: fw_upgrade.tcl: Command: {write memory}: and Output: {
Building configuration...

[OK]
Router#}
000356: *Jul 31 06:26:54.476: %HA_EM-6-FMS_RELOAD_SYSTEM: fh_io_ipc_msg: Policy has requested a system
reload; -Process= "EEM Server", ipl= 0, pid= 428
000357: *Jul 31 06:26:56.048: %SYS-5-RELOAD: Reload requested by EEM. Reload Reason: Embedded Event
Manager action.
System Bootstrap, Version 15.0(1r)M1, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2009 by cisco Systems, Inc.
```

## Firmware Upgrade on WP76xx Modems in Cisco ISRs Starting with release 16.8.1

Perform the following steps to upgrade the modem firmware on WP76xx modems in Cisco ISRs starting with 16.8.1.

**Note**: The procedure is slightly different for the IR807. See additional information later in this guide: " Firmware Upgrade on the IR807"

1. Go to the Cisco web page to download the latest certified firmware for your carrier by going to the following location: https://software.cisco.com/download/home/286288566
2. Boot the router with Cisco IOS version 16.8.1 or later.
3. Create a directory/folder in flash to host the firmware.
4. For WP76xx modems, there are 2 files, which are used in the firmware upgrade.
   - A firmware file, with a .spk extension
   - A Cisco (OEM) PRI file with a .NVU extension

**Note**: Make sure you follow these rules:

- Do not create subdirectories.
- Always execute the firmware upgrade CLI from flash. Never execute the CLI when inside a directory, otherwise the firmware upgrade will fail.
- Reload the router after any firmware upgrade procedure.

There are two types of upgrades using the .spk file and the .NVU file:

- " Example: Firmware upgrade of WP7603 modem with a .SPK file"
- " Example: Firmware upgrade of WP7601 modem with a .NVU file (OEM)"

## Firmware File upgrade

This is the default, and is the only way to upgrade to any new firmware, corresponding to the carrier.

**Step 1:**

Create a folder on the router flash and make sure the required Firmware File (.spk) **OR** the OEM PRI file (.NVU) are placed inside the directory folder.

**Caution**: Both files **CANNOT** be in the folder simultaneously.

```
Router# dir bootflash:fw_att/
Directory of bootflash:fw_att/
64770  -rw-         62507042  Mar 21 2018 09:35:48 -07:00  WP7603_02.10.01.00_00_ATT_002.015_000.spk
6650826752 bytes total (4756987904 bytes free)
```

**Step 2:**

Once **Step 1** is complete, start the firmware upgrade process using the directory as input. Check the current firmware version before you start upgrading:

```
Router# show cellular <slot number> hardware
```

Then, execute the upgrade:

```
Router# microcode reload cellular 0 <slot_number> modem-provision flash:/FW/
```

**Step 3:**

The firmware upgrade process should now begin. Once the firmware upgrade starts, wait until it is complete.

**Note**: The process should take NO MORE than 7 minutes.

If firmware upgrade is successful, you will see the following message on the console:

```
F/W Upgrade: Firmware Upgrade has Completed Successfully
```

**-Or**

```
FW_UPGRADE: Firmware upgrade success.....
```

After this message appears, wait 2 minutes until the MODEM_UP message is received as shown in this log example:

```
MODEM_UP: <> modem is now UP
```

**Step 4:**

The final verification step to confirm if the firmware upgrade has completed successfully, will vary depending upon the AUTOSIM feature being enabled or disabled.

AUTOSIM is a feature on ISR and IR platforms where the modem reads the SIM card and then identifies the carrier associated with the SIM card. Then it boots up the modem with the firmware and carrier PRI corresponding to the carrier associated with the SIM card that is active.

When AUTOSIM is disabled, the modem will boot with the firmware that it was last upgraded with.

### With AUTOSIM Enabled

When modem firmware is upgraded while AUTOSIM is turned ON, the following CLIs should be used to verify that the firmware upgrade was successful:

```
Router# show cellular <your interface> firmware
 Idx Carrier      FwVersion    PriVersion   Status
 1   ATT          02.14.04.00  002.023_000  Inactive
 2   GENERIC      02.14.04.00  002.025_000  Active

