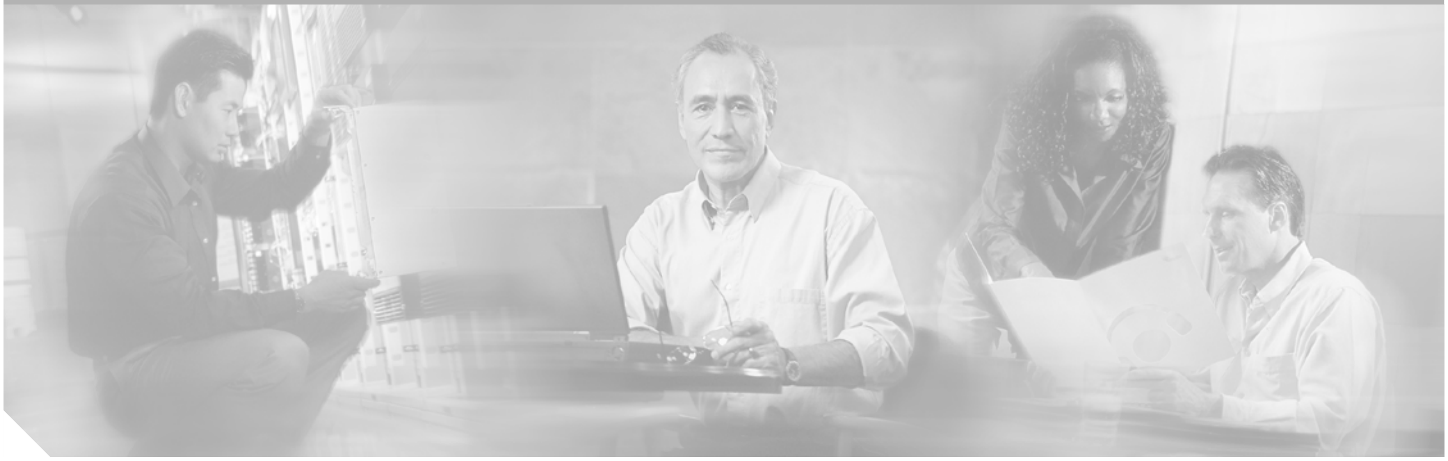

Cisco WLAN Controller Web Interface User Guide

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Cisco WLAN Controller Web Interface User Guide

CONTENTS

Preface

Welcome to the Web User Interface Online Help! This help system is designed for use with Cisco WIreless LAN Controllers and comes bundled with the Operating System software.

Note The Web User Interface Online Help pages require that cookies be enabled on your Web Browser. If the Web User Interface fails to appear when you attempt to log on, make sure that cookies are enabled on your Web Browser.

Note The Web User Interface Online Help pages can be blocked by Internet Explorer Content Advisor. If the Web User Interface Online Help pages fail to appear when you click the **Help** button, make sure Internet Explorer Content Advisor is disabled.

Note The Web User Interface Online Help pages refer to *Controllers*. The term Controllers generally applies to all Cisco 2000 Series Wireless LAN Controllers, NMWLC6 Controllers, Cisco 4100 Series Wireless LAN Controllers, and Cisco 4400 Series Wireless LAN Controllers unless expressly called out. Similarly, the Web User Interface Online Help pages refer to "access points". The term access points generally applies to all Cisco Aironet 1000 Series IEEE 802.11a/b/g lightweight access points (Cisco Aironet 1000 Series lightweight access points) and Cisco Aironet 1030 IEEE 802.11a/b/g remote edge lightweight access points (Cisco Aironet 1030 remote edge lightweight access points), unless expressly called out.

This guide consists of the following chapters:

- Chapter 1, "Using Controller Web User Interface," describes the various sections on the controller user interface.
- Chapter 2, "Monitor Menu Bar Selection," describes how to monitor the various devices associated with the controller.
- Chapter 3, "WLANs Menu Bar Selection," explains how to create and configure a WLAN, and implement various features on a WLAN.
- Chapter 4, "Controller Menu Bar Selection," describes how to configure a controller.
- Chapter 5, "Wireless Menu Bar Selection," describes how to configure access points, enable bridging feature, and configure global parameters for 802.11a and 802.11b/g networks.
- Chapter 6, "Security Menu Bar Selection," describes how to implement the various security policies on a controller.

- Chapter 7, “Management Menu Bar Selection,” describes the various management features that can be implemented on the controller.
- Chapter 8, “Commands Menu Bar Selection,” describes how to download and upload a file through a TFTP server, reboot and reset the controller to factory settings, and so on.

Note If you are configuring the Cisco 4100 Series Wireless LAN Controllers for the very first time, refer to Using the Configuration Wizard.

Audience

This guide is for the networking professional who installs and manages the Cisco Wireless LAN Controllers using the Web Interface. To use this guide, you should have experience working with the Cisco Wireless LAN Controllers and be familiar with the concepts and terminology of wireless local area networks.

Purpose

This guide provides the information you need to configure Wireless LAN Controllers and the access points associated with the controller.

Conventions

This publication uses these conventions to convey instructions and information:

Command descriptions use these conventions:

- Commands and keywords are in boldface text.
- Arguments for which you supply values are in italic.
- Square brackets ([ ]) mean optional elements.
- Braces ({ }) group required choices, and vertical bars (|) separate the alternative elements.
- Braces and vertical bars within square brackets ([{ | }]) mean a required choice within an optional element.

Interactive examples use these conventions:

- Terminal sessions and system displays are in screen font.
- Information you enter is in boldface screen font.
- Nonprinting characters, such as passwords or tabs, are in angle brackets (< >).

Notes, cautions, and timesavers use these conventions and symbols:

Tip Means the following will help you solve a problem. The tips information might not be troubleshooting or even an action, but could be useful information.

Note Means reader take note. Notes contain helpful suggestions or references to materials not contained in this manual.

Caution Means reader be careful. In this situation, you might do something that could result equipment damage or loss of data.

Warning **This warning symbol 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.**

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

http://www.cisco.com/univercd/home/home.htm

You can access the Cisco website at this URL:

http://www.cisco.com

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation DVD

Cisco documentation and additional literature are available in a Documentation DVD package, which may have shipped with your product. The Documentation DVD is updated regularly and may be more current than printed documentation. The Documentation DVD package is available as a single unit.

Registered Cisco.com users (Cisco direct customers) can order a Cisco Documentation DVD (product number DOC-DOCDVD=) from the Ordering tool or Cisco Marketplace.

Cisco Ordering tool:

http://www.cisco.com/en/US/partner/ordering/

Cisco Marketplace:

http://www.cisco.com/go/marketplace/

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpck/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Ordering tool:

  http://www.cisco.com/en/US/partner/ordering/

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 1 800 553-NETS (6387).

Documentation Feedback

You can send comments about technical documentation to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you can perform these tasks:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

http://www.cisco.com/go/psirt

If you prefer to see advisories and notices as they are updated in real time, you can access a Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed from this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

- Emergencies—security-alert@cisco.com
- Nonemergencies—psirt@cisco.com

Tip We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.x through 8.x.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one that has the most recent creation date in this public key server list:

http://pgp.mit.edu:11371/pks/lookup?search=psirt%40cisco.com&op=index&exact=on

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, Cisco Technical Support provides 24-hour-a-day, award-winning technical assistance. The Cisco Technical Support Website on Cisco.com features extensive online support resources. In addition, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not hold a valid Cisco service contract, contact your reseller.

Cisco Technical Support Website

The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, 365 days a year, at this URL:

http://www.cisco.com/techsupport

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

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

Note Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support Website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/techsupport/contacts

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

- Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.
- Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.
- Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.
- Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

http://www.cisco.com/go/marketplace/

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications.

  For current Cisco Press titles and other information, go to Cisco Press at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

  http://www.cisco.com/packet

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

  http://www.cisco.com/go/iqmagazine

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

  http://www.cisco.com/ipj

- World-class networking training is available from Cisco. You can view current offerings at this URL:

  http://www.cisco.com/en/US/learning/index.html

CHAPTER 1

Using Controller Web User Interface

The Web User Interface is built into each Cisco Wireless LAN Controller. The Web User Interface allows up to five users to simultaneously browse into the built-in controller **http** or **https** (**http + SSL**) Web server, configure parameters, and monitor operational status for the controller and its associated access points.

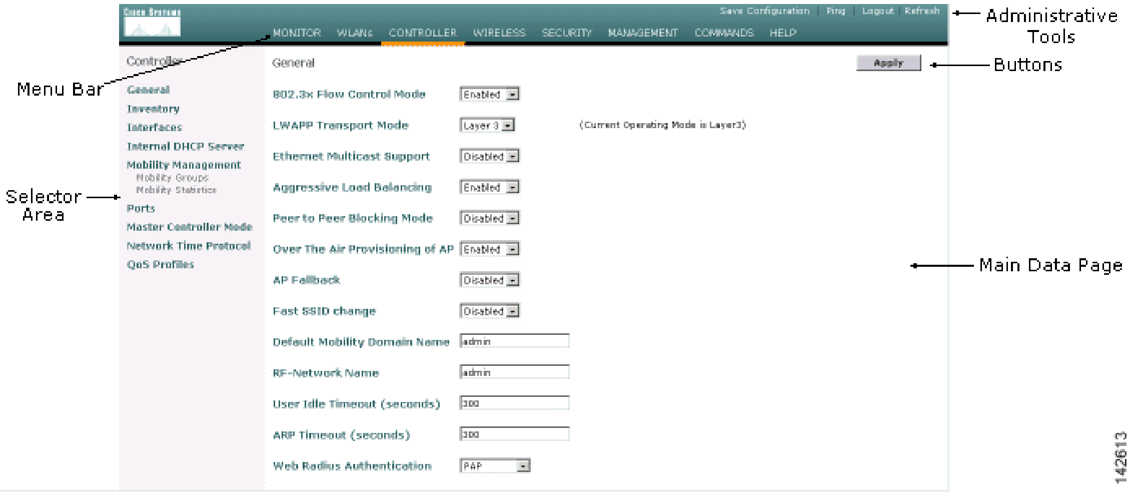
Because the Web User Interface works with one controller at a time, the Web User Interface is especially useful when you wish to configure or monitor a single controller and its associated access points.

Note Cisco strongly recommends that you enable the https: and disable the http:interfaces to ensure more robust security for your Cisco WLAN Solution. For information on disabling **http: interface**, refer to HTTP Configuration.

Note Some popup window filters can be configured to block the Web User Online Help windows. If your system cannot display the Online Help windows, disable or reconfigure your browser popup filter software.

A typical Web User Interface page consists of five areas. The following figure illustrates them.

Figure 1-1 Web User Interface



General

802.3x Flow Control Mode: Enabled
LWAPP Transport Mode: Layer 3 (Current Operating Mode is Layer3)
Ethernet Multicast Support: Disabled
Aggressive Load Balancing: Enabled
Peer to Peer Blocking Mode: Disabled
Over The Air Provisioning of AP: Enabled
AP Fallback: Disabled
Fast SSID change: Disabled
Default Mobility Domain Name: admin
RF-Network Name: admin
User Idle Timeout (seconds): 300
ARP Timeout (seconds): 300
Web Radius Authentication: PAP

Refer to the following for more information:

- Applying Parameters
- Refreshing the Screen
- Troubleshooting

Web User Interface Areas

The following sections describe the Web User Interface page areas and how to use them:

- Menu Bar
- Selector Area
- Main Data Page
- Administrative Tools
- Button Area

Menu Bar

The menu bar shows the names of the main configuration areas of the controller. Refer to the following for available menu bar selections:

- Monitor Menu Bar Selection
- WLANs Menu Bar Selection
- Controller Menu Bar Selection
- Wireless Menu Bar Selection
- Security Menu Bar Selection
- Management Menu Bar Selection
- Commands Menu Bar Selection

Selector Area

The selector area allows you to select a new configuration panel under the menu area that you have selected. You may select a single choice from several available for data to be displayed or configured. The selector area options vary based on the menu you select.

Main Data Page

The main data page depends on what information the menu requires. Input fields are of two basic types:

- Text Fields into which data may be entered using the keyboard.
- Pull-downs from which one of several options may be chosen.

Input fields are black text on a white background. When you enter or select data, it does not go to the controller, but is saved in the field until you click the **Apply** button. There may be fields that contain buttons. Selecting a button does take immediate effect. Data may also be displayed.

Note Microsoft Internet Explorer generates a submit action on the next available button when you press the enter key while in an input field. On most menus this triggers the apply function.

Administrative Tools

This area provides shortcuts to administration functions used on a regular basis when configuring a controller through the Web User Interface.

- **Save Configuration:** Data is saved to the controller in non-volatile RAM (NVRAM) and is preserved in the event of a power cycle. If you reboot the controller, all applied changes are lost unless the configuration has been saved. Click on the **Save** button to save the current configuration.
- **Ping:** Send a Ping to a network element.

  This pop-up window allows the you to tell the controller to send a Ping request to a specified IP address. This can help you determine if there is connectivity between the controller and a particular IP station. Once the operator clicks the Submit button, three pings are sent and the results of the ping are displayed in the pop-up. If a reply to the ping is not received, it shows No Reply Received from IP xxx.xxx.xxx.xxx, otherwise it shows Reply received from IP xxx.xxx.xxx.xxx: (send count = 3, receive count = n).
- **Logout:** Exit the current Web User Interface session.

Button Area

At the right side of the main data area are command buttons to apply or refresh the data displayed in the main data area or request a help window.

Buttons take immediate effect when you select them and information goes to the controller about the state of the menu at that time. The most commonly used buttons are:

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **New:** Select to add a new item to a list.
- **Refresh:** Update the data on the current screen from the controller.
- **Help:** Request that the help page be displayed in a new browser window.

There are additional buttons to perform other actions and not all main data areas have all buttons. The functionality of these buttons are described under the respective help topics.

Applying Parameters

After submitting the new parameters or settings entered the page is refreshed. However, in some cases, the settings may appear different than specified by the operator. This happens where timers are involved and the affected code takes some period of time to execute. Refreshing the menu or tree shows the expected results. An example of this occurs when you enable the spanning tree mode or disabled on the controller.

Refreshing the Screen

Using the refresh function from the Web User Interface refreshes all screens and displays the default initial screen in the main data area.

If you want to refresh a screen in the main data area, and there is no refresh button present on that screen, use your mouse to right-click on the main data area screen, then select the refresh option.

Troubleshooting

Some popup window filters can be configured to block the Web User Interface Online Help windows. If your system does not display the Online Help windows, disable or reconfigure your browser popup filter software.

Monitor Menu Bar Selection

This menu bar selection provides access to the controller and access points' summary details. Use the selector area to access the respective network details. Making this selection from the menu bar displays the system Summary page.

The following sections can be accessed from this menu bar:

- Summary
- Controller Statistics
- Ports Statistics
- Ports > Statistics
- Rogue APs
- Rogue AP Detail
- Known Rogue APs
- Known Rogue APs > New
- Rogue AP Detail
- Rogue Clients
- Rogue Client Detail
- Adhoc Rogues
- 802.11a Radios
- Radio > Statistics
- 802.11b/g Radios
- Clients
- Clients > Detail
- RADIUS Servers
- RADIUS Servers > Authentication Stats
- RADIUS Servers > Accounting Stats

Summary

Use **MONITOR > Summary** to navigate to this page.

The summary page provides a top level description of your controller, access points, clients, WLANs, and rogues. Rogues are unauthorized devices (access points, clients) which are connected to your network.

The controller image is displayed at the top of the summary page and gives information about the controller model number and the number of access points supported by the controller.

The following table describes the parameters on this page. This page is refreshed every 30 seconds.

Note All parameters on this page are read-only parameters.

Table 2-1 Summary Parameters

Parameter	Description
Controller Summary	
Management IP Address	Management IP address of the controller.
Service Port IP Address	The IP address of the controller front-panel service port.
Software Version	The version of the Operating System running on the controller.
System Name	Controller name specified by the operator.
Up Time	Time elapsed since the controller was last rebooted.
System Time	Current time set on the controller.
Internal Temperature	Current internal chassis temperature.
802.11a Network State	Enabled or disabled.
802.11b/g Network State	Enabled or disabled.
Access Point Summary	
802.11a Radios	Number of 802.11a Cisco radios. Click **Detail** for additional information about 802.11a Radios.
802.11b/g Radios	Number of 802.11b/g Cisco radios. Click **Detail** for additional information about 802.11b/g Radios.
All APs	Number of access points associated with this controller. Click **Detail** for additional information about Cisco APs.
Client Summary	
Current Clients	Number of clients currently associated with the controller. Click **Detail** for additional information about current Clients.
Excluded Clients	Enable or disable automatic excluding for client computers by MAC address.
Disabled Clients	Number of clients that are currently disabled.
Rogue Summary	
Active Rogue APs	Number of unauthorized access points detected by controller. Click **Detail** for additional information about active Rogue APs.

Table 2-1 Summary Parameters (continued)

Parameter	Description
Active Rogue Clients	Active clients associated with a rogue access point. Click **Detail** for additional information about Rogue Client Detail.
Adhoc Rogues	Click **Detail** for additional information about Adhoc Rogues.
Top WLANs	
WLAN	Name of the WLAN as specified by the operator.
# of Clients by SSID	Number of clients associated with the WLAN based on SSID.

Controller Statistics

Use **MONITOR > Statistics > Controller** to navigate to this page.

The following table describes the controller statistics displayed on this page.

Table 2-2 Controller Summary Statistics

Parameter	Description
Octets Received	The total number of octets of data received by the processor (excluding framing bits but including FCS octets).
Packets Received Without Error	The total number of packets received by the processor.
Unicast Packets	The number of subnetwork-unicast packets delivered to a higher-layer protocol.
Multicast Packets	The total number of packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.
Broadcast Packets	The total number of packets received that were directed to the broadcast address.
Receive Packets Discarded	The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.
Octets Transmitted	The total number of octets transmitted out of the interface, including framing characters.
Packets Transmitted without Errors	The total number of packets transmitted out of the interface.
Unicast Packets Transmitted	The total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.
Multicast Packets Transmitted	The total number of packets that higher-level protocols requested be transmitted to a Multicast address, including those that were discarded or not sent.
Broadcast Packets Transmitted	The total number of packets that higher-level protocols requested be transmitted to the Broadcast address, including those that were discarded or not sent.
Transmit Packets Discarded	The number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.
Most Address Entries Ever Used	The highest number of Forwarding Database Address Table entries that have been learned by this controller since the most recent reboot.
Address Entries in Use	The number of Learned and static entries in the Forwarding Database Address Table for this controller.
Maximum VLAN Entries	The maximum number of Virtual LANs (VLANs) allowed on this controller.

Table 2-2 Controller Summary Statistics (continued)

Parameter	Description
Most VLAN Entries Ever Used	The largest number of VLANs that have been active on this controller since the last reboot.
Static VLAN Entries	The number of presently active VLAN entries on this controller that have been created statically.
VLAN Deletes	The number of VLANs on this controller that have been created and then deleted since the last reboot.
Time Since Counters Last Cleared	The elapsed time, in days, hours, minutes, and seconds, since the statistics for this controller were last cleared.

Command Buttons

- **Clear Counters:** Sets all summary and detailed controller statistics counters to zero; also resets the "Time Since Counters Last Cleared" field.
- **Help:** Request that the help page be displayed in a new browser window.

Ports Statistics

Use **MONITOR > Statistics > Ports** to navigate to this page.

This page displays the status of each port on the controller. The following table provides a description and the range for each parameter.

Table 2-3 Summary Parameters

Parameter	Description	Range
Port No	Port number on the controller.	1-12 for 10/100Base-T, 13 for 1000Base-T or -SX . 1-24 for 10/100Base-T, 25 for 1000Base-T or -SX . 1 for 1000Base-SX on a Cisco 4100 Series Wireless LAN Controller. 1 for 1000Base-SX on a Cisco 4100 Series Wireless LAN Controller.
Admin Status	State of the port.	Enable; Disable.
Physical Mode	Displays the configuration of the port physical interface.	Auto. 100 Mbps Full Duplex. 100 Mbps Half Duplex. 10 Mbps Full Duplex. 10 Mbps Half Duplex. 1000 Mbps Full Duplex. **Note** In a Cisco NMWLC6 controller, the physical mode is always set to “Auto”.
Physical Status	Displays the actual port physical interface.	Auto. 100 Mbps Full Duplex. 100 Mbps Half Duplex. 10 Mbps Full Duplex. 10 Mbps Half Duplex. 1000 Mbps Full Duplex.
Link Status	Displays the status of the link.	Link Up; Link Down.

The Physical Mode and Status may reflect different values depending on the link status. For example, the Physical Mode may be set to “Auto” while the link actually runs at “10 Mbps Half Duplex”.

Select the **View Stats** link to see detailed statistics for each port on Ports > Statistics.

Command Buttons

- **Help:** Request that the help page be displayed in a new browser window.

Ports > Statistics

Use **MONITOR > Statistics > Ports** and then click **View Stats** to navigate to this page.

This page displays statistics on a per port basis. The **Port Number** appears on the main data page directly below the page title and above the Traffic Statistics tables. The following tables explain the port statistics.

Table 2-4 Traffic Statistics

Parameter	Received Description	Transmitted Description
Total Bytes	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). This object can be used as a reasonable estimate of Ethernet utilization. If greater precision is desired, the etherStatsPkts and etherStatsOctets objects should be sampled before and after a common interval. The result of this equation is the value Utilization which is the percent utilization of the Ethernet segment on a scale of 0 to 100 percent.	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). This object can be used as a reasonable estimate of Ethernet utilization. If greater precision is desired, the etherStatsPkts and etherStatsOctets objects should be sampled before and after a common interval.
Packets (64 Octets)	The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).	The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).
Packets (65-127 Octets)	The total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).	The total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).
Packets (128-255 Octets)	The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).	The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).
Packets (256-511 Octets)	The total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).	The total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).
Packets (512-1023 Octets)	The total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).	The total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).

Table 2-4 Traffic Statistics (continued)

Parameter	Received Description	Transmitted Description
Packets (1024-1518 Octets)	The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).	The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).
Packets (1519-1530 Octets)	The total number of packets (including bad packets) received that were between 1519 and 1530 octets in length inclusive (excluding framing bits but including FCS octets).	The total number of packets (including bad packets) received that were between 1519 and 1530 octets in length inclusive (excluding framing bits but including FCS octets).
Packets (> 1530 Octets)	The total number of packets received that were longer than 1530 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.	The total number of packets transmitted that were longer than 1530 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.

Maximum Info size allowed - The maximum size of the Info (non-MAC) field that this port receives or transmits.

Table 2-5 Successful Packets

Parameter	Received Description	Transmitted Description
Total	The total number of packets received that were without errors.	The total number of packets transmitted that were without errors.
Unicast Packets	The number of subnetwork-unicast packets delivered to a higher-layer protocol.	The total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.
Multicast Packets	The total number of good packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.	The total number of packets that higher-level protocols requested be transmitted to a Multicast address, including those that were discarded or not sent.
Broadcast Packets	The total number of good packets received that were directed to the broadcast address.	The total number of packets that higher-level protocols requested be transmitted to the Broadcast address, including those that were discarded or not sent.

Table 2-6 Protocol Statistics

Parameter	Received Description	Transmitted Description
BPDUs	The count of Bridge Protocol Data Units (BPDUs) received in the spanning tree layer.	The count of Bridge Protocol Data Units (BPDUs) transmitted from the spanning tree layer.
802.3x Pause Frames Received	A count of Media Access Control (MAC) frames received on this interface with an opcode indicating a PAUSE. This counter does not increment when the interface operates in half-duplex mode.	N/A.

Time Since Counters Last Cleared: The elapsed time, in days, hours, minutes, and seconds since the statistics for this port were last cleared.

Click **Clear Counters** to set all summary and controller detailed statistics counters to zero; also resets the “Time Since Counters Last Cleared” field.

Table 2-7 Received Packets with MAC Errors

Parameter	Description
Total	The total number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
Jabbers	The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). Note that this definition of jabber differs from the definition in IEEE-802.3 section 8.2.1.5 (10Base-5) and section 10.3.1.4 (10Base-2). These documents define jabber as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms.
Fragments/Undersize	The total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets).
Alignment Errors	The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had a bad Frame Check Sequence (FCS) with a non-integral number of octets.
FCS Errors	The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had a bad Frame Check Sequence (FCS) with an integral number of octets.
Overruns	The total number of frames discarded as this port was overloaded with incoming packets, and could not keep up with the inflow.

Table 2-8 Received Packets Not Forwarded

Parameter	Description
Total	A count of valid frames received which were discarded, or filtered, by the forwarding process.
Local Traffic Frames	The total number of frames dropped in the forwarding process because the destination address was located off of this port.
802.3x Pause Frames Received	A count of MAC Control frames received on this interface with an opcode indicating the PAUSE operation. This counter does not increment when the interface operates in half-duplex mode.
Unacceptable Frame Type	The number of frames discarded from this port due to being an unacceptable frame type.
VLAN Membership Mismatch	The number of frames discarded on this port due to ingress filtering.
VLAN Viable Discards	The number of frames discarded on this port when a lookup on a particular VLAN occurs while that entry in the VLAN table is being modified, or if the VLAN has not been configured.
Multicast Tree Viable Discards	The number of frames discarded when a lookup in the multicast tree for a VLAN occurs while that tree is being modified.
Reserved Address Discards	The number of frames discarded that are destined to an IEEE 802.1 reserved address and are not supported by the system.
CFI Discards	The number of frames discarded that have CFI bit set and the addresses in RIF are in non-canonical format.
Upstream Threshold	The number of frames discarded due to lack of cell descriptors available for that packet's priority level.

Table 2-9 Transmit Errors

Parameter	Description
Total Errors	The sum of Single, Multiple, and Excessive Collisions.
FCS Errors	The total number of packets transmitted that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had a bad Frame Check Sequence (FCS) with an integral number of octets.
Oversized	The total number of frames that exceeded the maximum permitted frame size. This counter has a maximum increment rate of 815 counts per second at 10 Mbps.
Underrun Errors	The total number of frames discarded because the transmit FIFO buffer became empty during frame transmission.

Table 2-10 Transmit Discards

Parameter	Description
Total Discards	The sum of single collision frames discarded, multiple collision frames discarded, and excessive frames discarded.
Single Collision Frames	A count of the number of successfully transmitted frames on a particular interface for which transmission is inhibited by exactly one collision.
Excessive Collisions	A count of frames for which transmission on a particular interface fails due to excessive collisions.
Port Membership	The number of frames discarded on egress for this port due to egress filtering being enabled.
VLAN Viable Discards	The number of frames discarded on this port when a lookup on a particular VLAN occurs while that entry in the VLAN table is being modified, or when the VLAN has not been configured.
Multiple Collision Frames	A count of the number of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one collision.

Command Buttons

- **Back:** Return to the previous window.
- **Help:** Request that the help page be displayed in a new browser window.

Rogue APs

Use **MONITOR > Summary > Rogue Summary > Active Rogue APs > Detail** or **MONITOR > Wireless > Rogue APs** or **WIRELESS > Rogue APs** to navigate to this page.

This page displays access points in your air space which are not part of your configured network. These rogue access point radios may be one of the following four types:

- Pending or Alert radio: This type of radio may present a threat to the integrity and security of your network. It has not been identified as a Known internal radio or as an Acknowledged radio belonging to another company located near your premises.
- Known radio: This radio has been identified and accepted as being secure. This radio is being used for accepted company functions, but is not part of the internal network.
- Acknowledged radio: This radio is transmitting from a known source outside of the company network. This radio may be part of another company's LAN which is located on another floor or in close proximity to your network. This radio does not present a security threat to your network.
- Contained radio: Between one and four access points are transmitting de-authorization and disassociate messages to clients attempting to associate with the rogue access point.

The following information is provided when a rogue access point radio is detected:

Table 2-11 Rogue Access Point Radios

Parameter	Description
MAC Address	Media Access Control address of the rogue access point.
SSID	Service Set Identifier being broadcast by the rogue access point radio.
# Detecting Radios	Number of Cisco radios detecting the rogue access point radio.
Number of Clients	Number of clients currently associated with the rogue access point.
Status	Automatic and configurable state of this radio relative to the network or controller. The status of rogue access point radios appear as one of the following: • Pending - OS identification is still underway. • Alert - first scanned by the controller, and maintained in this state until the user changes the state. • Known - known internal access point being used for accepted company functions, but it is not part of the internal network. • Acknowledge - this radio is transmiting from an external source outside of the company network. • Contained - between one and four access points are transmitting deauthorization and disassociate messages to clients attempting to associate with this rogue access point.

This page reports rogue access points until the "Expiration Timeout for Rogue AP Entries" (set on the Rogue Policy page) expires.

The **Edit** links in the rogue access point radios table take you to the respective Rogue AP Detail page when selected.

Command Buttons

- **Next:** Displays the next page of the listing.
- **Help:** Request that the help page be displayed in a new browser window.

Rogue AP Detail

Use **MONITOR > Summary > Rogue Summary > Active Rogue APs > Detail** and then click **Edit** to navigate to this page.

This page displays the access point details of the unauthorized or unknown radio. The following information is provided when a rogue access point radio is detected:

Table 2-12 Rogue Access Point Radio Details

Parameter	Description
MAC Address	Media Access Control address of the rogue access point.
Type	Rogue access point type: AP = Infrastructure access point Ad Hoc = Client-to-Client
Is Rogue on Wired Network?	Yes or No. Unknown if WEP is enabled, as shown lower on this page.
First Time Reported On	Date and time the radio was first scanned by the controller.
Last Time Reported On	Date and time the radio was last scanned by the controller.
Current Status	The status of this radio is: • Alert (Unknown access point) • Known (Internal access point) • Acknowledge (External access point) • Contain (Rogue access point) • Pending (unidentified)
Update Status (Note)	Configurable state of this rogue access point in the controller. You may set the status to: • Contain Rogue - Discourage all rogue access point clients, and then choose the number of Cisco access points (1 through 4) that should be used to contain the rogue. • Alert Unknown rogue access point • Known Internal rogue access point. **Note** When you update the status of a rogue access point to Known Internal and click **Apply**, that rogue access point gets listed on Known Rogue APs page. • Acknowledge external rogue access point

Note Make sure you do not attempt to contain rogue access points operated by other establishments, such as the cafe hotspot across the street!

