CHAPTER 9

Managing Controller Software and Configurations

This chapter describes how to manage configurations and software versions on the controllers. It contains these sections:

Upgrading Controller Software

When you upgrade the controller's software, the software on the controller's associated access points is also automatically upgraded. When an access point is loading software, each of its LEDs blinks in succession. Up to 10 access points can be concurrently upgraded from the controller.

Note The 5500 series controllers can download the 6.0 software to 100 access points simultaneously.

Caution Do not power down the controller or any access point during this process; otherwise, you might corrupt the software image! Upgrading a controller with a large number of access points can take as long as 30 minutes, depending on the size of your network. However, with the increased number of concurrent access point upgrades supported in software release 4.0.206.0 and later, the upgrade time should be significantly reduced. The access points must remain powered, and the controller must not be reset during this time.

Note In controller software release 5.2 or later, the WLAN override feature has been removed from both the controller GUI and CLI. If your controller is configured for WLAN override and you upgrade to controller software release 5.2 or later, the controller deletes the WLAN configuration and broadcasts all WLANs. You can specify that only certain WLANs be transmitted by configuring access point groups. Each access point advertises only the enabled WLANs that belong to its access point group. Access point groups do not enable WLANs to be transmitted on per radio interface of AP.

Guidelines for Upgrading Controller Software

Follow these guidelines before upgrading your controller to software release 6.0:

- Make sure you have a TFTP or FTP server available for the software upgrade. Keep these guidelines in mind when setting up a TFTP or FTP server:
  - Controller software release 6.0 is greater than 32 MB; therefore, you must make sure that your TFTP server supports files that are larger than 32 MB. Some TFTP servers that support files of this size are tftpd32 and the TFTP server within WCS. If you attempt to download the 6.0 controller software and your TFTP server does not support files of this size, the following error message appears: "TFTP failure while storing in flash."
  - If you are upgrading through the service port, the TFTP or FTP server must be on the same subnet as the service port because the service port is not routable, or you must create static routes on the controller.
  - If you are upgrading through the distribution system network port, the TFTP or FTP server can be on the same or a different subnet because the distribution system port is routable.
  - A third-party TFTP or FTP server cannot run on the same computer as WCS because the WCS built-in TFTP or FTP server and the third-party TFTP or FTP server require the same communication port.
- You can upgrade or downgrade the controller software only between certain releases. In some instances, you must first install an intermediate release prior to upgrading to software release 6.0. Table 9-1 shows the upgrade path that you must follow prior to downloading software release 6.0.

Table 9-1 Upgrade Path to Controller Software Release 6.0

Current Software Release	Upgrade Path to 6.0 Software
3.2.78.0 or later 3.2 release	First upgrade to a 4.1 release and then upgrade to 4.2.176.0 before upgrading to 6.0.
4.0.155.5 or later 4.0 release	Upgrade to 4.2.176.0 before upgrading to 6.0.
4.1.171.0 or later 4.1 release	Upgrade to 4.2.176.0 before upgrading to 6.0.
4.1.191.xM	Upgrade to 4.1.192.35M before upgrading to 6.0.
4.1.192.xM	You can upgrade directly to 6.0.
4.2.130.0 or earlier 4.2 release	Upgrade to 4.2.176.0 before upgrading to 6.0.
4.2.173.0 or later 4.2 release	You can upgrade directly to 6.0.
5.0.148.0 or later 5.0 release	You can upgrade directly to 6.0.
5.1.151.0 or later 5.1 release	You can upgrade directly to 6.0.
5.2.157.0 or later 5.2 release	You can upgrade directly to 6.0.

Note The 5500 series controllers can run only controller software release 6.0 or later.

Note When you upgrade the controller to an intermediate software release, wait until all of the access points joined to the controller are upgraded to the intermediate release before you install the 6.0 software. In large networks, it may take some time to download the software on each access point.

- In software releases 6.0.186.0 and later, you can download the upgrade image to the controller, then download the image to the access points while the network is still up. New CLI and controller GUI functionality allow you to specify the boot image for both devices and to reset the access points when the controller resets. When both devices are up, the access points discover and rejoin the controller. See the "Predownloading an Image to an Access Point" section on page 9-11 for more information about predownloading images to access points.
- Cisco recommends that you install the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file on all controller platforms. This file resolves CSCsm03461 and is necessary to view the version information for ER.aes files in the output of the **show sysinfo** CLI command. If you do not install this ER.aes file, your controller does not obtain the fix for this defect, and "N/A" appears in the Field Recovery Image Version or Emergency Image Version field in the output of this command.

Note The ER .aes files are independent from the controller software files. You can run any controller software file with any ER.aes file. However, installing the latest boot software file (5.2.157.0 ER.aes) ensures that the boot software modifications in all of the previous and current boot software ER.aes files are installed.

Caution If you require a downgrade from one release to another, you may lose the configuration from your current release. The workaround is to reload the previous controller configuration files saved on the backup server or to reconfigure the controller.

Guidelines for Upgrading to Controller Software 6.0 in Mesh Networks

Caution Before upgrading your controller to software release 6.0 in a mesh network, you must comply with the following rules.

Upgrade Compatibility Matrix

Table 2 outlines the upgrade compatibility of controller mesh and non-mesh releases and indicates the intermediate software releases required as part of the upgrade path.

Software Upgrade Notes

- You can upgrade from all mesh releases to controller software release 6.0 without any configuration file loss. See Table 2 for the available upgrade paths.

  Note If you downgrade to a mesh release, you must then reconfigure the controller. Cisco recommends that you save the configuration from the mesh release before upgrading to release 6.0 for the first time. Then you can reapply the configuration if you need to downgrade.

- You cannot downgrade from controller software release 6.0 to a mesh release (4.1.190.5, 4.1.191.22M, or 4.1.192.xxM) without experiencing a configuration loss.
- Configuration files are in the binary state immediately after upgrade from a mesh release to controller software release 6.0. After reset, the XML configuration file is selected.
- Do not edit XML files.
- Any field with an invalid value is filtered out and set to default by the XML validation engine. Validation occurs during bootup.

Table 2 Upgrade Compatibility Matrix for Controller Mesh and Non-Mesh Releases

Upgrade to	6.0	5.2	4.1.192.35M	4.1.191.24M	4.1.190.5	4.1.185.0	4.1.171.0	4.0.219.0	4.0.217.204	4.0.217.0	4.0.216.0	4.0.206.0	4.0.179.11	4.0.179.8	4.0.155.5	4.0.155.0	3.2.195.10	3.2.193.5	3.2.171.6	3.2.171.5	3.2.150.10	3.2.150.6	3.2.116.21	3.2.78.0	3.1.111.0	3.1.105.0
Upgrade from																										
4.1.192.35M	Y	Y																								
4.1.192.22M	Y	Y	Y																							
4.1.191.24M			Y	–																						
4.1.190.5			Y[1]	Y	–																					
4.1.185.0				Y	Y[2]	–																				
4.1.181.0					Y[2]	Y[2]																				
4.1.171.0					Y[2]	Y[2]	–																			
4.0.219.0						Y[2]	Y[2]	–																		
4.0.217.204				Y[2]		Y[2]	Y[2]	Y[2]	–																	
4.0.217.0						Y[2]	Y[2]	Y[2]	Y[3]	–																
4.0.216.0						Y[2]	Y[2]	Y[2]	Y[3]	Y	–															
4.0.206.0						Y[2]	Y[2]	Y[2]	Y[3]	Y		–														
4.0.179.11										Y		Y[4]	–													
4.0.179.8										Y		Y[4]	Y	–												
4.0.155.5										Y		Y[4]	Y	Y	–											
4.0.155.0										Y		Y[4]	Y	Y	Y	–										
3.2.195.10										Y		Y[4]	Y	Y	Y		–									
3.2.193.5										Y		Y[4]	Y	Y	Y		Y	–								
3.2.171.6										Y		Y[4]	Y	Y	Y		Y		–							
3.2.171.5										Y		Y[4]	Y	Y	Y		Y		Y	–						

Table 2 Upgrade Compatibility Matrix for Controller Mesh and Non-Mesh Releases (continued)

Upgrade to	6.0	5.2	4.1.192.35M	4.1.191.24M	4.1.190.5	4.1.185.0	4.1.171.0	4.0.219.0	4.0.217.204	4.0.217.0	4.0.216.0	4.0.206.0	4.0.179.11	4.0.179.8	4.0.155.5	4.0.155.0	3.2.195.10	3.2.193.5	3.2.171.6	3.2.171.5	3.2.150.10	3.2.150.6	3.2.116.21	3.2.78.0	3.1.111.0	3.1.105.0
3.2.150.10										Y		Y[4]	Y	Y	Y		Y		Y		–					
3.2.150.6										Y		Y[4]	Y	Y	Y		Y		Y		Y	–				
3.2.116.21										Y		Y[4]	Y	Y	Y		Y		Y		Y		–			
3.2.78.0										Y		Y[4]	Y	Y	Y		Y		Y		Y		Y	–		
3.1.111.0																	Y		Y		Y		Y	Y	–	
3.1.105.0																	Y		Y		Y		Y	Y	Y	–
3.1.59.24																	Y		Y		Y		Y	Y	Y	Y

[1] You can upgrade directly from software release 4.1.190.5 to 4.1.192.35M; however, upgrading to 4.1.191.24M before upgrading to 4.1.192.35M is highly recommended.

