



Release Notes for Cisco Wireless LAN Controllers and Lightweight Access Points for Release 6.0.196.0

February 2010

These release notes describe open and resolved caveats for maintenance software release 6.0.196.0 for Cisco 2100, 4400, and 5500 Series Wireless LAN Controllers; Cisco Wireless Services Modules (WiSMs); Cisco Wireless LAN Controller Network Modules; Catalyst 3750G Integrated Wireless LAN Controller Switches; Cisco 3201 Wireless Mobile Interface Cards (WMICs); Cisco Aironet 1100, 1130, 1140, 1200, 1230AG, 1240, 1250, 1300, and AP801 Series Lightweight Access Points; Cisco Aironet 1130AG, 1240AG, 1522, and 1524 Mesh Access Points, which comprise part of the Cisco Unified Wireless Network (UWN) Solution.



Note

Unless otherwise noted, all of the Cisco wireless LAN controllers are referred to as *controllers*, and all of the Cisco lightweight access points are referred to as *access points*.

Contents

These release notes contain the following sections.

- [Cisco Unified Wireless Network Solution Components, page 2](#)
- [Controller Requirements, page 3](#)
- [MIB Files, page 3](#)
- [New Features, page 3](#)
- [Software Release Information, page 4](#)
- [Upgrading to a New Software Release, page 10](#)
- [Installation Notes, page 13](#)
- [Using the Cisco 5500 Series Controller USB Console Port, page 15](#)
- [Important Notes for Controllers and Non-Mesh Access Points, page 17](#)



Americas Headquarters:

Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

© 2010 Cisco Systems, Inc. All rights reserved.

- [Important Notes for Controllers and Mesh Access Points, page 34](#)
- [Caveats, page 35](#)
- [Troubleshooting, page 38](#)
- [Documentation Updates, page 38](#)
- [Related Documentation, page 39](#)
- [Obtaining Documentation and Submitting a Service Request, page 39](#)

Cisco Unified Wireless Network Solution Components

The following components are part of the Cisco UWN Solution and are compatible in this release:

- Software release 6.0.196.0 for all Cisco controllers and lightweight access points
- Cisco autonomous to lightweight mode upgrade tool release 3.0
- Cisco Wireless Control System (WCS) software release 6.0.181.0
- Cisco WCS Navigator 1.5.181.0
- Location appliance software release 6.0.101.0
- Cisco 2700 Series Location Appliances
- Mobility services engine software release 6.0.103.0 and Context Aware Software



Note

Client and tag licenses are required in order to retrieve contextual (such as location) information within the Context Aware Software. See the *Release Notes for Cisco 3350 Mobility Services Engine for Software Release 6.0* for more information.

- Cisco 3350 Mobility Services Engines
- Cisco 2100 Series Wireless LAN Controllers
- Cisco 4400 Series Wireless LAN Controllers
- Cisco 5500 Series Wireless LAN Controllers
- Cisco Wireless Services Module (WiSM) for Cisco Catalyst 6500 Series Switches and Cisco 7600 Series Routers
- Cisco Wireless LAN Controller Network Module for Cisco Integrated Services Routers



Note

The 6.0.196.0 release does not support the NM-AIR-WLC6 platform.

- Catalyst 3750G Wireless LAN Controller Switches
- Cisco 3201 Wireless Mobile Interface Card (WMIC)
- Cisco Aironet 1130AG, 1240AG, 1522, and 1524 Mesh Access Points



Note

This release does not support Cisco Aironet 1505 and 1510 access points.

- Cisco Aironet 1100, 1130, 1140, 1200, 1230AG, 1240, 1250, 1300, and AP801 Series Lightweight Access Points

**Note**

Controller software release 5.0.148.0 or later is not compatible with Cisco Aironet 1000 series access points.

**Note**

The AP801 is an integrated access point on the Cisco 800 Series Integrated Services Routers (ISRs).

**Note**

Only Cisco Aironet 1200 Series Access Points that contain 802.11g (AIR-MP21G) or second-generation 802.11a radios (AIR-RM21A or AIR-RM22A) are supported for use with controller software releases. The AIR-RM20A radio, which was included in early 1200 series access point models, is not supported. To see the type of radio module installed in your access point, enter this command on the access point: **show controller dot11radio *n***, where *n* is the number of the radio (0 or 1).

**Note**

For 5500 Series controller, the Dot1p value in the capwap packet between controller and the AP is always 0 irrespective of the profile configured on the WLAN and the DSCP value.

Controller Requirements

The controller GUI requires the following operating system and web browser:

- Windows XP SP1 (or later) or Windows 2000 SP4 (or later)
- Internet Explorer 6.0 SP1 (or later) or Mozilla Firefox 2.0.0.11 (or later)

**Note**

Internet Explorer 6.0 SP1 (or later) and Mozilla Firefox 2.0.0.11 (or later) are the only browsers supported for using the controller GUI and web authentication.

MIB Files

Cisco controllers support standard SNMP Management Information Base (MIB) files. MIBs can be downloaded from the Software Center on Cisco.com. Only one MIB is posted per major release (6.0, 5.2, 5.1, and so on). If an updated MIB becomes available, the previous version is removed from the Software Center and replaced by the new version.

New Features

This maintenance release does not introduce new features.

Software Release Information

Software is factory installed on your controller and automatically downloaded to the access points after a release upgrade and whenever an access point joins a controller. As new releases become available for the controllers and their access points, consider upgrading.



Note

The Cisco WiSM requires software release SWISMK9-32 or later. The Supervisor 720 12.2(18)SXF2 supports the Cisco WiSM software release 3.2.78.4 or later, and the Supervisor 720 12.2(18)SXF5 (Cisco IOS Software Modularity) supports the Cisco WiSM software release 4.0.155.5 (with Cisco IOS Software Modularity).



Note

To use the Cisco WiSM in the Cisco 7609 and 7613 Series Routers, the routers must be running Cisco IOS Release 12.2(18)SXF5 or later.



Note

The Cisco Wireless LAN Controller Network Module is supported on Cisco 28/37/38xx Series Integrated Services Routers running Cisco IOS Release 12.4(11)T2, 12.4(11)T3, and 12.5.



Note

To use the controller in the Catalyst 3750G Wireless LAN Controller Switch, the switch must be running Cisco IOS Release 12.2(25)FZ, 12.2(35)SE or later, 12.2(37)SE or later, 12.2(44)SE or later, or 12.2(46)SE or later. The following Cisco IOS Releases and any variants are not supported: 12.2(25)SEC, 12.2(25)SED, 12.2(25)SEE, 12.2(25)SEF, and 12.2(25)SEG. All Catalyst 3750 software feature sets (IP Base, IP Service, and Advanced IP Services) are supported for use with the controller.



Note

You can use the 2112 and 2125 controllers only with software release 5.1.151.0 or later.

Finding the Software Release

To find the software release running on your controller, click **Monitor** and look at the Software Version field under Controller Summary on the controller GUI or enter **show sysinfo** on the controller CLI.

Special Rules for Upgrading to Controller Software Release 6.0.196.0



Caution

Before upgrading your controller to software release 6.0.196.0, you must comply with the following rules.

- Before you download a software image or an ER.aes file to a 2100 series controller or a controller network module, use the **show memory statistics** CLI command to see the current amount of free memory. If the controller has less than 90 MB of free memory, you need to reboot it before downloading the file.

- Before you use an AP801 series lightweight access point with controller software release 6.0.196.0, you must upgrade the software in the Cisco 860 and 880 Series Integrated Services Routers (ISRs) to Cisco IOS 12.4(22)T and the software in the Cisco 890 Series Integrated Services Router to Cisco IOS 12.4(22)YB.
- 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 6.0.196.0 is larger 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 tftpd and the TFTP server within the WCS. If you attempt to download the 6.0.196.0 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 6.0.196.0. [Table 1](#) shows the upgrade path that you must follow before downloading software release 6.0.196.0.