Cisco APs that Detected this Rogue

This table provides a detailed list of access points that detect the unauthorized radio as well as the transmit characteristics of the radio. The following information physically identifies the location of the rogue access point.

- MAC address of the Cisco access point that identified the rogue access point radio.
- Name of the Cisco access point that identified the rogue access point radio.
- SSID - Service Set Identifier being broadcast by the rogue access point radio.
- Channel - Which channel the rogue access point is broadcasting on.
- Radio Type - Protocol of the rogue access point is either 802.11a, 802.11b or 802.11g.
- WEP - Whether WEP is enabled or disabled.
- WPA - This type of security protocol is Enabled or Disabled.
- Pre-Amble - Whether the Preamble is Short or Long.
- RSSI (receive signal strength indicator) of rogue access point radio at the access point (-80 dBm or lower, the rogue access point is far away or transmitting at a low signal strength; -60 dBm or higher, the rogue access point is close and/or transmitting at a high signal strength).
- SNR (signal to noise ratio) of rogue access point radio at the access point.
- Containment Type - 'Contained' if the rogue access point clients have been contained at Level 1 through Level 4 under Update Status Maximum Number, otherwise blank.
- Containment Channels - Current channel or channels if the rogue access point clients have been contained at Level 1 through Level 4 under Update Status, otherwise blank.

Clients associated to this Rogue AP

This table provides a detailed list of clients associated to this rogue access point.

- MAC address - Media Access Control of the Rogue Client.
- Last Time Heard - The last time the Cisco access point detected the rogue access point client.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Known Rogue APs

Use **MONITOR > Wireless > Known Rogue APs** or **WIRELESS > Rogues > Known Rogue APs** to navigate to this page.

This page displays details about Known Rogue APs that have been configured on the network.

Table 2-13 Known Rogue Access Points

Parameter	Description
MAC Address	Media Access Control Address of the known rogue access point.
SSID	Service Set Identifier being broadcast by the known rogue access point radio.
# Detecting Radios	Number of Cisco radios detecting the known rogue access point radio.
Number of Clients	Number of clients currently associated with the known rogue access point.
Status	Known - known internal access point being used for accepted company functions, but it is not part of the internal network.

From the summary table, select **Edit** to bring up the Known Rogue AP Detail page where you can view the details and also update the status of the Known Rogue access point.

Select **Remove** from the summary table to remove the selected Known Rogue access point. You are prompted to confirm the removal.

Known Rogue APs > New

Use **MONITOR > Wireless > Known Rogue APs** or **Wireless > Rogues > Known Rogue APs** and then click **New** to navigate to this page. This page allows you to add an access point to the Known Rogue APs list.

To add an access point, perform these steps:

Step 1 Enter the MAC address of the access point in the MAC Address field.

Step 2 Click **Apply** button to bring up the Known Rogue APs page where the access point that you added is displayed.

Known Rogue AP Detail

Use **MONITOR > Wireless > Known Rogue APs** or **Wireless > Rogues > Known Rogue APs** and then click **Edit** to navigate to this page.

This page displays the details of the authorized or known rogue access point.

The following information is provided:

Table 2-14 Known Rogue AP Detail

Parameter	Description
MAC Address	Media Access Control of the known rogue access point.
Type	Rogue Access Point Type: AP = Infrastructure Access Point Ad Hoc = Client-to-Client
Is Rogue on Wired Network?	Yes or No. Unknown if WEP is enabled.
First Time Reported On	Date and time the radio was first scanned by the controller.
Last Time Reported On	Date and time the radio was last scanned by the controller.

Table 2-14 Known Rogue AP Detail (continued)

Parameter	Description
Current Status	The status of this radio is: • Alert (Unknown access point) • Known (Internal access point) • Acknowledge (External access point) • Contain (Rogue access point) • Pending (unidentified)
Update Status (Note)	Configurable state of this known rogue access point in the controller. You may set the status to: • Contain Rogue - Discourage all rogue access point clients, and then choose the number of access points (1 through 4) to contain the rogue. • Alert Unknown rogue access point • Known Internal rogue access point • Acknowledge External rogue access point

Cisco APs that Detected this Rogue

This table provides a detailed list of the access points that detect the authorized radio as well as the transmit characteristics of the radio. The following information physically identifies the location of the known rogue access point.

- The MAC address of the access point that identified the known rogue access point radio.
- Name of the access point that identified the known rogue access point radio.
- SSID - Service Set Identifier being broadcast by the known rogue access point radio.
- Channel - Which channel the known rogue access point is broadcasting on.
- Radio Type - Protocol of the known rogue access point is either 802.11a, 802.11b or 802.11g.
- WEP - Whether WEP is enabled or disabled.
- WPA - This type of security protocol is Enabled or Disabled.
- Pre-Amble - Whether the Preamble is Short or Long.
- RSSI (receive signal strength indicator) of known rogue access point radio at the access point (-80 dBm or lower, the rogue access point is far away or transmitting at a low signal strength; -60 dBm or higher, the rogue access point is close and/or transmitting at a high signal strength).
- SNR (signal to noise ratio) of the known rogue access point radio at the Cisco access point.
- Containment Type - ‘Contained’ if the rogue access point clients have been contained at Level 1 through Level 4 under Update Status Maximum Number, otherwise blank.
- Containment Channels - Current channel or channels if the rogue access point clients have been contained at Level 1 through Level 4 under Update Status, otherwise blank.

Clients associated to this Known Rogue AP

This table provides a detailed list of clients associated to this known rogue access point.

- MAC address - Media Access Control of the known rogue client.
- Last Time Heard - The last time the Cisco access point detected the known rogue access point client.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Rogue Clients

Use **MONITOR > Wireless > Rogue Clients** or **MONITOR > Summary > Rogue Clients** to navigate to this page.

This page contains information about detected rogue clients.

Table 2-15 Rogue Clients

Parameters	Description
MAC Address	MAC address of the rogue client.
AP MAC Address	MAC address of the Cisco access point.
SSID	Service Set Identifier being broadcast by the rogue client.
# Detecting Radios	Number of Cisco radios detecting the rogue client.
Last Seen On	The last time the Cisco access point detected the rogue access point client.
Status	Configurable state of this radio relative to the network or controller. Rogue radios appear as “Alert” when first scanned by the controller, or as “Pending” when OS identification is still underway.

The **Edit** link in the rogue clients table takes you to Rogue Client Detail when selected.

Command Button

- **Help:** Request that the help page be displayed in a new browser window.

Rogue Client Detail

Use **MONITOR > Summary > Active Client Detail** and then click **Edit** to navigate to this page.

This page displays details about unauthorized clients. The following information is provided when a rogue client is detected:

Table 2-16 Rogue Client Details

Parameter	Description
MAC Address	MAC address of the rogue access point.
APs MAC Address	MAC address of the Cisco access point that identified the rogue access point radio.
SSID	Service Set Identifier being broadcast by the rogue access point radio.
IP Address	IP address of the rogue client or Unknown.
First Time Reported On	Date and time the radio was first scanned by the controller.
Last Time Reported On	Date and time the radio was last scanned by the controller.
Current Status	The status of this radio is: Alert (Unknown access point) Known (Internal access point) Acknowledge (External access point) Contain (Rogue access point) Pending (unidentified)
Update Status (Note)	Configurable state of this rogue access point in the controller. You may set the status to: Contain (Rogue access point) discourage all rogue access point clients. Alert (Unknown access point)

Note Make sure you do not attempt to contain rogue access points operated by other establishments, such as the cafe hotspot across the street!

APs that Detected this rogue client

This table provides a detailed list of access points that detect the unauthorized radio as well as the transmit characteristics of the radio. The following information physically identifies the location of the rogue access point.

- MAC Address - Media Access Control of the Rogue Client.
- AP Name - Access points that identified the rogue access point radio.
- Channel - Which channel the rogue access point is broadcasting on.
- Radio Type - Protocol of the rogue access point is either 802.11a, 802.11b or 802.11g.
- RSSI (receive signal strength indicator) of rogue access point radio at the access point (-80 dBm or lower, the rogue access point is far away or transmitting at a low signal strength; -60 dBm or higher, the rogue access point is close and/or transmitting at a high signal strength).
- SNR (signal to noise ratio) of rogue access point radio at the Cisco access point.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Ping:** Send a Ping to a network element.

Adhoc Rogues

Use **MONITOR > Wireless > Adhoc Rogues** or **MONITOR > Summary > Adhoc Rogues** to navigate to this page.

This page lists Ad Hoc rogue information on the following table.

Table 2-17 Rogue Clients

Parameters	Description
MAC Address	MAC address of the rogue client.
BSSID	MAC address of the Cisco access point.
SSID	Service Set Identifier being broadcast by the rogue client.
# Detecting Radios	Number of Cisco radios detecting the rogue client.
Status	The status of this radio is: Pending (unidentified). Alert (Unknown access point). Known (Internal access point). Acknowledge (External access point). Contain (Rogue Access Point).

Command Button

- **Help:** Request that the help page be displayed in a new browser window.

802.11a Radios

Use **MONITOR > Wireless > 802.11a Radios** or **MONITOR > Summary > 802.11a Radios** to navigate to this page.

This page displays the Cisco radio profile for your 802.11a RF network. It shows the status of each 802.11a Cisco radio configured on this controller and its profile.

Table 2-18 802.11a Radio Profile

Parameters	Description
AP Name	This is the name assigned to the access point.
MAC Address	Media Access Control Address of the access point.
Operational Status	Displays the operational status of the Cisco radios, UP or DOWN.
Load Profile	The Radio Resource Management (RRM) profile for the Cisco radio is displayed for these characteristics. The profile status is displayed as a pass or fail with details provided on Radio > Statistics page.
Noise Profile	
Interference Profile	
Coverage Profile	

To access details for each Cisco radio, click the **Detail** link (Radio > Statistics).

Command Buttons

- **Help:** Request that the help page be displayed in a new browser window.

Radio > Statistics

Use **MONITOR > Wireless > 802.11a Radios** or **MONITOR > Wireless > 802.11b Radios** and then click **Detail** to navigate to this page.

This page displays the RF (Radio Frequency) statistics for the selected Cisco radio. You can alternate between the Graphics View and the Text View clicking the **Graphics View/Text View** button. You can view and refresh the following statistics by selecting them (using the checkboxes) and then clicking the **Refresh** button on the data page:

- Profile Information.
- Rx Neighbors.
- 802.11 MAC Counters.

This page also displays the following access point variables:

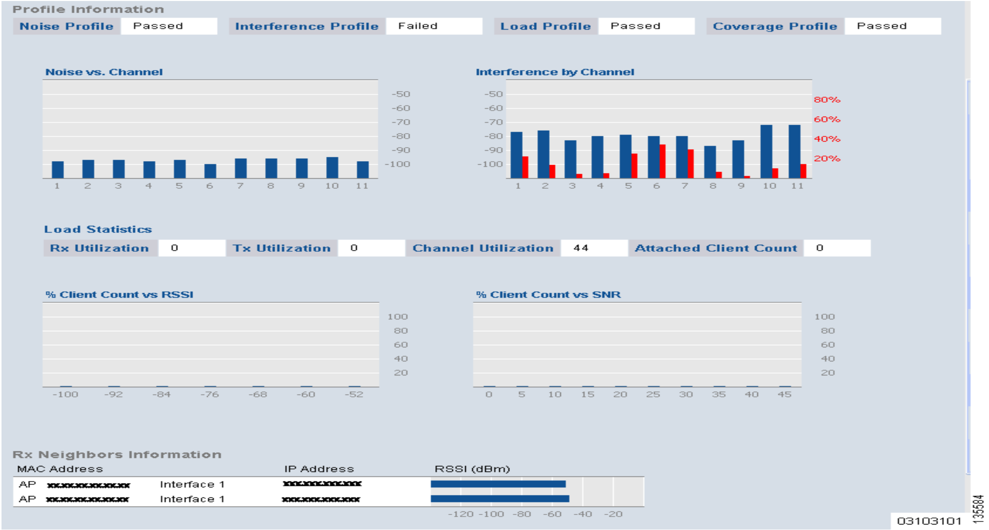
- AP Name.
- AP MAC Address.
- AP IP Address - Only shows an IP address if the controller LWAPP protocol is set for Layer 3 on the General page, otherwise Disabled.
- Radio Type (802.11a or 802.11b/g).
- Operational Status - Displays the operational status of the Cisco radios, either UP or DOWN.
- Monitor Only Mode (Cisco Aironet 1000 Series lightweight access point) Status - Local (Cisco Aironet 1000 Series lightweight access point in same-subnet mode or in Rogue Detector mode), Cisco 1030 remote edge lightweight access point (Cisco Aironet 1030 IEEE 802.11a/b/g remote edge lightweight access point), or Monitor (Cisco Aironet 1000 Series lightweight access point in monitor-only mode).
- Current Channel Number.

Profile Information - Graphics View and Text View

The RF statistics are used to derive the Radio Resource Management (RRM) profile for each Cisco radio in your network. The controller uses the Radio Resource Management (RRM) profile to adjust the Cisco radio transmit and receive levels in order to maintain the most efficient configuration for your network. This data view also displays the RF properties of the controller and its clients.

- The Radio Resource Management (RRM) PASSED/FAILED thresholds are globally set for all access points in the 802.11a Global Parameters > Auto RF and 802.11b/g Global Parameters > Auto RF pages.
- The Radio Resource Management (RRM) PASSED/FAILED thresholds are Individually set for this access point in the 802.11 AP Interfaces > Performance Profile page.

Figure 2-1 Profile Information in Graphics View



Profile Information

Noise Profile	Passed	Interference Profile	Failed	Load Profile	Passed	Coverage Profile	Passed

Load Statistics

Rx Utilization	0	Tx Utilization	0	Channel Utilization	44	Attached Client Count	0

Rx Neighbors Information

MAC Address		IP Address	RSSI (dBm)
AP xx:xx:xx:xx:xx:xx	Interface 1	xxx.xxx.xxx.xxx	
AP xx:xx:xx:xx:xx:xx	Interface 1	xxx.xxx.xxx.xxx	

The following sections describe each of the Graphical and Text results.

Noise vs. Channel

Each channel of the access point appears along with the corresponding non-802.11 noise interfering with the currently-assigned channel.

Interference by Channel

Each channel of the access point appears with the corresponding traffic interference from other 802.11 sources.

Load Statistics

Total Receive and Transmit bandwidth and channel utilization appears for transmitting and receiving traffic on this Cisco radio. The number of attached clients is also displayed.

% Client Count vs. RSSI

Sorts attached clients by their Received Signal Strengths.

% Client Count vs. SNR

Sorts attached clients by their Signal to Noise Ratios.

Rx Neighbors Information

This area displays the Cisco radio’s neighboring APs, and their IP address and RSSI values. These details are used for channel allotment and RF coverage area shaping.

This information is displayed similar to the following:

```
AP 00:0b:85:00:83:00 Interface 0        172.16.16.10
```

where:

- `AP` is an access point.

- `00:0b:85:00:83:00` is the MAC address of the neighboring access point.
- `Interface x` is the interface number of the neighboring access point.
- `172.16.16.10` is the IP address of the access point's controller.

802.11 MAC Counters

The following table describes the 802.11 MAC counters.

Table 2-19 802.11 MAC Counters

Counter	Description
Tx Fragment Count	This counter is incremented for an acknowledged MPDU with an individual address in the address 1 field.
Tx Failed Count	This counter increments when an MSDU is successfully transmitted after one or more retransmissions.
Multiple Retry Count (Graphics view only)	This counter shall increment when an MSDU is successfully transmitted after more than one retransmission.
Invalid IP netmask (Text view only)	This counter shall increment when an invalid IP netmask is transmitted after more than one retransmission.
RTS Success Count	This counter increments when a CTS is received in response to an RTS.
ACK Failure Count	This counter increments when an ACK is not received when expected.
Multicast Rx Frame Count	This counter increments when a MSDU is received with the multicast bit set in the destination MAC address.
Tx Frame Count	This counter increments for each successfully transmitted MSDU.
Multicast Tx Frame Count	This counter increments only when the multicast bit is set in the destination MAC address of a successfully transmitted MSDU. When operating as a STA in an ESS, where these frames are directed to the access point, this implies having received an acknowledgment to all associated MPDUs.
Retry Count	This counter increments when an MSDU is successfully transmitted after one or more retransmissions.
Frame Duplicate Count	This counter increments when a frame is received that the Sequence Control field indicates is a duplicate.
RTS Failure Count	This counter increments when a CTS is not received in response to an RTS.
Rx Fragment Count	This counter shall be incremented for each successfully received MPDU of type Data or Management.
FCS Error Count	This counter increments when an FCS error is detected in a received MPDU.
WEP Undecryptable Count	This counter increments when a frame is received with the WEP subfield of the Frame Control field set to one and the WEPOn value for the key mapped to the TA's MAC address indicates that the frame should not have been encrypted or that frame is discarded due to the receiving STA not implementing the privacy option.

Command Buttons

- **Back:** Return to the previous window.
- **Graphics View/Text View:** Move back and forth between the graphics and text views of the Radio > Statistics page.
- **Help:** Request that the help page be displayed in a new browser window.

802.11b/g Radios

Use **MONITOR > Wireless 802.11b/g Radios** or **MONITOR > Summary > 802.11b/g Radios** to navigate to this page.

This page displays the Cisco radio profile for your 802.11b/802.11g RF network. It shows the status of each 802.11b/g Cisco radio configured on this and its profile.

Table 2-20 802.11b/g Radio Profile

Parameters	Description
AP Name	This is the name assigned to the access point.
MAC Address	Media Access Control address of the access point.
Operational Status	Displays the operational status of the Cisco radios, UP or DOWN.
Load Profile	The Radio Resource Management (RRM) profile for the Cisco radio is displayed for these characteristics. The profile status is displayed as a pass or fail with details provided on the Radio > Statistics data page.
Noise Profile	
Interference Profile	
Coverage Profile	

To access details for each Cisco radio, click the **Detail** link (Radio > Statistics).

Command Buttons

- **Help:** Request that the help page be displayed in a new browser window.

Clients

Use **MONITOR > Wireless > Clients** or **MONITOR > Summary > Current Clients Detail** or **WIRELESS > Clients** to navigate to this page. This page displays information about the clients associated with the access points.

Search by MAC Address

You can search the client list by MAC address.

Enter the MAC address as 6 two-digit hexadecimal numbers separated by colons--for example, **`01:23:45:67:89:AB`**. Then click the **Search** button. If the address exists, that entry is displayed as the first entry followed by the remaining (greater) MAC addresses. An exact match is required.

Client Information Table

This table displays a list of all clients attached to the . Client information includes:

- MAC Address of the client.
- Name of the access point to which client is attached.
- MAC Address of the access point.
- Name of WLAN used by the client.
- The type of client (802.11a, 802.11b or 802.11g).
- Status of the client connection.
- Authorization status.
- Port number of the client's associated access point.

Select the **Detail** link to display the Clients > Detail page.

Select **LinkTest** to test the link to the Client, report the Client MAC Address, and report the number of test packets sent and received, the local signal strength, and the local signal to noise ratio in a popup window. Note that the **LinkTest** does not work for IPSec links, and may not work for some clients.

Select **Disable** to manually disable a client on the Disabled Client > New page.

Select the **Remove** link to dissociate the Client.

Clients > Detail

Use **MONITOR > Wireless > Clients** then click **Detail** to navigate to this page.

This page displays the details of the select client's session, and allows you to enable or disable Mirror Mode for this client. Information is displayed for both the client and its associated access point.

Table 2-21 Client Properties

Parameter	Description
MAC Address	MAC address of the client.
IP Address	IP address of the client.
User Name	Login client name from RADIUS or controller authentication.
Port Number	Controller port used for the client's associated access point.

Table 2-21 Client Properties (continued)

Parameter	Description
Interface	User-defined name for this interface; for example, management, service-port, virtual.
VLAN ID	The VLAN tag identifier, or 0 for no VLAN tag.
Mobility Role	**Local** when the client has not roamed from its original controller, or when the client has roamed to another controller on the same subnet. **Foreign** when the client has roamed from its original controller to another controller on a different subnet. **Anchor** when the client has roamed back to its original controller after roaming to another controller on a different subnet.
Mobility Peer IP Address	N/A when the client is Local (has not roamed from its original subnet). Anchor IP Address (the IP address of the original controller) when the client is Foreign (has roamed to another controller on a different subnet). Foreign IP Address (the IP address of the original controller) when the client is Anchor (has roamed back to another controller on a different subnet).
Policy Manager State	DHCP_REQD when a DHCP server is required to complete the security policy. 8021X_REQD when 802.1X is the required policy. Other messages to be determined.
Mirror Mode	Enable or disable Mirror Mode.

Table 2-22 Security Information

Parameter	Description
Security Policy Completed	No, when the security policy checks have not been completed, or Yes, when the security policy checks have been completed.
Policy Type	Security Policy Type, for example, 802.1X
Encryption Cipher	WEP 802.1X data encryption type: 40/64 bit key. 104/128 bit key. 128/152 bit key.
Policy Type	The Policy Type being enforced by the access point.
Encryption Cipher	The encryption format being used by the Cisco WLAN Solution WLAN, such as WEP.
EAP Type	N/A for none, more messages TBD.

Table 2-23 Quality of Service Properties

Parameter	Description
WME State	Enable or disable WME. Wireless Media Extensions (WME) is a QoS protocol and a subset of 802.11e standard. WME technology identifies packets of voice, video, audio or other types of data and prioritizes their delivery based on traffic conditions. Videos transmitted over wireless networks suffer greatly if packets are delayed or dropped. So video data is given priority over other types of data traveling on a network.
QoS Level	Quality of Service Level, set on the Edit QoS Profile page: • Platinum (Voice)—This setting assures a high Quality of Service for Voice over Wireless. • Gold (Video)—This setting supports high-quality video applications. • Silver (Best Effort)— This is the default setting and supports normal bandwidth for clients. • Bronze (Background)— Lowest bandwidth for guest services. VoIP clients should be set to Platinum, Gold or Silver, while low-bandwidth clients can be set to Bronze.
802.1P Tag	VLAN tag (1-7) received from the client, defining the access priority. Maps to QoS Level for client-to-network packets. Set on the Edit QoS Profile page.
Average Data Rate	Operator-defined average data rate for non-UDP traffic, set on the Edit QoS Profile page.
Average Real-Time Rate	Operator-defined average data rate for UDP traffic, set on the Edit QoS Profile page.
Burst Data Rate	Operator-defined peak data rate for non-UDP traffic, set on the Edit QoS Profile page.
Burst Real-Time Rate	Operator-defined peak data rate for UDP traffic, set on the Edit QoS Profile page.

Table 2-24 Client Statistics

Parameter	Description
Bytes Received	Total number of bytes received by the controller from the client.
Bytes Sent	Total number of bytes sent to the client from the controller.
Packets Received	Total number of packets received by the controller from the client.
Packets Sent	Total number of packets sent to the client from the controller.
Policy Errors	Number of policy errors for the client.
RSSI	Receive signal strength indicator of the client RF session.
SNR	Signal to noise ratio of the client RF session.

The AP Properties table identifies the properties of the client's access point and of the client's negotiated session.

Table 2-25 AP Properties

Parameter	Description
AP Address	MAC address of the access point.
AP Name	Name of the access point.
AP Type	Access point's RF type.
WLAN SSID	Name of the WLAN.
Status	Status of client from status code (see Status Code below).
Association ID	Client's access point association identification number.
802.11 Authentication	Authentication algorithm of client.
Reason Code	The client reason code may be one of the following: • no reason code (0) -- normal operation. • unspecified reason (1) -- client associated but no longer authorized. • previousAuthNotValid (2) -- client associated but not authorized. • deauthenticationLeaving (3) -- the access point went offline, de-authenticating the client. • disassociationDueToInactivity (4) -- client session timeout exceeded. • disassociationAPBusy (5) -- the access point is busy, performing load balancing, for example. • class2FrameFromNonAuthStation (6) -- client attempted to transfer data before it was authenticated. • class2FrameFromNonAssStation (7) -- client attempted to transfer data before it was associated. • disassociationStaHasLeft (8) -- Operating System moved the client to another access point using non-aggressive load balancing. • staReqAssociationWithoutAuth (9) -- client not authorized yet, still attempting to associate with access point. • missingReasonCode (99) -- client momentarily in an unknown state.

Table 2-25 AP Properties (continued)

Parameter	Description
Status Code	Client status may be one of the following: • idle (0) -- normal operation: no rejections of client association requests. • aaaPending (1) -- completing an aaa transaction. • authenticated (2) -- 802.11 authentication completed. • associated (3) -- 802.11 association completed. • powersave (4) -- client in powersave mode. • disassociated (5) -- 802.11 disassociation completed. • tobedeleted (6) -- to be deleted after disassociation. • probing (7) -- client not associated or authorized yet. • disabled (8) -- automatically disabled by Operating System for an operator-defined time.
CF Pollable	When this attribute is implemented, it indicates that the client is able to respond to a CF-Poll with a data frame within a SIFS time. This attribute is not implemented if the STA is not able to respond to a CF-Poll with a data frame within a SIFS time.
CF Poll Request	Specifies whether CFP is requested by the client.
Short Preamble	This attribute, when true, indicates that the short preamble option as defined in subclause 18.2.2.2 is implemented. This parameter must be Disabled to optimize this controller for some clients, including SpectraLink NetLink Telephones.
PBCC	This attribute, when true, indicates that the PBCC modulation option as defined in subclause 18.4.6.6 is implemented. The default value of this attribute is not implemented.
Channel Agility	Physical channel agility functionality is or is not implemented.
Timeout	Client Session timeout. Sets the maximum amount of time allowed a client before it is forced to re-authenticate.
WEP State	WEP security state of the client.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Link Test:** Use the built-in test circuitry to test the link between the client and the controller, report the Client MAC Address, and report the number of test packets sent and received, the local signal strength, and the local signal to noise ratio in a popup window. Note that the **LinkTest** does not work for IPSec links, and may not work for some clients.
- **Remove:** Disconnect the client.
- **Help:** Request that the help page be displayed in a new browser window.

RADIUS Servers

Use **MONITOR > Wireless > RADIUS Servers** to navigate to this page.

This page displays addressing and status information for your Remote Authentication Dial-In User Servers. Configure the authentication and accounting servers by selecting the Security option from the Menu Bar.

Table 2-26 Authentication Servers and Accounting Servers Status

Parameter	Description
Index	Access priority number for RADIUS servers. Up to 17 Authentication and 17 Accounting servers can be configured, and controller polling of the servers starts with Index 1, Index 2 second, and so forth. Index number is based on the server index priority that is selected for a RADIUS server when it is added to the controller.
Address	IP address of the RADIUS server.
Port	Communication port.
Admin Status	Enabled or disabled.

Select the **Stats** link to display the statistics page for the selected server (RADIUS Servers > Authentication Stats or RADIUS Servers > Accounting Stats).

RADIUS Servers > Authentication Stats

Use **MONITOR > Wireless > RADIUS Servers** then click **Stats** in a RADIUS Authentication entry to navigate to this page.

This page displays addressing and status information for your Remote Authentication Dial-In User Servers as follows.

Table 2-27 Authentication Server Addressing

Parameter	Description
Server Index	Access priority number for RADIUS servers. Up to 17servers can be configured, and controller polling of the servers starts with Index 1 first, Index 2 second, and so on. Index number is based on the server index priority that is selected for a RADIUS server when it is added to the controller.
Server Address	IP address of the RADIUS server.
Admin Status	State of the server.

Table 2-28 Authentication S erver Statistics

Parameter	Description
Msg Round Trip Time	The time interval (in hundredths of a second) between the most recent Access-Reply/Access-Challenge and the Access-Request that matched it from this RADIUS authentication server.
First Requests	The number of RADIUS Access-Request packets sent to this server. This does not include retransmissions.
Retry Requests	The number of RADIUS Authentication-Request packets retransmitted to this RADIUS authentication server.
Accept Responses	The number of RADIUS Access-Accept packets (valid or invalid) received from this server.
Reject Responses	The number of RADIUS Access-Reject packets (valid or invalid) received from this server.
Challenge Responses	The number of RADIUS Access-Challenge packets (valid or invalid) received from this server.
Malformed Messages	The number of malformed RADIUS Access-Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators or Signature attributes or unknown types are not included as malformed access responses.
Bad Authenticator Msgs	The number of RADIUS Access-Response packets containing invalid authenticators or Signature attributes received from this server.
Pending Requests	The number of RADIUS Access-Request packets destined for this server that have not yet timed out or received a response. This variable is incremented when an Access-Request is sent and decremented due to receipt of an Access-Accept, Access-Reject or Access-Challenge, a timeout, or retransmission.
Timeout Requests	The number of authentication timeouts to this server. After a timeout the client may retry to the same server, send to a different server, or give up. A retry to the same server is counted as a retransmit as well as a timeout. A send to a different server is counted as a Request as well as a timeout.
Unknown Type Msgs	The number of RADIUS packets of unknown type which were received from this server on the authentication port.
Other Drops	The number of RADIUS packets received from this server on the authentication port and dropped for some other reason.

Command Buttons

- **Back:** Return to the previous window.
- **Help:** Request that the help page be displayed in a new browser window.

RADIUS Servers > Accounting Stats

Use **MONITOR > Wireless > RADIUS Servers** then clcik **Stats** in a RADIUS Accounting entry to navigate to this page.