[2] CUSTOMERS WHO REQUIRE DYNAMIC FREQUENCY SELECTION (DFS) FUNCTIONALITY SHOULD NOT USE THIS RELEASE. This release does not provide DFS functionality fixes found in release 4.0.217.204. Additionally, this release is not supported in ETSI-compliant countries or Singapore.

[3] Release 4.0.217.204 provides fixes for DFS on 1510 series access points. This functionality is needed only in countries where DFS rules apply.

[4] An upgrade to 4.0.206.0 is not allowed in the following country codes when operating with the following access points: Australia (1505 and 1510), Brazil (1505 and 1510), Hong Kong (1505 and 1510), India (1505 and 1510), Japan (1510), Korea (1505 and 1510), Mexico (1505 and 1510), New Zealand (1505 and 1510), and Russia (1505 and 1510). Note: The 1505 mesh access point is not supported in release 5.0 and later. The 1510 mesh access point is supported only in mesh releases 4.1.190.5, 4.1.191.22M, and 4.1.192.xxM.

Using the GUI to Upgrade Controller Software

Using the controller GUI, follow these steps to upgrade the controller software.

Note Do not install the 6.0 controller software file and the 5.2.157.0 ER.aes boot software file at the same time. Install one file and reboot the controller; then install the other file and reboot the controller.

Step 1 Upload your controller configuration files to a server to back them up.

Note Cisco highly recommends that you back up your controller's configuration files prior to upgrading the controller software. See the "Uploading and Downloading Configuration Files" section on page 9-26 for instructions.

Step 2 Follow these steps to obtain the 6.0 controller software and the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file from the Software Center on Cisco.com:

a. Go to the Cisco Product Support & Downloads page:

http://www.cisco.com/c/en/us/support/index.html

b. Navigate to the controller model page.

c. Choose a controller software release. The software releases are labeled as follows to help you determine which release to download:
   - **Early Deployment (ED)**—These software releases provide new features and new hardware platform support as well as bug fixes.
   - **Maintenance Deployment (MD)**—These software releases provide bug fixes and ongoing software maintenance.
   - **Deferred (DF)**—These software releases have been deferred. Cisco recommends that you migrate to an upgraded release.

d. Choose a software release number.

e. Click the filename (*filename*.aes).

f. Click **Download**.

g. Read Cisco's End User Software License Agreement and then click **Agree**.

h. Save the file to your hard drive.

i. Repeat steps *a* through *h* to download the remaining file (either the 6.0 controller software or the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file).

Step 3 Copy the controller software file (*filename*.aes) and the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file to the default directory on your TFTP or FTP server.

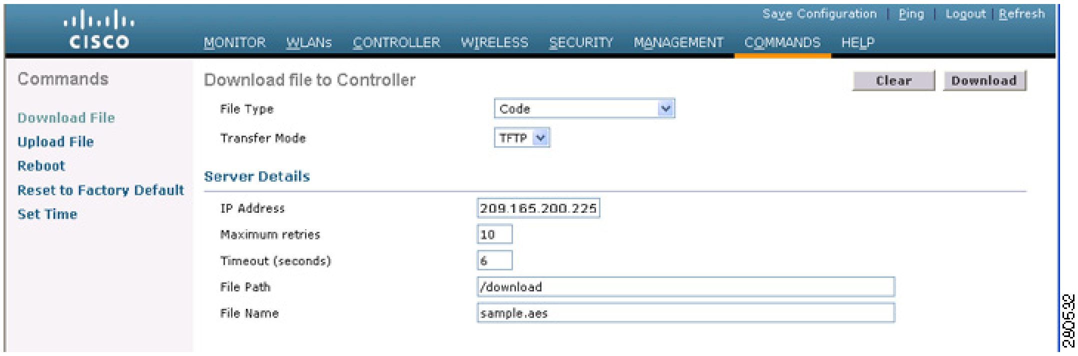
Step 4 Disable the controller 802.11a and 802.11b/g networks.

Step 5 For Cisco WiSMs, shut down the controller port channel on the Catalyst switch to allow the controller to reboot before the access points start downloading the software.

Step 6 Disable any WLANs on the controller.

Step 7 Choose **Commands** > **Download File** to open the Download File to Controller page (see Figure 9-1).

Figure 9-1 Download File to Controller Page



Download file to Controller

File Type: Code

Transfer Mode: TFTP

Server Details

IP Address: 209.165.200.225

Maximum retries: 10

Timeout (seconds): 6

File Path: /download

File Name: sample.aes

Step 8 From the File Type drop-down box, choose **Code**.

Step 9 From the Transfer Mode drop-down box, choose **TFTP** or **FTP**.

Step 10 In the IP Address field, enter the IP address of the TFTP or FTP server.

Step 11 If you are using a TFTP server, the default values of 10 retries and 6 seconds for the Maximum Retries and Timeout fields should work correctly without any adjustment. However, you can change these values. To do so, enter the maximum number of times that the TFTP server attempts to download the software in the Maximum Retries field and the amount of time (in seconds) that the TFTP server attempts to download the software in the Timeout field.

Step 12 In the File Path field, enter the directory path of the software.

Step 13 In the File Name field, enter the name of the controller software file (*filename*.aes).

Step 14 If you are using an FTP server, follow these steps:

a. In the Server Login Username field, enter the username to log into the FTP server.

b. In the Server Login Password field, enter the password to log into the FTP server.

c. In the Server Port Number field, enter the port number on the FTP server through which the download occurs. The default value is 21.

Step 15 Click **Download** to download the software to the controller. A message appears indicating the status of the download.

Step 16 After the download is complete, click **Reboot**.

Step 17 If prompted to save your changes, click **Save and Reboot**.

Step 18 Click **OK** to confirm your decision to reboot the controller.

Note Do not wait to reboot the controller. Reboot it immediately after downloading the software. Otherwise, the access points might start downloading the software before the controller is running it.

Step 19 After the controller reboots, repeat Step 7 to Step 18 to install the remaining file (either the 6.0 controller software or the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file).

Step 20 Re-enable the WLANs.

Step 21 For Cisco WiSMs, re-enable the controller port channel on the Catalyst switch.

Step 22 Re-enable your 802.11a and 802.11b/g networks.

Step 23 If desired, reload your latest configuration file to the controller.

Step 24 To verify that the 6.0 controller software is installed on your controller, choose **Monitor** on the controller GUI and look at the Software Version field under Controller Summary.

Step 25 To verify that the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file is installed on your controller, choose **Monitor** to open the Summary page and look at the Field Recovery Image Version or Emergency Image Version field.

Note If a Cisco Unified Wireless Network Controller Boot Software ER.aes file is not installed, the Field Recovery Image Version or Emergency Image Version field shows "N/A."

Using the CLI to Upgrade Controller Software

Using the controller CLI, follow these steps to upgrade the controller software.

Note Do not install the 6.0 controller software file and the 5.2.157.0 ER.aes boot software file at the same time. Install one file and reboot the controller; then install the other file and reboot the controller.

Step 1 Upload your controller configuration files to a server to back them up.

> **Note** Cisco highly recommends that you back up your controller's configuration files prior to upgrading the controller software. See the "Uploading and Downloading Configuration Files" section on page 9-26 for instructions.

Step 2 Follow these steps to obtain the 6.0 controller software and the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file from the Software Center on Cisco.com:

- **a.** Go to http://www.cisco.com/c/en/us/support/index.html.
- **b.** Navigate to the Cisco WLC model of your choice.
- **c.** Choose a controller software release.
- **d.** Click the filename (*filename*.aes).
- **e.** Click **Download**.
- **f.** Read Cisco's End User Software License Agreement and then click **Agree**.
- **g.** Save the file to your hard drive.
- **h.** Repeat steps a. to g. to download the remaining file (either the 6.0 controller software or the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file).

Step 3 Copy the controller software file (*filename*.aes) and the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file to the default directory on your TFTP or FTP server.

Step 4 Disable the controller 802.11a and 802.11b/g networks.

Step 5 For Cisco WiSMs, shut down the controller port channel on the Catalyst switch to allow the controller to reboot before the access points start downloading the software.

Step 6 Disable any WLANs on the controller (using the **config wlan disable** *wlan_id* command).

Step 7 Log into the controller CLI.

Step 8 Enter **ping** *server-ip-address* to verify that the controller can contact the TFTP or FTP server.