Table 1 Upgrade Path to Controller Software Release 6.0.196.0

Current Software Release	Upgrade Path to 6.0.196.0 Software
3.2.78.0 or later 3.2 release	Upgrade to 4.0.206.0 or later 4.0 release, then upgrade to 4.2.176.0, before upgrading to 6.0.196.0.
4.0.155.5 or later 4.0 release	Upgrade to 4.2.176.0 before upgrading to 6.0.196.0.
4.1.171.0 or later 4.1 release	Upgrade to 4.2.176.0 before upgrading to 6.0.196.0.
4.1.191.xM	Upgrade to 4.1.192.35M and then to 6.0.182.0 before upgrading to 6.0.196.0.
4.1.192.xM	You can upgrade directly to 6.0.196.0.
4.2.130.0 or earlier 4.2 release	Upgrade to 4.2.176.0 before upgrading to 6.0.196.0.
4.2.173.0 or later 4.2 release	You can upgrade directly to 6.0.196.0.
5.0.148.0 or later 5.0 release	You can upgrade directly to 6.0.196.0.
5.1.151.0 or later 5.1 release	You can upgrade directly to 6.0.196.0.
5.2.157.0 or later 5.2 release	You can upgrade directly to 6.0.196.0.



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 6.0.196.0 software. In large networks, it can take some time to download the software on each access point.

- 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 in order for you 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 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.

Software Release Support for Access Points

Table 2 lists the controller software releases that support specific Cisco access points. The First Support column lists the earliest controller software release that supports the access point. For access points that are not supported in ongoing releases, the Last Support column lists the last release that supports the access point.

Table 2 *Software Support for Access Points*

Access Points		First Support	Last Support
1000 Series	AIR-AP1010	3.0.100.0	4.2.207.0
	AIR-AP1020	3.0.100.0	4.2.207.0
	AIR-AP1030	3.0.100.0	4.2.207.0
	Airespace AS1200	—	4.0
1100 Series	AIR-LAP1121	4.0.155.0	—
	AIR-LAP1131	3.1.59.24	—
	AIR-LAP1141N	5.2.157.0	—
	AIR-LAP1142N	5.2.157.0	—
1200 Series	AIR-AP1220A	3.1.59.24	—
	AIR-AP1220B	3.1.59.24	—
1230 Series	AIR-AP1230A	3.1.59.24	—
	AIR-AP1230B	3.1.59.24	—
	AIR-LAP1231G	3.1.59.24	—
	AIR-LAP1232AG	3.1.59.24	—
1240 Series	AIR-LAP1242G	3.1.59.24	—
	AIR-LAP1242AG	3.1.59.24	—

Table 2 **Software Support for Access Points (Continued)**

Access Points		First Support	Last Support
1250 Series	AIR-LAP1250	4.2.61.0	—
	AIR-LAP1252G	4.2.61.0	—
	AIR-LAP1252AG	4.2.61.0	—
1300 Series	AIR-BR1310G	4.0.155.0	—
1400 Series	Standalone Only	N/A	—
1500 Mesh Series	AIR-LAP-1505	3.1.59.24	4.2.176.51M
	AIR-LAP-1510	3.1.59.24	4.2.176.51M
1520 Mesh Series	AIR-LAP1522AG	-A and N: 4.1.190.1 or 5.2 or later ¹	—
		All other reg. domains: 4.1.191.24M or 5.2 or later ¹	—
	AIR-LAP1522HZ	-A and N: 4.1.190.1 or 5.2 or later ¹	—
		All other reg. domains: 4.1.191.24M or 5.2 or later ¹	—
	AIR-LAP1522PC	-A and N: 4.1.190.1 or 5.2 or later ¹	—
		All other reg. domains: 4.1.191.24M or 5.2 or later ¹	—
	AIR-LAP1524SB	-A, C and N: 6.0 or later	—
	AIR-LAP1524PS	-A: 4.1.192.22M or 5.2 or later ¹	—

1. These access points are supported in the separate 4.1.19x.x Mesh Software Release train or with Release 5.2 or later. These access points are not supported in the 4.2, 5.0, or 5.1 Release trains.

Special Rules for Upgrading to Controller Software 6.0.196.0 in Mesh Networks



Caution

Before upgrading your controller to software release 6.0.196.0 in a mesh network, you must comply with the following rules.

Upgrade Compatibility Matrix

Table 3 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 4.1.192.22M and 4.1.192.135M to 6.0.182.0 without any configuration file loss. See Table 3 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 6.0.196.0 for the first time. Then you can reapply the configuration if you need to downgrade.

- You cannot downgrade from controller software release 6.0.196.0 to a mesh release (for example, 4.1.190.5, 4.1.191.22M, or 4.1.192.xM) without losing your configuration settings.
- Configuration files are in the binary state immediately after upgrade from a mesh release to controller software release 6.0.196.0. 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.
- If you upgrade the controller from software release 4.1.191.xM to 4.1.192.xM and then to software release 6.0.182.0, the controller might reboot without a crash file. To work around this problem, manually reset the controller without saving the configuration after you upgrade the controller to software release 6.0.196.0. Also, make sure to check the RRM configuration settings after the reset to verify that they are correct (CSCsv50357).

Table 3 Upgrade Compatibility Matrix for Controller Mesh and Non-Mesh Releases

Upgrade to	6.0.196.0	6.0.182.0	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	–																						

Table 3 Upgrade Compatibility Matrix for Controller Mesh and Non-Mesh Releases (Continued)

Upgrade to	6.0.196.0	6.0.182.0	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
4.1.190.5				Y ₁	Y	—																					
4.1.185.0					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	—								
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	—						

Table 3 Upgrade Compatibility Matrix for Controller Mesh and Non-Mesh Releases (Continued)

Upgrade to	6.0.196.0	6.0.182.0	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
3.2.116.21											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.

Upgrading to a New Software Release

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 6.0.196.0 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 6.0.196.0, 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.

**Note**

If a WiSM controller is heavily loaded with access points and clients and is running heavy traffic, software upgrade sometimes causes Ethernet receive-path lockup and the hardware watchdog sometimes trips. You might need to reset the controller to return to normal operation.

**Note**

Do not install the 6.0.196.0 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.

Follow these steps to upgrade the controller software using the controller GUI.

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. Otherwise, you must manually reconfigure the controller.

Step 2 Follow these steps to obtain the 6.0.196.0 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. Click this URL to go to the Software Center:
<http://tools.cisco.com/support/downloads/go/Redirect.x?mdfid=278875243>
- b. Click **Wireless Software**.
- c. Click **Wireless LAN Controllers**.
- d. Click **Standalone Controllers** or **Integrated Controllers and Controller Modules**.
- e. Click a controller series.
- f. If necessary, click a controller model.
- g. If you chose Standalone Controllers in Step d., click **Wireless LAN Controller Software**.
- h. If you chose Cisco Catalyst 6500 Series/7600 Series Wireless Services Module (WiSM) in Step e., click **Wireless Services Modules (WiSM) Software**.
- i. Click 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.
- j. Click 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.

- 

If you do not install the 5.2.157.0 ER.aes file, the Emergency Image Version field shows “N/A.”

Installation Notes

This section contains important information to keep in mind when installing controllers and access points.

Warnings



Warning

This warning means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.
Statement 1071



Warning

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.
Statement 1030



Warning

Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, as they may cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes (e.g. U.S.: NFPA 70, National Electrical Code, Article 810, Canada: Canadian Electrical Code, Section 54). Statement 280



Warning

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors). Statement 13



Warning

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground connector. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024



Warning

Read the installation instructions before you connect the system to its power source. Statement 10



Warning

Do not work on the system or connect or disconnect any cables (Ethernet, cable, or power) during periods of lightning activity. The possibility of serious physical injury exists if lightning should strike and travel through those cables. In addition, the equipment could be damaged by the higher levels of static electricity present in the atmosphere. Statement 276



Warning

Do not operate the unit near unshielded blasting caps or in an explosive environment unless the device has been modified to be especially qualified for such use. Statement 364

**Warning**

In order to comply with radio frequency (RF) exposure limits, the antennas for this product should be positioned no less than 6.56 ft (2 m) from your body or nearby persons. Statement 339

**Warning**

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

Statement 1017

Safety Information

Follow the guidelines in this section to ensure proper operation and safe use of the controllers and access points.

FCC Safety Compliance Statement

FCC Compliance with its action in ET Docket 96-8, has adopted a safety standard for human exposure to RF electromagnetic energy emitted by FCC-certified equipment. When used with approved Cisco Aironet antennas, Cisco Aironet products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper operation of this radio device according to the instructions in this publication results in user exposure substantially below the FCC recommended limits.