This page displays addressing and status information for your Remote Authentication Dial-In User Servers as follows:

Table 2-29 Accounting Server Addressing

Parameter	Description
Server Index	Access priority number for RADIUS servers. Up to 17 servers can be configured, and controller polling of the servers starts with Index 1 first, Index 2 second, and so on. Index number is based on the server index priority that is selected for a RADIUS server when it is added to the controller.
Server Address	IP address of the RADIUS server.
Admin Status	State of the server.

Table 2-30 Accounting Server Statistics

Parameter	Description
Msg Round Trip Time	The time interval between the most recent Accounting-Response and the Accounting-Request that matched it from this RADIUS accounting server.
First Requests	The number of RADIUS Accounting-Request packets sent. This does not include retransmissions.
Retry Requests	The number of RADIUS Accounting-Request packets retransmitted to this RADIUS accounting server. Retransmissions include retries where the Identifier and Acct-Delay have been updated, as well as those in which they remain the same.
Accounting Responses	The number of RADIUS packets received on the accounting port from this server.
Malformed Messages	The number of malformed RADIUS Accounting-Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators and unknown types are not included as malformed accounting responses.
Bad Authenticator Msgs	The number of RADIUS Accounting-Response packets which contained invalid authenticators received from this server.
Pending Requests	The number of RADIUS Accounting-Request packets sent to this server that have not yet timed out or received a response. This variable is incremented when an Accounting-Request is sent and decremented due to receipt of an Accounting-Response, a timeout or a retransmission.
Timeout Requests	The number of accounting timeouts to this server. After a timeout the client may retry to the same server, send to a different server, or give up. A retry to the same server is counted as a retransmit as well as a timeout. A send to a different server is counted as an Accounting-Request as well as a timeout.

Table 2-30 Accounting Server Statistics (continued)

Parameter	Description
Unknown Type Msgs	The number of RADIUS packets of unknown type which were received from this server on the accounting port.
Other Drops	The number of RADIUS packets which were received from this server on the accounting port and dropped for some other reason.

Command Buttons

- **Back:** Return to the previous window.
- **Help:** Request that the help page be displayed in a new browser window.

CHAPTER 3

WLANs Menu Bar Selection

The **WLANs** tab allows you to create, configure, and delete WLANs on your controller.

You can access the following pages from the WLANs menu bar selection:

- WLANs
- WLANs > New
- WLANs > Edit
- WLANs > Mobility Anchors
- AP Groups VLAN

WLANs

Click **WLANs** to navigate to this page.

This page shows a summary of the wireless local access networks (WLANs) that you have configured on your network. From this page, you may add, remove or edit WLANs.

Table 3-1 Timer Descriptions

Parameter	Description
WLAN ID	Identification number of the WLAN.
WLAN SSID	Definable name of the WLAN (text string).
Admin Status	Status of the WLAN is either enabled or disabled.
Security Policies	Security policies enabled on the WLAN.

From the summary table, select **Edit** to modify the selected WLAN characteristics and the WLANs > Edit page is displayed.

Select **Remove** from the summary table to delete the selected WLAN. You are prompted to confirm the removal of the selected WLAN.

Command Buttons

- **New:** Click to add a WLAN on the WLANs > New page.
- **Help:** Request that the help page be displayed in a new browser window.

WLANs > New

Use **WLANs > New** to navigate to this page.

To add a new wireless LAN, perform these steps:

Step 1 Select a WLAN ID from the drop-down menu.

Note Cisco access points can support up to 16 WLANs per controller. However some Cisco access points do not support WLANs that have a WLAN ID greater than 8. In such cases, when you attempt to create a WLAN you get a message that says `"Not all types of AP support WLAN ID greater than 8, do you wish to continue?"`. Clicking **OK** creates a WLAN with the WLAN ID that you selected.

Note The WLANs that are not assigned to the access points are denoted with an asterisk (*) symbol.

Step 2 Enter a text name for the WLAN in the WLAN SSID box. (This is the SSID broadcast name for the WLAN.)

Step 3 Click the **Apply** button to bring up the WLANs > Edit page, where you can continue configuring the WLAN.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.

WLANs > Edit

For existing WLANs, use **WLANs > Edit** to navigate to this page. For new WLANs, create a new WLAN as described in WLANs > New page, then click **Apply** to navigate to this page.

This page allows you to edit the configurable parameters for a WLAN. The **WLAN ID** and **WLAN SSID** are displayed at the top of the page. The following tables describe the WLAN parameters.

Table 3-2 General Policies

Parameter	Description
Radio Policy	Set the WLAN radio policy to apply to All = 802.11a/b/g, 802.11a only, 802.11g only, 802.11b/g only, or 802.11a/g only. This setting requires that the selected bands be enabled on the 802.11a Global Parameters and 802.11b/g Global Parameters pages.
Admin Status	Set the status of the WLAN to either Enabled or Disabled.
Session Timeout	Set the maximum time for a client session before requiring reauthorization. Default = 1800 seconds.
Quality of Service (QoS)	Quality of Service Level, set on the Edit QoS Profile page: • Platinum (Voice)—This setting assures a high Quality of Service for Voice over Wireless. • Gold (Video)—This setting supports high-quality video applications. • Silver (Best Effort)— This is the default setting and supports normal bandwidth for clients. • Bronze (Background)— Lowest bandwidth for guest services. VoIP clients should be set to Platinum, Gold or Silver, while low-bandwidth clients can be set to Bronze.
WMM Policy	Select one of the following: • Disabled—Use this setting to disable this WMM policy. • Allowed—Use this setting to allow the clients to communicate with the WLAN. • Required—Use this setting to ensure that it is mandatory for the clients to have WMM feature enabled on them to communicate with the WLAN.

Table 3-2 General Policies (continued)

Parameter	Description
7920 Phone Support	Select one of the following: • Disabled—Use this setting to disable support for your Cisco 7920 phones on the WLAN. • Client CAC Limit—Use this setting if you want the WLAN to support the older version of the software on your Cisco 7920 phones. In older versions, the CAC limit is set on the client. • AP CAC Limit—Use this setting if you want the WLAN to support the newer version of the software on your Cisco 7920 phones. In newer versions, the CAC limit is advertised by the access points. • All 7920 Phones—Use this setting to enable WLAN support for all Cisco 7920 phones.
Broadcast SSID	Enable or Disable the Service Set Identifier broadcasts.
Allow AAA Override	Enable or disable AAA override for global WLAN parameters. When AAA Override is enabled, and a client has conflicting AAA and controller WLAN authentication parameters, client authentication is performed by the AAA server. As part of this authentication, the Operating System will move clients from the default Cisco WLAN Solution WLAN VLAN to a VLAN returned by the AAA server and predefined in the controller Interface configuration (only when configured for MAC filtering, 802.1X, and/or WPA operation). In all cases, the Operating System also uses QoS, DSCP, 802.1p priority tag values and ACLs provided by the AAA server, as long as they are predefined in the controller Interface configuration. (This VLAN switching by AAA Override is also referred to as Identity Networking.) For instance, if the Corporate WLAN primarily uses a Management Interface assigned to VLAN 2, and if AAA Override returns a redirect to VLAN 100, the Operating System redirects all client transmissions to VLAN 100, regardless of the physical port to which VLAN 100 is assigned. When AAA Override is disabled, all client authentication defaults to the controller authentication parameter settings, and authentication is only performed by the AAA server if the controller WLAN do not contain any client-specific authentication parameters. The AAA override values may come from a RADIUS server, for example.
External Policy Validation	External security policy validation. Enable or Disable.
Client Exclusion	When automatic adding to the Exclusion List (disabling) is enabled, set the timeout in seconds for disabled client machines. Client machines are disabled by MAC address and their status can be observed on the Clients > Detail page. A timeout setting of 0 indicates that administrative control is required to re-enable the client.

Table 3-2 General Policies (continued)

Parameter	Description
DHCP Server (Override)	When selected, you can enter the IP address of your DHCP server. This is a required field for some WLAN configurations. There are three valid configurations: **DHCP Server Override** ON, a valid DHCP Server IP address, and **DHCP Address Assignment Required**: Requires all WLAN clients to obtain an IP address from the DHCP Server. **DHCP Server Override** ON, a valid DHCP Server IP address, and **DHCP Address Assignment Not Required**: Allows all WLAN clients to obtain an IP address from the DHCP Server or use a static IP address. **DHCP Server Override** OFF: Forces all WLAN clients to use the DHCP setting in the Management Interface, not the static address.
DHCP Addr. Assignment	Required check box.
Interface Name	Limited to the non-service-port and non-virtual Interface Names configured on the Interfaces page.

You can choose both Layer 2 and Layer 3 security policies from the drop down list under the Security Policies heading. The selected security policy options are at the bottom of the page with the appropriate parameters listed. The following tables describe these parameters.

Table 3-3 Layer 2 Security Policies

Parameter	Description
None	No Layer 2 security selected.
WPA	Select to enable Wi-Fi Protected Access with TKIP-MIC Data Encryption. When WPA is selected as the Layer 2 security policy, you can choose to enable a Pre-Shared Key with or without a Passphrase.
RSN	Robust Security Network (802.11i standard): WPA Compatibility Mode - Enable checkbox. Allow RSN TKIP Clients - Enable checkbox. Pre-Shared Key - When Enabled, you can choose to enable a pre-shared key with or without an eight- to 63-character RSN Passphrase.
802.1X	WEP 802.1X data encryption type (Note 1): 40/64 bit key. 104/128 bit key. 128/152 bit key.
Static WEP	Static WEP encryption parameters: Key sizes: 40/64, 104/128 and 128/152 bit key sizes. Key Index: 1 to 4 (Note 2). Enter encryption key. Select encryption key format in ASCII or HEX.

Table 3-3 Layer 2 Security Policies (continued)

Parameter	Description
Cranite	Configure the WLAN to use the FIPS140-2 compliant Cranite WirelessWall Software Suite, which uses AES encryption and VPN tunnels to encrypt and verify all data frames carried by the Cisco WLAN Solution (Note 3).
Fortress	FIPS 40-2 compliant Layer 2 security feature.
MAC Filtering	Select to filter clients by MAC address. Locally configure clients by MAC address in the MAC Filters > New page. Otherwise, configure the clients on a RADIUS server.
Static WEP + 802.1x	Use this setting to enable both Static WEP and 802.1x parameters. If this option is selected, static WEP and 802.1x parameters are displayed at the bottom of the page.

Note The Third-Party AP WLAN (17) can only be configured with 802.1X encryption. Drop down configurable 802.1X parameters are not available for this WLAN.

Note One unique WEP Key Index can be applied to each WLAN. As there are only four WEP Key Indexes, only four WLANs can be configured for Static WEP Layer 2 encryption.

Note When Cranite is selected as the Layer 2 security policy, no Layer 3 security policies are allowed.

- Layer 3 security is available via **IPSec**, **VPN Pass Through**, or **L2TP**. Check software availability and client hardware compatibility before implementing IPSec. Layer 3 IPSec parameters are described in the following table.

Table 3-4 Layer 3 IPSec and L2TP Parameters

Parameter (Note 1)	Range
IPSec Authentication	HMAC MD5; HMAC SHA1.
IPSec Encryption	DES; Triple DES; AES CBC.
IKE Authentication	Certificates, Pre Shared Key, or XAuth Pre Shared Key (Notes 2, 3).
IKE Phase 1	Aggressive or Main. When you select L2TP, only Main is allowed.
Lifetime	Timeout in seconds. Default = 28800 seconds.
IKE Diffie-Hellman Group	Group 1, 2 or 5.
Contivity Mode	Enabled or Disabled. Enable to allow the WLAN to use a Contivity IP Services Gateway for additional Cisco WLAN Solution security.

Table 3-4 Layer 3 IPSec and L2TP Parameters (continued)

Parameter (Note 1)	Range
Web Policy	Select this check box to enable the Web Policy. The following parameters are displayed. • Authentication - If you select this option, you will be prompted for user name and password while connecting the client to the wireless network. • Passthrough - If you select this option, you can access the network directly without entering the user name and password. • Preauthentication ACL – Select the ACL to be used for traffic between the client and the controller. Refer to Access Control Lists for more information. • Email Input – This option is available for the Passthrough option only. If you select this option, you will be prompted for your email address while connecting to the network.

Note You must have the optional VPN/Enhanced Security Module (crypto processor card) installed to enable IPSec. Verify it is installed on your controller using the Inventory page.

Note When you select IKE Authentication Pre Shared Key or XAuth Pre Shared Key, you must also enter a key.

Note When you select XAuth Pre Shared Key, the key must be at least eight bytes to interoperate with Cisco clients. Other tested clients function with a key of less than eight bytes.

- When you select Layer 3 **VPN Pass Through**, fill in the VPN Gateway IPSec Pass Through Address.
- With **VPN Pass Through**, but not with IPSec or L2TP, you may also enable **Web Authentication**, also known as Web Auth.
- When you have **Web Authentication** enabled, you can also select a **Preauthentication ACL**, which allows you to assign any of the Access Control Lists displayed on the Access Control Lists page.

Note To enable **Web Authentication**, you **MUST** configure the Virtual Gateway Address in the Interfaces page.

RADIUS Servers

You can configure up to three RADIUS servers for the WLAN. Table 3-5 describes the RADIUS server parameters.

Table 3-5 RADIUS Servers Parameters

Server	Authentication Servers	Accounting Servers
Server 1	Select a RADIUS server from the drop-down list. If this server is selected, it will be the default RADIUS authentication server for the specified WLAN and will override the RADIUS server that is configured for the network.	Select a RADIUS server from the drop-down list. If this server is selected, it will be the default RADIUS accounting server for the specified WLAN and will override the RADIUS server that is configured for the network.
Server 2	This server has the second highest priority.	This server has the second highest priority.
Server 3	This server is third in the order of priority.	This server is third in the order of priority.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

WLANs > Mobility Anchors

Use **WLANs** > **Mobility Anchors** to navigate to this page.

Mobility anchors are used to restrict a WLAN to a single subnet, irrespective of the client's entry point into the network. It can also be used to provide geographic load balancing, since WLANs can be used to represent a particular section of the building like engineering, marketing and so on.

To create a new mobility anchor for a WLAN, perform these steps:

Step 1 Use **WLANs** > **Mobility Anchors** to navigate to the mobility anchor page.

Step 2 Select a controller IP address from the list of controllers.

Step 3 Click **Mobility Anchor Create** button.

The selected controller now becomes an anchor for the WLAN.

Note A Cisco 2000 Series Wireless LAN Controller cannot be designated as an anchor for a WLAN. However, a WLAN created on a Cisco 2000 Series Wireless LAN Controller can have a Cisco 4100 Series Wireless LAN Controller and Cisco 4400 Series Wireless LAN Controller as its anchor.

To remove a mobility anchor for a WLAN, perform these steps:

Step 1 Click on **Mobility Anchors** link for a WLAN.

Step 2 Under the controller IP address, click **Remove** to delete the mobility anchor.

AP Groups VLAN

Use **WLAN > AP Groups VLAN** to navigate to this page. This page displays a summary of the AP Group VLANs configured on your network. Here you can add, remove or view details of an AP Group.

The traditional method of assigning an interface to a device is based on the SSID or AAA policy override. In this case, if a client wants to broadcast information to another client on a WLAN, the broadcast will be received by all the clients on that WLAN irrespective of whether it was intended for them or not.

AP Group VLANs limit the broadcast domains to a minimum. This is done by logically segmenting a WLAN into different broadcast domains. This helps to manage load balancing and bandwidth allocation more effectively.

Note The **AP Groups VLANs** option should be enabled to use this feature.

Creating a new AP Group:

To create a new AP group from AP Groups VLAN page, perform these steps:

Step 1 In the AP Group Name field, enter the name of the **AP Group**.

Step 2 In the AP Group Description field, enter a brief description of the AP Group.

Step 3 Click **Create New AP-Group**.

The AP group is created.

Mapping an interface for an existing AP group:

To map an interface to an existing AP group from AP Groups VLAN page, perform these steps:

Step 1 Under AP Group name, click **Detail**.

Step 2 Select a WLAN SSID from the drop-down list.

Step 3 Select an interface from the drop-down list.

Step 4 Click **Add Interface-Mapping**.

The AP group is mapped to the selected interface. For more information on interfaces, refer to Interfaces.

Command button:

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.

Controller Menu Bar Selection

This menu bar selection provides access to the controller configuration details. Use the selector area to access specific controller parameters.

You can access the following pages from the **Controller** tab:

- General
- Inventory
- Interfaces
- Interfaces > New
- Interfaces > Edit
- Network Routes
- Network Routes > New
- DHCP Scopes
- DHCP Scope > New
- DHCP Scope > Edit
- Static Mobility Group Members
- Mobility Group Member > New
- Mobility Group Member > Edit All
- Mobility Statistics
- Controller Spanning Tree Configuration
- Ports
- Ports > Configure All
- Port > Edit Configuration
- Master Controller Configuration
- NTP Servers
- NTP Servers > New
- NTP Servers > Edit
- QoS Profiles
- Edit QoS Profile

General

Use **CONTROLLER > General** to navigate to this page.

The following tables explain the controller configuration general parameters.

Table 4-1 Controller Configuration Parameters

Parameter	Description
802.3x Flow Control Mode	May be Enabled or Disabled by selecting the corresponding line on the pull-down entry field. The factory default is Disabled.
LWAPP Transport Mode	Layer 2 or Layer 3 Lightweight Access Point Protocol transport mode. When set to Layer 3, the LWAPP uses IP addresses to communicate with the access point; these IP addresses are collected from a mandatory DHCP server. When set to Layer 2, the LWAPP uses proprietary code to communicate with the access points. Use the **Save Configuration** Administrative Tool to save the configuration after changing this parameter. Then use the System Reboot page to restart the controller with a configuration save after changing this parameter.
LAG Mode on next reboot (Displayed only in Cisco 4400 Series Wireless LAN Controllers)	Enabled—Use this setting to enable link aggregation on the controller. Disabled—Use this setting to disable link aggregation on the controller. For more information, refer to Link Aggregation.
Ethernet Multicast Mode	Disabled—Use this setting to disable multicast support on the controller. Unicast—If this option is selected, the controller on receiving a multicast packet forwards the packet as a unicast packet to all the associated access points. Multicast—Use this setting to enable multicast support on the controller.
Multicast Group Address (Displayed only in Cisco 4400 Series Wireless LAN Controllers if multicast support is enabled)	Enter the IP address of the multicast group. When the controller receives a multicast packet, it forwards the packet to this multicast group IP address. **Note** The multicast group IP address must be the same on all controllers that are part of Cisco WCS.
Aggressive Load Balancing	Enable or disable aggressive load balance algorithm.
Peer to Peer Blocking Mode	Enable or disable peer to peer blocking mode. Disabled (default) allows same-subnet clients to communicate through the Cisco 4100 Series Wireless LAN Controller. Enable forces same-subnet clients to communicate through a higher-level router.

Table 4-1 Controller Configuration Parameters (continued)

Parameter	Description
Over the Air Provisioning of AP	Enable or disable over-the-air Cisco Aironet 1000 Series lightweight access point and Cisco Aironet 1030 IEEE 802.11a/b/g remote edge lightweight access point (Cisco 1030 remote edge lightweight access point) configuration.
AP Fallback	Enabled or disabled checkbox. Determines whether or not an access point that lost a primary controller connection automatically returns to service when the primary controller becomes functional again.
Apple Talk Bridging	Enabled or disabled checkbox.
Fast SSID Change	Enable or disable Fast SSID. SSID (Service Set Identifier) is a code attached to all packets on a wireless network to identify each packet as part of that network. Each client is connected to a particular WLAN (through an AP) that is identified by the SSID. If the client moves out of reach of the connected AP, the client has to reconnect to the controller using a different AP. This procedure consumes some time as the DHCP (Dynamic Host Configuration Protocol) Server has to assign an IP Address to the client. If the Fast SSID option is enabled, the controller will use the existing IP Address of the client even if the client is on a different WLAN.
Default Mobility Domain Name	Operator-defined Mobility Group Name.
RF Network Name	Enter the RF Network Group name. The valid range for RF Network Name is 8 (minimum) to 19 characters. Radio Resource Management (RRM) neighbor packets are distributed among APs within a RF Network Group. The Cisco APs will only accept RRM neighbor packets sent with this RF Network Name. The RRM neighbor packets sent with different RF Network Names will be dropped.
User Idle Timeout	Set time out for idle clients in seconds. The factory default is 300. When timeout expires, client loses authentication, briefly disassociates from the access point, reassociates, and re-authenticates.
ARP Timeout	Timeout in seconds for the Address Resolution Protocol. The factory default is 300.

Link Aggregation

Link aggregation enables you to reduce the number of IP addresses needed to configure the ports on your controller. This is achieved by grouping all the physical ports and creating a link aggregation group (LAG). In a 4402 model, two ports are combined to form a LAG where as in a 4404 model, all four ports are combined to form a LAG.

Note You cannot create more than one LAG on a controller.

Some of the advantages of creating a LAG are:

- If one of the links goes down, the traffic is moved to the other links in the LAG. Hence, as long as one of the physical ports is working, the system remains functional.
- It eliminates the need to configure separate backup ports for each interface.
- Multiple AP-manager interfaces are not required since only one logical port is visible to the application.

Note When you make changes to the LAG configuration, the controller has to be rebooted for the changes to take effect.

When LAG is enabled on the controller, the following configuration changes occur:

- Any dynamic interfaces that you have created are deleted. This is done to prevent configuration inconsistencies in the interface database.
- Interfaces cannot be created with the “Dynamic AP Manager” flag set.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.

Inventory

Use **CONTROLLER > Inventory** to navigate to this page.

This page identifies Cisco WLAN Solution product information assigned by the manufacturer.

The read-only fields are described in the following table.

Table 4-2 Inventory Parameters

Parameter	Description
System Description	Product name of this controller.
Model No.	Specifies the model as defined by the factory.
Serial Number	Unique Serial Number for this controller.
Burned-in MAC Address	The burned-in ethernet Media Access Control address for this controller management interface.
Maximum numbers of APs supported	The maximum number of access points supported by the controller.
Gig Ethernet/Fiber Card	Displays the presence or absence of the optional 1000BASE-T or 1000BASE-SX GigE card.
Crypto Accelerator 1	Displays the presence or absence of a VPN/Enhanced Security Module (Crypto card) which enables IPSec security and provides enhanced processing power.
Crypto Accelerator 2	Displays the presence or absence of a second VPN/Enhanced Security Module (Crypto card).
Power Supply 1	Displays the presence or absence of a power supply.
Power Supply 2	Displays the presence or absence of a second power supply.
Note Crypto Accelerator 2, Power Supply 1, and Power Supply 2 options are displayed only in Cisco 4400 Series Wireless LAN Controllers.	

Command Buttons

- **Help:** Request that the help page be displayed in a new browser window.

Interfaces

Use **CONTROLLER > Interfaces** to navigate to this page.

The following table shows controller interface general parameters.

Table 4-3 Controller Interface Parameters

Parameter	Description
Interface Name	Name of the interface: • Management -- 802.11 Distribution System wired network. • Service-port -- System Service interface. • Virtual -- Unused IP address used as the Virtual Gateway Address. • AP-manager -- Only used when the LWAPP protocol is run across Layer 3. Can be on the same subnet as the management IP address, but must have a different IP address than the management interface. • <name> -- An Operator-Defined Interface assignment, without any spaces.
VLAN Identifier	Virtual LAN assignment of the interface.
IP Address	The IP address of the controller and its distribution port.
Interface Type	Static - Management, AP-Manager, Service-Port, and Virtual interfaces. Dynamic - Operator-defined interfaces.

- To edit the parameters for an interface, select the **Edit** link (Interfaces > Edit).
- Remove an interface by selecting the appropriate **Remove** link. You are prompted for confirmation of the interface removal.

Command Buttons

- **New:** Click to add a new interface.
- **Help:** Request that the help page be displayed in a new browser window.

Interfaces > New

Use **CONTROLLER > Interfaces** then **New** to navigate to this page.

Add a new controller Operator-Defined Interface by entering the following parameters:

- Interface Name - Enter the name of the new Operator-Defined Interface, without any spaces.
- VLAN Id - Enter the VLAN identifier for this new interface, or 0 for an untagged VLAN.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Click **Apply** to display the Interfaces > Edit page and continue configuring the new Operator-Defined Interface.
- **Help:** Request that the help page be displayed in a new browser window.

Interfaces > Edit

Use **CONTROLLER > Interfaces** then click **Edit** to navigate to this page.

The top of this page displays the Operator-Defined **Interface Name**, and may include the interface **MAC Address**. Edit controller management, VLAN, Service Port, Virtual, Operator-Defined and LWAPP Layer 3 AP-Manager interfaces as described in the following tables.

Table 4-4 Controller Management or Operator-Defined Interface Parameters

Parameter	Description
VLAN Identifier	Virtual LAN assigned to the interface.
IP Address	The IP address of the Interface.
Netmask	Interface subnet mask.
Gateway	Interface gateway router IP address.
Port Number	The controller physical port for this interface. **Note** The port number for a Cisco NMWLC6 controller is always displayed as "1" as the external port is not used.
Primary Port Number	The primary port for Cisco 4400 Series Wireless LAN Controllers.
Secondary Port Number	The secondary port for Cisco 4400 Series Wireless LAN Controller. If the primary port shuts down, all the interfaces on the primary port are moved to the secondary port. When the primary port becomes active again, the interfaces are moved back to the primary port.
AP Management	Select this checkbox to enable AP Management. A single AP management interface will result in all the APs communicating with the controller over a single gigabit port. This leads to increased traffic on the port. To avoid this, if AP Management option is enabled, you can designate any dynamic interface configured on the controller as an AP interface. As a result, a group of access points or each access point can be assigned a dynamic interface over which it can transmit data. **Note** This feature is present in Cisco 4400 Series Wireless LAN Controllers only.
Primary DHCP Server	The interface uses this DHCP server first to obtain an IP address.
Secondary DHCP Server	The interface uses this DHCP server as a backup to obtain an IP address.
ACL Name	Any of the Access Control Lists currently displayed on the Access Control Lists page.

Table 4-5 Controller Service Port Interface Parameters

Parameter	Description
DHCP Protocol	Check the check box to have the Service Port interface use a DHCP server to obtain its IP address.
IP Address	The IP address of the Service Port interface.
Netmask	Interface subnet mask.

Note The service port cannot be configured with the same IP address nor on the same subnet as the network distribution system.

Table 4-6 Controller Virtual Interface Parameters

Parameter	Description
IP Address	Gateway IP address. Any fictitious, unassigned IP address (such as 10.1.10.1) to be used by Layer 3 Security and Mobility managers. Reboot the controller to have this change take effect.
DNS Host Name	Gateway host name. Used by Layer 3 Security and Mobility managers to verify the source of certificates when Web Auth is enabled. Reboot the controller to have this change take effect.

Note You must configure the Virtual Gateway Address to enable Layer 3 Web Auth, configured on the WLANs > Edit page.

Table 4-7 Controller LWAPP Layer 3 Access Point Management Interface Parameters

Parameter	**Description**
VLAN Identifier	Virtual LAN assigned to the interface.
IP Address	The IP address of the controller Layer 3 LWAPP protocol manager. Note that this IP address cannot be the same as used by the Management Interface.
Netmask	Interface subnet mask.
Gateway	Interface gateway router IP address.
Port Number	The controller physical port for this interface.
Primary DHCP Server	The interface uses this DHCP server first to obtain an IP address.
Secondary DHCP Server	The interface uses this DHCP server as a backup to obtain an IP address.
ACL Name	Any of the Access Control List Names currently available on the Access Control Lists page.

Note You may only create a Layer 3 LWAPP Access Point manager after the controller has been rebooted to use Layer 3 LWAPP protocol.

Command Buttons

- Back: Return to the previous window.

- Apply: Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- Applying Interface changes may cause WLANs to temporarily drop client connections. You will be prompted to confirm the changes if this is the case.
- Help: Request that the help page be displayed in a new browser window.

Network Routes

Use **CONTROLLER > Network Routes** to navigate to this page.

This page provides a summary of existing Service port Network Routes to Network or Element Management systems on a different subnet by **IP Address**, **IP Netmask**, and **Gateway IP Address**.

- Remove a Network Route by selecting the appropriate **Remove** link. You are prompted for confirmation of the Network Route removal.

Command Buttons

- **New:** Select to add a new Network Route.
- **Help:** Request that the help page be displayed in a new browser window.

Network Routes > New

Use **CONTROLLER > Network Routes** then click **New** to navigate to this page.

Add a new Network Route for the Service port by entering the Route:

- IP Address - Destination network IP Address range.
- IP Netmask - Destination subnet mask.
- Gateway IP Address - IP Address of the Service Port gateway router.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

DHCP Scopes

Use **CONTROLLER > Internal DHCP Server** to navigate to this page.

The controllers have built-in DHCP relay agents. However, when network administrators desire network segments that do not have a separate DHCP server, the controllers can have built-in DHCP Scopes (Dynamic Host Configuration Protocol servers) that assign IP addresses and subnet masks to Cisco WLAN Solution clients. Typically, one controller can have one or more DHCP Scopes that each provide a range of IP addresses. This page shows the existing DHCP server Scope names.

Each DHCP Scope displays the following entries, which are a subset of those set on the DHCP Scope > Edit page:

- Scope Name.
- Network Served.
- Netmask - subnet mask assigned to all Cisco WLAN Solution clients.
- Address Pool - IP Address range. Note that this pool must be unique for each DHCP Scope, and must not include the static IP addresses of routers and other servers.
- Lease Time - number of seconds an IP address is granted to a client.
- Scope Status - Scope Enabled or Disabled.
- Click **Edit** to go to the DHCP Scope > Edit page to change the DHCP Scope settings.
- Remove a DHCP Scope by selecting the appropriate **Remove** link. You are prompted to confirm the DHCP Scope removal.