Step 9 Enter **transfer download start** and answer **n** to the prompt to view the current download settings. Information similar to the following appears:

```
Mode......................................... TFTP
Data Type.................................... Code
TFTP Server IP............................... xxx.xxx.xxx.xxx
TFTP Packet Timeout............................. 6
TFTP Max Retries................................ 10
TFTP Path.................................... <directory path>
TFTP Filename................................ xxx.aes

This may take some time.
Are you sure you want to start? (y/N) n
Transfer Canceled
```

Step 10 Enter these commands to change the download settings, if necessary:

- **transfer download mode** {**tftp** | **ftp**}
- **transfer download datatype code**
- **transfer download serverip** *server-ip-address*
- **transfer download filename** *filename*
- **transfer download path** *server-path-to-file*

Note Pathnames on a TFTP or FTP server are relative to the server's default or root directory. For example, in the case of the Solarwinds TFTP server, the path is "/".

If you are using a TFTP server, also enter these commands:

- **transfer download tftpMaxRetries** *retries*
- **transfer download tftpPktTimeout** *timeout*

Note The default values of 10 retries and a 6-second timeout should work correctly without any adjustment. However, you can change these values. To do so, enter the maximum number of times that the TFTP server attempts to download the software for the *retries* parameter and the amount of time (in seconds) that the TFTP server attempts to download the software for the *timeout* parameter.

If you are using an FTP server, also enter these commands:

- **transfer download username** *username*
- **transfer download password** *password*
- **transfer download port** *port*

Note The default value for the *port* parameter is 21.

Step 11 Enter **transfer download start** to view the updated settings and answer **y** to the prompt to confirm the current download settings and start the software download. Information similar to the following appears:

```
Mode........................................... TFTP
Data Type...................................... Code
TFTP Server IP.................................... xxx.xxx.xxx.xxx
TFTP Packet Timeout............................... 6
TFTP Max Retries............................... 10
TFTP Path...................................... <directory path>
TFTP Filename.................................. xxx.aes

Are you sure you want to start? (y/n) y
TFTP Code transfer starting.
TFTP receive complete... extracting components.
Writing new bootloader to flash.
Making backup copy of RTOS.
Writing new RTOS to flash.
Making backup copy of Code.
Writing new Code to flash.
TFTP File transfer operation completed successfully.
  Please restart the switch (reset system) for update to complete.
```

Step 12 Enter **reset system** to save the code update to non-volatile NVRAM and reboot the controller. The controller completes the bootup process.

Note Do not wait to reboot the controller. Reboot it immediately after downloading the software. Otherwise, the access points might start downloading the software before the controller is running it.

Step 13 After the controller reboots, repeat Step 9 to Step 12 to install the remaining file (either the 6.0 controller software or the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file).

Step 14 Enter **config wlan enable** *wlan_id* to re-enable the WLANs.

Step 15 For Cisco WiSMs, re-enable the controller port channel on the Catalyst switch.

Step 16 Re-enable your 802.11a and 802.11b/g networks.

Step 17 If desired, reload your latest configuration file to the controller.

Step 18 To verify that the 6.0 controller software is installed on your controller, enter **show sysinfo** and look at the Product Version field.

Step 19 To verify that the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file is installed on your controller, enter the **show sysinfo** command on the controller CLI and look at the Field Recovery Image Version or Emergency Image Version field.

Note If a Cisco Unified Wireless Network Controller Boot Software ER.aes file is not installed, the Field Recovery Image Version or Emergency Image Version field shows "N/A."

Predownloading an Image to an Access Point

To minimize a network outages, you can now download an upgrade image to the access point from the controller without resetting the access point or losing network connectivity. Previously, you would download an upgrade image to the controller and reset it, which causes the access point to go into discovery mode. After the access point discovers the controller with the new image, the access point downloads the new image, resets, goes into discovery mode, and rejoins the controller.

You can now download the upgrade image to the controller then download the image to the access point while the network is still up. You can also schedule a reboot of the controller and access points, either after a specified amount of time or at a specific date and time. When both devices are up, the access point will discover and rejoin the controller.

Note These access point models do not support predownloading of images: 1120, 1230, and 1310.

Guidelines and Limitations for Predownloading Images

Keep these guidelines in mind when you use image predownloading:

- Maximum predownload limit: The maximum number of concurrent predownloads is limited to half the number of concurrent normal image downloads on 4400 series controllers; it is limited to 25 concurrent downloads on 5500 series controllers. This limitation allows new access points to join the controller during image downloading.

If you reach the predownload limit, access points that cannot get an image back off and wait for a time between 180 to 600 seconds and then re-attempt the predownload.

- For predownloading to be effective, all controllers (primary, secondary, and tertiary) that your access points can join should use the same images for primary and backup images. For example, if you have three controllers, all three should use software release x as the primary image and release y as the backup image. This concistency is important because some controllers reboot more slowly than others, and access points rejoin a controller as soon as they reboot. If a 4400 controller reboots before a 5500 controller, it is important that both controllers are running the same images in case an access point joins one rather than the other.
- Before you enter the predownload command, Cisco recommends that you change the active controller boot image to the backup image. This step ensures that if the controller reboots for some reason, it comes back up with the earlier running image, not the partially downloaded upgrade image.
- Access points with 16MB total available memory (1130 and 1240 access points) sometimes do not have enough free memory to download an upgrade image, and they automatically delete crash info files, radio files, and any backup images to free up space. However, this limitation does not affect the predownload process because the predownload image replaces any backup image on the access point.

Using the CLI to Predownload an Image to Access Points

Using the CLI, you can predownload an image to a specific access point or to all access points. The process includes these steps:

- Predownload the upgrade image to the controller.
- Predownload the upgrade image to the access points.
- Upgrade images on the controller and access points.
- Set a reboot time for the controller and the access points.

Predownload the Upgrade Image to the Controller

To obtain an upgrade image, follow Step 1 through Step 10 in the "Using the CLI to Upgrade Controller Software" section on page 9-9.

On the controller CLI, enter **transfer download start** to view the updated settings and answer **y** to the prompt to confirm the current download settings and start the software download. Information similar to the following appears:

```
Mode........................................... TFTP
Data Type...................................... Code
TFTP Server IP.................................... xxx.xxx.xxx.xxx
TFTP Packet Timeout............................... 6
TFTP Max Retries............................... 10
TFTP Path...................................... <directory path>
TFTP Filename.................................. xxx.aes

Are you sure you want to start? (y/n) y
TFTP Code transfer starting.
TFTP receive complete... extracting components.
Writing new bootloader to flash.
Making backup copy of RTOS.
Writing new RTOS to flash.
Making backup copy of Code.
Writing new Code to flash.
```

```
TFTP File transfer operation completed successfully.
  Please restart the switch (reset system) for update to complete.
```

Enter **show boot** on the controller. The new image is listed as the primary image and the old image is listed as the backup. However, you should switch the primary and backup images to ensure that if the controller resets before or during the upgrade the network still comes up with the existing image.

Enter **config boot backup** to change the controller active boot image to the existing image (which is now the backup).

Enter **show boot** again to make sure the images are set up correctly.

Predownload the Image to the Access Points

To predownload the image to the access point Flash memory, enter this command on the controller CLI:

config ap image predownload {**primary** | **backup**} {*ap_name* | **all**}

The primary image is the new image; the backup image is the existing image. Access points always boot with the primary image.

To swap an access point's primary and backup images, enter this command:

config ap image swap {*ap_name* | **all**}

Upgrade Images on the Controller and Access Points

To display detailed information on access points specified for predownload, enter this command:

show ap image {**all** | *ap-name*}

Output for the command:

```
Total number of APs............................. 7
Number of APs
        Initiated..................................... 4
        Predownloading................................ 0
        Completed predownloading...................... 3
        Not Supported................................. 0
        Failed to Predownload......................... 0

                                                 Predownload     Predownload
AP Name            Primary Image  Backup Image   Status          Version        Next Retry Time  Retry Count
------------------ -------------- -------------- --------------- -------------- ---------------- ------------
AP1140-1           7.0.56.0       6.0.183.38     Complete        6.0.183.38     NA               NA
AP1140-2           7.0.56.0       6.0.183.58     Initiated       6.0.183.38     23:46:43         1
AP1130-2           7.0.56.0       6.0.183.38     Complete        6.0.183.38     NA               NA
AP1130-3           7.0.56.0       6.0.183.58     Initiated       6.0.183.38     23:43:25         1
AP1130-4           7.0.56.0       6.0.183.38     Complete        6.0.183.38     NA               NA
AP1130-5           7.0.56.0       6.0.183.58     Initiated       6.0.183.38     23:43:00         1
AP1130-6           7.0.56.0       6.0.183.58     Initiated       6.0.183.38     23:41:33         1
```

The output lists access points specified for predownloading and provides, for each access point, primary and secondary image versions, the version of the predownload image, the predownload retry time (if necessary), and the number of predownload attempts. The output also includes the predownload status for each device. Statuses include:

- None—the access point is not scheduled for predownload.
- Predownloading—the access point is predownloading the image.
- Not supported—the access point (1120, 1230, and 1310) does not support predownloading.

- Initiated—the access point is waiting to get the predownload image because the conccurent download limit has been reached.
- Failed—the access point has failed 64 predownload attempts.
- Complete—the access point has completed predownloading.

