Managing Controller Software and Configurations

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

Upgrading the 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 Cisco 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 releases, 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 releases, 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 releases, 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.

Guidelines for Upgrading Controller Software

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

- Make sure that you have a TFTP or FTP server available for the software upgrade. Follow these guidelines when setting up a TFTP or FTP server:
  - Controller software release 6.0 is greater than 32 MB; 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 is 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 10-1 shows the upgrade path that you must follow prior to downloading software release 6.0.

Table 10-1 Upgrade Path to Controller Software Release 6.0

Current Software Release	Upgrade Path to 6.0 Software
3.2.78.0 or 3.2 release	Upgrade to a 4.1 release and then upgrade to 4.2.176.0 before upgrading to 6.0.
4.0.155.5 or 4.0 release	Upgrade to 4.2.176.0 before upgrading to 6.0.
4.1.171.0 or 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 Cisco 5500 Series Controllers can run only controller software release 6.0 or later releases.

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 releases, you can download the upgrade image to the controller, and 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 10-11 for more information about predownloading images to access points.
- We recommend 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** 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 text box Recovery Image Version or Emergency Image Version text box in the output of this command.

Note You cannot install the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0ER.aes file on Cisco 5500 Controller platform.

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 10-2 outlines the upgrade compatibility of controller mesh and nonmesh 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 10-2 for the available upgrade paths.

  Note If you downgrade to a mesh release, you must then reconfigure the controller. We recommend that you save the configuration from the mesh release before upgrading to release 6.0 for the first time. 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.

Table 10-2 Upgrade Compatibility Matrix for Controller Mesh and Non-Mesh Releases

Upgrade to / Upgrade from	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
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 10-2 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). The 1505 mesh access point is not supported in release 5.0 and later releases. 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 and 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 10-28 for instructions.

Step 2 Obtain the 6.0 controller software and the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file from the Cisco Support and Downloads page:

a. Click this URL to go to the Cisco Support and Downloads page:

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

b. Choose **Wireless**.

c. Choose **Wireless LAN Controllers**.

d. Choose **Standalone Controllers** or **Integrated Controllers and Controller Modules**.

e. Choose a controller series.

f. If necessary, choose a controller model.

g. If you chose Standalone Controllers in Step d., choose **Wireless LAN Controller Software**.

h. If you chose the Cisco Catalyst 6500 series / switch 7600 Series Wireless Services Module (WiSM) in Step e., choose **Wireless Services Modules (WiSM) Software**.

i. 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, new hardware platform support, and bug fixes.
- Maintenance Deployment (MD)—These software releases provide bug fixes and ongoing software maintenance.
- Deferred (DF)—These software releases have been deferred. We recommend that you migrate to an upgraded release.

j. Choose a software release number.

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

l. Click **Download**.

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

n. Save the file to your hard drive.

o. Repeat steps a. through n. 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.

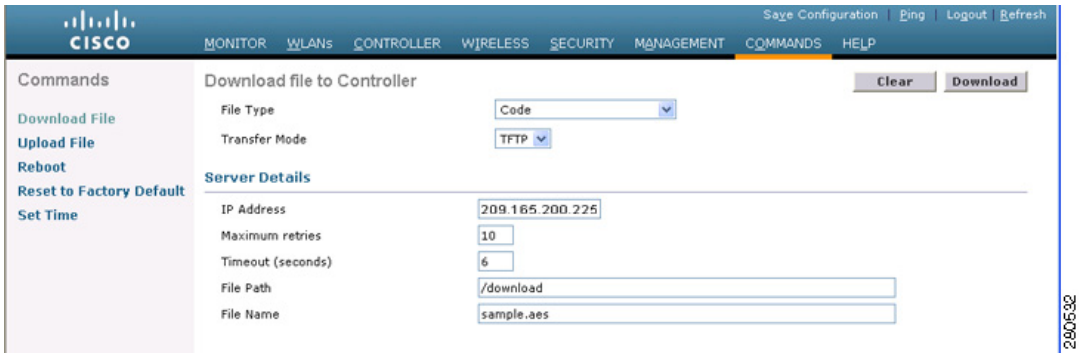
Step 4 Disable the controller 802.11a and 802.11b/g networks.

Step 5 For Cisco WiSMs, shut down the controller port channel on the Catalyst 6500 Series 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 10-1).