Command Buttons

- **New:** Click **New** to go to the DHCP Scope > New page.

DHCP Scope > New

Use **CONTROLLER > Internal DHCP Server** then click **New** to navigate to this page.

The controllers have built-in DHCP relay agents. However, when network administrators desire network segments that do not have a separate DHCP server, the controllers also have built-in DHCP Scopes (servers) that assign IP addresses and subnet masks to Cisco WLAN Solution clients. Typically, one controller can have one or more DHCP Scopes that each provide a range of IP addresses. This page allows you to add a DHCP server Scope Name.

Add a new DHCP Scope by entering the DHCP Scope Name and then clicking **Apply**. The Cisco WLAN Solution saves the DHCP Scope Name and returns you to the DHCP Scopes page. On the DHCP Scopes page, click **Edit** to set the DHCP Scope parameters on the DHCP Scope > Edit page.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.

DHCP Scope > Edit

Use **CONTROLLER > Internal DHCP Server** then click **Edit** to navigate to this page.

The controllers have built-in DHCP relay agents. However, when network administrators desire network segments that do not have a separate DHCP server, the controllers also have built-in DHCP Scopes (servers) that assign IP addresses and subnet masks to Cisco WLAN Solution clients. Typically, one controller can have one or more DHCP Scopes that each provide a range of IP addresses. This page allows you to edit a DHCP server Scope.

This page shows the name of the DHCP Scope you are editing.

Each DHCP Scope allows you to edit the following parameters:

- Pool Start Address - the starting IP address in the range assigned to clients. Note that this pool must be unique for each DHCP Scope. Also note that the pool must not include the static IP addresses of routers and other servers.
- Pool End Address - the ending IP address in the range assigned to clients. Note that this pool must be unique for each DHCP Scope. Also note that the pool must not include the static IP addresses of routers and other servers.
- Network - the network served by this DHCP Scope. This is the IP address used by the Management Interface listed on the Interfaces page.
- Netmask - the subnet mask assigned to all Cisco WLAN Solution clients.
- Lease Time - how many seconds an IP address is granted to a client, from 0 through 65536.
- Default Routers - IP address of the optional router or routers connecting Cisco 4100 Series Wireless LAN Controllers. Note that each router must include a DHCP forwarding agent. Note that this allows a single controller to serve the clients of multiple Cisco 4100 Series Wireless LAN Controllers.
- DNS Domain Name - optional DNS (Domain Name System) Domain Name of this DHCP Scope, for use with one or more DNS Servers.
- DNS Servers - IP address of the optional DNS Servers. Note that each DNS Server must be able to update a client’s DNS entry to match the IP address assigned by this DHCP Scope.
- NetBIOS Name Servers - IP address of the optional Microsoft NetBIOS (Network Basic Input Output System) Name Servers, such as a WINS (Windows Internet Naming Service) Server.
- Status - Enable or Disable this DHCP Scope.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.

Static Mobility Group Members

Use **CONTROLLER > Mobility Management > Mobility Groups** to navigate to this page.

This page lists existing Mobility Group members by **MAC Address** and **IP Address**, and also indicates whether the Mobility Group member is Local (this controller) or remote (any other Mobility Group member). The first entry is the local controller, which cannot be deleted. The following entries are other controllers in the mobility group, that can be deleted at any time using the **Remove** link.

Note You can ping any of the static mobility group members using the **Ping** link.

The RF Mobility Group Domain Name is set on the General page.

Command Buttons

- **New:** Select to add a new Mobility Group member.
- **Edit All:** Display the Mobility Group Member > Edit All page.
- **Help:** Request that the help page be displayed in a new browser window.

Mobility Group Member > New

Use **CONTROLLER > Mobility Management > Mobility Groups** then click **New** to navigate to this page.

This page allows you to add mobility group members by **IP Address** and **MAC Address**.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Mobility Group Member > Edit All

Use **CONTROLLER > Mobility Management > Mobility Groups** then click **Edit All** to navigate to this page.

This page allows you to edit all the existing Mobility Group members' **MAC Addresses** and **IP Addresses** in a text box, and then to cut and paste all the entries from one controller to the other controllers in the mobility group.

You can edit existing entries in the box and/or paste new entries into the box. In all cases, leave one space between the MAC address and IP address on each line.

The text box on this page makes it easy to avoid data-entry errors while copying the mobility group members list to all the controllers in the same mobility group:

1. Notice that the text box starts with the local controller MAC address and IP address.

2. In the text box, add the MAC addresses and IP addresses for the rest of the controllers in the same geographical location (such as a campus or building) you want to add to the static mobility group.
3. When you have added all the controller MAC addresses and IP addresses to the static mobility group, you can cut and paste the complete list into the corresponding boxes in the Mobility Group Member > Edit All pages in other mobility group member Web User Interface pages.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Mobility Statistics

Use **CONTROLLER > Mobility Management > Mobility Statistics** to navigate to this page.

This page displays the statistics for mobility group events, and is divided into three sections: Global Mobility Statistics, Mobility Initiator Statistics, and Mobility Responder Statistics.

- Global Statistics are those that affect all mobility transactions.
- Mobility Initiator Statistics are those that are generated by controller initiating the mobility event.
- Mobility Responder Statistics are those generated by controller responding to a mobility event.

The following tables list parameters and descriptions or each of these statistics:

Table 4-8 Global Mobility Statistics

Parameter	Description
Rx Errors	Generic protocol packet receive errors, such as packet too short or format incorrect.
Tx Errors	Generic protocol packet transmit errors, such as packet transmission fail.
Responses Retransmitted	The mobility protocol uses UDP and it resends requests several times if it doesn't receive a response. Because of network or processing delays, the responder may receive one or more retry requests after it initially responds to a request. This is a count of the response resends.
Handoff Requests Received	Total number of handoff requests received, ignored or responded.
Handoff End Requests Received	Total number of handoff end requests received. These are sent by the Anchor or the Foreign to notify the other about the close of a client session.
State Transitions Disallowed	PEM (policy enforcement module) has denied a client state transition, usually resulting in the handoff being aborted.
Resource Unavailable	A necessary resource, such as a buffer, was unavailable, resulting in the handoff being aborted.

Table 4-9 Mobility Initiator Statistics

Parameter	Description
Handoff Requests Sent	Number of client clients that have associated with controller and have been 'announced' to the mobility group.
Handoff Replies Received	Number of handoff replies that have been received in response to the requests sent.
Handoff as Local Received	Number of handoffs in which the entire client session has been transferred.
Handoff as Foreign Received	Number of handoffs in which the client session was anchored elsewhere.
Handoff Denys Received	Number of handoffs that were denied.

Table 4-9 Mobility Initiator Statistics (continued)

Parameter	Description
Anchor Request Sent	Number of anchor requests that were sent for a three party (foreign to foreign) handoff. Handoff was received from another foreign and the new controller is requesting the anchor to move the client.
Anchor Deny Received	Number of anchor requests that were denied by the current anchor.
Anchor Grant Received	Number of anchor requests that were approved by the current anchor.
Anchor Transfer Received	Number of anchor requests that 'closed' the session on the current anchor and transferred the anchor back to the requestor.

Table 4-10 Mobility Responder Statistics

Parameter	Description
Handoff Requests Ignored	Number of handoff requests/client announces that were ignored. The controller simply had no knowledge of that client.
Ping Pong Handoff Requests Dropped	Number of handoff requests that were denied because the handoff period was too short (3 sec).
Handoff Requests Dropped	Number of handoff requests that were dropped due to a either an incomplete knowledge of the client or a problem with the packet.
Handoff Requests Denied	Number of handoff requests that were actively denied.
Client Handoff as Local	Number of handoffs responses sent while in the 'local' role.
Client Handoff as Foreign	Number of handoffs responses sent while in the 'foreign' role.
Anchor Requests Received	Number of anchor requests received.
Anchor Requests Denied	Number of anchor requests denied.
Anchor Requests Granted	Number of anchor requests granted.
Anchor Transferred	Number of anchors transferred because the client has moved from a foreign controller to a controller on the same subnet as the current anchor.

Command Buttons

- **Clear Stats:** Deletes all Mobility statistics entries.
- **Help:** Request that the help page be displayed in a new browser window.

Controller Spanning Tree Configuration

Use **CONTROLLER > Spanning Tree** to navigate to this page.

The Spanning Tree Protocol (STP) is a link management protocol. Cisco WLAN Solution implements the IEEE 802.1D standard for media access control bridges.

Using the spanning tree algorithm provides redundancy while preventing undesirable loops in a network that are created by multiple active paths between stations. STP allows only one active path at a time between any two network devices (this prevents the loops) but establishes the redundant links as a backup if the initial link should fail.

This page allows you to enable or disable the spanning tree algorithm, modify its characteristics and view statistics as described in the following tables.

Table 4-11 STP Parameters

Parameter	Description
Spanning Tree Algorithm	Specifies if this controller participates in the spanning tree protocol. May be enabled or disabled by selecting the corresponding line on the pull-down entry field. The factory default is disabled.
Priority	The value of the writable portion of the Bridge ID, i.e., the first two octets of the (8 octet long) Bridge ID. The other (last) 6 octets of the Bridge ID are given by the value of Bridge MAC Address. The value may be specified as a number between 0 and 65535. The factory default is 32768.
Maximum Age (seconds)	The value that all bridges use for MaxAge when this bridge is acting as the root. Note that 802.1D-1990 specifies that the range for this parameter is related to the value of Stp Bridge Hello Time. The granularity of this timer is specified by 802.1D-1990 to be 1 second. Valid values are 6 through 40 seconds. The factory default is 20.
Hello Time (seconds)	The value that all bridges use for HelloTime when this bridge is acting as the root. The granularity of this timer is specified by 802.1D-1990 to be 1 second. Valid values are 1 through 10 seconds. The factory default is 2.
Forward Delay (seconds)	The value that all bridges use for ForwardDelay when this bridge is acting as the root. Note that 802.1D-1990 specifies that the range for this parameter is related to the value of Stp Bridge Maximum Age. The granularity of this timer is specified by 802.1D-1990 to be 1 second. An agent may return a badValue error if a set is attempted to a value that is not a whole number of seconds. Valid values are 4 through 30 seconds. The Factory default is 15.
Spanning Tree Specification	An indication of what version of the Spanning Tree Protocol is being run. IEEE 802.1D implementations return 'IEEE 802.1D'. If future versions of the IEEE Spanning Tree Protocol are released that are incompatible with the current version a new value will be defined.

Table 4-12 STP Statistics

Parameter	Description
Base MAC Address	The MAC address used by this bridge when it must be referred to in a unique fashion. When concatenated with dot1dStpPriority, a unique BridgeIdentifier is formed that is used in the Spanning Tree Protocol.
Topology Change Count	The total number of topology changes detected by this bridge since the management entity was last reset or initialized.
Time Since Topology Changed	The time (in days, hours, minutes and seconds) since the last time a topology change was detected by the bridge entity.
Designated Root	The bridge identifier of the root of the spanning tree as determined by the Spanning Tree Protocol as executed by this node. This value is used as the Root Identifier parameter in all Configuration Bridge PDUs originated by this node.
Root Port	The port number of the port that offers the lowest cost path from this bridge to the root bridge.
Root Cost	The cost of the path to the root as seen from this bridge.
Max Age (seconds)	The maximum age of Spanning Tree Protocol information learned from the network on any port before it is discarded.
Hello Time (seconds)	The amount of time between the transmission of Configuration Bridge PDUs by this node on any port when it is the root of the spanning tree or trying to become so. This is the actual value that this bridge is currently using.
Forward Delay (seconds)	This time value controls how fast a port changes its spanning state when moving towards the Forwarding state. The value determines how long the port stays in each of the Listening and Learning states, that precede the Forwarding state. This value is also used, when a topology change has been detected and is underway, to age all dynamic entries in the Forwarding Database. [This value is the one that this bridge is currently using, in contrast to Stp Bridge Forward Delay that is the value that this bridge and all others would start using if/when this bridge were to become the root.]
Hold Time (seconds)	The minimum time period to elapse between the transmission of Configuration BPDUs through a given LAN Port: at most one Configuration BPDU shall be transmitted in any Hold Time period.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Ports

Use **CONTROLLER > Ports** to navigate to this page.

This page displays the status of each physical port on the controller, and also indicates whether **Port Mirroring** is enabled or disabled.

The following table provides a description and the range for each parameter.

Table 4-13 Summary Parameters

Parameter	Description	Range
Port No	Port number on the controller.	13 for optional 1000Base-T or 1000Base-SX module 25 for optional 1000Base-T or 1000Base-SX module 1 for Cisco 4100 Series Wireless LAN Controller 1000Base-SX port(s)
STP Status	State of the Spanning Tree Protocol Administrative Mode associated with the port.	Enabled Disabled Forwarding
Admin Status	Displays the state of the port.	Enable Disable
Physical Mode	Displays the configuration of the port physical interface.	Auto 100 Mbps Full Duplex 100 Mbps Half Duplex 10 Mbps Full Duplex 10 Mbps Half Duplex **Note** In a Cisco NMWLC6 controller, the physical mode is always set to “Auto”.
Physical Status	Displays the actual port physical interface.	Auto 100 Mbps Full Duplex 100 Mbps Half Duplex 10 Mbps Full Duplex 10 Mbps Half Duplex
Link Status	Displays the status of the link.	Link Up Link Down
Link Trap	Displays if the port is set to send a trap when link status changes.	Enable Disable

Table 4-13 Summary Parameters (continued)

Parameter	Description	Range
POE	Displays status of Power over Ethernet functionality.	Enable Disable
Mcast Appliance	Sets support for multicast appliance mode.	Enable Disable

Note The physical mode and status may reflect different values depending on the link status. For example, the physical mode may be set to “Auto” while the actual link is running at “10 Mbps Half Duplex”.

- To edit global parameters across all ports, click the **ConfigureAll** command button to open the Ports > Configure All page.
- To edit the parameters for a single port, select the **Edit** link for the port you wish to configure. This brings up a Port > Edit Configuration page.

Command Buttons

- **ConfigureAll:** Open the Global Port configuration data page.
- **Help:** Request that the help page be displayed in a new browser window.

Ports > Configure All

Use **CONTROLLER > Ports** then click **ConfigureAll** to navigate to this page.

This page allows you to change the parameters of all front-panel physical ports on the controller simultaneously. The following table describes these parameters.

Table 4-14 Port Configuration Details

Parameter	Description	Range
Admin Status	Sets the state of all ports to **Don’t Apply**, **Enable** or **Disable**.	
Physical Mode	Sets the physical mode of all ports.	Don’t Apply Auto 100 Mbps Full Duplex 100 Mbps Half Duplex 10 Mbps Full Duplex 10 Mbps Half Duplex

Table 4-14 Port Configuration Details (continued)

Parameter	Description	Range
Link Trap	Sets all ports to send or not to send a trap when link status changes. The factory default is Don’t Apply.	
STP Mode	The Spanning Tree Protocol Administrative Mode associated with the port. The possible values are:	Don’t Apply 802.1D - all ports participate in the spanning tree and goes through all of the spanning tree states when the link state transitions from Down to Up. Off - spanning tree is disabled for all ports. Fast - all ports participate in the spanning tree and are put in the forwarding state when the link state transitions from Down to Up faster than when STP Mode is 802.1D. In this state, the Forwarding Delay timer is ignored on Link Up.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Port > Edit Configuration

Use **CONTROLLER > Ports** then click **Edit** to navigate to this page.

This page allows you to change the parameters of a single physical port on the controller. Table 4-15 describes these parameters.

Table 4-15 General Port Configuration

Parameter	Description	Range
Port No	Identifies the current port.	13 for optional 1000Base-T or 1000Base-SX module 25 for optional 1000Base-T or 1000Base-SX module 1 for Cisco 4100 Series Wireless LAN Controller 1000Base-SX port(s)
Admin Status	Sets the state of the port.	Enable Disable
Mirror Mode	Sets the Port Mirroring mode.	Enable Disable

Table 4-15 General Port Configuration (continued)

Parameter	Description	Range
Physical Mode	Sets the physical mode of the port.	Auto 100 Mbps Full Duplex 100 Mbps Half Duplex 10 Mbps Full Duplex 10 Mbps Half Duplex
Physical Status	Displays the current physical port interface status.	100 Mbps Full Duplex 100 Mbps Half Duplex 10 Mbps Full Duplex 10 Mbps Half Duplex
Link Status	Displays the status of the link.	Link Up Link Down
Link Trap	Sets port to send or not to send a trap when link status changes. The factory default is enabled.	Enable Disable
Power over Ethernet (PoE)	Detects if connecting device is equipped to receive power via the Ethernet cable and if so provides -48 VDC per 802.3af. (Note.)	Enable Disable
Multicast Appliance Mode	Sets support for multicast appliance mode.	Enable Disable

Note Some Cisco access points **do not conform** to the 802.3af specification. Some older Cisco APs do not draw PoE, even if it is enabled on the controller port. In such cases, please contact Cisco WLAN Solution Cisco Technical Assistance Center (TAC).

Table 4-16 Spanning Tree Protocol Configuration

Parameter	Description
STP Port ID	The port number of the port for which this entry contains Spanning Tree Protocol management information.
STP Mode	The Spanning Tree Protocol Administrative Mode associated with the port or trunk. The possible values are: • 802.1D - this port participates in the spanning tree and goes through all of the spanning tree states when the link state transitions from Down to Up. • Fast - this port participates in the spanning tree and is put in the forwarding state when the link state transitions from Down to Up faster than when STP Mode is 802.1D. In this state, the Forwarding Delay timer is ignored on Link Up. • Off - spanning tree is disabled for this port. This is also referred to as manual spanning tree.

Table 4-16 Spanning Tree Protocol Configuration (continued)

Parameter	Description
STP State	The port's current state as defined by application of the Spanning Tree Protocol. This state controls what action a port takes on reception of a frame. If the bridge has detected a port that is malfunctioning it places that port into the broken state. For ports disabled by Spanning Tree mode, this object has a value of disabled. The valid values are: Disabled Blocking Listening Learning Forwarding Broken
STP Port Designated Root	The unique Bridge Identifier of the Bridge recorded as the Root in the Configuration BPDUs transmitted by the Designated Bridge for the segment to which the port is attached.
STP Port Designated Cost	The path cost of the Designated Port of the segment connected to this port. This value is compared to the Root Path Cost field in received Bridge PDUs.
STP Port Designated Bridge	The Bridge Identifier of the bridge that this port considers to be the Designated Bridge for this port's segment.
STP Port Designated Port	The Port Identifier of the port on the Designated Bridge for this port's segment.
STP Port Forward Transitions Count	The number of times this port has transitioned from the Learning state to the Forwarding state.
STP Port Priority	The value of the priority field contained in the first (in network byte order) octet of the (2 octet long) Port ID. The other octet of the Port ID is given by the value of the Port id. Valid values are from 0 to 255. The factory default is 128.
STP Port Path Cost Mode	Auto (use the STP Port Path Cost parameter) or User Configured.
STP Port Path Cost	The contribution of this port to the path cost of paths towards the spanning tree root that includes this port. 802.1D-1990 recommends that the default value of this parameter be in inverse proportion to the speed of the attached LAN. Valid values are from 0 to 65535. The factory default is 0, which means the cost is adjusted for the speed of the port when the link comes up. The value used is 100 for 10 Mbps ports, and 19 for 100 Mbps ports.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Master Controller Configuration

Use **CONTROLLER > Master Controller Mode** to navigate to this page.

This page enables the controller to be configured as the master controller for your access points connected in appliance mode. When there is a master controller enabled, all newly-added access points with no Primary, Secondary, or Tertiary controllers assigned associate with the master controller on the same subnet. This allows the operator to verify the access point configuration and assign Primary, Secondary, and Tertiary controllers to the access point using the Cisco APs > Details page.

Note The master controller is normally used only while adding new access points to the Cisco Wireless LAN Solution (Cisco WLAN Solution). When no more access points are being added to the network, Cisco WLAN Solution recommends that you disable the master controller.

Note Because the master controller is normally not used in a deployed network, the master controller setting is automatically disabled upon reboot or OS code upgrade.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

NTP Servers

Use **CONTROLLER > Network Time Protocol** to navigate to this page. Use this page to set the following Network Time Protocol parameters:

- NTP Polling Interval Seconds - Network Polling Time Interval in seconds.
- Server Index - The NTP server Index. The controller tries Index 1 first, then Index 2 through 3, in descending order. Should be 1 if your network is using only one NTP server.
- Server Address - IP address of the NTP server.
- Click **Edit** to go to the NTP Servers > Edit page to change the NTP server IP address.
- Remove an NTP server entry by selecting the appropriate **Remove** link. You are prompted for confirmation of the NTP server removal.
- Click **Ping** to ping the NTP server.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **New:** Select to add a new item to a list. To set up a new NTP server, click to open the NTP Servers > New page.
- **Help:** Request that the help page be displayed in a new browser window.

NTP Servers > New

Use **CONTROLLER > Network Time Protocol** then click **New** to navigate to this page.

This page allows you to add a new NTP server. The following table describes the required parameters.

Table 4-17 New Network Time Protocol Server Configuration

Parameter	Description
Server Index (Priority)	The NTP server Index. The controller tries Index 1 first, then Index 2 through 3, in descending order. Set this to 1 if your network is using only one NTP server.
Server IP Address	IP address of the NTP server.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

NTP Servers > Edit

Use **CONTROLLER > Network Time Protocol** then click **Edit** to navigate to this page.

This page allows you to change the NTP server. The following table describes the parameter you can change.

Table 4-18 Edit Network Time Protocol Server Configuration

Parameter	Description
Server Address	IP address of the NTP server.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

QoS Profiles

Use **CONTROLLER > QoS Profiles** to navigate to this page. Use this page to view the following OS Quality of Service settings:

Table 4-19 QoS Profiles

Parameter	Description
Profile Name	Name of the OS QoS Profile.
Description	Platinum (Voice)—This setting assures a high Quality of Service for Voice over Wireless. Gold (Video)—This setting supports high-quality video applications. Silver (Best Effort)— This is the default setting and supports normal bandwidth for clients. Bronze (Background)— Lowest bandwidth for guest services. VoIP clients should be set to Platinum, Gold or Silver, while low-bandwidth clients can be set to Bronze.

Command Buttons

- **Help:** Request that the help page be displayed in a new browser window.

Edit QoS Profile

Use **CONTROLLER > QoS Profiles** then click **Edit** to navigate to this page. The top of the main page lists the selected Quality of Service profile name. Use this page to edit the following OS QoS parameters.

Table 4-20 QoS Profile Parameters

Parameter	Description
Description	Operator-Defined description for this QoS Profile.
Average Per-User Contract Data Rate	0 to 60,000 bits per second. Operator-defined average data rate for non-UDP traffic. Default 0 = OFF.
Burst Per-User Contract Data Rate	0 to 60,000 bits per second. Operator-defined peak data rate for non-UDP traffic. Default 0 = OFF.
Average Per-User Contract Real-Time Rate	0 to 60,000 bits per second. Operator-defined average data rate for UDP traffic. Default 0 = OFF.
Burst Per-User Contract Real-Time Rate	0 to 60,000 bits per second. Operator-defined peak data rate for UDP traffic. Default 0 = OFF.
Maximum QoS RF usage per AP	1 to 100%. Maximum air bandwidth available to a class of clients. Default 100%.
QoS Queue Depth	50 to 500. Depth of Queue for a class of client. Causes packets with a greater value to be dropped at the access point. Nominally 100 for Bronze, 150 for Silver, 255 for Gold, and 255 for Platinum.
Wired QoS Protocol	Select 802.1P to activate 802.1P Priority Tags, or select None to deactivate 802.1P Priority Tags (default).
802.1P Tag	802.1P Priority Tag for the wired connection from 0 to 7. This is used for traffic and LWAPP packets. Nominally 1 for Bronze, 3 for Silver, 4 for Gold, and 6 for Platinum.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Reset to default:** Reset the parameters to the factory default.
- **Help:** Request that the help page be displayed in a new browser window.

Wireless Menu Bar Selection

The **WIRELESS** tab provides access to the Cisco WLAN Solution wireless network configuration. Use the selector area to access specific wireless network parameters. Making this selection from the menu bar opens the Cisco APs page.

You can access the following pages from the Wireless Menu Bar Selection:

- Cisco APs
- Cisco APs > Details.
- 802.11a Cisco radio
- 802.11a Cisco APs > Configure
- 802.11 AP Interfaces > Performance Profile
- 802.11a AP Interfaces > Details
- 802.11b/g Cisco Radios
- 802.11b/g Cisco Radios > Configure
- 802.11b/g AP Interfaces > Details
- Bridging
- Zero Touch Configuration
- Rogue APs
- Rogue AP Detail
- Known Rogue APs
- Known Rogue APs
- Known Rogue AP Detail
- Rogue Clients
- Rogue Client Detail
- Adhoc Rogues
- Clients
- Clients > Detail
- 802.11a Global Parameters
- 802.11a Global Parameters > Auto RF
- 802.11b/g Global Parameters

- 802.11b/g Global Parameters > Auto RF
- Country
- Timers

Cisco APs

Use **WIRELESS > Access Points > Cisco APs** or **MONITOR > Summary > Cisco APs Detail** to navigate to this page.

This page displays the access points associated with this controller.

Table 5-1 Cisco AP Summary

Parameter	Description
AP Name	Operator-defined name of the access point.
AP ID	Identification number automatically assigned by the controller when the access point is configured.
Ethernet MAC	The ethernet MAC address of the access point.
Admin Status	Administration state of the access point is either enabled or disabled.
Operational Status	Operational status of the access point is either registered (REG) or not registered (DEREG).
Port Number	This is the port to which the access point is connected.

For details on a particular access point, select the **Detail** link to open the Cisco APs > Details page for that access point.

Command Button

- **Help:** Request that the help page be displayed in a new browser window.

Cisco APs > Details

Use **WIRELESS > Access Points > Cisco APs** and then click **Detail** to navigate to this page.

This page shows the details of the selected access point including the hardware, Operating System software and boot version details.

Note Bridging information parameters are displayed only when the AP mode is set to “**Bridge**”.

Table 5-2 General Details

Parameter	**Description**
AP Name	Set the customer definable name of the access point.
Ethernet MAC Address	The ethernet MAC address of the access point.
Base Radio MAC	The MAC address of the 802.11a/b/g radio.
Regulatory Domain	The regulatory domain of the AP.
AP IP Address	IP address of the access point.
AP ID	Identification number automatically assigned by the controller when the access point is configured.
Admin Status	Set the administration state of the access point to either enabled or disabled.
AP Static IP	The static IP address of the AP. **Note** This option is visible only when the controller is configured in layer3 mode. When an AP boots up, it tries to determine if its static IP address is configured or not. In case the AP has been configured with a static IP address that is not valid on the network, the AP cannot join the controller and hence will not be able to communicate with the rest of the network. In such a scenario, the only way to recover that AP is to manually open the AP door and connect a serial console for configuration purpose. To overcome this, the AP can be configured in such a way that, even if its static IP address is not valid on the network, it will initiate a DHCP process to get a new IP address and use it for communication. This allows the AP to join the controllers on the network. Options for this parameter are: • **Checked** - When the box is checked, you can set the following: – AP Static IP: the static IP address of the AP. – Netmask: subnet mask assigned to the AP IP address. – Gateway: the gateway of the AP • **Unchecked** - When the box is unchecked, the static IP address will be disabled and the AP will initiate a DHCP process when it boots up to procure the IP address.

Table 5-2 General Details (continued)

Parameter	Description
AP Mode	Set the access point mode of operation. Options are: • Local - the default option. • Monitor - monitor-only mode. • Bridge (displayed only if the AP is bridge capable)- set the AP mode to “Bridge” if you are connecting a WRAP. **Note** If the AP mode is set to “Bridge” and the AP is not REAP capable, an error is displayed. • Rogue Detector - monitors the rogue APs; does not transmit or contain rogue APs. • Sniffer - the access point starts sniffing the air on a given channel. It will capture and forward all the packets from the clients on that channel to a remote machine that runs airopeek (A packet analyzer for IEEE 802.11 wireless LANs). It will include information on timestamp, signal strength, packet size and so on The following parameters are required for sniffing: – Channel: the channel to sniff – Server IP address: the IP address of the remote machine running Airopeek Refer to the Sniffer Feature for more details. • Remote Edge lightweight Access Point (REAP)- used for Cisco Aironet 1030 IEEE 802.11a/b/g remote edge lightweight access points
Mirror Mode	Port Mirroring mode, either enabled or disabled.
Operational Status	The operational status of the access point comes up as either registered (REG) or not registered (DEREG) automatically by the controller.
Port Number	The access point is connected to this controller port.
AP Group Name	This drop-down list contains the names of AP Groups VLANs that you have created. To associate an AP group VLAN with an access point: 1. Select an AP group VLAN from the drop-down list. 2. Click the **Apply** button. For more information on creating a new AP Group and mapping it to an interface, refer to AP Groups VLAN.
Location	Customer-definable location name for the access point.
Primary Controller Name	This is the access point’s primary controller SNMP name. The access point attempts to associate with this controller first for all network operations and in the event of a hardware reset (Note).

Table 5-2 General Details (continued)

Parameter	Description
Secondary Controller Name	This is the access point's secondary controller SNMP name. The access point attempts to associate with this controller second for all network operations and in the event of a hardware reset (See Note).
Tertiary Controller Name	This is the access point's tertiary controller SNMP name. The access point attempts to associate with this controller third for all network operations and in the event of a hardware reset (See Note).
Statistics Timer	This counter sets the time in seconds that the access point sends its DOT11 statistics to the controller.