Set a Reboot Time

Using the CLI, enter one of the following commands to schedule a reboot of the controller and access points. The network comes back up without going through an image download phase.

- **reset system in** *HH*:*MM*:*SS* **image** {**swap** | **no-swap**} **reset-aps** [**save-config**]

  This command lets you specify the amount of time delay before the devices reboot. The controller sends a reset mesage to all joined access points, then the controller resets. Use the **swap** keyword to swap the primary and backup images on the access point.

  This output appears on the console after you enter the command:

  ```
  System reset is scheduled for Jan 12 18:12:9 2010.
  Current local time and date is Jan 12 12:53:35 2010.
  A trap will be generated 10 minutes before each scheduled system reset.
  Use 'reset system cancel' to cancel.
  Configuration will be saved before the system reset.
  ```

- **reset system at** *YYYY-MM-DD HH*:*MM*:*SS* **image** {**swap** | **no-swap**} **reset-aps** [**save-config**]

  This command lets you specify a date and time that the devices will reboot. The controller sends a reset mesage to all joined access points, and then the controller resets. Use the **swap** keyword to swap the primary and backup images on the access point.

- **reset system notify-time** *minutes*

  This optional command sets up an SNMP trap message that announces the upcoming reset. The controller sends the announcement trap the configured number of minutes before the reset.

  This output appears on the console after you enter the command:

  ```
  System reset is scheduled for Jan 12 18:12:9 2010.
  Current local time and date is Jan 12 12:53:35 2010.
  A trap will be generated 10 minutes before each scheduled system reset.
  Use 'reset system cancel' to cancel.
  Configuration will be saved before the system reset.
  ```

To cancel the scheduled reboot, enter the **reset system cancel** command.

Note If you configure reset times and then use the **config time** command to change the system time on the controller, the controller notifies you that any scheduled reset times will be cancelled and must be reconfigured after you set the system time.

Use the **show reset** command to display scheduled resets. Sample output for the command:

```
System reset is scheduled for Oct 10 01:01:01 2009.
Current local time and date is Oct 07 02:57:44 2009.
A trap will be generated 10 minutes before each scheduled system reset.
Use 'reset system cancel' to cancel the reset.
Configuration will be saved before the system reset.
```

If any access points are downloading the image from the controller at the scheduled reset time, the reset is cancelled and this message appears on the controller console:

```
%OSAPI-3-RESETSYSTEM_FAILED: osapi_task.c:4458 System will not reset as software is being
upgraded.
```

Transferring Files to and from a Controller

Controllers have built-in utilities for uploading and downloading various files. Follow the instructions in these sections to import files using either the controller GUI or CLI:

- Downloading a Login Banner File, page 9-15
- Downloading Device Certificates, page 9-18
- Downloading CA Certificates, page 9-21
- Uploading PACs, page 9-23
- Uploading and Downloading Configuration Files, page 9-26

Downloading a Login Banner File

In controller software release 6.0 or later, you can download a login banner file using either the GUI or the CLI. The login banner is the text that appears on the screen before user authentication when you access the controller GUI or CLI using Telnet, SSH, or a console port connection.

You save the login banner information as a text (*.txt) file. The text file cannot be larger than 1500 bytes and cannot have more than 18 lines of text.

Note The ASCII character set consists of printable and non-printable characters. The login banner supports only printable characters.

Here is an example of a login banner:

```
Welcome to the Cisco Wireless Controller!
Unauthorized access prohibited.
Contact sysadmin@corp.com for access.
```

Follow the instructions in this section to download a login banner to the controller through the GUI or CLI. However, before you begin, make sure you have a TFTP or FTP server available for the file download. Keep these guidelines in mind when setting up a TFTP or FTP server:

- If you are downloading through the service port, the TFTP or FTP server must be on the same subnet as the service port because the service port is not routable, or you must create static routes on the controller.
- If you are downloading through the distribution system network port, the TFTP or FTP server can be on the same or a different subnet because the distribution system port is routable.
- A third-party TFTP or FTP server cannot run on the same computer as WCS because the WCS built-in TFTP or FTP server and the third-party TFTP or FTP server require the same communication port.

Note Clearing the controller configuration does not remove the login banner. See the "Clearing the Login Banner" section on page 9-18 for information about clearing the login banner using the controller GUI or CLI.

Note The controller can have only one login banner file. If you download another login banner file to the controller, the first login banner file is overwritten.

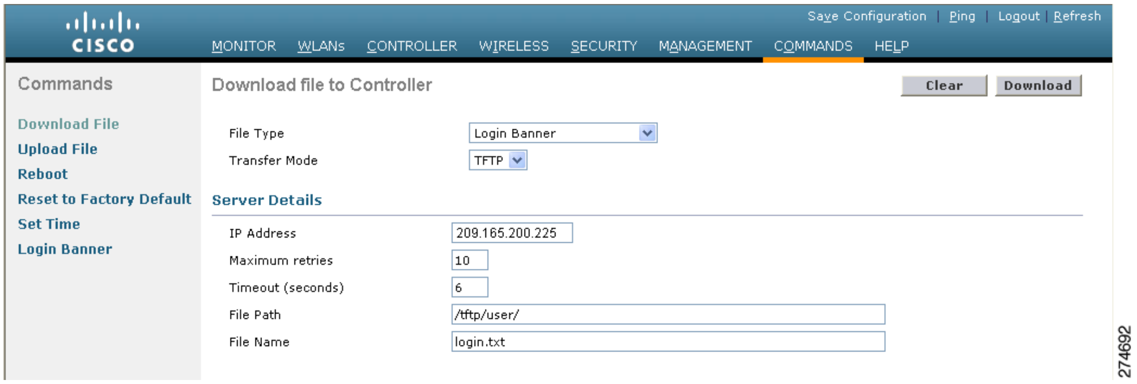
Using the GUI to Download a Login Banner File

Using the controller GUI, follow these steps to download a login banner file to the controller.

Step 1 Copy the login banner file to the default directory on your TFTP or FTP server.

Step 2 Choose **Commands** > **Download File** to open the Download File to Controller page (see Figure 9-2).

Figure 9-2 Download File to Controller Page



Download file to Controller

File Type: Login Banner
Transfer Mode: TFTP

Server Details

IP Address: 209.165.200.225
Maximum retries: 10
Timeout (seconds): 6
File Path: /tftp/user/
File Name: login.txt

Step 3 From the File Type drop-down box, choose **Login Banner**.

Step 4 From the Transfer Mode drop-down box, choose **TFTP** or **FTP**.

Step 5 In the IP Address field, enter the IP address of the TFTP or FTP server.

Step 6 If you are using a TFTP server, the default values of 10 retries and 6 seconds for the Maximum Retries and Timeout fields should work correctly without any adjustment. However, you can change these values. To do so, enter the maximum number of times that the TFTP server attempts to download the certificate in the Maximum Retries field and the amount of time (in seconds) that the TFTP server attempts to download the certificate in the Timeout field.

Step 7 In the File Path field, enter the directory path of the login banner file.

Step 8 In the File Name field, enter the name of the login banner text (*.txt) file.

Step 9 If you are using an FTP server, follow these steps:

a. In the Server Login Username field, enter the username to log into the FTP server.

b. In the Server Login Password field, enter the password to log into the FTP server.

c. In the Server Port Number field, enter the port number on the FTP server through which the download occurs. The default value is 21.

Step 10 Click **Download** to download the login banner file to the controller. A message appears indicating the status of the download.

Using the CLI to Download a Login Banner File

Using the controller CLI, follow these steps to download a login banner file to the controller.

Step 1 Log into the controller CLI.

Step 2 Enter **transfer download mode** {**tftp** | **ftp**}.

Step 3 Enter **transfer download datatype login-banner**.

Step 4 Enter **transfer download serverip** *server-ip-address*.

Step 5 Enter **transfer download path** *server-path-to-file*.

Step 6 Enter **transfer download filename** *filename***.txt**.

Step 7 If you are using a TFTP server, enter these commands:

- **transfer download tftpMaxRetries** *retries*
- **transfer download tftpPktTimeout** *timeout*

Note The default values of 10 retries and a 6-second timeout should work correctly without any adjustment. However, you can change these values. To do so, enter the maximum number of times that the TFTP server attempts to download the software for the *retries* parameter and the amount of time (in seconds) that the TFTP server attempts to download the software for the *timeout* parameter.

Step 8 If you are using an FTP server, enter these commands:

- **transfer download username** *username*
- **transfer download password** *password*
- **transfer download port** *port*

Note The default value for the *port* parameter is 21.