Safety Precautions

For your safety, and to help you achieve a good installation, read and follow these safety precautions. **They may save your life!**

1. If you are installing an antenna for the first time, for your own safety as well as others, seek professional assistance. Your Cisco sales representative can explain which mounting method to use for the size and type of antenna you are about to install.
2. Select your installation site with safety as well as performance in mind. Electric power lines and phone lines look alike. For your safety, assume that any overhead line can kill you.
3. Call your electric power company. Tell them your plans and ask them to come look at your proposed installation. This is a small inconvenience considering your life is at stake.
4. Plan your installation carefully and completely before you begin. Successfully raising a mast or tower is largely a matter of coordination. Each person should be assigned to a specific task and should know what to do and when to do it. One person should be in charge of the operation to issue instructions and watch for signs of trouble.
5. When installing an antenna, remember:
 - a. **Do not** use a metal ladder.
 - b. **Do not** work on a wet or windy day.
 - c. **Do** dress properly—shoes with rubber soles and heels, rubber gloves, long-sleeved shirt or jacket.
6. If the assembly starts to drop, get away from it and let it fall. Remember that the antenna, mast, cable, and metal guy wires are all excellent conductors of electrical current. Even the slightest touch of any of these parts to a power line completes an electrical path through the antenna and the installer: **you!**

7. If any part of an antenna system should come in contact with a power line, **do not touch it or try to remove it yourself. Call your local power company.** They will remove it safely.
8. If an accident should occur with the power lines, call for qualified emergency help immediately.

Installation Instructions

Refer to the appropriate quick start guide or hardware installation guide for instructions on installing controllers and access points.



Note

To meet regulatory restrictions, all external antenna configurations must be professionally installed.

Personnel installing the controllers and access points must understand wireless techniques and grounding methods. Access points with internal antennas can be installed by an experienced IT professional.

The controller must be installed by a network administrator or qualified IT professional, and the proper country code must be selected. Following installation, access to the controller should be password protected by the installer to maintain compliance with regulatory requirements and ensure proper unit functionality.

Using the Cisco 5500 Series Controller USB Console Port

The USB console port on the 5500 series controllers connects directly to the USB connector of a PC using a USB Type A-to-5-pin mini Type B cable.



Note

The 4-pin mini Type B connector is easily confused with the 5-pin mini Type B connector. They are not compatible. Only the 5-pin mini Type B connector can be used.

For operation with Microsoft Windows, the Cisco Windows USB console driver must be installed on any PC connected to the console port. With this driver, you can plug and unplug the USB cable into and from the console port without affecting Windows HyperTerminal operations.



Note

Only one console port can be active at a time. When a cable is plugged into the USB console port, the RJ-45 port becomes inactive. Conversely, when the USB cable is removed from the USB port, the RJ-45 port becomes active.

USB Console OS Compatibility

- Microsoft Windows 2000, XP, Vista (Cisco Windows USB console driver required)
- Apple Mac OS X 10.5.2 (no driver required)
- Linux (no driver required)

To install the Cisco Windows USB console driver, follow these steps:

-
- Step 1** Follow these steps to download the USB_Console.inf driver file:
- Click this URL to go to the Software Center:
<http://tools.cisco.com/support/downloads/go/Redirect.x?mdfid=278875243>
 - Click **Wireless LAN Controllers**.
 - Click **Standalone Controllers**.
 - Click **Cisco 5500 Series Wireless LAN Controllers**.
 - Click **Cisco 5508 Wireless LAN Controller**.
 - Choose the USB driver file.
 - Save the file to your hard drive.
- Step 2** Connect the Type A connector to a USB port on your PC.
- Step 3** Connect the mini Type B connector to the USB console port on the controller.
- Step 4** When prompted for a driver, browse to the USB_Console.inf file on your PC. Follow the prompts to install the USB driver.



Note Some systems might also require an additional system file. You can download the Usbser.sys file from this URL:
<http://support.microsoft.com/kb/918365>

The USB driver is mapped to COM port 6. Some terminal emulation programs do not recognize a port higher than COM 4. If necessary, change the Cisco USB systems management console COM port to an unused port of COM 4 or lower. To do so, follow these steps:

-
- Step 1** From your Windows desktop, right-click **My Computer** and choose **Manage**.
- Step 2** From the list on the left side, choose **Device Manager**.
- Step 3** From the device list on the right side, double-click **Ports (COM & LPT)**.
- Step 4** Right-click **Cisco USB System Management Console 0108** and choose **Properties**.
- Step 5** Click the **Port Settings** tab and click the **Advanced** button.
- Step 6** From the COM Port Number drop-down box, choose an unused COM port of 4 or lower.
- Step 7** Click **OK** to save; then close the Advanced Settings dialog box.
- Step 8** Click **OK** to save; then close the Communications Port Properties dialog box.
-

Important Notes for Controllers and Non-Mesh Access Points

This section describes important information about controllers and non-mesh lightweight access points.

ARP Requests Sometimes Fail for Access Points Connected Directly to 2100 Series Controllers

Cisco 2100 series controllers do not support ARP requests from access points connected directly to a port on the controller unless there is an interface configured on that controller port. ARP requests from the access point cannot reach the gateway on the interface VLAN and the access point might lose its connection to the controller.

To work around this limitation, configure the access point's default gateway to match the controller's management IP address, or connect the access point to a switch port between the access point and the 2100 series controller.

WPlus License Features Included in Base License

All features included in a Wireless LAN Controller WPlus license are now included in the base license; this change is introduced in release 6.0.196.0. There are no changes to WCS BASE and PLUS licensing.

These WPlus license features are included in the base license:

- Office Extend AP
- Enterprise Mesh
- CAPWAP Data Encryption

The licensing change can affect features on your wireless LAN when you upgrade or downgrade software releases, so you should be aware of these guidelines:

- If you have a WPlus license and you upgrade from 6.0.18x to 6.0.196.0: Your license file contains both Basic and WPlus license features. You won't see any disruption in feature availability and operation.
- If you have a WPlus license and you downgrade from 6.0.196.0 to 6.0.188 or 6.0.182: The license file in 6.0.196.0 contains both Basic and WPlus license features, so you won't see any disruption in feature availability and operation.
- If you have a base license and you downgrade from 6.0.196.0 to 6.0.188 or 6.0.182: When you downgrade, you lose all WPlus features.



Note

Some references to Wireless LAN Controller WPlus licenses remain in WCS and in the controller CLI and GUI in release 6.0.196.0. However, WLC WPlus license features have been included in the Base license, so you can ignore those references.

Additive Licenses Available for 5500 Series Controllers

You can now purchase licenses to support additional access points on 5500 series controllers. The new additive licenses (for 25, 50, or 100 access points) can be upgraded from all license tiers (12, 25, 50, 100, and 250 access points). The additive licenses are supported through both rehosting and RMAs.

One-Time Password (OTP) Support

One Time Passwords (OTP) are supported on the Wireless Lan Controller (WLC) using TACACS and RADIUS. In this configuration, the controller acts as a transparent pass-thru device. The controller forwards all client requests to the TACACS/RADIUS server without inspecting the client behavior. When using OTP the client must only establish a single connection to the controller to function properly. The controller currently does not have any intelligence or checks to correct a client that is trying to establish multiple connections.

RADIUS Called-station-id and Calling-station-id Attributes

In software releases prior to 6.0, the controller sends uppercase alpha characters in the MAC address. In software release 6.0 or later, the controller sends lowercase alpha characters in the MAC address for the RADIUS called-station-id and calling-station-id attributes. If you enabled these attributes for 802.1X authentication in previous releases and upgrade to software release 6.0, client authentication fails. Therefore, you must change the MAC addresses to lowercase characters on the RADIUS server before upgrading to software release 6.0.

Access Point Groups

You can create up to 50 access point groups for 2100 series controllers and controller network modules and up to 192 access point groups for 4400 series controllers, 5500 series controllers, the Cisco WiSM, and the 3750G wireless LAN controller switch.

Using Access Points in Sniffer Mode

You must disable IP-MAC address binding in order to use an access point in sniffer mode if the access point is joined to a 5500 series controller, a 2100 series controller, or a controller network module running software release 6.0. To disable IP-MAC address binding, enter this command using the controller CLI: **config network ip-mac-binding disable**.

WLAN 1 must be enabled in order to use an access point in sniffer mode if the access point is joined to a 5500 series controller, a 2100 series controller, or a controller network module running software release 6.0. If WLAN 1 is disabled, the access point cannot send packets.

Inter-Release Controller Mobility

When controllers in the mobility list are running different software releases (such as 5.0, 5.1, 5.2, and 6.0), Layer 2 or Layer 3 client roaming is not supported between GD to ED. It is supported only between controllers running the same and GD release such as 6.0 and 4.2.