Figure 10-1 Download File to Controller Page



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

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

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

If you are using a TFTP server, the default values of 10 retries and 6 seconds for the Maximum Retries and Timeout text boxes should work correctly without any adjustment. However, you can change these values.

Step 11 Enter the maximum number of times that the TFTP server attempts to download the software in the Maximum Retries text box and the amount of time (in seconds) that the TFTP server attempts to download the software in the Timeout text box.

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

Step 13 In the File Name text box, 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 text box, enter the username to log into the FTP server.

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

c. In the Server Port Number text box, 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.

You will be prompted to reboot the controller. Choose to reschedule the reboot at a specified time. See Setting a Reboot Time, page 10-15.

Step 16 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 17 Reenable the WLANs.

Step 18 For Cisco WiSMs, reenable the controller port channel on the Catalyst switch.

Step 19 Reenable your 802.11a and 802.11b/g networks.

Step 20 (Optional) Reload your latest configuration file to the controller.

Step 21 Verify that the 6.0 controller software is installed on your controller by choosing **Monitor** on the controller GUI and looking at the Software Version text box under Controller Summary.

Step 22 Verify that the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file is installed on your controller by choosing **Monitor** to open the Summary page and looking at the text box Recovery Image Version or Emergency Image Version text box.

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

Using the CLI to Upgrade Controller Software

To upgrade the controller software using the controller CLI, follow these steps:

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 We highly recommend 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 10-28 for instructions.

Step 2 Obtain the 6.0 controller software and the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file from the Cisco Support and Downloads page:

a. Click this URL to go to the Software Center:

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

b. Choose **Wireless**.

c. Choose **Wireless LAN Controllers**.

d. Choose **Standalone Controllers**, **Wireless Integrated Routers**, or **Wireless Integrated Switches**.

e. Choose the name of a controller.

f. Choose **Wireless LAN Controller Software**.

g. Choose a controller software release.

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

i. Click **Download**.

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

k. Save the file to your hard drive.

l. Repeat steps a. to k. 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 the **ping** *server-ip-address* command to verify that the controller can contact the TFTP or FTP server.

Step 9 View current download settings by entering the **transfer download start** command. 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 Change the download settings, if necessary by entering these commands:

- **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 View the current updated settings by entering the **transfer download start** command. 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 Save the code update to nonvolatile NVRAM.

To reboot the controller, use the following command.

reset system

The controller completes the bootup process.

Note Alternatively, you can schedule the reboot at a specified time. See Setting a Reboot Time, page 10-15.

Step 13 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 Reenable the WLANs by entering this command:

config wlan enable *wlan_id*

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

Step 16 Reenable your 802.11a and 802.11b/g networks.

Step 17 (Optional) Reload your latest configuration file to the controller.

Step 18 Verify that the 7.0 controller software is installed on your controller by entering the **show sysinfo** command and look at the Product Version text box.

Step 19 Verify that the Cisco Unified Wireless Network Controller Boot Software 5.2.157.0 ER.aes file is installed on your controller by entering the **show sysinfo** command on the controller CLI and looking at the text box Recovery Image Version or Emergency Image Version text box.

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

Predownloading an Image to an Access Point

To minimize 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 and 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 discovers and rejoins the controller.

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

Access Point Predownload Process

The access point predownload feature works as below:

- The controller image is downloaded.
  - The downloaded image becomes the backup image on the controller. Change the current boot image as the backup image using the **config boot backup** command. This ensures that if a system failure occurs, the controller boots with the last working image of the controller.
  - User predownloads the upgraded image using the **config ap image predownload primary all** command. The upgrade image gets downloaded as the backup up image on the access points. This can be verified using the **show ap image all** command.
  - User manually changes the boot image to primary using **config boot primary** command and reboot the controller for the upgrade image to get activated.

    or
  - User issues scheduled reboot with **swap** keyword. For more information see Setting a Reboot Time, page 10-15. Here the **swap** keyword has the following importance: The swapping happens to the primary and backup images on access point, and the currently active image on controller with the backup image.
  - When the controller reboots, the access points get disassociated and eventually they come up with upgrade image. Once the controller responds to the discovery request sent by access points with its discovery response packet, the access point sends a join request.
- The actual upgrade of the images occur. The following sequence of actions occur.
  - During boot time, the access point sends a join request.
  - Controller responds with the join response along with the image version the controller is running.
  - The access point compares its running image with the running image on the controller. If the versions match, the access point joins the controller.
  - If the versions do not match, the access point compares the version of the backup image and if they match, the access point swaps the primary and backup images and reloads and subsequently joins the controller.
  - If the primary image of the access point is same as that of the controllers', the access point reloads and joins the controller.
  - If none of the above conditions are true, the access point sends a image data request to the controller, downloads the latest image, reloads and joins the contoller.