Step 9 Enter **transfer download start** to view the updated settings; then answer **y** when prompted to confirm the current settings and start the download process. This example shows the download command output:

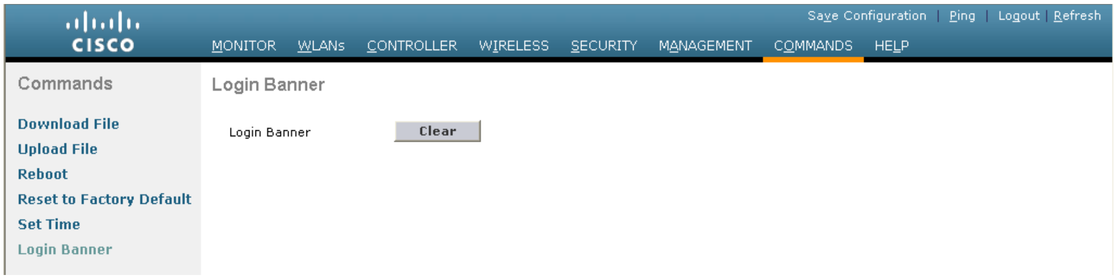
```
Mode........................................... TFTP
Data Type...................................... Login Banner
TFTP Server IP................................. 10.10.10.10
TFTP Packet Timeout............................ 6
TFTP Max Retries............................... 10
TFTP Path...................................... /
TFTP Filename.................................. banner.txt

This may take some time.
Are you sure you want to start? (y/N) y

TFTP Login Banner transfer starting.

TFTP receive complete... checking login banner.

Successfully installed new login banner file
```

Clearing the Login Banner

Using the controller GUI, follow these steps to clear the login banner from the controller.

Step 1 Choose **Commands** > **Login Banner** to open the Login Banner page (see Figure 9-3).

Figure 9-3 Login Banner Page



Step 2 Click the **Clear** button.

Step 3 When prompted, click **OK** to clear the banner.

To clear the login banner from the controller using the controller CLI, enter the **clear login-banner** command.

Downloading Device Certificates

Each wireless device (controller, access point, and client) has its own device certificate. For example, the controller is shipped with a Cisco-installed device certificate. This certificate is used by EAP-FAST (when not using PACs), EAP-TLS, PEAP-GTC, and PEAP-MSCHAPv2 to authenticate wireless clients during local EAP authentication. However, if you wish to use your own vendor-specific device certificate, it must be downloaded to the controller.

Note See the "Configuring Local EAP" section on page 5-40 for information on configuring local EAP.

Follow the instructions in this section to download a vendor-specific device certificate to the controller through the GUI or CLI. However, before you begin, make sure you have a TFTP or FTP server available for the certificate download. Keep these guidelines in mind when setting up a TFTP or FTP server:

- If you are downloading through the service port, the TFTP or FTP server must be on the same subnet as the service port because the service port is not routable, or you must create static routes on the controller.
- If you are downloading through the distribution system network port, the TFTP or FTP server can be on the same or a different subnet because the distribution system port is routable.
- A third-party TFTP or FTP server cannot run on the same computer as WCS because the WCS built-in TFTP or FTP server and the third-party TFTP or FTP server require the same communication port.

Note All certificates downloaded to the controller must be in PEM format.

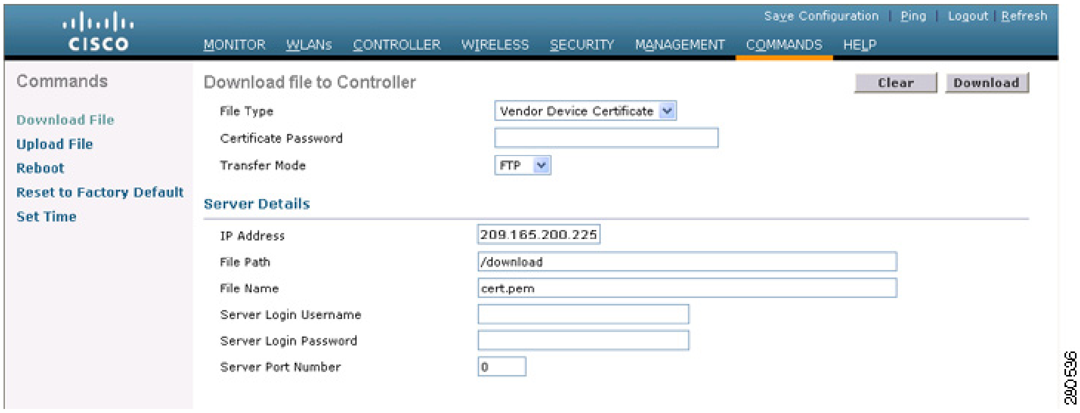
Using the GUI to Download Device Certificates

Using the controller GUI, follow these steps to download a device certificate to the controller.

Step 1 Copy the device certificate to the default directory on your TFTP or FTP server.

Step 2 Choose **Commands** > **Download File** to open the Download File to Controller page (see Figure 9-4).

Figure 9-4 Download File to Controller Page



Download file to Controller

File Type: Vendor Device Certificate

Certificate Password:

Transfer Mode: FTP

Server Details

IP Address: 209.165.200.225

File Path: /download

File Name: cert.pem

Server Login Username:

Server Login Password:

Server Port Number: 0

Step 3 From the File Type drop-down box, choose **Vendor Device Certificate**.

Step 4 In the Certificate Password field, enter the password that was used to protect the certificate.

Step 5 From the Transfer Mode drop-down box, choose **TFTP** or **FTP**.

Step 6 In the IP Address field, enter the IP address of the TFTP or FTP server.

Step 7 If you are using a TFTP server, the default values of 10 retries and 6 seconds for the Maximum Retries and Timeout fields should work correctly without any adjustment. However, you can change these values. To do so, enter the maximum number of times that the TFTP server attempts to download the certificate in the Maximum Retries field and the amount of time (in seconds) that the TFTP server attempts to download the certificate in the Timeout field.

Step 8 In the File Path field, enter the directory path of the certificate.

Step 9 In the File Name field, enter the name of the certificate.

Step 10 If you are using an FTP server, follow these steps:

a. In the Server Login Username field, enter the username to log into the FTP server.

b. In the Server Login Password field, enter the password to log into the FTP server.

c. In the Server Port Number field, enter the port number on the FTP server through which the download occurs. The default value is 21.

Step 11 Click **Download** to download the device certificate to the controller. A message appears indicating the status of the download.

Step 12 After the download is complete, choose **Commands** > **Reboot** > **Reboot**.

Step 13 If prompted to save your changes, click **Save and Reboot**.

Step 14 Click **OK** to confirm your decision to reboot the controller.

Using the CLI to Download Device Certificates

Using the controller CLI, follow these steps to download a device certificate to the controller.

Step 1 Log into the controller CLI.

Step 2 Enter **transfer download mode** {**tftp** | **ftp**}.

Step 3 Enter **transfer download datatype eapdevcert**.

Step 4 Enter **transfer download certpassword** *password*.

Step 5 Enter **transfer download serverip** *server-ip-address*.

Step 6 Enter **transfer download path** *server-path-to-file*.

Step 7 Enter **transfer download filename** *filename*.pem.

Step 8 If you are using a TFTP server, enter these commands:

- **transfer download tftpMaxRetries** *retries*
- **transfer download tftpPktTimeout** *timeout*

Note The default values of 10 retries and a 6-second timeout should work correctly without any adjustment. However, you can change these values. To do so, enter the maximum number of times that the TFTP server attempts to download the software for the *retries* parameter and the amount of time (in seconds) that the TFTP server attempts to download the software for the *timeout* parameter.

Step 9 If you are using an FTP server, enter these commands:

- **transfer download username** *username*
- **transfer download password** *password*
- **transfer download port** *port*

Note The default value for the *port* parameter is 21.

Step 10 Enter **transfer download start** to view the updated settings; then answer **y** when prompted to confirm the current settings and start the download process. This example shows the download command output:

```
Mode......................................... TFTP
Data Type.................................. Vendor Dev Cert
TFTP Server IP............................. 10.10.10.4
TFTP Packet Timeout........................... 6
TFTP Max Retries.............................. 10
TFTP Path.................................. /tftpboot/username/
TFTP Filename.............................. filename.pem

This may take some time.
Are you sure you want to start? (y/N) y
```

```
TFTP EAP Dev cert transfer starting.

Certificate installed.
Reboot the switch to use the new certificate.
```

Step 11 Enter **reset system** to reboot the controller.

Downloading CA Certificates

Controllers and access points have a Certificate Authority (CA) certificate that is used to sign and validate device certificates. The controller is shipped with a Cisco-installed CA certificate. This certificate may be used by EAP-FAST (when not using PACs), EAP-TLS, PEAP-GTC, and PEAP-MSCHAPv2 to authenticate wireless clients during local EAP authentication. However, if you wish to use your own vendor-specific CA certificate, it must be downloaded to the controller.

Note See the "Configuring Local EAP" section on page 5-40 for information on configuring local EAP.

Follow the instructions in this section to download CA certificates to the controller through the GUI or CLI. However, before you begin, make sure you have a TFTP or FTP server available for the certificate download. Keep these guidelines in mind when setting up a TFTP or FTP server:

- If you are downloading through the service port, the TFTP or FTP server must be on the same subnet as the service port because the service port is not routable, or you must create static routes on the controller.
- If you are downloading through the distribution system network port, the TFTP or FTP server can be on the same or a different subnet because the distribution system port is routable.
- A third-party TFTP or FTP server cannot run on the same computer as WCS because the WCS built-in TFTP or FTP server and the third-party TFTP or FTP server require the same communication port.