Guest tunneling works only between controllers running the same software release or between controllers running software release 4.2 and controllers running any later software release (for example, 4.2 to 5.0, 4.2 to 5.1, 4.2 to 5.2, or 4.2 to 6.0). Guest tunneling does not work among controllers running other combinations of software.

RLDP Limitations in This Release

Rogue Location Discovery Protocol (RLDP) is a controller feature that detects the presence of rogue access points that are connected to your wired network. In this software release, RLDP operates with these limitations:

- RLDP detects rogue access points that are configured for open authentication.
- RLDP detects rogue access points that use a broadcast BSSID (that is, the access point broadcasts its SSID in beacons).
- RLDP detects only rogue access points that are on the same network. In other words, if an access list in the network prevents the sending of RLDP traffic from the rogue access point to the controller, RLDP does not work.
- RLDP does not work on 5-GHz dynamic frequency selection (DFS) channels.
- If the automatic RLDP attempt does not detect the rogue (due to a noisy RF environment, for example), the controller does not retry. However, you can initiate RLDP manually on a rogue at any time.

Also, in controller software release 6.0, the rogue containment packet transmission times have changed as follows:

- For monitor mode, rogue containment deauthentication packets are still sent at 100-msec intervals.
- For non-monitor mode, deauthentication packets are sent at 500 msec (minimum). In previous releases, they are sent at 100-msec intervals.

Internal DHCP Server

When clients use the controller's internal DHCP server, IP addresses are not preserved across reboots. As a result, multiple clients can be assigned the same IP address. To resolve any IP address conflicts, clients must release their existing IP address and request a new one.

Bootloader Menu

When you plug a controller into an AC power source, the bootup script and power-on self-test run to initialize the system. During this time, you can press **Esc** to display the bootloader Boot Options Menu. The menu options for the 5500 series controllers are different than for other controller platforms.

Bootloader Menu for 5500 Series Controllers

```

Boot Options
Please choose an option from below:
1. Run primary image
2. Run backup image
3. Change active boot image
4. Clear Configuration
5. Format FLASH Drive
6. Manually update images
Please enter your choice:

```

Bootloader Menu for Other Controller Platforms

```

Boot Options
Please choose an option from below:
1. Run primary image
2. Run backup image

```

```
3. Manually update images
4. Change active boot image
5. Clear Configuration
Please enter your choice:
```

Enter **1** to run the current software, enter **2** to run the previous software, or enter **4** (on a 5500 series controller) or **5** (on another controller platform) to run the current software and set the controller configuration to factory defaults. Do not choose the other options unless directed to do so.



Note

Only options 1 through 3 are available on 5500 series controllers in FIPS mode.



Note

Refer to the Installation Guide or Quick Start Guide for your controller for more details on running the bootup script and power-on self-test.

Fragmented Pings

Cisco 5500 series controllers do not support fragmented pings on any interface. Similarly, Cisco 4400 series controllers, the Cisco WiSM, and the Catalyst 3750G Integrated Wireless LAN Controller Switch do not support fragmented pings on the AP-manager interface.

802.11g Controller and 802.11b Clients

When a controller is configured to allow only 802.11g traffic, 802.11b client devices are able to successfully associate to an access point but cannot pass traffic. When you configure the controller for 802.11g traffic only, disable any channels (such as channel 14 in Japan) that allow associations from 802.11b client devices.

FIPS 140-2

The Cisco 4400 series controllers, the Cisco WiSM, and the Catalyst 3750G Wireless LAN Controller Switch have received NIST FIPS 140-2 Level 2 certification. Click this link to view the NIST Security Policies and compliant software versions:

<http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/1401vend.htm>

CAPWAP Problems with Firewalls and ACLs

If you have a firewall or access control list (ACL) between the controller and its access points that allows LWAPP traffic, before upgrading to software release 5.2 or later and CAPWAP, you should allow CAPWAP traffic from the access points to the controller by opening the following destination ports:

- UDP 5246
- UDP 5247

The access points use a random UDP source port to reach these destination ports on the controller. In controller software release 5.2, LWAPP was removed and replaced by CAPWAP, but if you have a new out-of-the-box access point, it could try to use LWAPP to contact the controller before downloading the CAPWAP image from the controller. Once the access point downloads the CAPWAP image from the controller, it uses only CAPWAP to communicate with the controller.

**Note**

After 60 seconds of trying to join a controller with CAPWAP, the access point falls back to using LWAPP. If it cannot find a controller using LWAPP within 60 seconds, it tries again to join a controller using CAPWAP. The access point repeats this cycle of switching from CAPWAP to LWAPP and back again every 60 seconds until it joins a controller.

**Note**

An access point with the LWAPP recovery image (an access point converted from autonomous mode or an out-of-the-box access point) uses only LWAPP to try to join a controller before downloading the CAPWAP image from the controller.

Messages Appearing Upon Controller Bootup

Several messages might flood the message logs when the controller boots up. These messages appear because of a failure to read or delete several different configuration files. These are low-severity messages that can safely be ignored. They do not affect controller functionality. These are some examples:

```
Mar 18 16:05:56.753 osapi_file.c:274 OSAPI-5-FILE_DEL_FAILED: Failed to delete the file :
sshpmInitParms.cfg. file removal failed.
-Process: Name:fp_main_task, Id:11ca7618
Mar 18 16:05:56.753 osapi_file.c:274 OSAPI-5-FILE_DEL_FAILED: Failed to delete the file :
bcastInitParms.cfg. file removal failed.
-Process: Name:fp_main_task, Id:11ca7618
```

Web Authentication Redirects

The controller supports web authentication redirects only to HTTP (HTTP over TCP) servers. It does not support web authentication redirects to HTTPS (HTTP over SSL) servers.

**Note**

For 5500 series controllers, 2100 series controllers, and controller network modules, you must configure a preauthentication access control list (ACL) on the WLAN for the external web server and then choose this ACL as the WLAN preauthentication ACL under Security Policies > Web Policy on the WLANs > Edit page.

Security Issues with pure Web Authentication without L2 Protection

On pure web authentication without any L2 protection, it is possible to do MAC address spoofing and hijack connections. This is a security issue coming from the use of 802.11 open technologies, and not from web authentication itself.

This can be prevented by using 802.11i encryption or VPN IPsec/SSL technologies.

If you are using pure web authentication, you should take measures to ensure that guest access clients cannot access sensitive resources.

Cisco 1250 Series Access Points and Cisco 7920 IP Phones

Cisco 1250 series access points are not supported for use with the Cisco 7920 IP phone. They can, however, be used with the Cisco 7921 and 7925 IP phones.

Crash Files for 1250 Series Access Points

The 1250 series access points may contain a bootloader older than version 12.4(10b)JA. Units with old bootloaders do not generate a crash log when a crash occurs. The crash log is disabled so that a crash does not corrupt the flash file system. Units with bootloader versions 12.4(10b)JA or later generate a crash log if the access point is associated to a controller running software release 4.2.112.0 or later.

New 1250 series access points shipped from the factory contain new bootloader images, which fixes the flash file system after it is corrupted during a crash (without losing files). This new bootloader automatically sets a new CRASH_LOG environment variable to "yes," which enables a crash log to be generated following a crash but only on controllers running software release 4.2.112.0 or later. Therefore, no user configuration is needed to enable a crash log on new 1250 series access points shipped from the factory.

These examples show the output from the CLI commands (in bold) that you use to check the bootloader version on lightweight and autonomous 1250 series access points:

Commands entered on the controller CLI:

debug ap enable AP001b.d513.1754

debug ap command "show version | include BOOTLDR" AP001b.d513.1754

```
Thu Apr 23 09:31:38 2009: AP001b.d513.1754: BOOTLDR: C1250 Boot Loader
(C1250-BOOT-M) Version 12.4(10b)JA, RELEASE SOFTWARE (fc1)
```

Command entered on the access point CLI:

show version | include BOOTLDR

```
BOOTLDR: C1250 Boot Loader (C1250-BOOT-M) Version 12.4(10b)JA, RELEASE SOFTWARE (fc1)
```

Configuration File Stored in XML

In controller software release 4.2.61.0 and later, the controller's bootup configuration file is stored in an Extensible Markup Language (XML) format rather than in binary format. When you upgrade a controller to 4.2.61.0 or a later software release, the binary configuration file is migrated and converted to XML.



Note

You cannot download a binary configuration file onto a controller running software release 6.0.196.0. Also, do not attempt to make changes to the configuration file. If you do so 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.