Guidelines and Limitations for Predownloading Images

Follow these guidelines when you use image predownloading:

- The maximum number of concurrent predownloads is limited to half the number of concurrent normal image downloads. This limitation allows new access points to join the controller during image downloading.

  If you reach the predownload limit, then the access points that cannot get an image sleep for a time between 180 to 600 seconds and then reattempt the predownload.
- Before you enter the predownload command, you should 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 16-MB total available memory (1130 and 1240 access points) may not have enough free memory to download an upgrade image and may 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.
- When the system time is changed by using the **config time** command, the time set for scheduled reset will not be valid and the scheduled system reset will be canceled. You are given an option either to cancel the scheduled reset before configuring the time or retain the scheduled reset and not configure the time.
- All the primary, secondary, and tertiary controllers should run the same images as the primary and backup images. That is, the primary image of all three controllers should be X and the secondary image of all three controllers should be Y or the feature will not be effective.
- At the time of the reset, if any AP is downloading the controller image, the scheduled reset is canceled. The following message appears with the reason why the scheduled reset was canceled:

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

Using the GUI to Predownload an Image to an Access Point

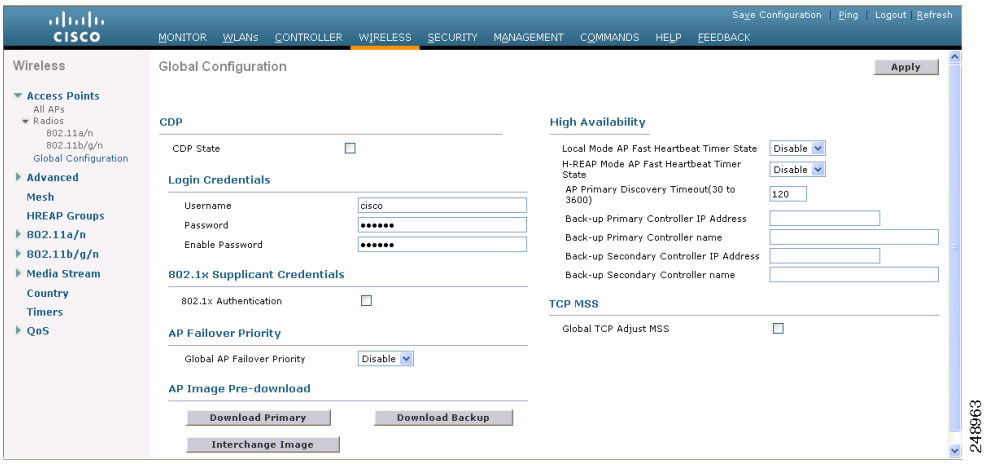
Using the GUI, you can predownload an image to a specific access point or to all access points.

To predownload an image using the controller GUI, follow these steps:

Step 1 Obtain the upgrade image and copy the image to the controller by performing Step 1 through Step 15 in the "Using the GUI to Upgrade Controller Software" section on page 10-6.

Step 2 Choose **Wireless > Access Points > Global Configuration** to open the Global Configuration page (see Figure 10-2).

Figure 10-2 Wireless > Access Points > Global Configuration Page



Step 3 Perform one of the following:

- To instruct all the access points to predownload a primary image from the controller, click **Download Primary** under the AP Image Pre-download.
- To instruct all the access points to swap their primary and backup images, click **Interchange Image**.
- To download an image from the controller and store it as a backup image, click **Download Backup**.

Step 4 Click **Apply** to commit your changes.

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 three steps:

1. Obtaining the upgrade image.
2. Specify access points that will receive the predownload image.
3. Set a reboot time for the controller and the access points.

Obtaining the Upgrade Image

To obtain the upgrade image and copy the image to the controller, follow Step 1 through Step 11 in the "Using the CLI to Upgrade Controller Software" section on page 10-9.