Note All certificates downloaded to the controller must be in PEM format.

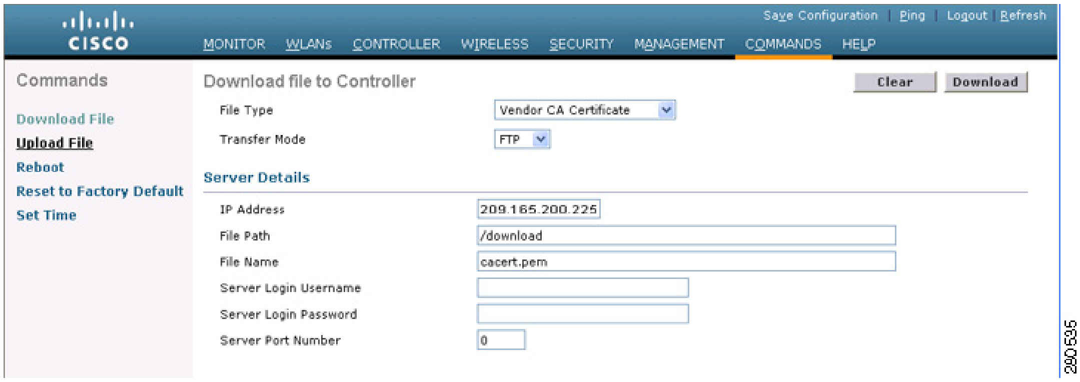
Using the GUI to Download CA Certificates

Using the controller GUI, follow these steps to download a CA certificate to the controller.

Step 1 Copy the CA certificate to the default directory on your TFTP or FTP server.

Step 2 Choose **Commands** > **Download File** to open the Download File to Controller page (see Figure 9-5).

Figure 9-5 Download File to Controller Page



Download file to Controller

File Type: Vendor CA Certificate

Transfer Mode: FTP

Server Details

IP Address: 209.165.200.225

File Path: /download

File Name: cacert.pem

Server Login Username:

Server Login Password:

Server Port Number: 0

Step 3 From the File Type drop-down box, choose **Vendor CA Certificate**.

Step 4 From the Transfer Mode drop-down box, choose **TFTP** or **FTP**.

Step 5 In the IP Address field, enter the IP address of the TFTP or FTP server.

Step 6 If you are using a TFTP server, the default values of 10 retries and 6 seconds for the Maximum Retries and Timeout fields should work correctly without any adjustment. However, you can change these values. To do so, enter the maximum number of times that the TFTP server attempts to download the certificate in the Maximum Retries field and the amount of time (in seconds) that the TFTP server attempts to download the certificate in the Timeout field.

Step 7 In the File Path field, enter the directory path of the certificate.

Step 8 In the File Name field, enter the name of the certificate.

Step 9 If you are using an FTP server, follow these steps:

- **a.** In the Server Login Username field, enter the username to log into the FTP server.
- **b.** In the Server Login Password field, enter the password to log into the FTP server.
- **c.** In the Server Port Number field, enter the port number on the FTP server through which the download occurs. The default value is 21.

Step 10 Click **Download** to download the CA certificate to the controller. A message appears indicating the status of the download.

Step 11 After the download is complete, choose **Commands > Reboot > Reboot**.

Step 12 If prompted to save your changes, click **Save and Reboot**.

Step 13 Click **OK** to confirm your decision to reboot the controller.

Using the CLI to Download CA Certificates

Using the controller CLI, follow these steps to download a CA certificate to the controller.

Step 1 Log into the controller CLI.

Step 2 Enter **transfer download mode** {**tftp** | **ftp**}.

Step 3 Enter **transfer download datatype eapcacert**.

Step 4 Enter **transfer download serverip** *server-ip-address*.

Step 5 Enter **transfer download path** *server-path-to-file*.

Step 6 Enter **transfer download filename** *filename*.pem.

Step 7 If you are using a TFTP server, enter these commands:

- **transfer download tftpMaxRetries** *retries*
- **transfer download tftpPktTimeout** *timeout*

Note The default values of 10 retries and a 6-second timeout should work correctly without any adjustment. However, you can change these values. To do so, enter the maximum number of times that the TFTP server attempts to download the software for the *retries* parameter and the amount of time (in seconds) that the TFTP server attempts to download the software for the *timeout* parameter.

Step 8 If you are using an FTP server, enter these commands:

- **transfer download username** *username*
- **transfer download password** *password*
- **transfer download port** *port*

Note The default value for the *port* parameter is 21.

Step 9 Enter **transfer download start** to view the updated settings; then answer **y** when prompted to confirm the current settings and start the download process. This example shows the download command output:

```
Mode......................................... TFTP
Data Type.................................. Vendor CA Cert
TFTP Server IP............................. 10.10.10.4
TFTP Packet Timeout........................... 6
TFTP Max Retries.............................. 10
TFTP Path.................................. /tftpboot/username/
TFTP Filename.............................. filename.pem

This may take some time.
Are you sure you want to start? (y/N) y

TFTP EAP CA cert transfer starting.

Certificate installed.
Reboot the switch to use the new certificate.
```

Step 10 Enter **reset system** to reboot the controller.

Uploading PACs

Protected access credentials (PACs) are credentials that are either automatically or manually provisioned and used to perform mutual authentication with a local EAP authentication server during EAP-FAST authentication. When manual PAC provisioning is enabled, the PAC file is manually generated on the controller.

Note See the "Configuring Local EAP" section on page 5-40 for information on configuring local EAP.

Follow the instructions in this section to generate and load PACs from the controller through the GUI or CLI. However, before you begin, make sure you have a TFTP or FTP server available for the PAC upload. Keep these guidelines in mind when setting up a TFTP or FTP server:

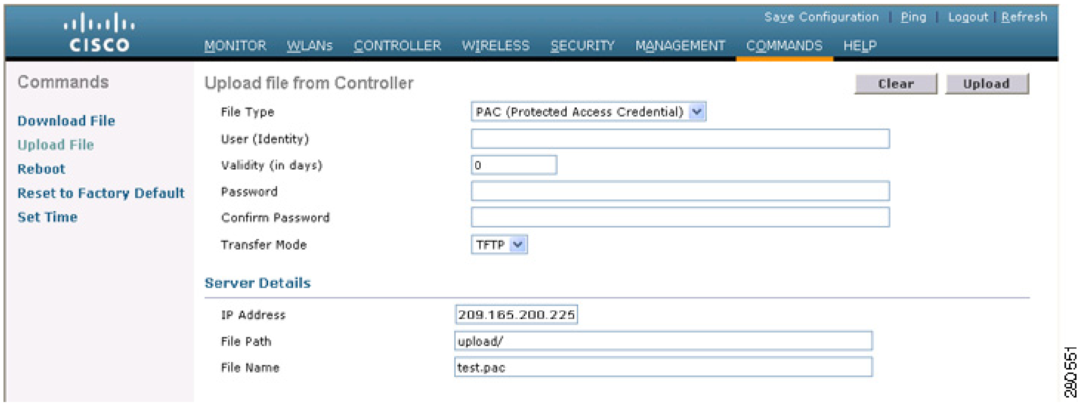
- If you are uploading through the service port, the TFTP or FTP server must be on the same subnet as the service port because the service port is not routable, or you must create static routes on the controller.
- If you are uploading through the distribution system network port, the TFTP or FTP server can be on the same or a different subnet because the distribution system port is routable.
- A third-party TFTP or FTP server cannot run on the same computer as WCS because the WCS built-in TFTP or FTP server and the third-party TFTP or FTP server require the same communication port.

Using the GUI to Upload PACs

Using the controller GUI, follow these steps to upload a PAC from the controller.

Step 1 Choose **Commands** > **Upload File** to open the Upload File from Controller page (see Figure 9-6).

Figure 9-6 Upload File from Controller Page



Upload file from Controller

File Type	PAC (Protected Access Credential)
User (Identity)	
Validity (in days)	0
Password	
Confirm Password	
Transfer Mode	TFTP

Server Details

IP Address	209.165.200.225
File Path	upload/
File Name	test.pac

Step 2 From the File Type drop-down box, choose **PAC (Protected Access Credential)**.

Step 3 In the User field, enter the name of the user who will use the PAC.

Step 4 In the Validity field, enter the number days for the PAC to remain valid. The default setting is zero (0).

Step 5 In the Password and Confirm Password fields, enter a password to protect the PAC.

Step 6 From the Transfer Mode drop-down box, choose **TFTP** or **FTP**.

Step 7 In the IP Address field, enter the IP address of the TFTP or FTP server.

Step 8 In the File Path field, enter the directory path of the PAC.

Step 9 In the File Name field, enter the name of the PAC file. PAC files have a .pac extension.