Note After the access point is reset, it attempts to connect with its primary, secondary, and tertiary controller as configured on this page. If the access point's primary, secondary, and tertiary controller are not available, it searches for the master controller (Master Controller Configuration) and finally the least loaded controller on the network.

Table 5-3 Radio Interface Details

Parameter	Description
Number of interfaces	One or Two 802.11a and/or 802.11b/g interfaces.
Interface Type	Displays the Cisco radio type: either 802.11a or 802.11b/g.
Admin Status	Displays the Cisco radio interface status: either enabled or disabled.
Oper Status	Displays the Cisco radio operational status: either UP or DOWN.

Table 5-4 Versions

Parameter	Description
Software Version	Displays the Software version, for example, 3.0.80.0.
Boot Version	Displays the Boot ROM versions for example, 11.20.0.

Table 5-5 Inventory Information

Parameter	Description
AP Model	Displays the model of the access point.
IOS Version	Displays the IOS version of the access point.
AP Serial Number	Displays the access point's serial number, for example, 01012203-10057105-01182.
AP Certificate Type	Displays the certificate type as either **Self Signed** or **Manufacture Installed**.
Reap Mode Supported	Not an editable field. Displays whether or not the access point can be configured either as a access point, or Cisco Aironet 1030 IEEE 802.11a/b/g remote edge lightweight access point.

Table 5-6 Bridging Information Parameters

Parameter	Description
AP Role	Not an editable field. Specifies if the WRAP is a RAP or PAP. RAP: RAPs have a wired LWAPP (Light Weight AP Protocol) connection back to a Cisco controller. It uses the backhaul wireless interface to communicate to neighboring PAPs. RAPs are the parent node to any bridging or mesh network and connect a bridge or mesh network to the wired network, thus their can only be one RAP for any bridged or mesh network. PAP: PAPs have no wired connection to a Cisco controller. They can be completely wireless supporting clients, communicating to other PAPs and a RAP to get access to the network, or they can be wired and serve as bridge to a remote wired network. The access point roles can be configured using *Zero Touch Configuration* or *AP Configuration Too*l.
Bridge Type	Not an editable field. Specifies if the WRAP is an indoor or outdoor access point.
Bridge Group Name	Not an editable field. Specifies the bridge group name. Bridge Group Name can be configured using the AP configuration tool. Use bridge group names to logically group the access points and avoid two networks on the same channel from communicating with each other. **Note** For the access points to communicate with each other, they must have the same bridge group name.
Ethernet Bridging	Select the check box to enable ethernet bridging on the access point.
Backhaul Interface	This is an editable field if the WRAP is a RAP. Set the backhaul interface here (802.11a, 802.11b or 802.11g). **Note** To configure this parameter for PAP, use the *AP configuration tool*.

Bridge Data Rate (Mbps)	Set the data rate here. This is the rate at which data is shared between the access points. The drop-down list displays the data rates depending on the Backhaul Interface set.
	The correct range of values depend on the backhaul interfaces used by the access points.
	The data rates (Mbps) are:
	for 802.11a: 6, 9, 12, 18, 24, 36, 48, 54
	for 802.11b: 1, 2, 5.5, 11
	for 802.11g: 1, 2, 5.5, 11, 6, 9, 12, 18, 24, 36, 48, 54

Hardware Reset Button

- Click the **Reset AP Now** button to reset the access point.

Set to Factory Defaults Button

- Click the **Clear Config** button to reset the access point parameters to the factory defaults.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- Help: Request that the help page be displayed in a new browser window.

Sniffer Feature

When sniffer feature is enabled on an access point, the access point functions as a sniffer and captures and forwards all the packets on a particular channel to a remote machine that runs Airopeek. These packets contain information on timestamp, signal strength, packet size and so on.

Note Sniffer feature can be enabled only if you are running Airopeek, which is a third-party network analyzer software that supports decoding of data packets. For more information on Airopeek, refer to:

http://www.wildpackets.com/products/airopeek/overview.

Prerequisites for Using Sniffer Feature

Before using Sniffer feature, you must have completed the following:

- Configured an access point in sniffer mode at the remote site. For information on how to configure an access point in sniffer mode, refer to AP mode in Table 5-2 on page 5-4.
- Installed Airopeek version 2.05 or later on a Windows XP machine.
- Copied the following dll files:
  - **socket.dll** file to the Plugins folder (Example: C:\ProgramFiles\WildPackets\AiroPeek\Plugins)
  - **socketres.dll** file to the PluginRes folder (Example:C:\ProgramFiles\WildPackets\AiroPeek\1033\PluginRes)

Configuring Airopeek on the Remote Machine

1. Choose **Start > Programs > WildPackets Airopeek NX** to launch the application.
2. From the **Tools** menu, choose **Options**.
3. In the **Options** window, click **Analysis Module**.
4. Right click inside the **Analysis Modules** table and choose **Disable All** option.
5. Find **Cisco remote module** column and enable it. Click **OK** to save the changes.
6. Click **New capture** button to bring up the **Capture Option** window.
7. Click on **Adapter** and from the list of adapter modules, select remote Cisco adapter.

8. Expand it to locate the new remote adapter option. Double click on it to open a new window, enter a name in the field provided and enter the controller management interface IP in the IP address column.
9. Click **OK**. The new adapter will be added to the remote Cisco adapter.
10. Select the new adapter for remote airopeek capture using the access point.
11. Click **start socket capture** option in capture window to start the remote capture process.
12. Go to the controller CLI, bring up an access point and set it to sniffer mode by keying the command

    config ap mode sniffer <ap-name>

The access point reboots and come up in sniffer mode.

Configuring an Access Point in Sniffer Mode Using the Web User Interface

1. Use **Configure > Access Points**, click an item under AP Name list to navigate to this page.
2. Under **General** parameters, set the AP mode to **Sniffer** using the drop-down list and click **Apply**.
3. Select a **Protocol** (802.11a/802.11b/g) under **Radio Interfaces**. This will open the configuration page.
4. Select the **Sniff** check box to bring up the **Sniff** parameters. Select the channel to be sniffed and enter the IP address of the server (The remote machine running Airopeek).
5. Click **Save** to save the changes.

Now the access point is configured to sniff that particular channel, capture packets and forward it to the server that runs Airopeek.

Link T est

Use **WIRELESS > Access Points > All APs/Detail** and then click **Link Test** to navigate to this page.

You can test the status of a bridge connection using the link test. Using link test, you can configure and execute tests, check the status of a test, and access test data.

This test involves one transmitting WRAP and one receiving WRAP. A WRAP can run only one test at a time; you cannot have multiple WRAPs transmitting to one receiving WRAP.

The link test screen displays the link test parameters and the results of the last link tests, sorted by the link test ID. Link test ID is the receiving access point's ID.

The following table describes the Link Test field parameters.

Table 5-7 Link Test Parameters

Parameter	Description
AP Name	Not an editable field. The transmitting WRAP name.
AP MAC address	Not an editable field. The transmitting WRAP MAC Address.
AP Role	Not an editable field. The transmitting WRAP role.

Table 5-7 Link Test Parameters (continued)

Parameter	Description
Bridged Neighbor AP	Select the receiving WRAP whose link needs to be tested. This is the Link Test ID. Make sure to clear the existing link test results using the **Clear** option at the bottom of that WRAP's Link Test Results section. For example, if you are conducting the link test on Bridged Neighbor AP 8, go to the Link Test Results section; scroll to the Link Test ID 8 and click Clear.
Packet Size	Specify the packet size. Valid range is from 0 to 2300.
Bytes per Second	Bytes per second. This can be up to 80 % of the data rate.
Duration in Seconds	The test duration. Valid range is from 10 to 300 seconds.

Data Rate (Mbps)	Valid data rates are:
	for 802.11a: 6, 9, 12, 18, 24, 36, 48, 54
	for 802.11b: 1, 2, 5.5, 11
	for 802.11g: 1, 2, 5.5, 11, 6, 9, 12, 18, 24, 36, 48, 54

Note Before conducting link test on a receiving WRAP, go to the Link Test Results of that WRAP and click Clear to clear the existing Link Test Results.

Specify your link test values and click **Link Test**.

The link test will be conducted for the duration specified by you. If the test is successful, the Link Test Results field parameters will be populated with the latest link test results for the selected Bridged Neighbor AP (Link Test ID).

Link Test Results

The following table describes the link test results field parameters.

Table 5-8 Link Test Parameters

Parameter	Description
Link Test ID	The receiving WRAP ID specified using the Bridged Neighbor AP field.
Bridged Neighbor AP	The receiving WRAP whose link was tested.
Tx Packets	Number of packets transmitted during the link test duration.

Table 5-8 Link Test Parameters

Parameter	Description
Tx Dropped Packets	Number of transmitting packets dropped during the link test duration. The transmitting WRAP can only send data at a certain rate. If more data is received than can be sent, then it is stored in the buffer. If the buffer is full, some packets are dropped.
Rx Good Packets	Number of good packets received during the link test duration.
Rx Lost Packets	Number of lost packets during the link test duration.
Rx Out of Order Packets	The number of packets received that were not in the order at which they were transmitted during the link test duration. Packets are received by the receiving WRAP in the order at which they were sent by the transmitting WRAP. For example, the 2nd packet transmitted is expected to reach the receiving WRAP as the 2nd packet. If it reaches the receiving WRAP after it has received the 4th packet, then that 2nd packet is an out of order packet.

802.11a Cisco radio

Use **WIRELESS > Access Points > 802.11a Radios** to navigate to this page.

This page displays an overview of your 802.11a Cisco radio network. The status of each 802.11a Cisco radio configured on this controller and its profile as detailed in the following table.

Table 5-9 802.11a Cisco Radios Summary

Parameter	Description
AP Name	Set the customer definable name of the access point.
Radio MAC	The Media Access Control address of the 802.11a radio.
Admin Status	Indicates the interface status of either enabled or disabled.
Operational Status	Displays the Cisco radio operational status: either UP or DOWN.
Channel	Channel number of the access point.
Power Level	Set the transmit power level for the access point : 1 = Maximum power allowed per Country Code setting, 2 = 50% power, 3 = 25% power, 4 = 6.25 to 12.5% power, and 5 = 0.195 to 6.25% power. **Note** The power levels and available channels are defined by the Country Code setting, and are regulated on a country by country basis.
Antenna	Internal or external antennas.
Diversity	Diversity enabled or external antennas identified by connectors.

- The **Configure** link opens a list of configurable parameters for the identified Cisco radio (802.11a Cisco APs > Configure).
- The **Details** link opens a list of primarily read-only Cisco radio attributes (802.11a AP Interfaces > Details).

Command Buttons

- **Help:** Request that the help page be displayed in a new browser window.

802.11a Cisco APs > Configure

Use **WIRELESS > Access Points > 802.11a Radios** and then click **Configure** to navigate to this page.

This page allows you to configure parameters specifically for this Cisco radio including antenna type, RF channel and Tx power level assignments. The performance profile for this Cisco radio is also accessed through this page. Reference the following tables for these parameters.

Table 5-10 802.11a General Parameters

Parameter	Description
AP Name	Set the customer definable name of the access point.
Admin Status	Set the interface status to either enabled or disabled.
Operational Status	Displays the Cisco radio operational status: either UP or DOWN.
Site Config ID	Site identification number.

Table 5-11 Antenna Parameters

Parameter	Description
Antenna Type	Internal/External.
Antenna Mode (only in Cisco Aironet 1000 Series lightweight access points)	Sector A, Sector B, or OMNI (= Sector A and Sector B).
Diversity	Select one of the following: • Enabled—Use this setting if you want to enable diversity on both the left and right connectors of the access point. • Left—Use this setting if your access point has removable antennas and you install a high-gain antenna on the access point's left connector. • Right—Use this setting if your access point has removable antennas and you install a high-gain antenna on the access point's right connector.
Antenna Gain (dBi)	Specify the desired antenna gain. **Note** This option is available only if the *antenna type* is set to *external*.

The following table lists the default values of some of the attributes of an access point when it is added to the Cisco WCS for the first time:

Table 5-12 Default AP Settings

AP Type	Radio Type	Antenna Pattern	Antenna Gain (dBi)
AP 1200	802.11a	KODIAC-OMNI	5
AP 1200	802.11b/g	AIR-ANT4941	2.2
AP 1130	802.11a	AJAX-5GHz	5

Table 5-12 Default AP Settings (continued)

AP Type	Radio Type	Antenna Pattern	Antenna Gain (dBi)
AP 1130	802.11b	AJAX-5GHz	5
AP 1000	802.11a;802.11b/g	AIR-ANT1000	0

Table 5-13 WLAN Override

Parameter	Description
WLAN Override	Enable or disable WLAN Override for this 802.11a Cisco radio.
ID (only when WLAN Override is enabled)	WLAN ID number.
WLAN SSID (only when WLAN Override enabled)	Name of the WLAN.
Select (only when WLAN Override enabled)	Checkbox to make a selection.

Note When you enable WLAN Override, the Operating System displays a table showing all current Cisco WLAN Solution WLANs. In the table, select WLANs to enable WLAN operation, and deselect WLANs to disallow WLAN operation for this 802.11a Cisco radio.

Table 5-14 RF Channel Assignment

Parameter	Description
Current Channel	Channel number of the access point.
Assignment Method	Select one of the following: • Global—Use this setting if your access point’s channel is set globally by the controller. • Custom—Use this setting if your access point’s channel is set locally. Select a channel from the drop-down list.

Note The assignment method should normally be left at the global setting. This allows the controller to dynamically change the channel number as determined by the Radio Resource Management (RRM).

Table 5-15 Tx Power Level Assignment

Parameter	Description
Current Tx Power Level	The transmit power level of the access point. Tx Power Level indicates the maximum power. **Note** The power levels and available channels are defined by the Country Code setting, and are regulated on a country by country basis.
Assignment Method	Select one of the following: • Global—Use this setting if your access point's transmit power is set globally by the controller. • Custom—Use this setting if your access point's transmit power is set locally. Select an option from the drop-down list. `For example, if you select 2(17 dBm) as the custom power, 2 corresponds to the Power Level and 17 is the Absolute Power (dBm).`

Note The assignment method should be left at the global setting. This allows the controller to dynamically change the transmit power level based on the Radio Resource Management (RRM).

Configuring Tx Power Levels

The **Current Tx Power Level** setting controls the maximum conducted transmit power. The maximum available transmit power varies according to the configured channel, individual country regulation, and access point capability. Refer to the *Product Guide* or data sheet at www.cisco.com for each specific model in order to determine the capability of the access point.

A Current Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent power level (2, 3, 4, etc) represents approximately a 50% (or 3dBm) reduction in transmit power from the previous power level.

Note The actual power reduction may vary slightly for different models of access points.

Based on the configured antenna gain, the configured channel, and the configured power level, the actual transmit power at the access point can be reduced so that the specific country regulations are not exceeded.

Note Irrespective of whether you choose **Global** or **Custom** assignment method, the actual conducted transmit power at the access point is verified such that country specific regulations are not exceeded.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

802.11 AP Interfaces > Performance Profile

Use **WIRELESS > Access Points > 802.11a Radios** or **WIRELESS > Access Points > 802.11b/g Radios > Configure** and then click **Performance Profile** to navigate to this page.

This page shows the details of the performance profile of the selected Cisco radio. The profile parameters are detailed in the following table and should be enabled for global control.

Table 5-16 802.11 General Parameters

Parameter	Description
Interface Type	Displays the Cisco radio type: 802.11a or 802.11b/g.
AP Name	Displays the customer definable name of the access point.
AP ID	Displays the access point identification number automatically assigned by the controller.
Profile Parameters Globally Controlled	**Note** You cannot change the following parameters if the Profile Parameters Globally Controlled checkbox is selected.
Interference (0 to 100%)	Foreign 802.11a or 802.11b/g interference threshold between 0 and 100 percent. Globally set on 802.11a Global Parameters > Auto RF and 802.11b/g Global Parameters > Auto RF pages.
Clients (1 to 75)	Client threshold between 1 and 75 clients. Globally set on 802.11a Global Parameters > Auto RF and 802.11b/g Global Parameters > Auto RF pages.
Noise (-127 to 0 dBm)	Noise threshold between -127 and 0 dBm. Globally set on 802.11a Global Parameters > Auto RF and 802.11b/g Global Parameters > Auto RF pages.
Coverage (3 to 50 dBm)	802.11a or 802.11b/g coverage threshold between 3 and 50 dBm. Globally set on 802.11a Global Parameters > Auto RF and 802.11b/g Global Parameters > Auto RF pages.
Utilization (0 to 100%)	802.11a or 802.11b/g RF utilization threshold between 0 and 100 percent. Globally set on 802.11a Global Parameters > Auto RF and802.11b/g Global Parameters > Auto RF pages.
Coverage Exception Level (0 to 100%)	Coverage exception level between 0 and 100 percent. Globally set on 802.11a Global Parameters > Auto RF and 802.11b/g Global Parameters > Auto RF pages.
Data Rate (1 to 1000 Kbps)	802.11a or 802.11b/g throughput threshold between 1 Kbps and 1000 Kbps. Globally set on 802.11a Global Parameters > Auto RF and802.11b/g Global Parameters > Auto RF pages.
Client Min Exception Level (1 to 75)	Client minimum exception level. Globally set on 802.11a Global Parameters > Auto RF and 802.11b/g Global Parameters > Auto RF pages.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

802.11a AP Interfaces > Details

Use **WIRELESS > Access Points > 802.11a Radios** and then click **Detail** to navigate to this page.

This page lists primarily read-only attributes of the selected Cisco radio.

Table 5-17 AP Details

Parameters	Description
Interface Type	Displays the Cisco radio type as 802.11a.
AP Name	This is the name assigned to the access point.
AP ID	Identification number automatically assigned when the access point is configured.
Admin Status	Displays the interface status either enabled or disabled.
Operational Status	Displays the Cisco radio operational status: either UP or DOWN.
Monitor Mode	Displays the access point monitor mode: Local (normal operation), Cisco 1030 remote edge lightweight access point (Cisco Aironet 1030 IEEE 802.11a/b/g remote edge lightweight access point), or Monitor (monitor-only mode).
Location	Customer definable location.

Table 5-18 Station Configuration Parameters

Parameters	Description
Configuration Type	Automatic or Custom.
Number of WLANs	1 (one) is the default.
Medium Occupancy Limit	Indicates the maximum amount of time, in TU, that a point coordinator may control the usage of the wireless medium without relinquishing control for long enough to allow at least one instance of DCF access to the medium. The default value is 100, and the maximum value is 1000.
CFP Period	The number of DTIM intervals between the start of CFPs. It is modified by MLME-START.request primitive.
CFP Max Duration	The maximum duration of the CFP in TU that may be generated by the PCF. It is modified by MLME-START.request primitive.
BSSID	MAC address of the access point.
Beacon Period	The rate at which the SSID is broadcast by the access point, from 100 to 600 milliseconds.
DTIM Period	The number of beacon intervals that elapse between transmission of Beacon frames containing a TIM element whose DTIM Count field is 0. This value is transmitted in the DTIM Period field of Beacon frames.
Country String	Identifies the country in which the station is operating. The first two octets of this string are the two character country code.

Table 5-19 Operation Rate Set for 802.11a Cisco Radios

Parameter	Range (Note)
6000 Kilo Bits	Mandatory, Supported or Disabled.
9000 Kilo Bits	Mandatory, Supported or Disabled.
12000 Kilo Bits	Mandatory, Supported or Disabled.
18000 Kilo Bits	Mandatory, Supported or Disabled.
24000 Kilo Bits	Mandatory, Supported or Disabled.
36000 Kilo Bits	Mandatory, Supported or Disabled.
48000 Kilo Bits	Mandatory, Supported or Disabled.
54000 Kilo Bits	Mandatory, Supported or Disabled.

Note The data rates set here are negotiated between the client and the controller. If the data rate is set to Mandatory, the client must support it in order to use the network.

If a data rate is set as supported by the controller, any associated client that also supports that same rate may communicate with the access point using that rate. But it is not required that a client be able to use all the rates marked Supported in order to associate. Each data rate can also be set to Disabled to match client settings.

Table 5-20 MAC Operation Parameters

Parameter	Description
Configuration Type	Automatic or Custom.
RTS Threshold	This attribute shall indicate the number of octets in an MPDU, below which an RTS/CTS handshake shall not be performed. An RTS/CTS handshake shall be performed at the beginning of any frame exchange sequence where the MPDU is of type Data or Management, the MPDU has an individual address in the Address1 field, and the length of the MPDU is greater than this threshold. Setting this attribute to be larger than the maximum MSDU size shall have the effect of turning off the RTS/CTS handshake for Data or Management type frames transmitted by this STA. Setting this attribute to zero shall have the effect of turning on the RTS/CTS handshake for all frames of Data or Management type transmitted by this STA. The default value of this attribute shall be 2347.
Short Retry Limit	The maximum number of transmission attempts of a frame, the length of which is less than or equal to dot11RTSThreshold, that shall be made before a failure condition is indicated. The default value of this attribute shall be 7.
Long Retry Limit	The maximum number of transmission attempts of a frame, the length of which is greater than dot11RTSThreshold, that shall be made before a failure condition is indicated. The default value of this attribute shall be 4.

Table 5-20 MAC Operation Parameters (continued)

Parameter	Description
Fragmentation Threshold	The current maximum size, in octets, of the MPDU that may be delivered to the PHY. An MSDU shall be broken into fragments if its size exceeds the value of this attribute after adding MAC headers and trailers. An MSDU or MMPDU shall be fragmented when the resulting frame has an individual address in the Address1 field, and the length of the frame is larger than this threshold. The default value for this attribute shall be the lesser of 2346 or the aMPDUMaxLength of the attached PHY and shall never exceed the lesser of 2346 or the aMPDUMaxLength of the attached PHY. The value of this attribute shall never be less than 256.
Max. Tx MSDU Lifetime	The elapsed time in TU, after the initial transmission of an MSDU, after which further attempts to transmit the MSDU shall be terminated. The default value of this attribute is 512.
Max. Rx Life Time	The MaxReceiveLifetime shall be the elapsed time in TU, after the initial reception of a fragmented MMPDU or MSDU, after which further attempts to reassemble the MMPDU or MSDU shall be terminated. The default value is 512.

Table 5-21 Tx Power

Parameter	Description
# Supported Power Levels	Five or fewer power levels, depending on operator preference.
Tx Power Level (1, highest, through 5, lowest)	The transmit power level of the access point: 1 = Maximum power allowed per Country Code setting, 2 = 50% power, 3 = 25% power, 4 = 6.25 to 12.5% power, and 5 = 0.195 to 6.25% power. **Note** The power levels and available channels are defined by the Country Code setting, and are regulated on a country by country basis.
Tx Power Configuration	Globally controlled or Customized for this access point.
Current Tx Power Level	Displays the operating transmit power level from the transmit power table.

Table 5-22 Physical Channel Parameters

Parameter	Description
Current Channel	Current operating frequency channel.
Configuration	Locally customized or globally controlled.

Table 5-22 Physical Channel Parameters (continued)

Parameter	Description
Current CCA Mode	CCA method in operation. Valid values are: Energy detect only (edonly) = 01, Carrier sense only (csonly) = 02, Carrier sense and energy detect (edandcs)= 04 Carrier sense with timer (cswithtimer)= 08 High rate carrier sense and energy detect (hrcsanded)=16.
ED/TI Threshold	The Energy Detect and Threshold being used to detect a busy medium (frequency). CCA reports a busy medium upon detecting the RSSI above this threshold.

Table 5-23 RF Recommendation Parameters

Parameter	Description
Channel	802.11a Low Band, Medium Band, and High Band 802.11b/g
Tx Power Level	0 if Radio Resource Management (RRM) disabled, 1 - 5 if Radio Resource Management (RRM) enabled.
RTS/CTS Threshold	0 if Radio Resource Management (RRM) disabled, 1 - 5 if Radio Resource Management (RRM) enabled. Refer to RTS Threshold in MAC Operation Parameters above.
Fragmentation Threshold	0 if Radio Resource Management (RRM) disabled, or as Radio Resource Management (RRM) recommends.
Antenna Pattern	0 if Radio Resource Management (RRM) disabled, or as Radio Resource Management (RRM) recommends.

Command Buttons

- **Back:** Return to the previous window.
- **Help:** Request that the help page be displayed in a new browser window.

802.11b/g Cisco Radios

Use **WIRELESS > Access Points > 802.11b/g Radios** to navigate to this page.

This page displays an overview of your 802.11b/802.11g Cisco radio network. The status of each 802.11b/g Cisco radio configured on this controller and its profile as detailed in the following table.

Table 5-24 Cisco WLAN Solution 802.11b/g Cisco Radio Summary

Parameter	Description
AP Name	Set the customer definable name of the access point.
Radio MAC	The Media Access Control address of the 802.11b/g radio.
Admin Status	Displays the interface status of either enabled or disabled.
Operational Status	Displays the Cisco radio operational status: either UP or DOWN.
Channel	Channel number of the access point. **Note** The channels 1, 6, and 11 are non-overlapping.
Power Level	The transmit power level of the access point where 1 = Maximum power allowed per Country Code setting, 2 = 50% power, 3 = 25% power, 4 = 6.25 to 12.5% power, and 5 = 0.195 to 6.25% power. **Note** The power levels and available channels are defined by the Country Code setting, and are regulated on a country by country basis.
Antenna	Internal or external antennas.
Diversity	Diversity Enabled or external antennas identified by connectors.

Details for each Cisco radio may be accessed by selecting the **Configure** or **Details** link located next to the Cisco radio summary.

- The **Configure** link opens a list of configurable parliamentary for the identified Cisco radio (802.11b/g Cisco Radios > Configure).
- The **Details** link opens a list of primarily read-only Cisco radio attributes (802.11a AP Interfaces > Details).

Command Buttons

- **Help:** Request that the help page be displayed in a new browser window.

802.11b/g Cisco Radios > Configure

Use **WIRELESS > Access Points > 802.11b/g Radios** and then click **Configure** to navigate to this page.

This page allows you to configure parameters specifically for this Cisco radio including antenna type, RF channel and Tx power level assignments. The performance profile for this Cisco radio is also accessed through this page. Reference the following tables for these parameters.

Table 5-25 General

Parameter	Description
AP Name	Displays the customer definable name of the access point.
Admin Status	Set the interface status to either enabled or disabled.
Operational Status	Displays the Cisco radio operational status: either UP or DOWN.
Site Config ID	Site identification number.

Table 5-26 Antenna

Parameter	Description
Antenna Type	Internal or External.
Diversity	Select one of the following: For internal antennas: • Enable—Use this setting if you want to enable diversity on both Side A and Side B. • Side A—Use this setting if you want to enable diversity for the front (door) antenna. • Side B—Use this setting if you want to enable diversity for the rear antenna. For External antennas: • Enable—Use this setting if you want to enable diversity on both the connectors. • Right—Use this setting if you want to enable diversity for the Right (Connector B) antenna. • Left—Use this setting if you want to enable diversity for the Left (Connector A) antenna.

Table 5-27 WLAN Override

Parameter	Description
WLAN Override	Enable or disable WLAN Override for this 802.11b/g Cisco radio.
Note When you enable WLAN Override, the Operating System displays a table showing all current Cisco WLAN Solution WLANs. In the table, select WLANs to enable WLAN operation, and deselect WLANs to disallow WLAN operation for this 802.11b/g Cisco radio.	

Table 5-28 RF Channel Assignment

Parameter	Description
Current Channel	Channel number of the access point. **Note** The channels 1, 6, and 11 are non-overlapping.
Assignment Method	Select one of the following: • Global—Use this setting if your access point's channel is set globally by the controller. • Custom—Use this setting if you set the channel locally.
Note The assignment method should normally be left at the global setting. This allows the controller to dynamically change the channel number based Radio Resource Management (RRM) directives.	

Table 5-29 Tx Power Level Assignment

Parameter	Description
Current Tx Power Level	The transmit power level of the access point. Tx Power Level indicates the maximum power. **Note** The power levels and available channels are defined by the Country Code setting, and are regulated on a country by country basis.
Assignment Method	Select one of the following: • Global—Use this setting if your access point's transmit power is set globally by the controller. • Custom—Use this setting if your access point's transmit power is set locally. Select an option from the drop-down list. For example, if you select 2(17 dBm) as the custom power, 2 corresponds to the Power Level and 17 is the Absolute Power (dBm).
Note The assignment method should be left at the global setting. This allows the controller to dynamically change the transmit power level based on the Radio Resource Management (RRM).	

Configuring Tx Power Levels

The **Current Tx Power Level** setting controls the maximum conducted transmit power. The maximum available transmit power varies according to the configured channel, individual country regulation, and access point capability. Refer to the *Product Guide* or data sheet at www.cisco.com for each specific model in order to determine the access point capability.

The Current Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent power level (e.g. 2, 3, 4, etc) represents approximately a 50% (or 3dBm) reduction in transmit power from the previous power level.

Note The actual power reduction may vary slightly for different models of access points.

Based on the configured antenna gain, the configured channel, and the configured power level, the actual transmit power at the access point can be reduced so that the specific country regulations are not exceeded.

Note Irrespective of whether you choose **Global** or **Custom** assignment method, the actual conducted transmit power at the access point is verified such that country specific regulations are not exceeded.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

802.11b/g AP Interfaces > Details

Use **WIRELESS > Access Points > 802.11b/g Radios** and then click **Detail** to navigate to this page.

This page lists primarily read-only attributes of the selected Cisco radio.

Table 5-30 AP Details

Parameters	Description
Interface Type	Displays the Cisco radio type as 802.11b/g.
AP Name	This is the name assigned to the access point.
AP ID	Identification number automatically assigned when the access point is configured.
Admin Status	Displays the interface status either enabled or disabled.
Operational Status	Displays the Cisco radio operational status: either UP or DOWN.
Monitor Mode	Displays the access point Monitor mode: Local (normal operation), Cisco 1030 remote edge lightweight access point (Cisco Aironet 1030 IEEE 802.11a/b/g remote edge lightweight access point), or Monitor (monitor-only mode).
Location	Customer definable location.