Specifying Access Points for Predownload

Use one of these commands to specify access points for predownload:

- Specify access points for predownload by entering this command:

  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.

- Swap an access point's primary and backup images by entering this command:

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

- Display detailed information on access points specified for predownload by entering this command:

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

Information similar to the following appears:

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


AP Name Primary Image Backup Image Predownload Predownload Version Next Retry Time  Retry
                                   status     Version                            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 that are 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. The status of the access points is as follows:

- 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 concurrent download limit has been reached.
- Failed—The access point has failed 64 predownload attempts.
- Complete—The access point has completed predownloading.

Setting a Reboot Time

Use one of these commands to schedule a reboot of the controller and access points:

- Specify the amount of time delay before the devices reboot by entering this command:

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

  Note The **swap** operand in the **reset** command will result in the swapping of the primary and backup images on both the controller and the access point.

  The controller sends a reset message to all joined access points, and then the controller resets.

- Specify a date and time for the devices to reboot by entering this command:

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

  The controller sends a reset message to all joined access points, and then the controller resets.

Note The **swap** operand in the **reset** command will result in the swapping of the primary and backup images on both the controller and the access point.

- Set up an SNMP trap message that announces the upcoming reset by entering this command:

  reset system notify-time *minutes*

  The controller sends the announcement trap the configured number of minutes before the reset.
- Cancel the scheduled reboot by entering this command:

  reset system cancel

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 canceled and must be reconfigured after you set the system time.

Use the **show reset** command to display scheduled resets.

Information similar to the following appears:

```
System reset is scheduled for Apr 08 01:01:01 2010.
Current local time and date is Apr 07 02:57:44 2010.
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.
```

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 10-16
- Downloading Device Certificates, page 10-20
- Downloading CA Certificates, page 10-23
- Uploading PACs, page 10-26
- Uploading and Downloading Configuration Files, page 10-28

Downloading a Login Banner File

In controller software release 6.0 or later releases, you can download a login banner file using either the GUI or the CLI. The login banner is the text that appears on the page 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 nonprintable 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 that you have a TFTP or FTP server available for the file download. Follow these guidelines 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 10-19 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.

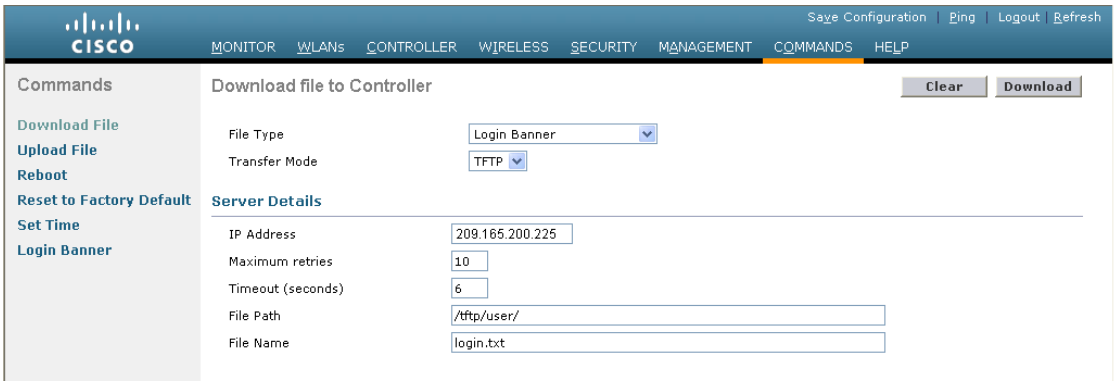
Using the GUI to Download a Login Banner File

To download a login banner file to the controller using the controller GUI, follow these steps:

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 10-3).

Figure 10-3 Download File to Controller Page



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

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

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

If you are using a TFTP server, the default values of 10 retries and 6 seconds for the Maximum Retries and Timeout text boxes should work correctly without any adjustment. However, you can change these values.

Step 6 Enter the maximum number of times that the TFTP server attempts to download the certificate in the Maximum Retries text box and the amount of time (in seconds) that the TFTP server attempts to download the certificate in the Timeout text box.

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

Step 8 In the File Name text box, 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 text box, enter the username to log into the FTP server.

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

c. In the Server Port Number text box, 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

To download a login banner file to the controller using the controller CLI, follow these steps:

Step 1 Log into the controller CLI.