Step 10 If you are using an FTP server, follow these steps:

a. In the Server Login Username field, enter the username to log into the FTP server.

b. In the Server Login Password field, enter the password to log into the FTP server.

c. In the Server Port Number field, enter the port number on the FTP server through which the upload occurs. The default value is 21.

Step 11 Click **Upload** to upload the PAC from the controller. A message appears indicating the status of the upload.

Step 12 Follow the instructions for your wireless client to load the PAC on your client devices. Make sure to use the password that you entered above.

Using the CLI to Upload PACs

Using the controller CLI, follow these steps to upload a PAC from the controller.

Step 1 Log into the controller CLI.

Step 2 Enter **transfer upload mode** {**tftp** | **ftp**}.

Step 3 Enter **transfer upload datatype pac**.

Step 4 Enter **transfer upload pac** *username validity password*.

Step 5 Enter **transfer upload serverip** *server-ip-address*.

Step 6 Enter **transfer upload path** *server-path-to-file*.

Step 7 Enter **transfer upload filename** *manual*.pac.

Step 8 If you are using an FTP server, enter these commands:

- **transfer upload username** *username*
- **transfer upload password** *password*
- **transfer upload port** *port*

Note The default value for the *port* parameter is 21.

Step 9 Enter **transfer upload start** to view the updated settings; then answer **y** when prompted to confirm the current settings and start the upload process. This example shows the upload command output:

```
Mode......................................... TFTP
TFTP Server IP............................... 10.10.10.4
TFTP Path.................................... /tftpboot/username/
TFTP Filename................................... manual.pac
Data Type....................................... PAC
PAC User........................................ username
PAC Validity.................................... 10 days
PAC Password.................................. password

Are you sure you want to start? (y/N) y

PAC transfer starting.

File transfer operation completed successfully.
```

Step 10 Follow the instructions for your wireless client to load the PAC on your client devices. Make sure to use the password that you entered above.

Uploading and Downloading Configuration Files

Cisco recommends that you upload your controller's configuration file to a server to back it up. If you ever experience some loss of configuration, you can then download the saved configuration to the controller.

Note Do not download a configuration file to your controller that was uploaded from a different controller platform. For example, a 5500 series controller does not support the configuration file from a 4400 or 2100 series controller.

In controller software release 4.2 or later, the controller's bootup configuration file is stored in an Extensible Markup Language (XML) format rather than in binary format. Therefore, you cannot download a binary configuration file onto a controller running software release 4.2 or later. However, when you upgrade a controller from a previous software release to 4.2 or later, the configuration file is migrated and converted to XML.

Note Controller software release 5.2 or later enables you to read and modify the configuration file. See the "Editing Configuration Files" section on page 9-32 for details. Controller software releases prior to 5.2 do not allow configuration files to be modified. If you attempt to make changes to a 4.2, 5.0, or 5.1 configuration file and then download the file to a controller, the controller displays a cyclic redundancy checksum (CRC) error while it is rebooting and returns the configuration parameters to their default values.

Uploading Configuration Files

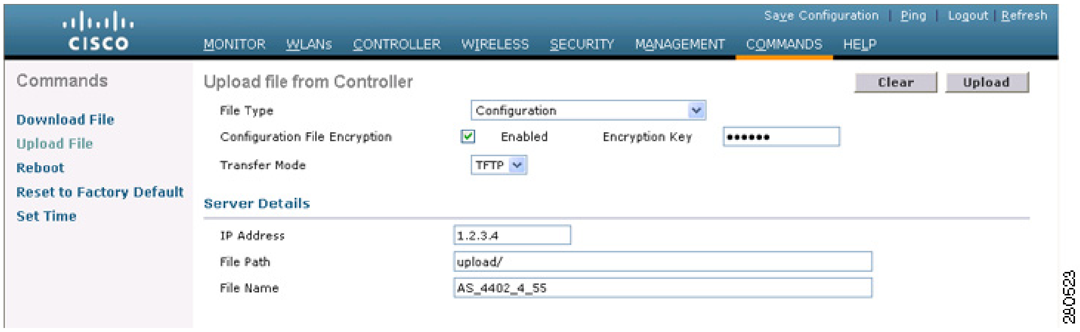
You can upload configuration files using either the GUI or the CLI.

Using the GUI to Upload Configuration Files

Using the controller GUI, follow these steps to upload a configuration file to a server.

Step 1 Choose **Commands > Upload File** to open the Upload File from Controller page (see Figure 9-7).

Figure 9-7 Upload File from Controller Page



Upload file from Controller

File Type: Configuration

Configuration File Encryption: ☑ Enabled Encryption Key: ••••••

Transfer Mode: TFTP

Server Details

IP Address: 1.2.3.4

File Path: upload/

File Name: AS_4402_4_55

Step 2 From the File Type drop-down box, choose **Configuration**.

Step 3 To encrypt the configuration file, check the **Configuration File Encryption** check box and enter the encryption key in the Encryption Key field.

Step 4 From the Transfer Mode drop-down box, choose **TFTP** or **FTP**.

Step 5 In the IP Address field, enter the IP address of the TFTP or FTP server.

Step 6 In the File Path field, enter the directory path of the configuration file.

Step 7 In the File Name field, enter the name of the configuration file.

Step 8 If you are using an FTP server, follow these steps:

a. In the Server Login Username field, enter the username to log into the FTP server.

b. In the Server Login Password field, enter the password to log into the FTP server.

c. In the Server Port Number field, enter the port number on the FTP server through which the upload occurs. The default value is 21.

Step 9 Click **Upload** to upload the configuration file to the TFTP or FTP server. A message appears indicating the status of the upload. If the upload fails, repeat this procedure and try again.

Using the CLI to Upload Configuration Files

Using the controller CLI, follow these steps to upload a configuration file to a server.

Step 1 To specify the transfer mode used to upload the configuration file, enter this command:

transfer upload mode {**tftp** | **ftp**}

Step 2 To specify the type of file to be uploaded, enter this command:

transfer upload datatype config

Step 3 To encrypt the configuration file, enter these commands:

- **transfer encrypt enable**
- **transfer encrypt set-key** *key*, where *key* is the encryption key used to encrypt the file

Step 4 To specify the IP address of the TFTP or FTP server, enter this command:

transfer upload serverip *server-ip-address*

Step 5 To specify the directory path of the configuration file, enter this command:

transfer upload path *server-path-to-file*

Step 6 To specify the name of the configuration file to be uploaded, enter this command:

transfer upload filename *filename*

Step 7 If you are using an FTP server, enter these commands to specify the username and password used to log into the FTP server and the port number through which the upload occurs:

- **transfer upload username** *username*
- **transfer upload password** *password*
- **transfer upload port** *port*

Note The default value for the *port* parameter is 21.

Step 8 To initiate the upload process, enter this command:

transfer upload start

Step 9 When prompted to confirm the current settings, answer **y**. This example shows the upload command output:

```
Mode............................................. TFTP
TFTP Server IP................................... 10.10.10.4
TFTP Path........................................ Config/
TFTP Filename.................................... AS_4402_4_2_55_8_Config.xml
Data Type........................................ Config File
Encryption....................................... Disabled

**************************************************
***  WARNING: Config File Encryption Disabled  ***
**************************************************

Are you sure you want to start? (y/N) y

File transfer operation completed successfully.
```

If the upload fails, repeat this procedure and try again.

Downloading Configuration Files

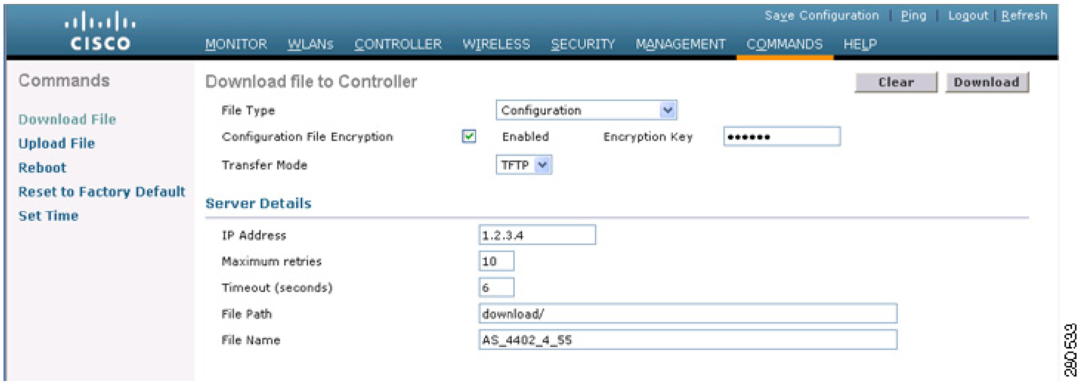
You can download configuration files using either the GUI or the CLI.

Using the GUI to Download Configuration Files

Using the controller GUI, follow these steps to download a configuration file to the controller.

Step 1 Choose **Commands** > **Download File** to open the Download File to Controller page (see Figure 9-8).