Table 5-31 Station Configuration Parameters

Parameters	Description
Configuration Type	Automatic or Custom.
Number of WLANs	1 (one) is the default.
Medium Occupancy Limit	Indicates the maximum amount of time, in TU, that a point coordinator may control the usage of the wireless medium without relinquishing control for long enough to allow at least one instance of DCF access to the medium. The default value is 100, and the maximum value is 1000.
CFP Period	The number of DTIM intervals between the start of CFPs. It is modified by MLME-START.request primitive.
CFP Max Duration	The maximum duration of the CFP in TU that may be generated by the PCF. It is modified by MLME-START.request primitive.
BSSID	MAC address of the access point.
Beacon Period	The rate at which the SSID is broadcast by the access point, from 100 to 600 milliseconds.
DTIM Period	The number of beacon intervals that shall elapse between transmission of Beacon frames containing a TIM element whose DTIM Count field is 0. This value is transmitted in the DTIM Period field of Beacon frames.
Country String	Identifies the country in which the station is operating. The first two octets of this string are the two character country code.

Table 5-32 Operation Rate Set for 802.11b/g Cisco Radios

Parameter	Band	Range (Note)
1000 Kilo Bits	802.11b or 802.11g.	Mandatory, Supported or Disabled.
2000 Kilo Bits	802.11b or 802.11g.	Mandatory, Supported or Disabled.
5500 Kilo Bits	802.11b or 802.11g.	Mandatory, Supported or Disabled.
11000 Kilo Bits	802.11b or 802.11g.	Mandatory, Supported or Disabled.
6000 Kilo Bits	802.11b or 802.11g.	Supported or Disabled.
9000 Kilo Bits	802.11b or 802.11g.	Supported or Disabled.
12000 Kilo Bits	802.11b or 802.11g.	Supported or Disabled.
18000 Kilo Bits	802.11b or 802.11g.	Supported or Disabled.
24000 Kilo Bits	802.11b or 802.11g.	Supported or Disabled.
36000 Kilo Bits	802.11b or 802.11g.	Supported or Disabled.
48000 Kilo Bits	802.11b or 802.11g.	Supported or Disabled.
54000 Kilo Bits	802.11b or 802.11g.	Supported or Disabled.

Note The data rates set here are negotiated between the client and the controller. If the data rate is set to Mandatory, the client must support it in order to use the network.

Note If a data rate is set as Supported by the controller, any associated client that also supports that same rate may communicate with the Cisco Aironet 1000 Series IEEE 802.11a/b/g lightweight access point using that rate. But it is not required that a client be able to use all the rates marked Supported in order to associate. Each data rate can also be set to Disabled to match Client settings.

Table 5-33 MAC Operation Parameters

Parameter	Description
Configuration Type	Automatic or Custom.
RTS Threshold	This attribute shall indicate the number of octets in an MPDU, below which an RTS/CTS handshake shall not be performed. An RTS/CTS handshake shall be performed at the beginning of any frame exchange sequence where the MPDU is of type Data or Management, the MPDU has an individual address in the Address1 field, and the length of the MPDU is greater than this threshold. Setting this attribute to be larger than the maximum MSDU size shall have the effect of turning off the RTS/CTS handshake for Data or Management type frames transmitted by this STA. Setting this attribute to zero shall have the effect of turning on the RTS/CTS handshake for all frames of Data or Management type transmitted by this STA. The default value of this attribute shall be 2347.
Short Retry Limit	The maximum number of transmission attempts of a frame, the length of which is less than or equal to dot11RTSThreshold, that shall be made before a failure condition is indicated. The default value of this attribute shall be 7.

Table 5-33 MAC Operation Parameters (continued)

Parameter	Description
Long Retry Limit	The maximum number of transmission attempts of a frame, the length of which is greater than dot11RTSThreshold, that shall be made before a failure condition is indicated. The default value of this attribute shall be 4.
Fragmentation Threshold	The current maximum size, in octets, of the MPDU that may be delivered to the PHY. An MSDU shall be broken into fragments if its size exceeds the value of this attribute after adding MAC headers and trailers. An MSDU or MMPDU shall be fragmented when the resulting frame has an individual address in the Address1 field, and the length of the frame is larger than this threshold. The default value for this attribute shall be the lesser of 2346 or the aMPDUMaxLength of the attached PHY and shall never exceed the lesser of 2346 or the aMPDUMaxLength of the attached PHY. The value of this attribute shall never be less than 256.
Max. Tx MSDU Lifetime	The elapsed time in TU, after the initial transmission of an MSDU, after which further attempts to transmit the MSDU shall be terminated. The default value of this attribute is 512.
Max Rx Life Time	The MaxReceiveLifetime shall be the elapsed time in TU, after the initial reception of a fragmented MMPDU or MSDU, after which further attempts to reassemble the MMPDU or MSDU shall be terminated. The default value is 512.

Table 5-34 Tx Power Parameters

Parameter	Description
# Supported Power Levels	Five or fewer power levels, depending on operator preference.
Tx Power Level (1, highest through 5, lowest)	The transmit power level of the access point where 1 = Maximum power allowed per Country Code setting, 2 = 50% power, 3 = 25% power, 4 = 6.25 to 12.5% power, and 5 = 0.195 to 6.25% power. Note that the power levels and available channels are defined by the Country Code setting, and are regulated on a country by country basis.
Tx Power Configuration	Globally controlled or Customized for this access point.
Current Tx Power Level	Displays the operating transmit power level from the transmit power table.

Table 5-35 Physical Channel Parameters

Parameter	Description
Current Channel	Current operating frequency channel.
Configuration	Locally customized or globally controlled.

Table 5-35 Physical Channel Parameters (continued)

Parameter	Description
Current CCA Mode	CCA method in operation. Valid values are: Energy detect only (edonly) = 01. Carrier sense only (csonly) = 02. Carrier sense and energy detect (edandcs)= 04. Carrier sense with timer (cswithtimer)= 08. High rate carrier sense and energy detect (hrcsanded)=16.
ED/TI Threshold	The Energy Detect and Threshold being used to detect a busy medium (frequency). CCA reports a busy medium upon detecting the RSSI above this threshold.

Table 5-36 RF Recommendation Parameters

Parameter	Description
Channel	802.11a Low Band, Medium Band, and High Band 802.11b/g
Tx Power Level	0 if Radio Resource Management (RRM) disabled, 1 - 5 if Radio Resource Management (RRM) enabled.
RTS/CTS Threshold	0 if Radio Resource Management (RRM) disabled, 1 - 5 if Radio Resource Management (RRM) enabled. Refer to RTS Threshold in MAC Operation Parameters above.
Fragmentation Threshold	0 if Radio Resource Management (RRM) disabled, or as Radio Resource Management (RRM) recommends.
Antenna Pattern	0 if Radio Resource Management (RRM) disabled, or as Radio Resource Management (RRM) recommends.

Command Buttons

- **Back:** Return to the previous window.
- **Help:** Request that the help page be displayed in a new browser window.

Bridging

Use **WIRELESS > Bridging** to navigate to this page.

This page displays the Zero Touch Configuration field parameters. Zero Touch Configuration if enabled, allows you to take WRAPs out of the box, install them and make them work without any manual configuration of the WRAPs. For more information, refer to Zero Touch Configuration.

Table 5-37 Bridging Parameters

Parameter	Description
Zero Touch Configuration	By default, this check box is not checked. If you enable this option, the WRAP will be allowed to get the shared secret key from the controller with the default shared key. If you disable this option, the controller will not provide the shared secret key. For the WRAP to establish a connection to the controller, pre-configure all the AP's shared secret key using the AP Configuration Tool. **Usage:** As the administrator, you can enable this feature and let all the WRAPs join the network. Once the network is stabilized you can disable this feature, which will further secure your networks against any rogue APs that might try and get the shared secret key from the controller. **Note** Even if you disable this option, the WRAPs will still be checked against the MAC filter list before they are allowed to communicate with the controller.
Key Format	Specify the Shared Secret Key format. It can be ASCII or Hex.
Bridging Shared Secret Key	This field will be enabled only if Zero Touch Configuration option is enabled. This is the key that is provided to the WRAPs for them to establish a secure LWAPP connection with the controller. The key should be at least 32 characters long in Hex or ASCII format. By default, this is blank. **Note** If you change the shared secret key, the controller will notify the change to all the RAPs, which will cause the PAPs to lose connectivity until they are able to negotiate the new shared secret key from the controller.
Confirm Shared Secret Key	Confirm the shared secret key.

Table 5-37 Bridging Parameters (continued)

Parameter	Description
Zero Touch Configuration	By default, this check box is not checked. If you enable this option, the WRAP will be allowed to get the shared secret key from the controller with the default shared key. If you disable this option, the controller will not provide the shared secret key. For the WRAP to establish a connection to the controller, pre-configure all the AP's shared secret key using the AP Configuration Tool. **Usage:** As the administrator, you can enable this feature and let all the WRAPs join the network. Once the network is stabilized you can disable this feature, which will further secure your networks against any rogue access points that might try and get the shared secret key from the controller. **Note** Even if you disable this option, the WRAPs will still be checked against the MAC filter list before they are allowed to communicate with the controller.
Key Format	Specify the Shared Secret Key format. It can be ASCII or Hex.

Zero Touch Configuration

When Zero Touch Configuration is enabled on the controller, Cisco WRAP performs the following actions to accomplish a secure zero touch.

Step 1 When a WRAP is first installed, it tries to find its role automatically. If it has a wired connection to a Cisco WLAN controller, then it assumes the role of RAP, otherwise it becomes a PAP.

Step 2 Next it determines the backhaul interface and channel.

- If it is a RAP, it already has a secure LWAPP connection to the controller and will use the configured RAP backhaul interface (Default: 802.11a).

Note The RAP offers service in one band for the clients, and uses the another band for backhaul, that is - communication between the APs.

- If it is a PAP, it will scan the backhaul interfaces and channels for neighbor APs. When it finds a neighbor AP with the same bridge group name with a path back to the controller, it will make that AP its parent. If the PAP finds more than one neighbor AP, it will use a least-cost algorithm to determine the parent that has the best path back to the controller.
- All the APs will use the configured data rate (Default: 18 Mbps).

Step 3 To set up a secure LWAPP connection with the controller, the PAP will send its default shared secret key and MAC address to set up a temporary secured connection. The controller validates the MAC address against the allowed devices list and if found, it will send the shared secret key to the PAP and disconnect. The PAP will store the shared secret key and use it to set up a secure LWAPP connection.

Step 4 If a PAP loses connection to the controller, it will look for valid neighbors using the bridge group name and scan the backhaul interfaces and channels. When it finds a neighbor, it will make that AP its parent. If it already has a shared secret key it will use that key and try to set up a secure LWAPP connection to the controller. If the shared secret key does not work, it will use the shared default secret key and attempt to get a new shared secret key.

Note The access points must be connected in Layer 2 mode for Zero Touch Configuration to work.

Note Zero Touch Configuration may not work if the RAP is an indoor WRAP, and the PAP is an outdoor WRAP. Indoor WRAP defaults to channel 52 and outdoor WRAP can not operate on that channel.

802.11a Global Parameters

Use **WIRELESS > Global RF > 802.11a Network** to navigate to this page.

This page allows you to change the global parameters of your 802.11a network.

- 802.11a Network Status - Enable or Disable the 802.11a network.

Note You must use this command to enable the 802.11a network after configuring other 802.11a parameters. Note that this command only enables the global Cisco WLAN Solution 802.11a network. To disable the 802.11a, 802.11b and/or 802.11g networks for an individual WLAN, refer to the WLANs > Edit page.

- 802.11a Band Status - 802.11a Network and 802.11a low, mid and high band Statuses are displayed.
- Data Rates—The data rates set here are negotiated between the client and the controller. If the data rate is set to Mandatory, the client must support it in order to use the network. If a data rate is set as Supported by the controller, the client may negotiate for the respective rate. Each data rate can also be set to Disabled to match Client settings.
- Beacon Period—The rate at which the SSID is broadcast by the access point, from 100 to 600 milliseconds. Default 100 milliseconds.
- DTIM Period—1 to 255 beacon intervals. The DTIM Period is the number of beacon intervals that elapse between transmission of Beacon frames containing a TIM element whose DTIM Count field is 0. Default 1 interval.
- Fragmentation Threshold—256 to 2346 bytes. Default 2346.
- Pico Cell Mode—Enables automatic OS parameter reconfiguration, allowing OS to function efficiently in pico cell deployments. Note that when the operator is deploying a pico cell network the OS must also have more memory allocated (512 to 2048 MB) using the following CLI command

  config database size 2048

- DTPC Support—Enable this option to advertise the transmit power level of the radio in the beacons and the probe responses.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Auto RF:** Opens the 802.11a Global Parameters > Auto RF page for the 802.11a network.
- **Help:** Request that the help page be displayed in a new browser window.

802.11a Global Parameters > Auto RF

Use **WIRELESS > Global RF > 802.11a Network** and then click **Auto RF** button to navigate to this page.

Use this page to edit the Auto RF characteristics.

Table 5-38 RF Group

Parameter	Description
Group Mode	Dynamic grouping has two modes: Enabled and Disabled. When the grouping is Disabled, no dynamic grouping occurs. Each controller optimizes only its own access point parameters. When grouping is Enabled, the controller forms groups and elects leaders to perform better dynamic parameter optimization.
Group Update Interval	When grouping is on, this interval (in seconds) represents the period with which the grouping algorithm is run by the Group Leader. Grouping algorithm also runs when the group contents changes and the automatic grouping is enabled. A dynamic grouping can be started upon request from the system administrator. Default value is 3600 seconds.
Group Leader	This is the MAC address of the group leader for the group containing this controller.
Is this Controller Group Leader?	Yes this controller is the group leader or No the controller is not the group leader.
Last Group Update	The elapsed time since the last group update in seconds. This is only valid if this controller is a group leader.

Table 5-39 RF Channel Assignment

Parameter	Description
Channel Assignment Method	Dynamic channel assignment has three modes. • Automatic - The channel assignment is periodically updated for all access point that permit this operation. • On Demand - Channel assignments are updated when the **Invoke Channel Update Now** button is clicked. • OFF - No dynamic channel assignments occur and value are set to their global default. Default is Automatic.
Avoid Foreign AP Interference	Enabled or Disabled. Enable this Radio Resource Management (RRM) foreign 802.11 interference-monitoring parameter to have Radio Resource Management consider interference from foreign (non-Cisco access point outside the RF/mobility domain) access points when assigning channels to Cisco access points. Disable this parameter to have Radio Resource Management ignore this interference. In certain circumstances with significant interference energy (dB) and load (utilization) from Foreign APs, Radio Resource Management may adjust the channel assignment to avoid these channels (and sometimes adjacent channels) in access points close to the Foreign APs to increase capacity and reduce variability for the Cisco WLAN Solution.
Avoid Cisco AP Load	Enabled or Disabled. Enable this Radio Resource Management (RRM) bandwidth-sensing parameter to have controllers consider the traffic bandwidth used by each access point when assigning channels to access point. Disable this parameter to have Radio Resource Management ignore this value. In certain circumstances and with denser deployments, there may not be enough channels to properly create perfect channel re-use. In these circumstances, Radio Resource Management can assign better re-use patterns to those access points that carry more traffic load.
Avoid non-802.11a Noise	Enabled or Disabled. Enable this Radio Resource Management (RRM) noise-monitoring parameter to have access points avoid channels that have interference from non-Access Point sources, such as microwave ovens or Bluetooth devices. Disable this parameter to have Radio Resource Management ignore this interference. In certain circumstances with significant interference energy (dB) from non-802.11 noise sources, Radio Resource Management may adjust the channel assignment to avoid these channels (and sometimes adjacent channels) in access points close to the noise sources to increase capacity and reduce variability for the Cisco WLAN Solution.

Table 5-39 RF Channel Assignment (continued)

Parameter	Description
Signal Strength Contribution	Always Enabled. Radio Resource Management (RRM) constantly monitors the relative location of all access points within the RF/mobility domain to ensure near-optimal channel re-use. The net effect is an increase in Cisco WLAN Solution capacity and a reduction in co-channel and adjacent channel interference.
Channel Assignment Leader	MAC address of the channel assignment leader. In Cisco WLAN Solution Mobility Groups or Cisco WLAN Solution WPS Groups, this is the MAC address of the Group leader.
Last Channel Assignment	Last time the Radio Resource Management (RRM) evaluated the current channel assignment. This occurs on a periodic basis. This does not imply that channels have changed, only that the Radio Resource Management has made an evaluation of the current assignment.

Table 5-40 Tx Power Level Assignment

Parameter	Description
Power Level Assignment Method	Dynamic transmit power assignment has three modes. Automatic - The transmit power is periodically updated for all access points that permit this operation. On Demand - Transmit power is updated when the **Invoke Power Update Now** button is clicked. Fixed - No dynamic transmit power assignments occur and value are set to their global default. Default is Automatic.
Power Threshold	These read-only parameters are used to fine tune the power control. The transmit power control is trying to limit power so that at most <neighbor count> access points receive the signal of each access point above a <power threshold>.
Power Neighbor Count	
Power Update Contribution	This read-only field displays the factors used for changing power level assignments. The factors are: L (Load) S (Signal) N (Noise) I (Interference) For each factor listed, the corresponding measurement is used in the power assignment algorithm.
Power Assignment Leader	MAC address of the power level assignment leader.
Last Power Level Assignment	The elapsed time since the last transmit power assignment in seconds.

Table 5-41 Profile Thresholds

Parameter	Description
Interference (0 to 100%)	Foreign 802.11a interference threshold between 0 and 100 percent.
Clients (1 to 75)	Client threshold between 1 and 75 clients.
Noise (-127 to 0 dBm)	Foreign noise threshold between -127 and 0 dBm.
Coverage (3 to 50 dBm)	802.11a coverage threshold between 3 and 50 dB.
Utilization (0 to 100%)	802.11a RF utilization threshold between 0 and 100 percent.
Coverage Exception Level (0 to 100%)	Coverage exception level between 0 and 100 percent.
Data Rate (1 to 1000 Kbps)	802.11a throughput threshold between 1 Kbps and 1000 Kbps.
Client Min Exception Level (1 to 75)	Client minimum exception level.

Table 5-42 Monitor Intervals

Parameter	Description
Noise Measurement	The interval (in seconds) for noise and interference measurements at each access point. Default is 300 seconds.
Load Measurement	The interval (in seconds) for load measurements at each access point. Default is 300 seconds.
Signal Measurement	The interval (in seconds) for strength measurements at each access point. Default is 300 seconds.
Coverage Measurement	The interval (in seconds) for coverage measurements at each access point. Default is 300 seconds.
Note Intervals from 60 to 3600 seconds.	

Use **Set to Factory Default** to set all Auto RF 802.11a parameters to the Factory Defaults.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

802.11b/g Global Parameters

Use **WIRELESS > Global RF > 802.11b/g Network** to navigate to this page.

Use this page to edit the global parameters of your 802.11b/g network.

- 802.11b/g Network Status - Enable or Disable the 802.11b/g network.
- 802.11g Support - Enable or Disable 802.11g network support. (Only available if the 802.11b/g Network is Enabled.)

Note You must use these commands to enable the 802.11b/g networks after configuring other 802.11b/g parameters. Note that this command only enables the global Cisco WLAN Solution 802.11b/g networks. To disable the 802.11a, 802.11b and/or 802.11g networks for an individual WLAN, refer to the WLANs > Edit page.

- Data Rates - The data rates set here are negotiated between the client and the controller. If the data rate is set to Mandatory, the client must support it in order to use the network. If a data rate is set as Supported by the controller, the client may negotiate for the respective rate. Each data rate can also be set to Disabled to match Client settings.
- Beacon Period - The rate at which the SSID is broadcast by the access point, from 100 to 600 milliseconds. Default 100 milliseconds.
- DTIM Period - 1 to 255 beacon intervals. The DTIM Period is the number of beacon intervals that elapse between transmission of Beacon frames containing a TIM element whose DTIM Count field is 0. Default 1 interval.
- Fragmentation Threshold - 256 to 2346 bytes. Default 2346.
- Short Preamble - Enabled or Disabled. This parameter must be disabled to optimize this controller for some clients, including SpectraLink NetLink Telephones. Default Enabled.
- Pico Cell Mode - Enables automatic OS parameter reconfiguration, allowing OS to function efficiently in pico cell deployments. Note that when the operator is deploying a pico cell network the OS must also have more memory allocated (512 to 2048 MB) using the following command

```
config database size 2048
```

- DTPC Support—Enable this option to advertise the transmit power level of the radio in the beacons and the probe responses.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Auto RF:** Opens the page for the 802.11b/g Global Parameters > Auto RF.
- **Help:** Request that the help page be displayed in a new browser window.

802.11b/g Global Parameters > Auto RF

Use **WIRELESS > Global RF 802.11b/g Network** and then click **Auto RF** button to navigate to this page.

The Auto RF characteristics may be modified on this page.

Table 5-43 RF Group

Parameter	Description
Group Mode	Dynamic grouping has two modes: Enabled and Disabled. When the grouping is Disabled, no dynamic grouping occurs. Each controller optimizes the parameters of only those access points that are associated with the controller. When grouping is Enabled, the controller forms groups and elects a leader to perform better dynamic parameter optimization.
Group Update Interval	When grouping is on, this interval (in seconds) represents the period with which the grouping algorithm is run by the Group Leader. Grouping algorithm also runs when the group contents changes and the automatic grouping is enabled. A dynamic grouping can be started upon request from the system administrator. Default value is 3600 seconds.
Group Leader	This is the MAC address of the group leader for the group containing this controller.
Is this Controller Group Leader	Yes this controller is the group leader or No the controller is not the group leader.
Last Group Update	The elapsed time since the last group update in seconds. This is only valid if this controller is a group leader.

Table 5-44 RF Channel Assignment

Parameter	Description
Channel Assignment Method	Dynamic channel assignment has three modes. Automatic - The channel assignment is periodically updated for all access points that permit this operation. On Demand - Channel assignments are updated when the **Invoke Channel Update Now** button is selected. OFF - No dynamic channel assignments occur and value are set to their global default. Default is Automatic.
Avoid Foreign AP Interference	Enabled or Disabled. Enable this Radio Resource Management (RRM) foreign 802.11 interference-monitoring parameter to have Radio Resource Management consider interference from foreign (non-Cisco access points outside the RF/mobility domain) access points when assigning channels to Cisco access points. Disable this parameter to have Radio Resource Management ignore this interference. In certain circumstances with significant interference energy (dB) and load (utilization) from foreign access points, Radio Resource Management may adjust the channel assignment to avoid these channels (and sometimes adjacent channels) in Cisco access points close to the Foreign APs to increase capacity and reduce variability for the Cisco WLAN Solution.
Avoid Foreign AP Load	Enabled or Disabled. Enable this Radio Resource Management (RRM) bandwidth-sensing parameter to have controllers consider the traffic bandwidth used by each access point when assigning channels to access points. Disable this parameter to have Radio Resource Management ignore this value. In certain circumstances and with denser deployments, there may not be enough channels to properly create perfect channel re-use. In these circumstances, Radio Resource Management can assign better re-use patterns to those APs that carry more traffic load.
Avoid non-802.11b Noise	Enabled or Disabled. Enable this Radio Resource Management (RRM) noise-monitoring parameter to have access points avoid channels that have interference from non-Access Point sources, such as microwave ovens or Bluetooth devices. Disable this parameter to have Radio Resource Management ignore this interference. In certain circumstances with significant interference energy (dB) from non-802.11 noise sources, Radio Resource Management may adjust the channel assignment to avoid these channels (and sometimes adjacent channels) in access points close to the noise sources to increase capacity and reduce variability for the Cisco WLAN Solution.

Table 5-44 RF Channel Assignment (continued)

Parameter	Description
Signal Strength Contribution	Always Enabled. Radio Resource Management (RRM) constantly monitors the relative location of all access points within the RF/mobility domain to ensure near-optimal channel re-use. The net effect is an increase in Cisco WLAN Solution capacity and a reduction in co-channel and adjacent channel interference.
Channel Assignment Leader	MAC address of the channel assignment leader. In Cisco WLAN Solution Mobility Groups or Cisco WLAN Solution WPS Groups, this is the MAC address of the Group leader.
Last Channel Assignment	Last time the Radio Resource Management (RRM) evaluated the current channel assignment. This occurs on a periodic basis. This does not imply that channels have changed, only that the Radio Resource Management has made an evaluation of the current assignment.

Table 5-45 Tx Power Level Assignment

Parameter	Description
Power Level Assignment Method	Dynamic transmit power assignment has three modes. Automatic - The transmit power is periodically updated for all access points that permit this operation. On Demand - Transmit power is updated when the **Invoke Power Update Now** button is selected. Fixed - No dynamic transmit power assignments occur and value are set to their global default. Default is Automatic.
Power Threshold	These read-only parameters are used to fine tune the power control. The transmit power control is trying to limit power so that at most <neighbor count> access points receive the signal of each access point above a <power threshold>.
Power Neighbor Count	
Power Update Contribution	This read-only field displays the factors used for changing channel assignments. The factors are: L (Load) S (Signal) N (Noise) I (Interference) For each factor listed, the corresponding measurement is used in the assignment algorithm.
Power Assignment Leader	MAC address of the power level assignment leader.
Last Power Level Assignment	The elapsed time since the last transmit power assignment in seconds.

Table 5-46 Profile Thresholds

Parameter	Description
Interference (0 to 100%)	Foreign 802.11b/g interference threshold between 0 and 100 percent.
Clients (1 to 75)	Client threshold between 1 and 75 clients.
Noise (-127 to 0 dBm)	Foreign noise threshold between -127 and 0 dBm.
Coverage (3 to 50 dBm)	802.11b/g coverage threshold between 3 and 50 dB.
Utilization (0 to 100%)	802.11b/g RF utilization threshold between 0 and 100 percent.
Coverage Exception Level (0 to 100%)	Coverage exception level between 0 and 100 percent.
Data Rate (1 to 1000 Kbps)	802.11b/g throughput threshold between 1 Kbps and 1000 Kbps.
Client Min Exception Level (1 to 75)	Client minimum exception level.

Table 5-47 Monitor Intervals

Parameter	Description
Noise Measurement	The interval (in seconds) for noise and interference measurements at each access point. Default is 300 seconds, range is from 60 to 3600 seconds.
Load Measurement	The interval (in seconds) for load measurements at each access point. Default is 300 seconds, range is from 60 to 3600 seconds.
Signal Measurement	The interval (in seconds) for strength measurements at each access point. Default is 300 seconds, range is from 60 to 3600 seconds.
Coverage Measurement	The interval (in seconds) for coverage measurements at each access point. Default is 300 seconds, range is from 60 to 3600 seconds.

- Use **Set to Factory Default** to set all Auto RF 802.11b/g parameters to the Factory Defaults.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

802.11h

Use **WIRELESS > Global RF > 802.11h** to navigate to this page.

This page describes the 802.11h parameters.

Caution The 802.11a network should be disabled before you configure 802.11h network.

The 802.11h standard defines two sets of mechanisms - Dynamic Frequency Selection (DFS) and Transmit Power Control (TPC) that ensure wireless networks operate according to regulatory requirements for the 5-GHz spectrum.

When DFS is enabled, it detects the presence of other devices that use the same radio channel and automatically switches the WLAN operation to another channel if necessary.

Transmit Power Control (TPC) reduces the radio-frequency (RF) output power of each network transmitter to a level that minimizes the risk of interference to and from other systems, while allowing satisfactory network performance.

The following tables describe the 802.11h parameters:

Table 5-48 Power Constraint Parameters

Parameter	Description
Power Constraint	Select this check box to enable TPC.
Local Power Constraint (only if Power Constraint option is enabled).	Used to calculate the local maximum transmit power for a channel. The valid range is 1 to 255dB. Local maximum transmit power for a channel is defined as the maximum transmit power level specified for the channel in the Country element minus the local power constraint specified for the channel in the Power Constraint element. `Example: If a particular channel has a maximum transmit power of 20dB and you set the local power constraint to 5dB, then Local maximum transmit power for the channel = 20bB - 5dB = 15dB.`

Table 5-49 Channel Switch Announcement Parameters

Parameter	Description
Channel Announcement	Check this check box to enable channel announcement. Channel announcement is a method in which the access point announces when it is switching to a new channel and the new channel number.
Quiet Mode	If this checkbox is selected, the access point stops transmission on the current channel.

Country

Use **WIRELESS > Country** to navigate to this page.

On this page, enter the country code where the controller and associated Access Points are installed and operational. This selection ensures that the listed broadcast frequency bands, interfaces, channels and transmit power levels are compliant with country-specific regulations.

The currently-supported countries are:

- AT (Austria), which allows 802.11a and 802.11b/g.
- AU (Australia), which allows 802.11a and 802.11b.
- BE (Belgium), which allows 802.11a and 802.11b/g.
- BR (Brazil), which allows 802.11a and 802.11b/g.
- CA (Canada), which allows 802.11b/g.
- CH (Switzerland and Liechtenstein), which allows 802.11a and 802.11b/g.
- CY (Cyprus) which allows 802.11a and 802.11b/g.
- CZ (Czech Republic) which allows 802.11a and 802.11b.
- DE (Germany), which allows 802.11a and 802.11b/g.
- DK (Denmark), which allows 802.11a and 802.11b/g.
- EE (Estonia) which allows 802.11a and 802.11b/g.
- ES (Spain), which allows 802.11a and 802.11b/g.
- FI (Finland), which allows 802.11a and 802.11b/g.
- FR (France), which allows 802.11a and 802.11b/g.
- GB (United Kingdom), which allows 802.11a and 802.11b/g.
- GR (Greece), which allows 802.11b/g.
- HK (Hong Kong), which allows 802.11a and 802.11b/g.
- HU (Hungary) which allows 802.11a and 802.11b/g.
- IE (Ireland), which allows 802.11a and 802.11b/g.
- IL (Israel), which allows 802.11a and 802.11b/g.
- ILO (Israel Outdoors), which allows 802.11a and 802.11b/g.
- IN (India), which allows 802.11a and 802.11b.
- IS (Iceland), which allows 802.11a and 802.11b/g.
- IT (Italy), which allows 802.11a and 802.11b/g.
- JP (Japan), which allows 802.11a and 802.11b/g.
- KR (Republic of Korea), which allows 802.11a and 802.11b/g.
- LT (Lithuania), which allows 802.11a and 802.11b/g.
- LU (Luxembourg), which allows 802.11a and 802.11b/g.
- LV (Latvia) which allows 802.11b/g.
- MY (Malaysia) which allows 802.11b/g.
- NL (Netherlands), which allows 802.11a and 802.11b/g.