Firmware Activation mode  =  AUTO <-Indicates AUTOSIM is enabled
```

Verify that the Carrier name, Firmware Version, and Carrier Pri Version that was upgraded is displayed as one of the outputs of the **sh cellular *0/x/0* firmware command**.

### With AUTOSIM Disabled

When the modem firmware is upgraded while AUTOSIM is turned OFF, the following CLIs should be used to verify that the firmware upgrade was successful:

```
Router# show cellular <your device's controller> hardware
Modem Firmware Version = SWI9X07Y_02.14.04.00
Device Model ID =  WP7603
International Mobile Subscriber Identity (IMSI) = 310410819528412
International Mobile Equipment Identity (IMEI) = 359528080101717
Integrated Circuit Card ID (ICCID) = 89014103278195284123
Mobile Subscriber Integrated Services
Digital Network-Number (MSISDN) = 14085064526
Factory Serial Number (FSN) = U3746286050410
Modem Status = Modem Online
Current Modem Temperature = 28 deg C
PRI SKU ID = 1103507, PRI version = 002.023_000, Carrier = ATT
OEM PRI version = 002.001
```

Verify that the Carrier name, Firmware Version, and Carrier Pri Version that was upgraded is displayed as one of the outputs of the **show cellular *0/x/0* hardware command**.

```
Router# show cellular <your interface> firmware
 Idx Carrier      FwVersion    PriVersion   Status
 1   ATT          02.14.04.00  002.023_000  Inactive
 2   GENERIC      02.14.04.00  002.025_000  Active

Firmware Activation mode  =  MANUAL <-Indicates AUTOSIM is disabled
```

Verify that Carrier name, Firmware Version, and Carrier Pri Version that was upgraded is displayed as one of the outputs of the **show cellular *0/x/0* hardware command**.

After the firmware upgrade procedure, make sure to reload the router

After firmware upgrade, as well as after reload, 'Radio power mode' should be online as shown in the following output:

```
Router# show cellular 0 radio
 Radio power mode = online
 LTE Rx Channel Number =  9410
 LTE Tx Channel Number =  27410
 LTE Band =  28
 LTE Bandwidth = 20 MHz
```

```
 Current RSSI = -61 dBmß
 Current RSRP = -95 dBm
 Current RSRQ = -11 dB
 Current SNR = 4.8  dB
 Radio Access Technology(RAT) Preference = AUTO
 Radio Access Technology(RAT) Selected = LTE
```

### Final verification after successful OEM PRI upgrade:

To verify that the OEM PRI upgrade has gone through successfully, check the value of the OEM PRI using the **show cellular *0/x/0* hardware command,** and it should reflect the correct version it was upgraded to:

```
Router# show cellular <your interface> hardware
Modem Firmware Version = SWI9X07Y_02.14.04.00
Device Model ID =  WP7603
International Mobile Subscriber Identity (IMSI) = 310410819528412
International Mobile Equipment Identity (IMEI) = 359528080101717
Integrated Circuit Card ID (ICCID) = 89014103278195284123
Mobile Subscriber Integrated Services
Digital Network-Number (MSISDN) = 14085064526
Factory Serial Number (FSN) = U3746286050410
Modem Status = Modem Online
Current Modem Temperature = 28 deg C
PRI SKU ID = 1103507, PRI version = 002.023_000, Carrier = ATT
OEM PRI version = 002.001
```

## Example: Firmware upgrade of WP7603 modem with a .SPK file