Step 2 Specify the transfer mode used to download the config file by entering this command:

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

Step 3 Download the controller login banner by entering this command:

transfer download datatype login-banner

Step 4 Specify the IP address of the TFTP or FTP server by entering this command:

transfer download serverip *server-ip-address*

Step 5 Specify the name of the config file to be downloaded by entering this command:

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

Step 6 Specify the directory path of the config file by entering this command:

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 View the download settings by entering the **transfer download start** command. Answer **y** when prompted to confirm the current settings and start the download process.

Information similar to the following appears:

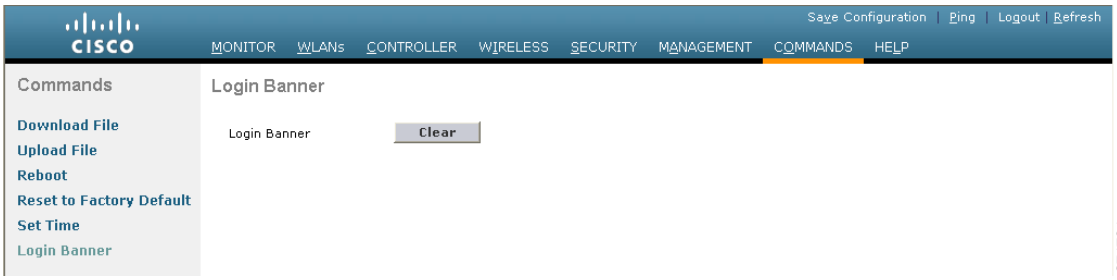
```
Mode............................................. TFTP
Data Type........................................ Login Banner
TFTP Server IP................................... 10.10.10.10
TFTP Packet Timeout.............................. 6
TFTP Max Retries................................. 10
TFTP Path........................................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

To clear the login banner from the controller using the controller GUI, follow these steps:

Step 1 Choose **Commands > Login Banner** to open the Login Banner page (see Figure 10-4).

Figure 10-4 Login Banner Page



Step 2 Click **Clear**.

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 6-40 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. Follow these guidelines 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.

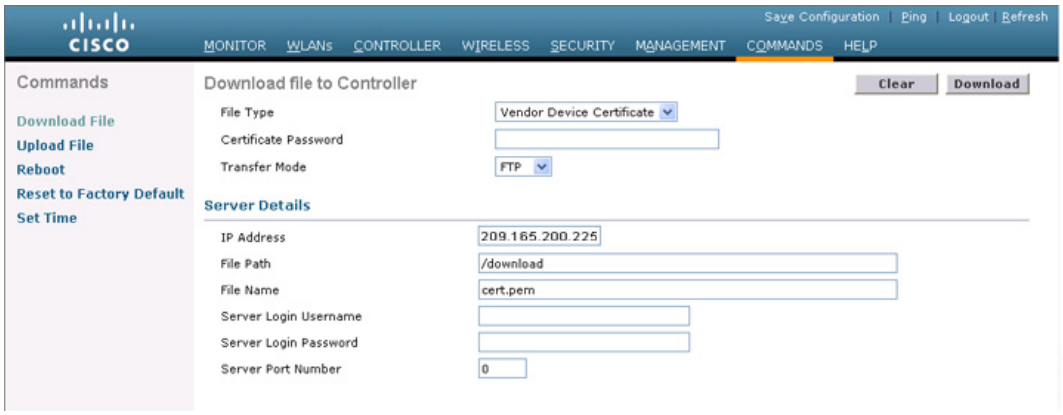
Using the GUI to Download Device Certificates

To download a device certificate to the controller using the controller GUI, follow these steps:

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 10-5).

Figure 10-5 Download File to Controller Page



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

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

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

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

If you are using a TFTP server, the default values of 10 retries and 6 seconds for the Maximum Retries and Timeout text boxes should work correctly without any adjustment. However, you can change these values.

Step 7 Enter the maximum number of times that the TFTP server attempts to download the certificate in the Maximum Retries text box and the amount of time (in seconds) that the TFTP server attempts to download the certificate in the Timeout text box.

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

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

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

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

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

c. In the Server Port Number text box, 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

To download a device certificate to the controller using the controller CLI, follow these steps:

Step 1 Log into the controller CLI.

Step 2 Specify the transfer mode used to download the config file by entering this command:

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

Step 3 Specify the type of the file to be downloaded by entering this command:

transfer download datatype eapdevcert

Step 4 Specify the certificate's private key by entering this command:

transfer download certpassword *password*

Step 5 Specify the IP address of the TFTP or FTP server by entering this command:

transfer download serverip *server-ip-address*

Step 6 Specify the name of the config file to be downloaded by entering this command:

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

Step 7 Specify the directory path of the config file by entering this command:

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 View the updated settings by entering the **transfer download start** command. Answer **y** when prompted to confirm the current settings and start the download process.

Information similar to the following appears:

```
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 Reboot the controller by entering this command:

reset system

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 want to use your own vendor-specific CA certificate, it must be downloaded to the controller.

Note See the "Configuring Local EAP" section on page 6-40 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 that you have a TFTP or FTP server available for the certificate download. Follow these guidelines 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.

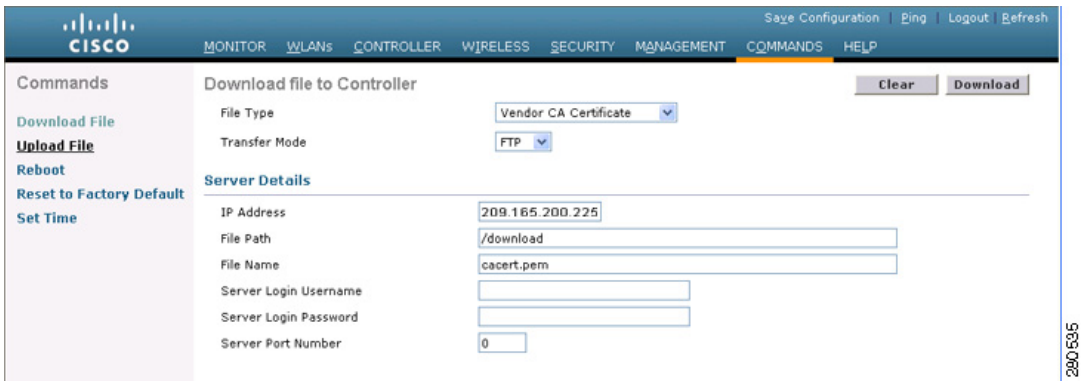
Using the GUI to Download CA Certificates

To download a CA certificate to the controller using the controller GUI, follow these steps:

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 10-6).

Figure 10-6 Download File to Controller Page



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

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

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

If you are using a TFTP server, the default values of 10 retries and 6 seconds for the Maximum Retries and Timeout text boxes should work correctly without any adjustment. However, you can change these values.

Step 6 Enter the maximum number of times that the TFTP server attempts to download the certificate in the Maximum Retries text box and the amount of time (in seconds) that the TFTP server attempts to download the certificate in the Timeout text box.

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

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

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

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

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

c. In the Server Port Number text box, 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

To download a CA certificate to the controller using the controller CLI, follow these steps:

Step 1 Log into the controller CLI.

Step 2 Specify the transfer mode used to download the config file by entering this command:

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

Step 3 Specify the type of the file to be downloaded by entering this command:

transfer download datatype eapdevcert

Step 4 Specify the IP address of the TFTP or FTP server by entering this command:

transfer download serverip *server-ip-address*

Step 5 Specify the directory path of the config file by entering this command:

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

Step 6 Specify the name of the config file to be downloaded by entering this command:

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 View the updated settings by entering the **transfer download start** command. Answer **y** when prompted to confirm the current settings and start the download process.

Information similar to the following appears:

```
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 Reboot the controller by entering the **reset system** command.

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 6-40 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. Follow these guidelines 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

To upload a PAC from the controller using the controller GUI, follow these steps:

Step 1 Choose **Commands** > **Upload File** to open the Upload File from Controller page (see Figure 10-7).

Figure 10-7 Upload File from Controller Page

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

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

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

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

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

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

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

Step 9 In the File Name text box, 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 text box, enter the username to log into the FTP server.

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

c. In the Server Port Number text box, 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

To upload a PAC from the controller using the controller CLI, follow these steps:

Step 1 Log into the controller CLI.

Step 2 Specify the transfer mode used to upload the config file by entering this command:

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

Step 3 Upload a Protected Access Credential (PAC) by entering this command:

transfer upload datatype pac

Step 4 Specify the identification of the user by entering this command:

transfer upload pac *username validity password*

Step 5 Specify the IP address of the TFTP or FTP server by entering this command:

transfer upload serverip *server-ip-address*

Step 6 Specify the directory path of the config file by entering this command:

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

Step 7 Specify the name of the config file to be uploaded by entering this command:

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 View the updated settings by entering the **transfer upload start** command. Answer **y** when prompted to confirm the current settings and start the upload process.

Information similar to the following appears:

```
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

We recommend that you upload your controller's configuration file to a server to back it up. If you lose your 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 Cisco 5500 Series Controller does not support the configuration file from a Cisco 4400 Series or 2100 Series Controller.

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

Follow these guidelines when working with configuration files:

- Any CLI with an invalid value is filtered out and set to default by the XML validation engine. Validation occurs during bootup. A configuration may be rejected if the validation fails. A configuration may fail if you have an invalid CLI. For example, if you have a CLI where you try to configure a WLAN without adding appropriate commands to add the WLAN.
- A configuration may be rejected if the dependencies are not addressed. For example, if you try to configure dependent parameters without using the add command. The XML validation may succeed but the configuration download infrastructure will immediately reject the configuration with no valadation errors.
- An invalid configuration can be verified by using the **show invalid-config** command. The **show invalid-config** command reports the configuration that is rejected by the conftroller either as part of download process or by XML validation infrastructure.

Note Controller software release 5.2 or later releases enable you to read and modify the configuration file. See the "Editing Configuration Files" section on page 10-35 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

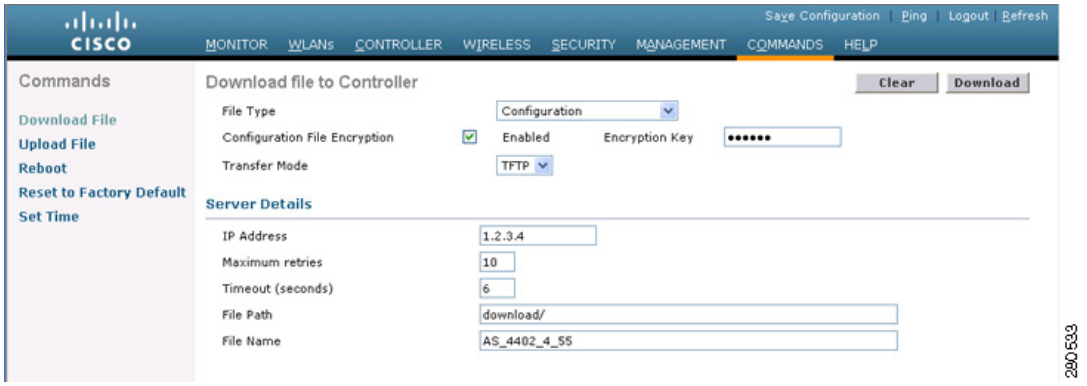
You can upload configuration files using either the GUI or the CLI.

Using the GUI to Upload Configuration Files

To upload a configuration file to a server using the controller GUI, follow these steps:

Step 1 Choose **Commands** > **Upload File** to open the Upload File from Controller page (see Figure 10-8).

Figure 10-8 Upload File from Controller Page



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

Step 3 Encrypt the configuration file by selecting the **Configuration File Encryption** check box and entering the encryption key in the Encryption Key text box.

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

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

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

Step 7 In the File Name text box, 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 text box, enter the username to log into the FTP server.

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

c. In the Server Port Number text box, 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

To upload a configuration file to a server using the controller CLI, follow these steps:

Step 1 Specify the transfer mode used to upload the configuration file by entering this command:

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

Step 2 Specify the type of file to be uploaded by entering this command:

transfer upload datatype config

Step 3 Encrypt the configuration file by entering these commands:

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

Step 4 Specify the IP address of the TFTP or FTP server by entering this command:

transfer upload serverip *server-ip-address*

Step 5 Specify the directory path of the configuration file by entering this command:

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

Step 6 Specify the name of the configuration file to be uploaded by entering 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 Initiate the upload process by entering this command:

transfer upload start

Step 9 When prompted to confirm the current settings, answer **y**.