**Note**

You cannot modify the configuration files for 2000, 4000, and 4100 series controllers. The ability to modify configuration files is available in controller software release 5.2 or later, and these controllers support only earlier software releases (up to the 4.2 release for 2000 series controllers and up to the 3.2 release for 4000 and 4100 series controllers).

LWAPP Mode Changes

When you upgrade to controller software release 5.0.148.0 or later, the LWAPP mode changes to Layer 3 if it was previously configured for Layer 2.

If you downgrade from controller software release 6.0.196.0, 6.0.188.0, 5.2.178.0, 5.2.157.0, 5.1.151.0, or 5.0.148.0 to 4.2.61.0 or an earlier release, the LWAPP mode changes from Layer 3 to Layer 2. Access points might not join the controller, and you must manually reset the controller to Layer 3 to resolve this issue.

Access Points Send Multicast and Management Frames at Highest Basic Rate

Access points running recent Cisco IOS versions transmit multicast frames at the highest configured basic rate and management frames at lowest basic mandatory rates. This can cause reliability problems. Access points running LWAPP or autonomous Cisco IOS should transmit multicast and management frames at the lowest configured basic rate. Such behavior is necessary to provide good coverage at the cell's edge, especially for unacknowledged multicast transmissions where multicast wireless transmissions may fail to be received.

Because multicast frames are not retransmitted at the MAC layer, clients at the edge of the cell may fail to receive them successfully. If reliable reception is a goal, then multicast frames should be transmitted at a low data rate. If support for high data rate multicast frames is required, then it may be useful to shrink the cell size and disable all lower data rates.

Depending on your specific requirements, you can take the following action:

- If you need to transmit multicast data with the greatest reliability and if there is no need for great multicast bandwidth, then configure a single basic rate, one that is low enough to reach the edges of the wireless cells.
- If you need to transmit multicast data at a certain data rate in order to achieve a certain throughput, then configure that rate as the highest basic rate. You can also set a lower basic rate for coverage of non-multicast clients.

Disabling Radio Bands

The controller disables the radio bands that are not permitted by the configured country of operation (CSCsi48220).

40-MHz Channels in the 2.4-GHz Band

Cisco recommends that you do not configure 40-MHz channels in the 2.4-GHz radio band because severe co-channel interference is likely to occur.

802.11a Channels 120, 124, and 128 Disabled

802.11a channels 120, 124, and 128 are disabled to achieve compliance with draft EN 301 893 version 1.5.1 on the following -E regulatory domain products: AP1131AG, AP1243AG, and AP1252AG.

Impact of External Antenna Gain on Transmit Power

In controller software release 4.2 or later, external antenna gain is factored into the maximum transmit power of the access point. Therefore, when you upgrade from an earlier software release to 4.2 or later, you might see a decrease in transmit power output.

Supporting Oversized Access Point Images

Controller software release 4.2 or later allows you to upgrade to an oversized access point image by deleting the recovery image to create sufficient space. This feature affects only access points with 8 MB of flash (the 1100, 1200, and 1310 series access points). All newer access points have a larger flash size than 8 MB.



Note

As of August 2007, there are no oversized access point images, but as new features are added, the access point image size will continue to grow.

The recovery image provides a backup image that can be used if an access point power-cycles during an image upgrade. The best way to avoid the need for access point recovery is to prevent an access point from power-cycling during a system upgrade. If a power-cycle occurs during an upgrade to an oversized access point image, you can recover the access point using the TFTP recovery procedure.

Follow these steps to recover the access point using the TFTP recovery procedure.

-
- Step 1** Download the required recovery image from Cisco.com (c1100-rcvk9w8-mx, c1200-rcvk9w8-mx, or c1310-rcvk9w8-mx) and install it in the root directory of your TFTP server.
 - Step 2** Connect the TFTP server to the same subnet as the target access point and power-cycle the access point. The access point boots from the TFTP image and then joins the controller to download the oversized access point image and complete the upgrade procedure.
 - Step 3** After the access point has been recovered, you may remove the TFTP server.
-

Multicast Queue Depth

The multicast queue depth is 512 packets on all controller platforms. However, the following message might appear on 2106 controllers: “Rx Multicast Queue is full on Controller.” This message does not appear on 4400 series controllers because the 4400 NPU filters ARP packets while all forwarding (multicast or otherwise) and multicast replication are done in the software on the 2106.

This message appears when too many multicast messages are sent to the CPU. In controller software releases prior to 5.1, multicast, CDP, and ARP packets share the same queue. However, in software releases 5.1 and later, these packets are separated into different queues. There are currently no controller commands that can be entered to determine if the multicast receive queue is full. When the queue is full, some packets are randomly discarded.

MAC Filtering for WGB Wired Clients

Controller software release 4.1.178.0 or later enables you to configure a MAC-filtering IP address for a workgroup bridge (WGB) wired client to allow passive WGB wired clients, such as terminal servers or printers with static IP addresses, to be added and remain in the controller's client table while the WGB is associated to a controller in the mobility group. This feature, activated by the **config macfilter ipaddress MAC_address IP_address** CLI command, can be used with any passive device that does not initiate any traffic but waits for another device to start communication.

This feature allows the controller to learn the IP address of a passive WGB wired client when the WGB sends an IAPP message to the controller that contains only the WGB wired client's MAC address. Upon receiving this message from the WGB, the controller checks the local MAC filter list (or the anchor controller's MAC filter list if the WGB has roamed) for the client's MAC address. If an entry is found and it contains an IP address for the client, the controller adds the client to the controller's client table.



Note

Unlike the existing MAC filtering feature for wireless clients, you are not required to enable MAC filtering on the WLAN for WGB wired clients.



Note

WGB wired clients using MAC filtering do not need to obtain an IP address through DHCP to be added to the controller's client table.

CKIP Not Supported with Dynamic WEP

In controller software release 4.1.185.0 or later, CKIP is supported for use only with static WEP. It is not supported for use with dynamic WEP. Therefore, a wireless client that is configured to use CKIP with dynamic WEP is unable to associate to a wireless LAN that is configured for CKIP. Cisco recommends that you use either dynamic WEP without CKIP (which is less secure) or WPA/WPA2 with TKIP or AES (which are more secure).

Setting the Date and Time on the Controller

Cisco Aironet lightweight access points do not connect to the controller if the date and time are not set properly. Set the current date and time on the controller before allowing the access points to connect to it.

Synchronizing the Controller and Location Appliance

For controller software release 4.2 or later, if a location appliance (release 3.1 or later) is installed on your network, the time zone must be set on the controller to ensure proper synchronization between the two systems. Also, Cisco highly recommends that the time be set for networks that do not have location appliances. Refer to Chapter 4 of the *Cisco Wireless LAN Controller Configuration Guide, Release 5.2* for instructions for setting the time and date on the controller.



Note

The time zone can be different for the controller and the location appliance, but the time zone delta must be configured accordingly, based on Greenwich Mean Time (GMT).

FCC DFS Support on 1130 Series Access Points

Federal Communications Commission (FCC) dynamic frequency selection (DFS) is supported only on 1130 series access points in the United States, Canada, and the Philippines that have a new FCC ID. Access points use DFS to detect radar signals such as military and weather sources and then switch channels to avoid interfering with them. 1130 series access points with FCC DFS support have an FCC ID *LDK102054E* sticker. 1130 series access points without FCC DFS support have an *LDK102054* (no *E* suffix) sticker. 1130 series access points that are operating in the United States, Canada, or the Philippines; have an FCC ID *E* sticker; and are running the 4.1.171.0 software release or later can use channels 100 through 140 in the UNII-2 band.

Inaccurate Transmit Power Display

After you change the position of the 802.11a radio antenna for a lightweight 1200 or 1230 series access point, the power setting is not updated in the controller GUI and CLI. Regardless of the user display, the internal data is updated, and the transmit power output is changed accordingly. To see the correct transmit power display values, reboot the access point after changing the antenna's position. (CSCsf02280)

Setting the Retransmit Timeout Value for TACACS+ Servers

Cisco recommends that the retransmit timeout value for TACACS+ authentication, authorization, and accounting servers be increased if you experience repeated reauthentication attempts or the controller falls back to the backup server when the primary server is active and reachable. The default retransmit timeout value is 2 seconds and can be increased to a maximum of 30 seconds.