```
Router# reload cellular 0 2 modem-provision flash:fw_att/
Reload microcode? [confirm]<enter>
Log status of firmware download in router flash?[confirm]<enter>
Firmware download status will be logged in bootflash:fwlogfile
Microcode Reload Process launched for cwan slot/bay =0/2; hw type=0x102download option = 0
Router#
Router#
**************************
 Modem will be upgraded!
 Upgrade process will take up to 15 minutes. During
 this time the modem will be unusable.
 Please do not remove power or reload the router during
 the upgrade process.
***************************
*Mar 21 09:37:49.626 PDT: %LINK-5-CHANGED: Interface Cellular0/2/0, changed state to administratively
down
*Mar 21 09:37:49.630 PDT: %LINK-5-CHANGED: Interface Cellular0/2/1, changed state to administratively
down
----------------------------
FIRMWARE INFO BEFORE UPGRADE:
Modem Device ID: WP7603  MODEM F/W Boot Version: SWI9X07Y_02.14.04.00
Modem F/W App Version: SWI9X07Y_02.14.04.00      Modem SKU ID: 1103507
Modem Package Identifier:
Modem PRI Ver: 002.001   Modem Carrier Name: ATT
Modem Carrier Revision: 002.023_000
----------------------------
*Mar 21 09:37:52.996 PDT: %IOSXE-3-PLATFORM: R0/0: ngiolite:   libSDP_BuildImagesPreferenceRequest
called for SPK file
*Mar 21 09:37:59.044 PDT: %IOSXE-2-PLATFORM: R0/0: kernel: Rx fixup: Unknown protocol: 0x0
*Mar 21 09:38:04.766 PDT: %CELLWAN-2-MODEM_DOWN: Modem in slot 0/2 is DOWN
*Mar 21 09:38:04.764 PDT: %IOSXE-3-PLATFORM: R0/0: ngiolite: SWI modem  Action:[remove] State[2]
*Mar 21 09:38:12.044 PDT: %IOSXE-4-PLATFORM: R0/0: kernel: usb_control_msg failed (-19)
*Mar 21 09:38:12.132 PDT: %IOSXE-3-PLATFORM: R0/0: ngiolite: SWI modem  Action:[add] State[0]
FW_UPGRADE: Upgrade begin at Wed Mar 21 09:38:15 2018
```

```
FW_UPGRADE: Upgrade end at Wed Mar 21 09:39:26 2018
FW_UPGRADE: Firmware upgrade success.....
FW_UPGRADE: Waiting for modem to become online
*Mar 21 09:39:26.835 PDT: %CELLWAN-2-MODEM_DOWN: Modem in slot 0/2 is DOWN
*Mar 21 09:39:26.829 PDT: %IOSXE-3-PLATFORM: R0/0: ngiolite: SWI modem  Action:[remove] State[2]
*Mar 21 09:39:37.384 PDT: %IOSXE-4-PLATFORM: R0/0: kernel: usb 3-1.1: config 1 has an invalid interface
number: 8 but max is 3
*Mar 21 09:39:37.385 PDT: %IOSXE-4-PLATFORM: R0/0: kernel: usb 3-1.1: config 1 has no interface number
1
*Mar 21 09:39:37.396 PDT: %IOSXE-2-PLATFORM: R0/0: kernel: cwan probe devpath usb-f2510000.usb3-1.1,
interface 8
*Mar 21 09:39:58.596 PDT: %IOSXE-4-PLATFORM: R0/0: kernel: QMIWDASetDataFormat 0
*Mar 21 09:39:58.596 PDT: %IOSXE-4-PLATFORM: R0/0: kernel: TE Enabled
*Mar 21 09:39:58.884 PDT: %IOSXE-3-PLATFORM: R0/0: ngiolite: SWI modem  Action:[add] State[1]
----------------------------
FIRMWARE INFO AFTER UPGRADE:
Modem Device ID: WP7603  MODEM F/W Boot Version: SWI9X07Y_02.10.01.00
Modem F/W App Version: SWI9X07Y_02.10.01.00      Modem SKU ID: 1103507
Modem Package Identifier:
Modem PRI Ver: 002.001   Modem Carrier Name: ATT
Modem Carrier Revision: 002.015_000
----------------------------
F/W Upgrade: Firmware Upgrade has Completed Successfully
*Mar 20 13:19:03.947 PDT: %CELLWAN-2-MODEM_RADIO: Cellular0/2/0 Modem radio has been turned on
*Mar 20 13:19:05.947 PDT: %LINK-3-UPDOWN: Interface Cellular0/2/0, changed state to down
*Mar 20 13:19:05.947 PDT: %LINK-3-UPDOWN: Interface Cellular0/2/1, changed state to down
*Mar 20 13:20:56.559 PDT: %CELLWAN-2-MODEM_UP: Modem in slot 0/2 is now UP
*Mar 20 13:20:56.761 PDT: %CELLWAN-2-MODEM_RADIO: Cellular0/2/0 Modem radio has been turned on
```