Information similar to the following appears:

```
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

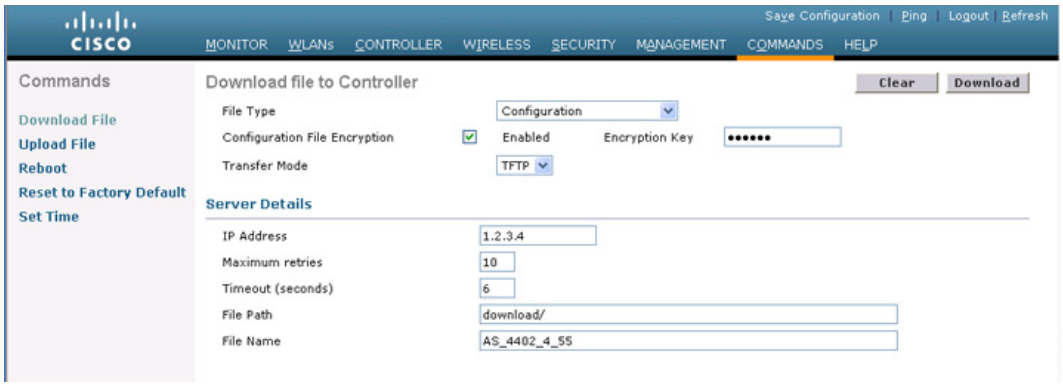
You can download configuration files using either the GUI or the CLI.

Using the GUI to Download Configuration Files

To download a configuration file to the controller using the controller GUI, follow these steps:

Step 1 Choose **Commands** > **Download File** to open the Download File to Controller page (see Figure 10-9).

Figure 10-9 Download File to Controller Page



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

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

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

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

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

If you are using a TFTP server, the default values of 10 retries and 6 seconds for the Maximum Retries and Timeout text boxes should work correctly without any adjustment. However, you can change these values.

Step 6 Enter the maximum number of times that the TFTP server attempts to download the configuration file in the Maximum Retries text box and the amount of time (in seconds) that the TFTP server attempts to download the configuration file in the Timeout text box.

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

Step 8 In the File Name text box, 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 text box, enter the username to log into the FTP server.

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

c. In the Server Port Number text box, 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

To download a configuration file to the controller using the controller CLI, follow these steps:

Note The controller does not support incremental configuration downloads. The configuration file contains all mandatory commands (all interface address commands, mgmtuser with read-write permission commands, and interface port or LAG enable or disable commands) required to successfully complete the download. For example, if you download only the **config time ntp server** *index server_address* command as part of the configuration file, the download fails. Only the 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 Specify the transfer mode used to download the configuration file by entering this command:

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

Step 2 Specify the type of file to be downloaded by entering 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 Specify the IP address of the TFTP or FTP server by entering this command:

transfer download serverip *server-ip-address*

Step 5 Specify the directory path of the configuration file by entering this command:

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

Step 6 Specify the name of the configuration file to be downloaded by entering 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 View the updated settings by entering this command:

transfer download start

Step 10 When prompted to confirm the current settings and start the download process, answer **y**.

Information similar to the following appears:

```
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 nonvolatile 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 releases enable 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 a CLI format on the server. When you are finished, you download the file back to the controller, where it is reconverted to an XML format and saved.

To edit the controller's configuration file, follow these steps:

Step 1 Upload the configuration file to a TFTP or FTP server by performing 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 10-29.
- Upload the file using the controller CLI. Follow the instructions in the "Using the CLI to Upload Configuration Files" section on page 10-30.

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 Download the configuration file to the controller by performing 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 10-31.
- Download the file using the controller CLI. Follow the instructions in the "Using the CLI to Download Configuration Files" section on page 10-33.

The controller converts the configuration file to an 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 10-29 but choose **Invalid Config** from the File Type drop-down list 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 10-30 but enter the transfer **upload datatype invalid-config** command in Step 2 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:

- **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 Save your changes by entering this command:

save config

Clearing the Controller Configuration

To clear the active configuration in NVRAM, follow these steps:

Step 1 Clear the configuration by entering this command:

clear config

Enter **y** at the confirmation prompt to confirm the action.

Step 2 Reboot the system by entering this command:

reset system

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

To reset the controller configuration to default, follow these steps:

Step 1 Reset the configuration by entering this command:

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, restore the factory-default settings by entering this command:

recover-config

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.