- NO (Norway), which allows 802.11a and 802.11b/g.
- NZ (New Zealand) which allows 802.11a and 802.11b/g.
- PH (Philippines) which allows 802.11a and 802.11b.
- PL (Poland) which allows 802.11a and 802.11b/g.
- PT (Portugal), which allows 802.11a and 802.11b/g.
- SE (Sweden), which allows 802.11a and 802.11b/g.
- SG (Singapore), which allows 802.11a and 802.11b/g.
- SI (Slovenia), which allows 802.11a and 802.11b/g.
- SK (Slovak Republic), which allows 802.11a and 802.11b/g.
- TH (Thailand), which allows 802.11b/g.
- TW (Taiwan), which allows 802.11a and 802.11b/g.
- US (United States of America), which allows 802.11b/g operation and 802.11a Low, Medium, and High bands.
- USE (USA) which allows 802.11a and 802.11b/g.
- USL (USA Low), which allows 802.11b/g operation and 802.11a Low and Medium bands. (Used for legacy 802.11a interface cards that do not support 802.11a High band.)
- USX (USA Extended) which allows 802.11a and 802.11b/g.
- ZA (South Africa) which allows 802.11a and 802.11b/g.

Note that both 802.11a and 802.11b/g bands must be disabled in order to change the country code.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Timers

Use **WIRELESS > Timers** to navigate to this page.

The timers listed on this page are described in the following table.

Table 5-50 Timer Descriptions

Timer	Description
802.11 Authentication Response Timeout	Configures 802.11 authentication response timeout between 5 and 60 seconds. Default 10 seconds.

Command Buttons

- **Apply**: Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help**: Request that the help page be displayed in a new browser window.

Security Menu Bar Selection

This tab allows you to configure and set security policies on your controller. Use the selector area to access specific security parameters. Making this selection from the menu bar opens the RADIUS Authentication Servers page.

You can access the following pages from the security menu bar:

- RADIUS Authentication Servers
- RADIUS Authentication Servers > New
- RADIUS Authentication Servers > Edit
- RADIUS Accounting Servers
- RADIUS Accounting Servers > New
- RADIUS Accounting Servers > Edit
- Local Net Users
- Local Net Users > New
- Local Net Users > Edit
- MAC Filtering
- MAC Filters > New
- MAC Filters > Edit
- Disabled Clients
- Disabled Client > New
- Disabled Client > Edit
- User Policies
- AP Policies
- Access Control Lists
- Access Control Lists > New
- Access Control Lists > Edit
- Access Control Lists > Rules > Edit
- Network Access Control
- Network Access Control > New
- Network Access Control > Edit

- NAC Statistics
- CA Certification
- ID Certificate
- ID Certificate > New
- Web Authentication Certificate
- Trusted AP Policies
- Rogue Policy
- Standard Signatures
- Signature > Detail
- Custom Signatures
- Client Exclusion Policies

RADIUS Authentication Servers

Use **SECURITY > AAA > RADIUS Authentication** to navigate to this page.

This page displays RADIUS Server information for your configured Remote Authentication Dial-In User Server(s) and allows you to edit the Call Station ID Type.

- Call Station ID Type - Choices are IP Address, System MAC Address, AP MAC Address.
- Cache credentials locally for use with one time password only - Checkbox to enable or disable.
- Network User - Network user authentication check box. If this option is enabled, this entry is considered as the network user RADIUS authenticating server entry.
- Management - Management authentication checkbox. If this option is enabled, this entry is considered as the management RADIUS authenticating server entry.
- Server Index - The RADIUS server Index. The controller tries Index 1 first, then Index 2 and so on, in an ascending order. Should be 1 if your network is using only one authentication server.
- Server Address - IP address of the RADIUS server.
- Port - Communication port number for the interface protocols. Default 1812.
- IP Sec - Read only field. Displays the status of the IP Security mechanism. If this option is enabled, the IP Security Parameters fields will also be displayed.
- Admin Status - Whether the RADIUS Authentication server is Enabled or Disabled.
- The **Edit** link opens the RADIUS Authentication Servers > Edit page.
- The **Remove** link allows you to delete an existing RADIUS Authentication server.
- Click the **Ping** link to send ping packets to the RADIUS Server to verify that you have a working connection between the controller and the RADIUS Server.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **New:** Select to add a new RADIUS Authentication server (RADIUS Authentication Servers > New).
- **Help:** Request that the help page be displayed in a new browser window.

RADIUS Authentication Servers > New

Use **SECURITY > AAA > RADIUS Authentication** then click **New** to navigate to this page.

This page allows you to add a new Remote Authentication Dial-In User Server. The following information is required:

- Server Index (Priority) - Index of the RADIUS server. The controller tries Index 1 first, then Index 2 through 17, in an ascending order. Set the server index to 1 if your network is using only one authentication server.

Note You can have a maximum of 17 RADIUS authenticating server entries for a single WLAN.

- Server IP Address - IP address of the RADIUS server.
- Shared Secret Format - Set the format of the shared secret to either ASCII or Hexadecimal.
- Shared Secret/Confirm Shared Secret - RADIUS server login Shared Secret.
- Port Number - Communication port number for the interface protocols.

Note DO NOT assign the Port Number to one used by another application. Use the default (1812) or any other port unused by any other application.

- Server Status - Set the RADIUS Authentication server to Enabled or Disabled.
- Support for RFC 3576 - Select this check box to enable or disable support for RFC 3576.RFC 3576 is an extension to the Remote Authentication Dial In User Service (RADIUS) protocol, allows dynamic changes to a user session. This includes support for disconnecting users and changing authorizations applicable to a user session, that is - provide support for Disconnect and Change-of-Authorization (CoA) messages. Disconnect messages cause a user session to be terminated immediately, whereas CoA messages modify session authorization attributes such as data filters.
- Retransmit Timeout - Specify the time in seconds after which the RADIUS authentication request will timeout and a retransmission will be taken up by the controller. You can specify a value between 2 to 30 seconds.
- Network User - Enable or disable network user authentication. If this option is enabled, this entry is considered as the RADIUS authenticating server for the network user.
- Management - Enable or disable management authentication. If this option is enabled, this entry is considered as the RADIUS authenticating server for the management user.
- IP sec - Select this check box to enable or disable the IP Security mechanism. If you enable this option, the IP Security Parameters fields will be displayed.

  Note IPSec option is displayed only if a crypto card is installed on the controller.

  - IPsec Authentication: Set the IP security authentication protocol to be used. Options are:
  - HMAC-SHA1
  - HMAC-MD5
  - None

Message Authentication Codes (MAC) are used between two parties that share a secret key to validate information transmitted between them. HMAC (Hash MAC) is a mechanism based on cryptographic hash functions. HMAC can be used in combination with any iterated cryptographic hash function. HMAC-MD5 and HMAC-SHA-1 are two constructs of the HMAC using the MD5 hash function and the SHA-1hash function. HMAC also uses a secret key for calculation and verification of the message authentication values.

– IP sec Encryption: Set the IP security encryption mechanism to be used. Options are:

- DES - Data Encryption Standard is a method of data encryption using a private (secret) key. DES applies a 56-bit key to each 64-bit block of data.
- Triple DES - Data Encryption Standard that applies three keys in succession.
- AES 128 CBC - Advanced Encryption Standard uses keys with a length of 128, 192, or 256 bits to encrypt blocks with a length of 128, 192, or 256 bits. AES 128 CBC uses 128 bit data path in Cipher Clock Chaining (CBC) mode.

– IKE Authentication: Not an editable field. IKE (Internet Key Exchange protocol) is used as a method of distributing the session keys (encryption and authentication), as well as providing a way for the VPN endpoints to agree on how the data should be protected. IKE keeps track of connections by assigning a bundle of Security Associations (SAs), to each connection.

– IKE Phase 1:Set the Internet Key Exchange protocol (IKE). Options are:

- Aggressive
- Main

IKE Phase-1 is used to negotiate how IKE should be protected. Aggressive mode will pass more information in fewer packets, with the benefit of slightly faster connection establishment, at the cost of transmitting the identities of the security gateways in the clear.

– Lifetime (seconds): Set the timeout interval for the session expiry. Default is 28800 seconds.

– IKE Diffie Hellman Group: Set the IKE Diffie Hellman Group. Options are:

- Group 1 (768 bits)
- Group 2 (1024 bits)
- Group 5 (1536 bits)

Diffie-Hellman techniques are used by two devices to generate a symmetric key where they can publicly exchange values and generate the same symmetric key.

Although all the three groups provide security from conventional attacks, Group 5 is considered more secure because of its larger key size. However, computations involving Group 1 and Group 2 based keys might occur slightly faster because of their smaller prime number size.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

RADIUS Authentication Servers > Edit

Use **SECURITY > AAA > RADIUS Authentication** then click **Edit** to navigate to this page.

This page allows you to change the following parameters on an existing Remote Authentication Dial-In User Server:

- Server Index (Priority) - Index of the RADIUS server.
- Shared Secret Format - Set the format of the shared secret to either ASCII or Hexadecimal.
- Server Shared Secret/Confirm Shared Secret - RADIUS server login Shared Secret.
- Port Number - Communication port number for the interface protocols.
- Server Status - Set the RADIUS Authentication server to enabled or disabled.
- Support for RFC 3576 - Select this check box to enable or disable support for RFC 3576.RFC 3576 is an extension to the Remote Authentication Dial In User Service (RADIUS) protocol, allows dynamic changes to a user session. This includes support for disconnecting users and changing authorizations applicable to a user session, that is - provide support for Disconnect and Change-of-Authorization (CoA) messages. Disconnect messages cause a user session to be terminated immediately, whereas CoA messages modify session authorization attributes such as data filters.
- Retransmit Timeout - Specify the time in seconds after which the RADIUS authentication request will timeout and a retransmission will be taken up by the controller. You can specify a value between 2 to 30 seconds.
- Network User - Enable or disable network user authentication. If this option is enabled, this entry is considered as the RADIUS authenticating server for the network user.
- Management - Enable or disable management authentication. If this option is enabled, this entry is considered as the RADIUS authenticating server for management user.
- IP sec - Check this check box to enable or disable the IP Security mechanism. If you enable this option, the IP Security Parameters fields will be displayed.

Note IPSec option is displayed only if a crypto card is installed on the controller.

– IP sec Authentication: Set the IP security authentication protocol to be used. Options are:

- HMAC-SHA1
- HMAC-MD5
- None

Message Authentication Codes (MAC) are used between two parties that share a secret key to validate information transmitted between them. HMAC (Hash MAC) is a mechanism based on cryptographic hash functions. HMAC can be used in combination with any iterated cryptographic hash function. HMAC-MD5 and HMAC-SHA-1 are two constructs of the HMAC using the MD5 hash function and the SHA-1hash function. HMAC also uses a secret key for calculation and verification of the message authentication values.

– IP sec Encryption: Set the IP security encryption mechanism to be used. Options are:

- DES - Data Encryption Standard is a method of data encryption using a private (secret) key. DES applies a 56-bit key to each 64-bit block of data.
- Triple DES - Data Encryption Standard that applies three keys in succession.

- AES 128 CBC - Advanced Encryption Standard uses keys with a length of 128, 192, or 256 bits to encrypt blocks with a length of 128, 192, or 256 bits. AES 128 CBC uses 128 bit data path in Cipher Clock Chaining (CBC) mode.

– IKE Authentication: Not an editable field.

IKE (Internet Key Exchange protocol) is used as a method of distributing the session keys (encryption and authentication), as well as providing a way for the VPN endpoints to agree on how the data should be protected. IKE keeps track of connections by assigning a bundle of Security Associations (SAs), to each connection.

– IKE Phase 1:Set the Internet Key Exchange protocol (IKE). Options are:

- Aggressive
- Main

IKE Phase-1 is used to negotiate how IKE should be protected. Aggressive mode will pass more information in fewer packets, with the benefit of slightly faster connection establishment, at the cost of transmitting the identities of the security gateways in the clear.

– Lifetime (seconds): Set the timeout interval for the session expiry. Default is 28800 seconds.

– IKE Diffie Hellman Group: Set the IKE Diffie Hellman Group. Options are:

- Group 1 (768 bits)
- Group 2 (1024 bits)
- Group 5 (1536 bits)

Diffie-Hellman techniques are used by two devices to generate a symmetric key where they can publicly exchange values and generate the same symmetric key.

Although all the three groups provide security from conventional attacks, Group 5 is considered more secure because of its larger key size. However, computations involving Group 1 and Group 2 based keys might occur slightly faster because of their smaller prime number size.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

RADIUS Accounting Servers

Use **SECURITY > AAA > RADIUS Accounting** to navigate to this page.

This page displays RADIUS information for your existing Remote Accounting Dial-In User Server(s).

- Network User - Enable or disable network user authentication. If this option is enabled, this entry is considered as the RADIUS authenticating server for the network user.
- Server Index - The RADIUS server Index. The controller tries Index 1 first, then Index 2 through 17, in an ascending order. Set the server index to 1 if your network is using only one accounting server.

Note You can configure a maximum of 17 RADIUS accounting server entries for a single WLAN.

- Server Address - IP address of the RADIUS server.
- Port - Controller port number for the interface protocols.
- IP Sec - Read only field. Displays the status of the IP Security mechanism. If this option is enabled, the IP Security Parameters fields will also be displayed.
- Admin Status - Whether the RADIUS Accounting server is enabled or disabled.
- The **Edit** link opens the RADIUS Accounting Servers > Edit page.
- The **Remove** link allows you to delete an existing RADIUS Accounting server.
- Click the **Ping** link to send ping packets to the RADIUS Server to verify that you have a working connection between the controller and the RADIUS Server

Command Buttons

- **New:** Select to add a new RADIUS Accounting server (RADIUS Accounting Servers > New).
- **Help:** Request that the help page be displayed in a new browser window.

RADIUS Accounting Servers > New

Use **SECURITY > AAA > RADIUS Accounting** then click **New** to navigate to this page.

This page allows you to add a new Remote Accounting Dial-In User Server. The following information is required:

- Server Index (Priority) - Index of the RADIUS server. The controller tries Index 1 first, then Index 2 through 17, in an ascending order. Set to 1 if your network is using only one Accounting server.
- Server IP Address - IP address of the RADIUS server.
- Shared Secret Format - ASCII of Hex.
- Shared Secret/Confirm Shared Secret - RADIUS server login Shared Secret.
- Port Number - Port number for the interface protocols.

Note DO NOT assign the Port Number to one used by another application. Use the default (1813) or any other port unused by any other application.

- Server Status - Set the RADIUS Accounting server to enabled or disabled.
- Retransmit Timeout - Specify the time in seconds after which the RADIUS authentication request will timeout and a retransmission will be taken up by the controller. You can specify a value between 2 to 30 seconds.
- Network User - Enable or disable network user authentication. If this option is enabled, this entry is considered as the RADIUS authenticating server for the network user.
- IP sec - Select this check box to enable or disable the IP Security mechanism. If you enable this option, the IP Security Parameters fields will be displayed.
  - – IP sec Authentication: Set the IP security authentication protocol to be used. Options are:
  - HMAC-SHA1
  - MAC-MD5
  - None

    Message Authentication Codes (MAC) are used between two parties that share a secret key to validate information transmitted between them. HMAC (Hash MAC) is a mechanism based on cryptographic hash functions. HMAC can be used in combination with any iterated cryptographic hash function. HMAC-MD5 and HMAC-SHA-1 are two constructs of the HMAC using the MD5 hash function and the SHA-1hash function. HMAC also uses a secret key for calculation and verification of the message authentication values.
  - – IP sec Encryption: Set the IP security encryption mechanism to be used. Options are:
  - DES - Data Encryption Standard is a method of data encryption using a private (secret) key. DES applies a 56-bit key to each 64-bit block of data.
  - Triple DES - Data Encryption Standard that applies three keys in succession.
  - AES 128 CBC - Advanced Encryption Standard uses keys with a length of 128, 192, or 256 bits to encrypt blocks with a length of 128, 192, or 256 bits. AES 128 CBC uses 128 bit data path in Cipher Clock Chaining (CBC) mode.
  - – IKE Authentication: Not an editable field.

- IKE (Internet Key Exchange protocol) is used as a method of distributing the session keys (encryption and authentication), as well as providing a way for the VPN endpoints to agree on how the data should be protected. IKE keeps track of connections by assigning a bundle of Security Associations (SAs), to each connection.
- IKE Phase 1:Set the Internet Key Exchange protocol (IKE). Options are:
- Aggressive
- Main

  IKE Phase-1 is used to negotiate how IKE should be protected. Aggressive mode will pass more information in fewer packets, with the benefit of slightly faster connection establishment, at the cost of transmitting the identities of the security gateways in the clear.
- Lifetime (seconds): Set the timeout interval for the session expiry. Default is 28800 seconds.
- IKE Diffie Hellman Group: Set the IKE Diffie Hellman Group. Options are:
- Group 1 (768 bits)
- Group 2 (1024 bits)
- Group 5 (1536 bits)

  Diffie-Hellman techniques are used by two devices to generate a symmetric key where they can publicly exchange values and generate the same symmetric key.

  Although all the three groups provide security from conventional attacks, Group 5 is considered more secure because of its larger key size. However, computations involving Group 1 and Group 2 based keys might occur slightly faster because of their smaller prime number size.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

RADIUS Accounting Servers > Edit

Use **SECURITY > AAA > RADIUS Accounting** then click **Edit** to navigate to this page.

This page allows you to change the following parameters on an existing Remote Accounting Dial-In User Server:

- Server Index (Priority) - Index of the RADIUS server.
- Shared Secret Format - ASCII of Hex.
- Server Shared Secret/Confirm Shared Secret - RADIUS server login Password.
- Server Status - Set the RADIUS Accounting server to enabled or disabled.
- Port Number - Communication port number for the interface protocols.
- Retransmit Timeout - Specify the time in seconds after which the RADIUS authentication request will timeout and a retransmission will be taken up by the controller. You can specify a value between 2 to 30 seconds.
- Network User - Enable or disable network user authentication. If this option is enabled, this entry is considered as the RADIUS authenticating server for the network user.

- IP sec - Check this check box to enable or disable the IP Security mechanism. If you enable this option, the IP Security Parameters fields will be displayed.
  - IP Sec Authentication: Set the IP security authentication protocol to be used. Options are:
  - HMAC-SHA1
  - HMAC-MD5
  - None

    Message Authentication Codes (MAC) are used between two parties that share a secret key to validate information transmitted between them. HMAC (Hash MAC) is a mechanism based on cryptographic hash functions. HMAC can be used in combination with any iterated cryptographic hash function. HMAC-MD5 and HMAC-SHA-1 are two constructs of the HMAC using the MD5 hash function and the SHA-1hash function. HMAC also uses a secret key for calculation and verification of the message authentication values.
  - IP sec Encryption: Set the IP security encryption mechanism to be used. Options are:
  - DES - Data Encryption Standard is a method of data encryption using a private (secret) key. DES applies a 56-bit key to each 64-bit block of data.
  - Triple DES - Data Encryption Standard that applies three keys in succession.
  - AES 128 CBC - Advanced Encryption Standard uses keys with a length of 128, 192, or 256 bits to encrypt blocks with a length of 128, 192, or 256 bits. AES 128 CBC uses 128 bit data path in Cipher Clock Chaining (CBC) mode.
  - IKE Authentication: Not an editable field.

    IKE (Internet Key Exchange protocol) is used as a method of distributing the session keys (encryption and authentication), as well as providing a way for the VPN endpoints to agree on how the data should be protected. IKE keeps track of connections by assigning a bundle of Security Associations (SAs), to each connection.
  - IKE Phase 1:Set the Internet Key Exchange protocol (IKE). Options are:
  - Aggressive
  - Main

    IKE Phase-1 is used to negotiate how IKE should be protected. Aggressive mode will pass more information in fewer packets, with the benefit of slightly faster connection establishment, at the cost of transmitting the identities of the security gateways in the clear.
  - Lifetime (seconds): Set the timeout interval for the session expiry. Default is 28800 seconds.
  - IKE Diffie Hellman Group: Set the IKE Diffie Hellman Group. Options are:
  - Group 1 (768 bits)
  - Group 2 (1024 bits)
  - Group 5 (1536 bits)

    Diffie-Hellman techniques are used by two devices to generate a symmetric key where they can publicly exchange values and generate the same symmetric key.

    Although all the three groups provide security from conventional attacks, Group 5 is considered more secure because of its larger key size. However, computations involving Group 1 and Group 2 based keys might occur slightly faster because of their smaller prime number size.

Command Buttons

- **Back:** Return to the previous window.

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Local Net Users

Use **SECURITY > AAA > Local Net Users** to navigate to this page.

This page displays a summary of the existing local network clients who are allowed to access a specific Cisco WLAN Solution WLAN sorted by User Name. This is an administrative bypass of the RADIUS authentication process. Layer 3 Web Authentication located on the WLANs > Edit page must be enabled.

Client information is passed to the RADIUS authentication server first, and if the client information does not match a RADIUS database entry, this local database is polled. Clients located in this database are granted access to network services if the RADIUS authentication fails or does not exist.

- Use the **Remove** link to remove an existing local network client.

Command Buttons

- **New:** Select to add a new local network client (Local Net Users > New).
- **Help:** Request that the help page be displayed in a new browser window.

Local Net Users > New

Use **SECURITY > AAA > Local Net Users** then click **New** to navigate to this page.

This page allows you to add a local network user. Layer 3 Web Authentication located on WLANs > Edit page must be enabled.

- Add the User Name, Password and Password Confirmation.
- Enter the Cisco WLAN Solution WLAN ID that the user is allowed to access.
- If desired, enter a user description.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Local Net Users > Edit

Use **SECURITY > AAA > Local Net Users** then click **Edit** to navigate to this page.

This page allows you to edit a local network user definition. Layer 3 Web Authentication located on WLANs > Edit page must be enabled.

- Confirm or change the Password and Password Confirmation.
- Enter the Cisco WLAN Solution WLAN ID that the user is allowed to access.
- If desired, enter a user description.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

MAC Filtering

Use **SECURITY > AAA > MAC Filtering** to navigate to this page.

This page displays the RADIUS Compatibility Mode and MAC Delimiters for MAC Filtering, and also presents a summary of the client machines allowed to access network services via a specific Cisco WLAN Solution WLAN and through a specific interface. The client machine access is determined by its MAC address. This is an administrative bypass of the RADIUS authentication process.

- Select the required **RADIUS Compatibility Mode** for MAC Filtering: Cisco ACS, ORINOCO RADIUS, or Other.
- Select the required **MAC Delimiters** for MAC Filtering. The MAC delimiters can be colon (xx:xx:xx:xx:xx:xx), hyphen (xx-xx-xx-xx-xx-xx), single hyphen (xxxxxx-xxxxxx), or none (xxxxxxxxxxxx), as required by the RADIUS server.

This page lists the current Local MAC Filters by MAC address, WLAN ID, Interface, and optional Description.

- Use the **Edit** link to change a current local MAC filter definition on the MAC Filters > Edit page.
- Use the **Remove** link to remove a current local MAC filter.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **New:** Select to add a new client by MAC address (MAC Filters > New).
- **Help:** Request that the help page be displayed in a new browser window.

MAC Filters > New

Use **SECURITY > AAA > MAC Filtering** then click **New** to navigate to this page.

This page allows you to add a client by MAC address.

- Add the client MAC Address
- Add the WLAN ID to which the client has access.
- If desired, add a client Description.
- Select the associated Interface Name, as defined in the Interfaces page.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

MAC Filters > Edit

Use **SECURITY > AAA > MAC Filtering** then click **Edit** to navigate to this page.

This page allows you to change a MAC Filter definition for an existing client MAC Address.

- Change the WLAN ID to which the client has access.
- If desired, add a filter Description.
- Select the associated Interface Name, as defined in the Interfaces page.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Disabled Clients

Use **SECURITY > AAA > Disabled Clients** to navigate to this page.

This page presents a summary of existing Exclusion Listed (blacklisted) clients manually barred by MAC address from access to network services.

- The **Edit** link opens the Disabled Client > Edit page.
- The **Remove** link allows you to enable a client that was formerly disabled.

Command Buttons

- **New:** Select to manually disable a client (Disabled Client > New).
- **Help:** Request that the help page be displayed in a new browser window.

Disabled Client > New

Use **SECURITY > AAA > Disabled Client** then click **New** or **MONITOR > Clients** then click **Disable** to navigate to this page.

This page allows you to manually Exclusion List (blacklist) a client by MAC address.

- Add the MAC Address and an optional Client Description for the client to be disabled.

Note When you enter a client MAC address to be disabled, the Operating System checks that the MAC address is not one of the known Local Net clients (Local Net Users), Authorized clients (MAC Filtering), or Local Management users (Local Management Users) MAC addresses. If the entered MAC address is on one of these three lists, the Operating System does not allow the MAC address to be manually disabled.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Disabled Client > Edit

Use **SECURITY > AAA > Disabled Clients** then click **Edit** to navigate to this page.

This page allows you to change a manually Exclusion List (blacklisted) client description.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

User Policies

Use **SECURITY > AAA > User Login Policies** to navigate to this page.

This page allows you to specify the maximum number of concurrent logins for a single client name, between one and eight, or 0 = unlimited.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

AP Policies

Use **SECURITY > AAA > AP Policies** to navigate to this page.

This page allows you to set policies that help in the authorization of access points. Access points are authorized against AAA and/or a certificate.

The following tables describe the access point authorization parameters.

Table 6-1 Policy Configuration

Parameter	Description
Authorize APs against AAA	Check this check box if you want the access points to be authorized against AAA.
Accept Self Signed Certificate (SSC)	Check this check box if you want the access points to be authorized against a certificate. **Note** SSC option is available only in Cisco 4400 Series Wireless LAN Controllers and Cisco 2000 Series Wireless LAN Controllers.

Adding an AP to Authorization List

To add an access point to the authorization list of a Cisco 4100 Series Wireless LAN Controller, perform these steps:

Step 1 In the **MAC Address** field, enter the MAC address of the AP.

Step 2 From the **Certificate Type** drop-down list, select **MIC**.

Step 3 Click **Add**.

To add an AP to the authorization list of a Cisco 2000 Series Wireless LAN Controller or Cisco 4400 Series Wireless LAN Controller:

Step 1 In the **MAC Address** field, enter the MAC address of the AP.

Step 2 From the **Certificate Type** drop-down list, select either **MIC** or **SSC**.

Note Select **MIC** as the certificate type if you want to add Cisco Aironet 1000 Series lightweight access points to the authorization list. For other Cisco access points, select **SSC** as the certificate type.

Step 3 Enter the **SHA1 Key Hash**.

Note **SHA1 Key Hash** option is displayed only if you have selected **SSC** as the certificate type in the previous step.

Step 4 Click **Add AP to AuthList**.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Access Control Lists

Use **SECURITY > Access Control Lists** to navigate to this page.

This page allows you to view current access control lists (ACLs) that are similar to standard firewall access control Lists.

Note The Operating System allows you to define up to 64 ACLs, with up to 64 Rules (filters) per ACL.

- Use the **Edit** link to open the Access Control Lists > Edit page.
- Use the **Remove** link to remove an existing local MAC filter.

Command Buttons

- **New:** Select to add a new ACL (Access Control Lists > New).
- **Help:** Request that the help page be displayed in a new browser window.

Access Control Lists > New

Use **SECURITY > Access Control Lists** then click **New** to navigate to this page.

This page allows you to create an ACL by specifying a name.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Access Control Lists > Edit

Use **SECURITY > Access Control Lists** then click **Edit** to navigate to this page.

This page allows you to view and/or change an ACL definition, similar to standard firewall ACLs.

Note The Operating System allows you to define up to 64 ACLs, with up to 64 Rules (filters) per ACL.

Use the **Remove** link to remove an existing ACL rule.

Table 6-2 Current Rules

Parameter	Description
Access List Name	The name of the ACL.
Sequence	The operator can define up to 64 Rules for each ACL. The Rules for each ACL are listed in contiguous sequence from 1 to 64. That is, if Rules 1 through 4 are already defined and you add Rule 29, it is added as Rule 5. **Note** If you add or change a sequence number, the Operating System adjusts the other rule sequence numbers to retain the contiguous sequence. For instance, if you have sequence numbers 1 through 7 defined and change number 7 to 5, the Operating System automatically reassigns Sequence 6 to 7 and Sequence 5 to 6.
Action (Note)	Deny or Permit.
Source IP/Mask	Any or IP Address and Netmask.
Destination IP/Mask	Any or IP Address and Netmask.
Protocol	Protocol to use for this ACL: Any - All protocols TCP - Transmission Control Protocol UDP - User Datagram Protocol ICMP - Internet Control Message Protocol ESP - IP Encapsulating Security Payload AH - Authentication Header GRE - Generic Routing Encapsulation IP - Internet Protocol Eth Over IP - Ethernet over Internet Protocol OSPF - Open Shortest Path First Other - Any other IANA protocol (http://www.iana.org/)
Source Port	Any or IP Address and Netmask.
Dest Port	Any or IP Address and Netmask.
DSCP	Any or Specific (from 0 - 63). Differentiated Services Code Point (DSCP). A packet header code that can be used to define quality of service across the Internet.
Direction	Any, Inbound (from client) or Outbound (to client).
Note The default filter is to deny all access unless a Rule explicitly permits it.	