```
Router# show cellular 0/2/0 hardware
Modem Firmware Version = SWI9X07Y_02.14.04.00
Device Model ID =  WP7603
International Mobile Subscriber Identity (IMSI) = 310410819528412
International Mobile Equipment Identity (IMEI) = 359528080101717
Integrated Circuit Card ID (ICCID) = 89014103278195284123
Mobile Subscriber Integrated Services
Digital Network-Number (MSISDN) = 14085064526
Factory Serial Number (FSN) = U3746286050410
Modem Status = Modem Online
Current Modem Temperature = 28 deg C
PRI SKU ID = 1103507, PRI version = 002.023_000, Carrier = ATT
OEM PRI version = 002.001
```

## Example: Firmware upgrade of WP7601 modem with a .NVU file (OEM)

```
Router#microcode reload cellular 0 2 modem-provision flash:vz_oem/
Reload microcode? [confirm]<enter>
Log status of firmware download in router flash?[confirm]<enter>
Firmware download status will be logged in bootflash:fwlogfile
Microcode Reload Process launched for cwan slot/bay =0/2; hw type=0x102download option = 0

Router#
Router#
**************************
 Modem will be upgraded!
 Upgrade process will take up to 15 minutes. During
 this time the modem will be unusable.
 Please do not remove power or reload the router during
 the upgrade process.
```

```
****************************
----------------------------
FIRMWARE INFO BEFORE UPGRADE:
Modem Device ID: WP7601  MODEM F/W Boot Version: SWI9X07Y_02.10.00.00
Modem F/W App Version: SWI9X07Y_02.10.00.00      Modem SKU ID: 1103237
Modem Package Identifier:
Modem PRI Ver: 002.001   Modem Carrier Name: VERIZON
Modem Carrier Revision: 002.014_002
----------------------------
OEM PRI for SKU :1103237.
FW_UPGRADE: Upgrade begin at Wed Mar 21 09:58:06 2018
FW_UPGRADE: Upgrade end at Wed Mar 21 09:58:46 2018
FW_UPGRADE: Firmware upgrade success.....
FW_UPGRADE: Waiting for modem to become online
----------------------------
FIRMWARE INFO AFTER UPGRADE:
Modem Device ID: WP7601  MODEM F/W Boot Version: SWI9X07Y_02.10.00.00
Modem F/W App Version: SWI9X07Y_02.10.00.00      Modem SKU ID: 1103237
Modem Package Identifier:
Modem PRI Ver: 002.001   Modem Carrier Name: VERIZON
Modem Carrier Revision: 002.014_002
----------------------------
F/W Upgrade: Firmware Upgrade has Completed Successfully
Router#term mon
Router#
*Mar 21 10:01:25.357 PDT: %CELLWAN-2-MODEM_UP: Modem in slot 0/2 is now UP
*Mar 21 10:01:25.560 PDT: %CELLWAN-2-MODEM_RADIO: Cellular0/2/0 Modem radio has been turned on
```

# Firmware Upgrade on the IR807

This section provides information about upgrading Cisco cellular modem firmware on the IR807. To make sure that the modem's firmware and other settings are upgraded correctly, certain packages needs to be downloaded and upgraded on the modem. It is important to identify the modem and SKU type and follow the corresponding sequence.

Unlike other routers, there are three file types that will be upgraded on the WP75xx and WP76xx modems:

- Modem firmware with carrier PRI which is a .spk file
- Modem Legato and Yacto firmware file which is a .spk file
- Modem OEM PRI file which is a .nvu file

Refer to Table 4 for the SKU, Modem Type, and Firmware.

# Firmware Upgrade Procedure

**Note**: The following examples illustrates how to perform an upgrade. You will need to perform the same steps with each modem file (*.spk and *.nvu) to complete the firmware upgrade.

**Table 4 Modem Firmware associated with each SKU**

| SKU ID | Modem Type | Firmware |
|---|---|---|
| IR807G-LTE-VZ-K9 | WP7601 | WP7601_02.18.05.00_00_VERIZON_002.041_001_fw.spk<br><br>WP7601_02.18.05.00_Legato_Yocto_MCU.spk |
| IR807G-LTE-NA-K9 | WP7504 | WP7504_07.12.09.00_00_ATT_001.028_000.spk (For AT&T)<br><br>WP7504_07.12.09.00_00_SPRINT_001.020_000.spk (For Sprint)<br><br>WP75xx_07.12.09.00_00_GENERIC_001.033_000.spk (For other carriers)<br><br>WP7504_1103235_07.12.09.00_00_Cisco_001.001_000.nvu<br><br>WP75xx_07.12.09.00_Legato_Yocto_MCU.spk |
| IR807G-LTE-GA-K9 | WP7502 | WP7502_1103234_07.12.09.00_00_Cisco_001.001_000.nvu<br><br>WP75xx_07.12.09.00_00_GENERIC_001.033_000.spk<br><br>WP75xx_07.12.09.00_Legato_Yocto_MCU.spk |

The following rules apply when upgrading modems:

- Each of the files need to be upgraded separately. You cannot place them together in the same folder and perform a simultaneous upgrade.
- When switching from one carrier to another, only the Firmware file corresponding to the carrier needs to be upgraded. You do not need to re-upgrade with the OEM PRI and Legato-Yocto files. For example: If using an IR807G-LTE-NA-K9 with the ATT SIM in one slot and Sprint SIM in the other slot, simply upgrade with the firmware corresponding to the active SIM.

Perform the following steps to upgrade the modem firmware:

1. Go to the Cisco web page to download the latest certified firmware for your carrier by going to the following location: https://software.cisco.com/download/home/286288566
2. Create a directory in flash to host the firmware, which will be downloaded in step 3.