Configuring an Access Point's Prestandard Power Setting

An access point can be powered by a Cisco prestandard 15-watt switch with Power over Ethernet (PoE) by entering this command:

```
config ap power pre-standard {enable | disable} {all | Cisco_AP}
```

A Cisco prestandard 15-watt switch does not support intelligent power management (IPM) but does have sufficient power for a standard access point. The following Cisco prestandard 15-watt switches are available:

- AIR-WLC2106-K9
- WS-C3550, WS-C3560, WS-C3750
- C1880
- 2600, 2610, 2611, 2621, 2650, 2651
- 2610XM, 2611XM, 2621XM, 2650XM, 2651XM, 2691
- 2811, 2821, 2851
- 3631-telco, 3620, 3640, 3660
- 3725, 3745
- 3825, 3845

The **enable** version of this command is required for full functionality when the access point is powered by a Cisco prestandard 15-watt switch. It is safe to use if the access point is powered by either an IPM switch or a power injector or if the access point is not using one of the 15-watt switches listed above.

You might need this command if your radio operational status is “Down” when you expect it to be “Up.” Enter the **show msglog** command to look for this error message, which indicates a PoE problem:

```
Apr 13 09:08:24.986 spam_lrad.c:2262 LWAPP-3-MSGTAG041: AP 00:14:f1:af:f3:40 is unable to
verify sufficient in-line power. Radio slot 0 disabled.
```

Controller Functions that Require a Reboot

After you perform these functions on the controller, you must reboot the controller in order for them to take effect:

- Enable or disable link aggregation (LAG)
- Enable a feature that is dependent on certificates (such as HTTPS and web authentication)
- Add new or modify existing SNMP v3 users
- Install a license, change the license feature set, or change the priority of an AP-count evaluation license on a 5500 series controller

2106 Controller LEDs

The 2106 controller’s Status LED and AP LED do not flash amber when software is being uploaded to the controller or downloaded to an access point, respectively.



Note

Some versions of the *Cisco 2106 Wireless LAN Controller Quick Start Guide* might incorrectly state that these LEDs flash amber during a software upload or download.

Rate-Limiting on the Controller

Rate-limiting is applicable to all traffic destined to the CPU from either direction (wireless or wired). Cisco recommends that you always run the controller with the default **config advanced rate enable** command in effect in order to rate-limit traffic to the controller and protect against denial-of-service (DoS) attacks. You can use the **config advanced rate disable** command to stop rate-limiting of Internet Control Message Protocol (ICMP) echo responses for testing purposes. However, Cisco recommends that you reapply the **config advanced rate enable** command after testing is complete.

Pings Supported to the Management Interface of the Controller

Controller software release 4.1.185.0 or later is designed to support ICMP pings to the management interface either from a wireless client or a wired host. ICMP pings to other interfaces configured on the controller are not supported.

Pinging from a Network Device to a Controller Dynamic Interface

Pinging from a network device to a controller dynamic interface may not work in some configurations. When pinging does operate successfully, the controller places Internet Control Message Protocol (ICMP) traffic in a low-priority queue, and the reply to ping is on best effort. Pinging does not pose a security threat to the network. The controller rate limits any traffic to the CPU, and flooding the controller is prevented. Clients on the WLAN associated with the interface pass traffic normally.

GLBP Not Supported

Controller software release 4.2 or later is not compatible with the Gateway Load Balancing Protocol (GLBP). Make sure to configure the controller's default gateway to a fixed address and not to the GLBP virtual address.

4400 Series Controllers Do Not Forward Subnet Broadcasts through the Guest Tunnel

As designed, 4400 series controllers do not forward IP subnet broadcasts from the wired network to wireless clients across the EoIP guest tunnel.

Connecting 1100 and 1300 Series Access Points

You must install software release 4.0.179.8 or later on the controller before connecting 1100 and 1300 series access points to the controller.

Preventing Clients from Accessing the Management Network on a Controller

To prevent or block a wired or wireless client from accessing the management network on a controller (from the wireless client dynamic interface or VLAN), the network administrator should ensure that there is no route through which to reach the controller from the dynamic interface or use a firewall between the client dynamic interface and the management network.

Voice Wireless LAN Configuration

Cisco recommends that aggressive load balancing always be turned off either through the controller GUI or CLI in any wireless network that is supporting voice, regardless of vendor. When aggressive load balancing is turned on, voice clients can hear an audible artifact when roaming, and the handset is refused at its first reassociation attempt.

Changing the IOS LWAPP Access Point Password

Cisco IOS Lightweight Access Point Protocol (LWAPP) access points have a default password of *Cisco*, and the pre-stage configuration for LWAPP access points is disabled by default. To enable it, you must configure the access point with a new username and password when it joins the controller. Enter this command using the controller CLI to push a new username and password to the access point:

```
config ap mgmtuser add user_id password password {Cisco_AP | all}
```

- The *Cisco_AP* parameter configures the username and password on the specified access point.
- The **all** parameter configures the username and password on all the access points registered to the controller.

The password pushed from the controller is configured as “enable password” on the access point.

There are some cases where the pre-stage configuration for LWAPP access points is disabled and the access point displays the following error message when the CLI commands are applied:

“ERROR!!! Command is disabled.”

For more information, refer to [Upgrading Autonomous Cisco Aironet Access Points to Lightweight Mode](#).

Exclusion List (Blacklist) Client Feature

If a client is not able to connect to an access point, and the security policy for the WLAN and client are correct, the client has probably been disabled. In the controller GUI, you can view the client’s status on the Monitor > Summary page under Client Summary. If the client is disabled, click **Remove** to clear the disabled state for that client. The client automatically comes back and, if necessary, reattempts authentication.

Automatic disabling happens as a result of too many failed authentications. Clients disabled due to failed authorization do not appear on the permanent disable display. This display is only for those MACs that are set as permanently disabled by the administrator.

RADIUS Servers and the Management VLAN

If a RADIUS server is on a directly connected subnet (with respect to the controller), then that subnet must be the management VLAN subnet.

RADIUS Servers

This product has been tested with CiscoSecure ACS 4.2 and later and works with any RFC-compliant RADIUS server.

Management Usernames and Local Netuser Names

Management usernames and local netuser names must be unique because they are stored in the same database. That is, you cannot assign the same name to a management user and a local netuser.

Using the Backup Image

The controller bootloader stores a copy of the active primary image and the backup image. If the primary image becomes corrupted, you can use the bootloader to boot with the backup image.

With the backup image stored before rebooting, be sure to choose **Option 2: Run Backup Image** from the boot menu to boot from the backup image. Then upgrade with a known working image and reboot the controller.

Home Page Retains Web Authentication Login with IE 5.x

Because of a caching problem in the Internet Explorer 5.x browser, the home page retains the web authentication login. To correct this problem, clear the history or upgrade your workstation to Internet Explorer 6.x.

Ad-Hoc Rogue Containment

Client card implementations may mitigate the effectiveness of ad-hoc containment.

Changing the Default Values of SNMP Community Strings

The controller has commonly known default values of “public” and “private” for the read-only and read-write SNMP community strings. Using these standard values presents a security risk. Therefore, Cisco strongly advises that you change these values. Refer to the *Cisco Wireless LAN Controller Configuration Guide, Release 5.2* for configuration instructions.

Changing the Default Values for SNMP v3 Users

The controller uses a default value of “default” for the username, authentication password, and privacy password for SNMP v3 users. Using these standard values presents a security risk. Therefore, Cisco strongly advises that you change these values. Refer to the *Cisco Wireless LAN Controller Configuration Guide, Release 5.2* for configuration instructions.



Note

SNMP v3 is time sensitive. Make sure that you have configured the correct time and time zone on your controller.

Features Not Supported on 2100 Series Controllers

This hardware feature is not supported on 2100 series controllers:

- Service port (separate out-of-band management 10/100-Mbps Ethernet interface)

These software features are not supported on 2100 series controllers:

- VPN termination (such as IPSec and L2TP)
- VPN passthrough option



Note

You can replicate this functionality on a 2100 series controller by creating an open WLAN using an ACL.

- Termination of guest controller tunnels (origination of guest controller tunnels is supported)
- External web authentication web server list
- Spanning Tree Protocol (STP)
- Port mirroring
- AppleTalk
- QoS per-user bandwidth contracts
- IPv6 pass-through
- Link aggregation (LAG)
- Multicast-unicast mode

Features Not Supported on 5500 Series Controllers

These software features are not supported on 5500 series controllers:

- Static AP-manager interface



Note

For 5500 series controllers, you are not required to configure an AP-manager interface. The management interface acts like an AP-manager interface by default, and the access points can join on this interface.