Figure 9-8 Download File to Controller Page



Download file to Controller

File Type: Configuration

Configuration File Encryption ☑ Enabled Encryption Key ••••••

Transfer Mode: TFTP

Server Details

IP Address: 1.2.3.4

Maximum retries: 10

Timeout (seconds): 6

File Path: download/

File Name: AS_4402_4_55

Step 2 From the File Type drop-down box, choose **Configuration**.

Step 3 If the configuration file is encrypted, check the **Configuration File Encryption** check box and enter the encryption key used to decrypt the file in the Encryption Key field.

Note The key that you enter here should match the one entered during the upload process.

Step 4 From the Transfer Mode drop-down box, choose **TFTP** or **FTP**.

Step 5 In the IP Address field, enter the IP address of the TFTP or FTP server.

Step 6 If you are using a TFTP server, the default values of 10 retries and 6 seconds for the Maximum Retries and Timeout fields should work correctly without any adjustment. However, you can change these values. To do so, enter the maximum number of times that the TFTP server attempts to download the configuration file in the Maximum Retries field and the amount of time (in seconds) that the TFTP server attempts to download the configuration file in the Timeout field.

Step 7 In the File Path field, enter the directory path of the configuration file.

Step 8 In the File Name field, enter the name of the configuration file.

Step 9 If you are using an FTP server, follow these steps:

a. In the Server Login Username field, enter the username to log into the FTP server.

b. In the Server Login Password field, enter the password to log into the FTP server.

c. In the Server Port Number field, enter the port number on the FTP server through which the download occurs. The default value is 21.

Step 10 Click **Download** to download the file to the controller. A message appears indicating the status of the download, and the controller reboots automatically. If the download fails, repeat this procedure and try again.

Using the CLI to Download Configuration Files

Using the controller CLI, follow these steps to download a configuration file to the controller.

Note The controller does not support incremental configuration downloads. The configuration file contains all mandatory CLIs (all interface address CLIs, mgmtuser with read-write permission CLIs, and interface port or LAG enable or disable CLIs) required to successfully complete the download. For example, if you download only **config time ntp server** *index server_address* as part of the configuration file, the download fails. Only the CLI commands present in the configuration file are applied to the controller, and any configuration in the controller prior to the download is removed.

Step 1 To specify the transfer mode used to download the configuration file, enter this command:

transfer download mode {**tftp** | **ftp**}

Step 2 To specify the type of file to be downloaded, enter this command:

transfer download datatype config

Step 3 If the configuration file is encrypted, enter these commands:

- **transfer encrypt enable**
- **transfer encrypt set-key** *key*, where *key* is the encryption key used to decrypt the file

Note The key that you enter here should match the one entered during the upload process.

Step 4 To specify the IP address of the TFTP or FTP server, enter this command:

transfer download serverip *server-ip-address*

Step 5 To specify the directory path of the configuration file, enter this command:

transfer download path *server-path-to-file*

Step 6 To specify the name of the configuration file to be downloaded, enter this command:

transfer download filename *filename*

Step 7 If you are using a TFTP server, enter these commands:

- **transfer download tftpMaxRetries** *retries*
- **transfer download tftpPktTimeout** *timeout*

Note The default values of 10 retries and a 6-second timeout should work correctly without any adjustment. However, you can change these values. To do so, enter the maximum number of times that the TFTP server attempts to download the software for the *retries* parameter and the amount of time (in seconds) that the TFTP server attempts to download the software for the *timeout* parameter.

Step 8 If you are using an FTP server, enter these commands to specify the username and password used to log into the FTP server and the port number through which the download occurs:

- **transfer download username** *username*
- **transfer download password** *password*
- **transfer download port** *port*

Note The default value for the *port* parameter is 21.

Step 9 To view the updated settings, enter this command:

transfer download start

Step 10 When prompted to confirm the current settings and start the download process, answer **y**. This example shows the download command output:

```
Mode.......................................... TFTP
TFTP Server IP................................ 10.10.10.4
TFTP Path..................................... Config/
TFTP Filename................................. AS_4402_4_2_55_8_Config.xml
Data Type..................................... Config File
Encryption.................................... Disabled

**************************************************
***  WARNING: Config File Encryption Disabled  ***
**************************************************

Are you sure you want to start? (y/N) y

File transfer operation completed successfully.
```

If the download fails, repeat this procedure and try again.

Saving Configurations

Controllers contain two kinds of memory: volatile RAM and NVRAM. At any time, you can save the configuration changes from active volatile RAM to non-volatile RAM (NVRAM) using one of these commands:

- **save config**—Saves the configuration from volatile RAM to NVRAM without resetting the controller.
- **reset system**—Prompts you to confirm that you want to save configuration changes before the controller reboots.
- **logout**—Prompts you to confirm that you want to save configuration changes before you log out.

Editing Configuration Files

When you save the controller's configuration, the controller stores it in XML format in flash memory. Controller software release 5.2 or later enables you to easily read and modify the configuration file by converting it to CLI format. When you upload the configuration file to a TFTP or FTP server, the controller initiates the conversion from XML to CLI. You can then read or edit the configuration file in CLI format on the server. When you are finished, you download the file back to the controller, where it is reconverted to XML format and saved.

Follow these steps to edit the controller's configuration file.

Step 1 To upload the configuration file to a TFTP or FTP server, perform one of the following:

- Upload the file using the controller GUI. Follow the instructions in the "Using the GUI to Upload Configuration Files" section on page 9-26.
- Upload the file using the controller CLI. Follow the instructions in the "Using the CLI to Upload Configuration Files" section on page 9-27.

Step 2 Read or edit the configuration file on the server. You can modify or delete existing CLI commands and add new CLI commands to the file.

Note To edit the configuration file, you can use either Notepad or WordPad on Windows or the VI editor on Linux.

Step 3 Save your changes to the configuration file on the server.

Step 4 To download the configuration file to the controller, perform one of the following:

- Download the file using the controller GUI. Follow the instructions in the "Using the GUI to Download Configuration Files" section on page 9-28.
- Download the file using the controller CLI. Follow the instructions in the "Using the CLI to Download Configuration Files" section on page 9-30.

The controller converts the configuration file to XML format, saves it to flash memory, and then reboots using the new configuration. CLI commands with known keywords and proper syntax are converted to XML while improper CLI commands are ignored and saved to flash memory. Any CLI commands that have invalid values are replaced with default values. To see any ignored commands or invalid configuration values, enter this command:

show invalid-config

Note You cannot execute this command after the **clear config** or **save config** command.

Step 5 If the downloaded configuration contains a large number of invalid CLI commands, you might want to upload the invalid configuration to the TFTP or FTP server for analysis. To do so, perform one of the following:

- Upload the invalid configuration using the controller GUI. Follow the instructions in the "Using the GUI to Upload Configuration Files" section on page 9-26 but choose **Invalid Config** from the File Type drop-down box in Step 2 and skip Step 3.
- Upload the invalid configuration using the controller CLI. Follow the instructions in the "Using the CLI to Upload Configuration Files" section on page 9-27 but enter this command in Step 2: **transfer upload datatype invalid-config** and skip Step 3.

Step 6 The controller does not support the uploading and downloading of port configuration CLI commands. If you want to configure the controller ports, enter these commands to do so now:

- **config port linktrap** {*port* | **all**} {**enable** | **disable**}—Enables or disables the up and down link traps for a specific controller port or for all ports.
- **config port adminmode** {*port* | **all**} {**enable** | **disable**}—Enables or disables the administrative mode for a specific controller port or for all ports.

Step 7 To save your changes, enter this command:

save config

Clearing the Controller Configuration

Follow these steps to clear the active configuration in NVRAM.

Step 1 Enter **clear config** and enter **y** at the confirmation prompt to confirm the action.

Step 2 Enter **reset system**. At the confirmation prompt, enter **n** to reboot without saving configuration changes. When the controller reboots, the configuration wizard starts automatically.

Step 3 Follow the instructions in the "Using the Configuration Wizard" section on page 2-2 to complete the initial configuration.

Erasing the Controller Configuration

Follow these steps to reset the controller configuration to default settings.

Step 1 Enter **reset system**. At the confirmation prompt, enter **y** to save configuration changes to NVRAM. The controller reboots.

Step 2 When you are prompted for a username, enter **recover-config** to restore the factory default configuration. The controller reboots and the configuration wizard starts automatically.

Step 3 Follow the instructions in the "Using the Configuration Wizard" section on page 2-2 to complete the initial configuration.

Resetting the Controller

You can reset the controller and view the reboot process on the CLI console using one of the following two methods:

- Turn the controller off and then turn it back on.
- On the CLI, enter **reset system**. At the confirmation prompt, enter **y** to save configuration changes to NVRAM. The controller reboots.

When the controller reboots, the CLI console displays the following reboot information:

- Initializing the system.
- Verifying the hardware configuration.
- Loading microcode into memory.
- Verifying the operating system software load.
- Initializing with its stored configurations.
- Displaying the login prompt.