```
IR807# mkdir flash
Create directory filename [flash]? <enter>
Created dir flash:/flash
```

3. Download the firmware to the directory in the router flash. This can be done by hosting the firmware on an FTP or TFTP server, and connecting to that server via any WAN interface on the router. Below is a example showing the modem firmware downloaded onto the router flash over the FastEthernet interface:
**Note**: Output edited for brevity.

```
IR807# copy tftp flash
Address or name of remote host []? 192.168.1.1
Source filename []? /<directory>/WP75xx_07.12.09.00_Legato_Yacto_MCU.spk
Destination filename [WP75xx_07.12.09.00_Legato_Yacto_MCU.spk]?<enter>
/<directory>/ WP75xx_07.12.09.00_Legato_Yacto_MCU.spk
Accessing tftp://192.168.1.1//<directory>/WP75xx_07.12.09.00_Legato_Yacto_MCU.spk...
Loading /<directory>/WP75xx_07.12.09.00_Legato_Yacto_MCU.spk from 192.168.1.1 (via FastEthernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 24444106 bytes]
24444106 bytes copied in 132.368 secs
```

4. Verify that the firmware is available on the newly created directory inside router flash by using the following command:

```
IR807# dir flash:WP75xx_07.12.09.00_Legato_Yacto_MCU
Directory of flash:/WP75xx_07.12.09.00_Legato_Yacto_MCU/
-rw- 24444106 Sep 4 2017 09:58:34 -08:00 WP75xx_07.12.09.00_Legato_Yacto_MCU.spk
```

5. Initiate a modem firmware upgrade using the microcode reload command.

## Example: Firmware upgrade of WP7504 modem with a .spk file