- Asymmetric mobility tunneling

- Spanning Tree Protocol (STP)
- Port mirroring
- Layer 2 access control list (ACL) support
- VPN termination (such as IPSec and L2TP)
- VPN passthrough option



Note You can replicate this functionality on a 5500 series controller by creating an open WLAN using an ACL.

- Configuration of 802.3 bridging, AppleTalk, and Point-to-Point Protocol over Ethernet (PPPoE)



Note The 5500 series controllers bridge these packets by default. If desired, you can use ACLs to block the bridging of these protocols.

Some Clients See Only 64 Access Point MAC Addresses (BSSIDs) at a Time

In a crowded RF environment, clients may not be able to detect the desired SSID because of internal table limitations. Sometimes disabling and then enabling the client interface forces a rescan. Your RF environment needs to be controlled. Cisco UWN rogue access point detection and containment can help you to enforce RF policies in your buildings and campuses.

2106 Image Not Supported for 3504 Controllers

The 2106 controller image is supported for use with only 2100 series controllers. Do not install the 2106 image on a 3504 controller. Otherwise, errors may occur. Install only the 3504 image on a 3504 controller.

Running a 3504 Image on a 2106 Series Controller

It is possible to run a 3504 controller image on a 2106 series controller, but Cisco Aironet 1130, 1200, and 1240 series access points will not be able to connect to the controller.

Upgrading External Web Authentication

When upgrading a controller from operating system release 2.0 or 2.2.127.4 to release 3.2.116.21 or later, update the external web authentication configuration as follows:

1. For 5500 series controllers, 2100 series controllers, and controller network modules, you must configure a preauthentication access control list (ACL) on the WLAN for the external web server and then choose this ACL as the WLAN preauthentication ACL under **Security Policies > Web Policy** on the WLANs > Edit page.
2. For 4400 series controllers and the Cisco WiSM, instead of using a preauthentication ACL, the network manager must configure the external web server IP address using this command:

config custom-web ext-webserver add index IP-address



Note *IP-address* is the address of any web server that performs external web authentication.

- The network manager must use the new login_template shown here:



Note Make sure to format the script to avoid any extra characters or spaces before using the web authentication template.

```
<html>
<head>
<meta http-equiv="Pragma" content="no-cache"> <meta HTTP-EQUIV="Content-Type"
CONTENT="text/html; charset=iso-8859-1"> <title>Web Authentication</title> <script>

function submitAction(){
    var link = document.location.href;
    var searchString = "redirect=";
    var equalIndex = link.indexOf(searchString);
    var redirectUrl = "";
    var urlStr = "";
    if(equalIndex > 0) {
        equalIndex += searchString.length;
        urlStr = link.substring(equalIndex);
        if(urlStr.length > 0){
            redirectUrl += urlStr;
            if(redirectUrl.length > 255)
                redirectUrl = redirectUrl.substring(0,255);
            document.forms[0].redirect_url.value = redirectUrl;
        }
    }

    document.forms[0].buttonClicked.value = 4;
    document.forms[0].submit();
}

function loadAction(){
    var url = window.location.href;
    var args = new Object();
    var query = location.search.substring(1);
    var pairs = query.split("&");
    for(var i=0;i<pairs.length;i++){
        var pos = pairs[i].indexOf('=');
        if(pos == -1) continue;
        var argname = pairs[i].substring(0,pos);
        var value = pairs[i].substring(pos+1);
        args[argname] = unescape(value);
    }
    //alert( "AP MAC Address is " + args.ap_mac);
    //alert( "The Switch URL is " + args.switch_url);
    document.forms[0].action = args.switch_url;

    // This is the status code returned from webauth login action
    // Any value of status code from 1 to 5 is error condition and user
    // should be shown error as below or modify the message as it suits
    // the customer
    if(args.statusCode == 1){
        alert("You are already logged in. No further action is required on your
part.");
    }
    else if(args.statusCode == 2){
```

```

        alert("You are not configured to authenticate against web portal. No further
action is required on your part.");
    }
    else if(args.statusCode == 3){
        alert("The username specified cannot be used at this time. Perhaps the user is
already logged into the system?");
    }
    else if(args.statusCode == 4){
        alert("Wrong username and password. Please try again.");
    }
    else if(args.statusCode == 5){
        alert("The User Name and Password combination you have entered is invalid.
Please try again.");
    }
}

</script>
</head>
<body topmargin="50" marginheight="50" onload="loadAction();" > <form method="post">
<input TYPE="hidden" NAME="buttonClicked" SIZE="16" MAXLENGTH="15" value="0"> <input
TYPE="hidden" NAME="redirect_url" SIZE="255" MAXLENGTH="255" VALUE=""> <input
TYPE="hidden" NAME="err_flag" SIZE="16" MAXLENGTH="15" value="0">

<div align="center">
<table border="0" cellspacing="0" cellpadding="0"> <tr> <td>&nbsp;&nbsp;&nbsp;</td></tr>

<tr align="center"> <td colspan="2"><font size="10" color="#336699">Web
Authentication</font></td></tr>

<tr align="center">

<td colspan="2"> User Name &nbsp;&nbsp;&nbsp;&nbsp;&nbsp;<input type="TEXT" name="username"
SIZE="25" MAXLENGTH="63" VALUE=""> </td> </tr> <tr align="center" > <td colspan="2">
Password &nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;&nbsp;<input type="Password" name="password"
SIZE="25" MAXLENGTH="24"> </td> </tr>

<tr align="center">
<td colspan="2"><input type="button" name="Submit" value="Submit" class="button"
onclick="submitAction();"> </td> </tr> </table> </div>

</form>
</body>
</html>

```

Important Notes for Controllers and Mesh Access Points

This section describes important information about controllers and mesh access points.

Features Not Supported on Mesh Networks

The following controller features are not supported on mesh networks:

- Multi-country support
- Load-based CAC (Mesh networks support only bandwidth-based, or static, CAC.)
- High availability (fast heartbeat and primary discovery join timer)
- EAP-FASTv1 and 802.1X authentication

- Access point join priority (Mesh access points have a fixed priority.)
- Locally significant certificate
- Location-based services

Caveats

The following sections lists [Open Caveats](#) and [Resolved Caveats](#) for Cisco controllers and lightweight access points for version 6.0.196.0. For your convenience in locating caveats in Cisco's Bug Toolkit, the caveat titles listed in this section are drawn directly from the Bug Toolkit database. These caveat titles are not intended to be read as complete sentences because the title field length is limited. In the caveat titles, some truncation of wording or punctuation might be necessary to provide the most complete and concise description. The only modifications made to these titles are as follows:

- Commands are in **boldface** type.
- Product names and acronyms may be standardized.
- Spelling errors and typos may be corrected.



Note

If you are a registered cisco.com user, view Bug Toolkit on cisco.com at the following website:

<http://tools.cisco.com/Support/BugToolKit/>

To become a registered cisco.com user, go to the following website:

<http://tools.cisco.com/RPF/register/register.do>

Open Caveats

[Table 4](#) lists open caveats in controller software release 6.0.196.0.

Table 4 *Open Caveats*

ID Number	Caveat Title
CSCsd96350	Should allow clearing internal-dhcp lease
CSCsu79692	WLC21xx crashes @ osapiReaper while TFTP download
CSCsv21441	Wireless controller unicast arp issues with redundant gateways
CSCsw20319	WLC5500: Crashe & hang @dtlArpTask w/ build 6.0.35.0
CSCsx70677	WLC5500: Kernel panic after clear config and reset system w/ build 97
CSCsx92007	WLC5500: Hangs after clear config & reset w/ build 101
CSCsy08256	WLC5500: Console hang in SW upgrade forever while upgrade from 105 to 106
CSCsy40609	4404 controller crashed at Task dtlArpTask
CSCsy59254	11n AP's retransmissions on platinum (UP6) queue take too long
CSCsz04885	TALWAR: WebGUI/WebAuth stopped working at UBC
CSCsz42048	Inconsistency in the neighbor RSSI measurements