```
IR807#microcode reload cellular 0 0 modem-provision
flash:WP7504_07.12.09.00_00_SPRINT_001.020_000.spk
IR807#Reload microcode? [confirm]<enter>
Log status of firmware download in router flash system?[confirm]<enter>
Firmware download status will be logged in flash:/fwlogfile
Could not create Log file.
flash: may not be installed or maybe full. Continue?[confirm]
Microcode Reload Process launched for Cellular 29246280; hw type = 0x6F3
Router#
*****************************************************
 The interface will be Shut Down for Firmware Upgrade
 This will terminate any active data connections.
*****************************************************
*****************************************************
 Modem will be upgraded!
 Upgrade process will take up to 15 minutes. During
 this time the modem will be unusable.
 Please do not remove power or reload the router during
 the upgrade process.
*****************************************************
*Aug 29 00:44:35.005: %LINK-5-CHANGED: Interface Cellular0, changed state to administratively down
*Aug 29 00:44:35.009: %LINK-5-CHANGED: Interface Cellular1, changed state to administratively down
 Sending F/W[WP75xx_07.12.09.00_00_SPRINT_001.020_000.spk] to the card [24590760 bytes]:
Firmware file: WP75xx_07.12.09.00_00_SPRINT_001.020_000.spk sent to the card

Modem Device ID: WP7504  MODEM F/W Boot Version: SWI9X15Y_07.12.09.00 r34123 CARMD-EV-FRMWR1
2017/04/26 23:34:19
Modem F/W App Version: SWI9X15Y_07.12.09.00 r34123 CARMD-EV-FRMWR1 2017/04/26 23:34:19   Modem SKU
ID: 1103235
Modem Package Identifier: 1103235_9906722_WP7504_07.12.09.00_00_Cisco_001.001_000        Modem
Carrier String: 4
Modem PRI Ver: 01.01     Modem Carrier Name: ATT
Modem Carrier Revision: 001.028_000


Firmware Upgrade is in Progress...
*Aug 29 00:45:19.305: %CISCO800-2-MODEM_DOWN: Cellular0 modem is now DOWN.
FIRMWARE INFO AFTER UPGRADE:
F/W Upgrade: Firmware Upgrade has Completed Successfully
*Aug 29 00:48:41.001: %CISCO800-2-MODEM_UP: Cellular0 modem is now UP
*Aug 29 00:49:41.205: %CELLWAN-2-MODEM_RADIO: Cellular0 Modem radio has been turned on
*Aug 2
```

## Example: Legato Firmware Upgrade of WP7504 with a .spk File

```
IR807#microcode reload cellular 0 0 modem-provision flash:Release-14-Yocto-Legato-MCU.spk
IR807#Reload microcode? [confirm]<enter>
Log status of firmware download in router flash system?[confirm]<enter>
Firmware download status will be logged in flash:/fwlogfile
Could not create Log file.
```

```
flash: may not be intalled or maybe full. Continue?[confirm]
Microcode Reload Process launched for Cellular 29246280; hw type = 0x6F3
Router#
****************************************
 The interface will be Shut Down for Firmware Upgrade
 This will terminate any active data connections.
*******************************************************
Router#
*******************************************************
 Modem will be upgraded!
 Upgrade process will take up to 15 minutes. During
 this time the modem will be unusable.
 Please do not remove power or reload the router during
 the upgrade process.
*******************************************************
*Aug 29 01:10:56.217: %LINK-5-CHANGED: Interface Cellular0, changed state to administratively down
*Aug 29 01:10:56.217: %LINK-5-CHANGED: Interface Cellular1, changed state to administratively down
 Sending F/W[Release-14-Yocto-Legato-MCU.spk] to the card [32221981 bytes]:
Firmware file: Release-14-Yocto-Legato-MCU.spk sent to the card

Modem Device ID: WP7504  MODEM F/W Boot Version: SWI9X15Y_07.12.09.00 r34123 CARMD-EV-FRMWR1 2017/04/26
23:34:19
Modem F/W App Version: SWI9X15Y_07.12.09.00 r34123 CARMD-EV-FRMWR1 2017/04/26 23:34:19   Modem SKU ID:
1103235
Modem Package Identifier: 1103235_9906722_WP7504_07.12.09.00_00_Cisco_001.001_000        Modem Carrier
String: 11
Modem PRI Ver: 01.01     Modem Carrier Name: SPRINT
Modem Carrier Revision: 001.020_000


Firmware Upgrade is in Progress...
*Aug 29 01:11:54.597: %CISCO800-2-MODEM_DOWN: Cellular0 modem is now DOWN.
FIRMWARE INFO AFTER UPGRADE:
F/W Upgrade: Firmware Upgrade has Completed Successfully
*Aug 29 01:13:47.584: %CISCO800-2-MODEM_UP: Cellular0 modem is now UP
```

## Example: Upgrade of (OEM) PRI (.NVU) file

```
Router# microcode reload cellular  0 0 modem-provision
flash:WP7504_1103235_07.12.09.00_00_Cisco_001.001_000.nvu
Reload microcode? [confirm]<enter>
Log status of firmware download in router flash system?[confirm]<enter>
Firmware download status will be logged in flash:/fwlogfile
Could not create Log file.
flash: may not be installed or maybe full. Continue?[confirm]
Microcode Reload Process launched for Cellular 29246280; hw type = 0x6F3
Router#
*******************************************************
 The interface will be Shut Down for Firmware Upgrade
 This will terminate any active data connections.
*******************************************************
*******************************************************
 Modem will be upgraded!
 Upgrade process will take up to 15 minutes. During
 this time the modem will be unusable.
 Please do not remove power or reload the router during
 the upgrade process.
*******************************************************
 Sending F/W[WP7504_1103235_07.12.09.00_00_Cisco_001.001_000.nvu] to the card [31081 bytes]:
Firmware file: WP7504_1103235_07.12.09.00_00_Cisco_001.001_000.nvu sent to the card
```

```
*Aug 29 01:22:32.544: %LINK-5-CHANGED: Interface Cellular0, changed state to administratively down
*Aug 29 01:22:32.544: %LINK-5-CHANGED: Interface Cellular1, changed state to administratively down
Modem Device ID: WP7504  MODEM F/W Boot Version: SWI9X15Y_07.12.09.00 r34123 CARMD-EV-FRMWR1 2017/04/26
23:34:19
Modem F/W App Version: SWI9X15Y_07.12.09.00 r34123 CARMD-EV-FRMWR1 2017/04/26 23:34:19   Modem SKU ID:
1103235
Modem Package Identifier: 1103235_9906722_WP7504_07.12.09.00_00_Cisco_001.001_000        Modem Carrier
String: 11
Modem PRI Ver: 01.01     Modem Carrier Name: SPRINT
Modem Carrier Revision: 001.020_000


Firmware Upgrade is in Progress...
*Aug 29 01:23:11.352: %CISCO800-2-MODEM_DOWN: Cellular0 modem is now DOWN.
FIRMWARE INFO AFTER UPGRADE:
F/W Upgrade: Firmware Upgrade has Completed Successfully
Router#
```

# Additional Resources

- " Technical Assistance"
- " Conventions"
- " Obtaining Documentation and Submitting a Service Request"

## Technical Assistance

The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.

http://www.cisco.com/cisco/web/support/index.html

## Conventions

This document uses the following conventions.

| Conventions | Indication |
|---|---|
| **bold** font | Commands and keywords and user-entered text appear in **bold** font. |
| *italic* font | Document titles, new or emphasized terms, and arguments for which you supply values are in *italic* font. |
| [ ] | Elements in square brackets are optional. |
| {x \| y \| z } | Required alternative keywords are grouped in braces and separated by vertical bars. |
| [ x \| y \| z ] | Optional alternative keywords are grouped in brackets and separated by vertical bars. |
| string | A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks. |
| courier font | Terminal sessions and information the system displays appear in courier font. |
| < > | Nonprinting characters such as passwords are in angle brackets. |
| [ ] | Default responses to system prompts are in square brackets. |
| !, # | An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line. |

**Note:** Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

**Caution: Means *reader be careful.* In this situation, you might perform an action that could result in equipment damage or loss of data.**

**Warning: IMPORTANT SAFETY INSTRUCTIONS**

**Means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.**

**SAVE THESE INSTRUCTIONS**

**Regulatory:** Provided for additional information and to comply with regulatory and customer requirements.

## Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see What's New in Cisco Product Documentation at: http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html.

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