Table 4 **Open Caveats (Continued)**

ID Number	Caveat Title
CSCta06193	CCXv5: RF Parameters values do not match with CCXv5 Specification
CSCta43615	WLC drop all APs, APs came back, WLC not accessible, SNMP & clients ok
CSCta77755	not able to backup/transfer third party certificates
CSCta91358	H-REAP locking up due to wedge input queue on radio interface.
CSCta93754	Unable to upload customized web bundle from WLC
CSCtb01964	4404 Crashed with no Task information indicated
CSCtb45178	insufficient memory/traceback on AP1130 and AP1232
CSCtb60736	Cannot hard set speed and duplex settings on WLC2112 running 6.0.182.0
CSCtb74239	WISM crashed on task sshpmMainTask System Crash
CSCtb94670	WLC outputs Decrypt errors traplog at client reauth timing
CSCtb96750	AP Fallback causes client drop with HREAP
CSCtc10068	1140 APs trying to join LWAPP controller.
CSCtc13378	5508 Systemcrash on apfProbeThread
CSCtc29250	AP crash on "CAPWAP Health Check"Task.
CSCtc29338	AP Crash - in process "LWAPP CLIENT"
CSCtc31663	wism running 6.0 hangs due to memory leak
CSCtc32748	Noise/Channel measurements not done on all DCA channels
CSCtc49270	Clients can't be deleted from exclusion list if not present in ass. list
CSCtc57611	Delay in Music on Hold on 7925 with HREAP AP
CSCtc58032	Add watchdog to monitor for admin UP and radio DOWN or RESET state
CSCtc67372	Sh run/sh tech hangs on SSH/telnet with paging disabled
CSCtc68378	Choppy Multicast MOH to 7925 with severe packet loss
CSCtc95434	FTP transfer does not work on 2100
CSCtc97144	Fixed 1800 sec session timeout when H-REAP standalone mode
CSCtd28542	WLC crash on emWeb due to AP config change
CSCtd30669	wlan security setting and session timeout are changed after restration
CSCtd66990	405 Method not allowed when using custom web auth bundle
CSCtd73371	WLC Shared memory allocation failed after web passthrough enabled
CSCtd82509	WLC crash at findContextInfo+268
CSCtd84522	Fiber port (gig3) does not create VLAN subinterfaces when bridging
CSCtd86901	Mobility Anchor config for Wlan lost while copying config via autoinstall
CSCtd90304	%MM-3-MEMORY_READ_ERROR: mm_mobile.c:464 Error reading mobility memory
CSCtd99602	Wired Guest: DHCP Required Breaks Web Auth Following Session Timeout
CSCte11997	AIRSPACE-WIRELESS-MIB on Cisco.com is having incomplete traps
CSCte15213	APs in wIPS submode detecting valid APs as soft APs

Table 4 **Open Caveats (Continued)**

ID Number	Caveat Title
CSCte19262	Client Deauthenticated - Unable to locate AP 00:00:00:00:00:00
CSCte24079	2106 LAN hangs after high load with duplex mismatch
CSCte27052	WLC 6.0 - Inconsistency in AAA Override feature
CSCte34291	WLC 6.0.188 - AP crashing on Dot11 driver - stack trace corrupted
CSCte90918	WiSM lock-up during upgrade with full load of APs and Clients
CSCtf12055	Symbol HH cannot get DHCP while coming out of sleep mode
CSCtf14873	controller crash at NPUCheckTask
CSCtf90722	ACL on WLC4400/WiSM can cause low throughput and packet loss.

Resolved Caveats

Table 5 lists caveats resolved in controller software release 6.0.196.0.

Table 5 **Resolved Caveats**

ID Number	Caveat Title
CSCso38071	AP's do not remain Joined if directly connected to WLC2106
CSCsx70889	Crash due to stack corruption caused by recursive tunnels
CSCsz38828	AMAC radio core dumps: transmitter seems to have stopped
CSCsz75186	tcp crash by watchdog timeout due to tcp options
CSCtb12031	1142 / 1252 inconsistently ACKs Vocera (gen1) badge.
CSCtb13491	Malformed IKE packet may cause reload
CSCtb16583	AP changes from Static IP to DHCP and doesn't covert back to Static
CSCtb52563	WLC 4.2.205.0 crashes at spam_CCM_decrypt+124
CSCtc06925	1250-WGB fails to scan for the uplink when it goes out of wifi zone
CSCtc14910	AP 1140 not joining WLC and logging tracebacks
CSCtc15696	1250 and 1130 APs flash got erased
CSCtc41293	Controller doesn't act upon receiving ICMP fragmented needed packet
CSCtc52054	AP1130 crash in HAL_A50X driver
CSCtc73414	AP not generating trap during radio UP -> radio DOWN transition
CSCtc83353	Dynamic interface support for RADIUS request and NAS-ID
CSCtd01611	Important TLS/SSL security update
CSCtd17116	Emergency Image Version shows up N/A
CSCtd18702	Max Tx Power in Country IE is incorrect
CSCtd23497	1242 AP HREAP Mode crashes after %CAPWAP-5-CHANGED state to Join
CSCtd34312	5508 Web Auth breaks with multicast MAC as gateway
CSCtd71123	Association failure due to WMM mismatch in AP and WLC

Table 5 **Resolved Caveats (Continued)**

ID Number	Caveat Title
CSCtd84522	Fiber port (gig3) does not create VLAN subinterfaces when bridging
CSCtd91013	memory corruption crash on 5500
CSCte01087	5508 on 6.0.188.0 won't let AP join when on different VLAN than mgmt int
CSCte07702	Rap 1522 crashes periodically
CSCte08161	Cannot get IP address from server if key-management is "wpa optional"
CSCte43508	5508 data plane hang/crash Task Name: osapiReaper
CSCte73125	APs cannot join wism
CSCte90708	Controller crash in emWeb while viewing mac filter table in GUI

If You Need More Information

If you need information about a specific caveat that does not appear in these release notes, you can use the Cisco Bug Toolkit to find caveats of any severity. Click this URL to browse to the Bug Toolkit:

<http://tools.cisco.com/Support/BugToolKit/>

(If you request a defect that cannot be displayed, the defect number might not exist, the defect might not yet have a customer-visible description, or the defect might be marked Cisco Confidential.)

Troubleshooting

For the most up-to-date, detailed troubleshooting information, refer to the Cisco TAC website at

<http://www.cisco.com/en/US/support/index.html>

Click **Product Support** > **Wireless**. Then choose your product and **Troubleshooting** to find information on the problem you are experiencing.

Documentation Updates

This section lists updates to user documentation that has not yet been added to either printed or online documents.

Omissions

The Package Contents section in the *Quick Start Guide: Cisco 4400 Series Wireless LAN Controllers* should be updated to include this item, which is included with the 4400 series controller:

- DB-9-to-DB-9 null modem cable

Related Documentation

For additional information on the Cisco controllers and lightweight access points, refer to these documents:

- The quick start guide or installation guide for your particular controller or access point
- *Cisco Wireless LAN Controller Configuration Guide*
- *Cisco Wireless LAN Controller Command Reference*
- *Cisco Wireless Control System Configuration Guide*

You can access these documents from this link:

<http://www.cisco.com/cisco/web/psa/default.html>

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS Version 2.0.

CCDE, CCENT, CCSI, Cisco Eos, Cisco HealthPresence, Cisco IronPort, the Cisco logo, Cisco Nurse Connect, Cisco Pulse, Cisco SensorBase, Cisco StackPower, Cisco StadiumVision, Cisco TelePresence, Cisco Unified Computing System, Cisco WebEx, DCE, Flip Channels, Flip for Good, Flip Mino, Flipshare (Design), Flip Ultra, Flip Video, Flip Video (Design), Instant Broadband, and Welcome to the Human Network are trademarks; Changing the Way We Work, Live, Play, and Learn, Cisco Capital, Cisco Capital (Design), Cisco:Financed (Stylized), Cisco Store, Flip Gift Card, and One Million Acts of Green are service marks; and Access Registrar, Aironet, AllTouch, AsyncOS, Bringing the Meeting To You, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, CCSP, CCVP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Lumin, Cisco Nexus, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Collaboration Without Limitation, Continuum, EtherFast, EtherSwitch, Event Center, Explorer, Follow Me Browsing, GainMaker, iLYNX, IOS, iPhone, IronPort, the IronPort logo, Laser Link, LightStream, Linksys, MeetingPlace, MeetingPlace Chime Sound, MGX, Networkers, Networking Academy, PCNow, PIX, PowerKEY, PowerPanels, PowerTV, PowerTV (Design), PowerVu, Prisma, ProConnect, ROSA, SenderBase, SMARTnet, Spectrum Expert, StackWise, WebEx, and the WebEx logo are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0910R)