- When the ACL contains one or more ACL Rule, click **Edit** to modify the rule on the Access Control Lists > Rules > Edit page.

Command Buttons

- **Back:** Return to the previous window.
- **Help:** Request that the help page be displayed in a new browser window.
- **Add New Rule:** Add a new rule to an existing ACL.

Access Control Lists > Rules > Edit

Use **SECURITY > Access Control Lists,** click **Edit** and then in the sequence number which you want to change the rule click **Edit** again to navigate to this page.

This page allows you to change an ACL rule definition.

Note The Operating System allows you to define up to 64 ACLs, with up to 64 Rules (filters) per ACL.

Table 6-3 Rule Edit Parameters

Parameter	Description
Sequence	The operator can define up to 64 rules for each ACL. The rules for each ACL are listed in contiguous sequence from 1 to 64. That is, if Rules 1 through 4 are already defined and you add Rule 29, it is be added as Rule 5. **Note** If you add or change a Sequence number, the Operating System adjusts the other rule sequence numbers to retain the contiguous sequence. For instance, if you have Sequence numbers 1 through 7 defined and change number 7 to 5, the Operating System automatically reassigns Sequence 6 to 7 and Sequence 5 to 6.
Source	Any or IP Address and Netmask.
Destination	Any or IP Address and Netmask.
Protocol (Note 1)	Protocol to use for this ACL: Any - All protocols TCP - Transmission Control Protocol UDP - User Datagram Protocol ICMP - Internet Control Message Protocol ESP - IP Encapsulating Security Payload AH - Authentication Header GRE - Generic Routing Encapsulation IP - Internet Protocol Eth Over IP - Ethernet over Internet Protocol OSPF - Open Shortest Path First Other - Any other IANA protocol (http://www.iana.org/)

Table 6-3 Rule Edit Parameters (continued)

Parameter	Description
DSCP	Any or Specific (from 0 - 63). Differentiated Services Code Point (DSCP). A packet header code that can be used to define quality of service across the Internet.
Direction	Any, Inbound (from client) or Outbound (to client).
Action (Note 2)	Deny or Permit.

Note When you select some of these protocols, one or more additional data entry fields open up. Enter the port number in a single data entry field, or enter the source and destination port when there are two data entry fields.

Note The default filter is to deny all access unless a rule explicitly permits it.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Access Control Lists > Edit > Add New Rule

Use **SECURITY > Access Control Lists,** click **Edit** link of an existing ACL and then click **Add New Rule** to navigate to this page.

This page allows you to add a new rule to an existing ACL.

Table 6-4 New Rule parameters

Parameter	Description
Sequence	The operator can define up to 64 rules for each ACL. The rules for each ACL are listed in contiguous sequence from 1 to 64. That is, if rules 1 through 4 are already defined and you add rule 29, it is be added as rule 5. **Note** If you add or change a sequence number, the Operating System adjusts the other rule sequence numbers to retain the contiguous sequence. For instance, if you have sequence numbers 1 through 7 defined and change number 7 to 5, the Operating System automatically reassigns sequence 6 to 7 and Sequence 5 to 6.
Source	Any or IP Address and Netmask.
Destination	Any or IP Address and Netmask.

Table 6-4 New Rule parameters

Parameter	Description
Protocol (Note 1)	Protocol to use for this ACL: Any - All protocols TCP - Transmission Control Protocol UDP - User Datagram Protocol ICMP - Internet Control Message Protocol ESP - IP Encapsulating Security Payload AH - Authentication Header GRE - Generic Routing Encapsulation IP - Internet Protocol Eth Over IP - Ethernet over Internet Protocol OSPF - Open Shortest Path First Other - Any other IANA protocol (http://www.iana.org/)
DSCP	Any or Specific (from 0 - 63). Differentiated Services Code Point (DSCP). A packet header code that can be used to define quality of service across the Internet.
Direction	Any, Inbound (from client) or Outbound (to client).
Action (Note 2)	Deny or Permit.

Note When you select some of these protocols, one or more additional data entry fields open up. Enter the port number in a single data entry field, or enter the source and destination port when there are two data entry fields.

Note The default filter is to deny all access unless a rule explicitly permits it.

Network Access Control

Use **SECURITY > Network Access Control** to navigate to this page.

This page displays information about Network Access Control ACLs. It displays the following parameters:

- NAC ACL Name
- Server Index
- Server Address
- Port
- Admin Status
- Server Status
  - The **Edit** link takes you to the Network Access Control > Edit page.
  - The **Remove** link allows you to remove the Network Access Control definition.
  - The **Ping** link causes OS to ping the Network Access Control.
  - The **Stats** link takes you to the NAC Statistics page.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **New:** Select to configure a new Network Access Control (Network Access Control > New).
- **Help:** Request that the help page be displayed in a new browser window.

Network Access Control > New

Use **SECURITY > Network Access Control** then click **New** to navigate to this page.

This page allows you to add a new Network Access Control. The following information is required:

- Server Index (Priority) - Index of the RADIUS server. The controller tries Index 1 first, then Index 2 through 4, in descending order. Set to 1 if your network is using only one Authentication server.
- Server IP Address - IP address of the Network Access Control.
- Shared Secret/Confirm Shared Secret - Network Access Control login Shared Secret.
- Port Number - Communication port number for the interface protocols.

Note DO NOT assign the Port Number to one used by another application. Use the default (1812) or any other port unused by any other application.

- Admin Status - Set the interface to Enabled or Disabled.

Command Buttons

- **Back:** Return to the previous window.

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Network Access Control > Edit

Use **SECURITY > Network Access Control**, then click **Edit** to navigate to this page.

This page allows you to edit the shared secret and admin status of a network access control. This page contains the following parameters:

- Server Index (Priority) - Index of the RADIUS server. The controller tries Index 1 first, then Index 2 through 4, in descending order. Set to 1 if your network is using only one Authentication server.
- Server IP Address - IP address of the Network Access Control.
- Shared Secret/Confirm Shared Secret - Network Access Control login Shared Secret.
- Port Number - Communication port number for the interface protocols.

Note DO NOT assign the Port Number to one used by another application. Use the default (1812) or any other port unused by any other application.

- Admin Status - Set the interface to Enabled or Disabled.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

NAC Statistics

Use **SECURITY > Network Access Control**, then click **Stats** to navigate to this page.

This page allows you to view the Network Access Control statistics. This page contains the following:

- Admin Status.
- Number of Requests Sent.
- Number of Retransmissions.
- Number of Requests Received.
- Number of Malformed Requests Received.
- Number of Invalid Auth Received.
- Number of Pending Requests.
- Number of Timeouts.
- Number of Other Drops.

Command Buttons

- **Back:** Return to the previous window.
- **Help:** Request that the help page be displayed in a new browser window.

CA Certification

Use **SECURITY > IPSec Certificates > CA Certificate** to navigate to this page.

This page contains the current CA certificate information. If you choose to add an operator-generated or purchased CA Certificate, paste the new CA certificate ASCII text into the certificate box and click **Apply**.

Caution Each certificate has a variable-length embedded RSA Key. The RSA key length can varies from512 bits, which is relatively insecure, to thousands of bits, which is very secure. When you are obtaining a new certificate from a Certificate Authority (such as the Microsoft CA), MAKE SURE the RSA key embedded in the certificate is AT LEAST 768 Bits.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Delete Certificate:** Deletes the current CA Certification. You are prompted to confirm if you select this option.
- **Help:** Request that the help page be displayed in a new browser window.

ID Certificate

Use **SECURITY > IPSec Certificates > ID Certificate** to navigate to this page.

This page summarizes existing network ID certificates by ID certificate name and valid period. An ID certificate can used by web server operators to ensure secure server operation.

⚠ **Caution** Each certificate has a variable-length embedded RSA Key. The RSA key length varies from512 bits, which is relatively insecure, to thousands of bits, which is very secure. When you are obtaining a new certificate from a Certificate Authority (such as the Microsoft CA), MAKE SURE the RSA key embedded in the certificate is AT LEAST 768 Bits.

Command Buttons

- **New:** Open the ID Certificate > New page to add a new ID certificate.
- **Help:** Request that the help page be displayed in a new browser window.

ID Certificate > New

Use **SECURITY > IPSec Certificates > ID Certificate** then click **New** to navigate to this page.

⚠ **Caution** Each certificate has a variable-length embedded RSA Key. The RSA key length can varies from512 bits, which is relatively insecure, to thousands of bits, which is very secure. When you are obtaining a new certificate from a Certificate Authority (such as the Microsoft CA), MAKE SURE the RSA key embedded in the certificate is AT LEAST 768 Bits.

Use this page to add new ID certificates, in addition to the factory-supplied ID certificate. For each new ID certificate, add:

- Certificate Name.
- Certificate Password (Private Key).
- Paste the new ID certificate ASCII text into the Certificate box.
- Click **Apply**.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Web Authentication Certificate

Use **SECURITY > Web Auth Certificate** to navigate to this page.

Use this page to view the current web authentication certificate type, download an SSL certificate, or regenerate a new locally- generated web auth certificate.

Note The Operating System automatically generates a fully-functional web authentication certificate as it is loaded onto your controller. This means that you do not have to do anything to use certificates with Layer 3 web authentication.

However, if you would like to use a new Operating System-generated web authentication certificate, click the **Regenerate Certificate** button. The Operating System generates a new web auth certificate, and displays a `Successfully generated Web Authentication Certificate` message. Reboot the controller to register the new certificate.

If you would prefer to use an externally-generated web authentication certificate, verify that the controller can ping the TFTP server, and then click the **Download SSL Certificate** box, and fill in the following parameters:

- Server IP Address.
- Maximum Retries: Maximum number of times each download can be attempted.
- Timeout: The amount of time allowed for each download.
- Certificate File Path: usually "/" so the TFTP software can use its default directory.
- Certificate File Name: The web authentication certificate filename in encrypted .PEM (Privacy Enhanced Mail) format.
- Certificate Password.

Note The TFTP server cannot run on the same computer as the Cisco WCS, because the Cisco WCS and the TFTP server use the same communication port.

Caution Each certificate has a variable-length embedded RSA Key. The RSA key length can varies from512 bits, which is relatively insecure, to thousands of bits, which is very secure. When you are obtaining a new certificate from a Certificate Authority (such as the Microsoft CA), MAKE SURE the RSA key embedded in the certificate is AT LEAST 768 Bits.

When you have filled in the required information, click **Apply** and the Operating System collects the new certificate from the TFTP server. Reboot the controller to register the new certificate.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Regenerate Certificate:** Direct the Operating System to internally generate a new Web Authentication certificate.
- **Help:** Request that the help page be displayed in a new browser window.

Trusted AP Policies

Use **SECURITY > Wireless Protection Policies > Trusted AP Policies** to navigate to this page.

This page allows you to select and view trusted access point policy information as shown in the following table.

Table 6-5 Trusted AP Policies Parameters

Parameter	Description
Enforced Encryption policy	Choices are: None, open, WEP, or WPA/802.11i
Enforced preample policy	Choices are: None, short, or long.
Enforced radio type policy	Choices are: None, 802.11b only, 802.11a only, or 802.11b/g Only
Valid SSID	Valid Service Set Identifier. Enable or Disable checkbox
Alert if Trusteed AP is missing	Enable or Disable checkbox
Expiration Timeout for Trusted AP Entries (seconds)	Value in seconds

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Rogue Policy

Use **SECURITY > Wireless Protection Policies > Rogue Policies** to navigate to this page.

This page allows you to select global parameters for rogue access point detection.

- Enable **Rogue Location Discovery Protocol** to have the Cisco WLAN Solution automatically detect rogue access points on your wired network.
- Expiration Timeout for Rogue AP Entries: The number of seconds after which the rogue AP will be taken off the list.
- Validate rogue clients against AAA: Enable or disable checkbox.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Standard Signatures

Use **SECURITY > Wireless Protection Policies** then click **Standard Signatures** to access this page.

This page allows you to view standard signature information.

- Precedence: Precedence order number.
- Name: Name of the signature.
- Frame Type: Type of frame, such as Management, or Data
- Action: Type of action to take, such as report.
- State: Enabled or disabled.
- Description: Text description of the signature, such as “Broadcast Deauthentication Frame.”

Click **Detail** to view more detailed information. Refer to Signature > Detail.

Signature > Detail

Use **SECURITY > Wireless Protection Policies**, click **Standard Signatures** and then click **Detail** to access this page. This page allows you view detailed signature information.

- Precedence: Precedence order number.
- Name: Name of the signature, such as Bcast deauth.
- Description: Text description of the signature, such as “Broadcast Deauthentication Frame.”
- Frame Type: Frame Type such as Broadcast Deauthentication Frame.
- Action: Action to take, such as Report
- Frequency (pkts/sec): Frequency in packets for second.
- Quiet Time (secs): TBD
- State: Enabled or disabled.

Signature Patterns

- Offset: TBD
- Pattern: TBD
- Mask: TBD

Command Button

- Back

Custom Signatures

Use **SECURITY > Wireless Protection Policies** then click **Custom Signatures** to access this page.

- Precedence: Precedence order number.
- Name: Name of the custom signature.
- Frame Type: Frame type, such as Management, or data.
- Action: Type of action to take, such as report.
- State: Enabled or disabled.
- Description: Text description of the signature.

Client Exclusion Policies

Use **SECURITY > Wireless Protection Policies** then click **Client Exclusion Policies** to access this page.

This page allows you to set client exclusion policies.

- Excessive 802.11a Association Failures: Enabled checkbox.
- Excessive 802.11a Authentication Failures: Enabled checkbox.
- Excessive 802.11x Authentication Failures: Enabled checkbox.
- Network Access Control Failures: Enabled checkbox.
- Excessive 802.11 Web Authentication Failures: Enabled checkbox.
- IP Theft Or Reuse: Enabled checkbox.

AP Authentication

Use **SECURITY > Wireless Protection Policies** then click **AP Authentication** to access this page.

This page allows you to set access point authentication policies.

Table 6-6 AP Authentication Parameters

Parameter	Description
RF Network Name	Not an editable field. The RF Network name entered in the general parameters window (Refer to General) is displayed here.
Enable AP Neighbor Authentication	Check this check box to enable the AP authentication feature. When this feature is enabled, the access points sending RRM neighbor packets with different RF Network Names are reported as rogues.
Alarm Trigger Threshold	Set the number of hits to be ignored from a foreign access point before an alarm is raised. The valid range is from 1 to 255. The default value is 255.

Command Buttons

- Back
- Apply
- Help

Management Menu Bar Selection

This menu bar selection provides access to the controller management details. Use the selector area to access specific management parameters. Making this selection from the menu bar opens the Summary page.

- Summary
- SNMP System Summary
- SNMP V3 Users
- SNMP V3 Users > New
- SNMP v1/v2c Community
- SNMP v1/v2c Community > New
- SNMP v1/v2c Community > Edit
- SNMP Trap Receiver
- SNMP Trap Receiver > New
- SNMP Trap Receiver > Edit
- SNMP Trap Controls
- Trap Logs
- HTTP Configuration
- Telnet-SSH Configuration
- Serial Port Configuration
- Local Management Users
- Local Management Users > New
- CLI Sessions
- Syslog Configuration
- Management Via Wireless
- Message Logs
- System Resource Information
- Controller Crash Information
- AP Log Information
- Web Login Page

Summary

Use **MANAGEMENT > Summary** to navigate to this page.

This page displays the network summary of this controller.

Table 7-1 Summary Parameters

Parameter	Description
SNMP Protocols	SNMP protocols supported.
Syslog	Log of system events.
HTTP Mode	Access mode for web and secure web.
HTTPS Mode	Enable or Disable the https Secure Shell (SSL) interface using secure certificate authentication
New Telnet Sessions Allowed	Whether or not additional telnet sessions are permitted.
New SSH Sessions Allowed	Whether or not additional SSH-enabled sessions are permitted.
Management via Wireless	Whether controller management from a wireless client is enabled or disabled.

Command Buttons

- **Help:** Request that the help page be displayed in a new browser window.

SNMP System Summary

Use **MANAGEMENT > SNMP > General** to navigate to this page.

This page allows you to change some of the SNMP system parameters.

Table 7-2 SNMP System Parameters

Parameter	Description
Name	Customer definable name of the controller.
Location	Customer definable controller location.
Contact	Customer definable contact details.
System Description	Read-only controller description.
System Object ID	Read-only object ID.
SNMP Port Number	Read-only SNMP port number.
Trap Port Number	Definable trap port number; Default is 162.
SNMP v1 Mode	Enable or disable SNMP v1; Default is disable.
SNMP v2c Mode	Enable or disable SNMP v2c; Default is disable. This parameter should be modified if remote management is desired.
SNMP v3 Mode	Enable or disable SNMP v3; Default is disable. This parameter should be modified if remote management is desired.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

SNMP V3 Users

Use **MANAGEMENT > SNMP > SNMP V3 Users** to navigate to this page.

This page provides a summary of the SNMP users as described in the following table.

Table 7-3 SNMP User Summary

Parameter	Range
User Name	Name of the user profile.
Access Level	Read Only; Read Write.
Auth Protocol	None; HMAC-MD5; HMAC-SHA.
Privacy Protocol	None; CBC-DES.

Remove a user profile by selecting the appropriate **Remove** link. You are prompted for confirmation of the user removal.

Command Buttons

- **New:** Select to add a new SNMP user (SNMP V3 Users > New).
- **Help:** Request that the help page be displayed in a new browser window.

SNMP V3 Users > New

Use **MANAGEMENT > SNMP > SNMP V3 Users** then click **New** to navigate to this page.

This page provides a summary of the SNMP users as described in the following table.

Table 7-4 SNMP User Details

Parameter	Range
User Profile Name	Name of the user profile.
Access Mode	Read Only or Read Write.
Authentication Protocol	None, HMAC-MD5, or HMAC-SHA. For HMAC-MD5 or HMAC-SHA, enter and confirm an Authentication Password.
Privacy Protocol	None or CBC-DES. For CBC-DES, enter and confirm a Privacy Password.

If you select an authentication or privacy protocol, you must enter a password for each.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

SNMP v1/v2c Community

Use **MANAGEMENT > SNMP > Communities** to navigate to this page.

This page provides a summary of the SNMP community as described in the following table.

Table 7-5 SNMP Community Summary

Parameter	Range
Community Name	The community string to which this entry grants access. A valid entry is a case-sensitive alphanumeric string of up to 16 characters. Each row of this table must contain a unique community name.
IP Address	An IP address from which this device accepts SNMP packets with the associated community. The requesting entity's IP address is ANDed with the Subnet Mask before being compared to the IP Address. **Note** If the Subnet Mask is set to 0.0.0.0, an IP Address of 0.0.0.0 matches all IP addresses. The default value is 0.0.0.0.
IP Mask	A mask to be ANDed with the requesting entity's IP address before comparison with IP Address. If the result matches with IP Address then the address is an authenticated IP address. For example, if the IP Address = 9.47.128.0 and the corresponding Subnet Mask = 255.255.255.0 a range of incoming IP addresses would match, that is, the incoming IP Address could equal 9.47.128.0 - 9.47.128.255. The default value is 0.0.0.0.
Access Mode	The access level for this community string. May be specified by selecting Read/Write or Read Only from the pull-down.
Status	The status of this community access entry. When this object is set to enabled, if the Community Name for this row is not unique among all valid rows, the set request is rejected.

Edit a user profile by selecting the **Edit** link (SNMP v1/v2c Community > Edit).

Remove a user profile by selecting the appropriate **Remove** link. You are prompted for confirmation of the user removal.

Command Buttons

- **New:** Select to add a new community user profile (SNMP v1/v2c Community > New).
- **Help:** Request that the help page be displayed in a new browser window.

SNMP v1/v2c Community > New

Use **MANAGEMENT > SNMP Communities** then click **New** to navigate to this page.

Use this page to add a new SNMP community profile as described in the following table.

Table 7-6 SNMP Community Summary

Parameter	Range
Community Name	The community string to which this entry grants access. A valid entry is a case-sensitive alphanumeric string of up to 16 characters. Each row of this table must contain a unique community name.
IP Address	An IP address from which this device accepts SNMP packets with the associated community. The requesting entity's IP address is ANDed with the Subnet Mask before being compared to the IP Address. **Note** If the Subnet Mask is set to 0.0.0.0, an IP Address of 0.0.0.0 matches all IP addresses. The default value is 0.0.0.0.
IP Mask	A mask to be ANDed with the requesting entity's IP address before comparison with IP Address. If the result matches with IP Address then the address is an authenticated IP address. For example, if the IP Address = 9.47.128.0 and the corresponding Subnet Mask = 255.255.255.0 a range of incoming IP addresses would match, that is, the incoming IP Address could equal 9.47.128.0 - 9.47.128.255. The default value is 0.0.0.0.
Access Mode	The access level for this community string. May be specified by selecting Read/Write or Read Only from the pull-down.
Status	The status of this community access entry. When this object is set to enabled, if the Community Name for this row is not unique among all valid rows, the set request is rejected. Community names may be made invalid by selecting disable.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

SNMP v1/v2c Community > Edit

Use **MANAGEMENT > SNMP Communities** then click **Edit** to navigate to this page.

Use this page to Enable or Disable an SNMP community profile. All fields are read-only except the Status field.

Table 7-7 SNMP Community Summary

Parameter	Range
Community Name	The community string to which this entry grants access. A valid entry is a case-sensitive alphanumeric string of up to 16 characters. Each row of this table must contain a unique community name.
IP Address	An IP address from which this device accepts SNMP packets with the associated community. The requesting entity's IP address is ANDed with the Subnet Mask before being compared to the IP Address. **Note** If the Subnet Mask is set to 0.0.0.0, an IP Address of 0.0.0.0 matches all IP addresses. The default value is 0.0.0.0.
IP Mask	A mask to be ANDed with the requesting entity's IP address before comparison with IP Address. If the result matches with IP Address then the address is an authenticated IP address. For example, if the IP Address = 9.47.128.0 and the corresponding Subnet Mask = 255.255.255.0 a range of incoming IP addresses would match, that is, the incoming IP Address could equal 9.47.128.0 - 9.47.128.255. The default value is 0.0.0.0.
Access Mode	The access level for this community string. May be specified by selecting Read/Write or Read Only from the pull-down.
Status	Set the status of this community access entry. When this object is set to enabled, if the Community Name for this row is not unique among all valid rows, the set request is rejected. Community names may be made invalid by selecting disable.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

SNMP Trap Receiver

Use **MANAGEMENT > SNMP > Trap Receivers** to navigate to this page.

This page provides a summary of existing SNMP trap receivers as described in the following table.

Table 7-8 SNMP Trap Receiver Summary

Parameter	Range
Trap Receiver Name	The name of the server where the traps are sent.
IP Address	The IP address of the server.
Status	Status must be enabled for the SNMP traps to be sent to the server.

Edit a user profile by selecting the **Edit** link (SNMP Trap Receiver > Edit).

Remove a user profile by selecting the appropriate **Remove** link. You are prompted for confirmation of the trap removal.

Command Buttons

- **New:** Select to add a new trap receiver (SNMP Trap Receiver > New).
- **Help:** Request that the help page be displayed in a new browser window.

SNMP Trap Receiver > New

Use **MANAGEMENT > SNMP > Trap Receivers** then click **New** to navigate to this page.

Use this page to add a server to receive SNMP traps from this controller as described in the following table.

Table 7-9 SNMP Trap Receiver Details

Parameter	Range
Trap Receiver Name	The name of the server where the traps are sent.
IP Address	The IP address of the server.
Status	Status must be enabled for the SNMP traps to be sent to the receiver.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

SNMP Trap Receiver > Edit

Use **MANAGEMENT > SNMP/Trap Receivers** then click **Edit** to navigate to this page.

You can use this page to Enable or Disable sending traps to a particular server. Only the Status field can be modified.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

SNMP Trap Controls

Use **MANAGEMENT > SNMP > Trap Controls** to navigate to this page.

This page allows you to select which traps logs should be captured. Select the applicable logs and select Apply.

Table 7-10 Miscellaneous Traps

Trap Name	Description
SNMP Authentication	The SNMPv2 entity has received a protocol message that is not properly authenticated.
Link (Port) Up/Down	Port changes status from up or down.
Multiple Users	Two users login with the same login ID.
Spanning Tree	Spanning Tree traps. Refer to the STP specifications for descriptions of individual parameters.
Rogue AP	Whenever a rogue access point is detected this trap is sent with its MAC Address; When a rogue access point that was detected earlier and it no longer exists this trap is sent.
Config Save	Notification sent when the configuration is modified.

Table 7-11 Client Related Traps

Trap Name	Description
802.11 Disassociation	The disassociate notification is sent when the client sends a disassociation frame.
802.11 Deauthentication	The deauthenticate notification is sent when the client sends a deauthentication frame.
802.11 Failed Authentication	The authenticate failure notification is sent when the client sends an authentication frame with a status code other than 'successful'.
802.11 Failed Association	The associate failure notification is sent when the client sends an association frame with a status code other than 'successful'.
Exclusion	The associate failure notification is sent when a client is Exclusion Listed (blacklisted).

Table 7-12 Cisco AP Traps

Trap Name	Description
AP Register	Notification sent when the access point associates or disassociates with the controller.
AP Interface Up/Down	Notification sent when the access point interface (802.11a or 802.11b/g) status changes to up or down.

Table 7-13 Auto RF Profile Traps

Trap Name	Description
Load Profile	Notification sent when Load Profile state changes between PASS and FAIL.
Noise Profile	Notification sent when Noise Profile state changes between PASS and FAIL.
Interference Profile	Notification sent when Interference Profile state changes between PASS and FAIL.
Coverage Profile	Notification sent when Coverage Profile state changes between PASS and FAIL.

Table 7-14 Auto RF Update Traps

Trap Name	Description
Channel Update	Notification sent when the access point’s dynamic channel algorithm is updated.
Tx Power Update	Notification sent when the access point’s dynamic transmit power algorithm is updated.
Antenna Update	Notification sent when the access point’s dynamic antenna algorithm is updated.

Table 7-15 AAA Traps

Trap Name	Description
User Authentication	This trap is to inform that a client RADIUS authentication failure has occurred.
RADIUS Servers Not Responding	This trap is to indicate that no RADIUS server(s) are responding to authentication requests sent by the RADIUS client.

Table 7-16 IP Security Traps

Trap Name	Description
ESP Authentication Failure	IPSec packets with invalid hashes were found in an inbound ESP SA.
ESP Replay Failure	IPSec packets with invalid sequence numbers were found in an inbound ESP SA.
Invalid SPI	A packet with an unknown SPI was detected from the specified peer with the specified SPI using the specified protocol.
IKE Negotiation Failure	An attempt to negotiate a phase 1 IKE SA failed. The notification counts are also sent as part of the trap, along with the current value of the total negotiation error counters.

Table 7-16 IP Security Traps (continued)

Trap Name	Description
IKE Suite Failure	An attempt to negotiate a phase 2 SA suite for the specified selector failed. The current total failure counts are passed as well as the notification type counts for the notify involved in the failure.
Invalid Cookie	ISAKMP packets with invalid cookies were detected from the specified source, intended for the specified destination. The initiator and responder cookies are also sent with the trap.

Table 7-17 802.11 Security Traps

Trap Name	Description
WEP Decrypt Error	This trap is to inform that an error has occurred while a WEP entity is being decrypted.

Table 7-18 WPS Traps

Trap Name	Description
Rogue Auto Containment	An AP which is being contained will either not be able to provide service at all, or will provide exceedingly slow service.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Trap Logs

Use **MANAGEMENT > SNMP/Trap Logs** to navigate to this page.

You can view the traps logs which have been captured by the controller. Each trap entry includes the Log Number, System Time, and Trap Description.

This screen also displays the number of traps since Last Reset and number of traps since Log Last Viewed.

Note Review the following Client Reason and Status Codes shown below. You are likely to encounter them when reviewing the Trap Logs.

Table 7-19 Client Reason Code Descriptions and Meanings

Client Reason Code	Description	Meaning
0	noReasonCode	normal operation
1	unspecifiedReason	client associated but no longer authorized
2	previousAuthNotValid	client associated but not authorized
3	deauthenticationLeaving	the access point went offline, de-authenticating the client
4	disassociationDueToInactivity	client session timeout exceeded
5	disassociationAPBusy	the access point is busy, performing load balancing, for example
6	class2FrameFromNonAuthStation	client attempted to transfer data before it was authenticated
7	class2FrameFromNonAssStation	client attempted to transfer data before it was associated
8	disassociationStaHasLeft	the Operating System moved the client to another access point using non-aggressive load balancing
9	staReqAssociationWithoutAuth	client not authorized yet, still attempting to associate with an access point
99	missingReasonCode	client momentarily in an unknown state

Table 7-20 Client Status Code Descriptions and Meanings

Client Status Code	Description	Meaning
0	idle	normal operation -- no rejections of client association requests
1	aaaPending	completing an aaa transaction
2	authenticated	802.11 authentication completed
3	associated	802.11 association completed
4	powersave	client in powersave mode
5	disassociated	802.11 disassociation completed
6	tobedeleted	to be deleted after disassociation
7	probing	client not associated or authorized yet
8	disabled	automatically disabled by the Operating System for an operator-defined time

Command Buttons

- **Clear Log:** Deletes all log entries. You are prompted for confirmation to delete the logs.

- **Help:** Request that the help page be displayed in a new browser window.

HTTP Configuration

Use **MANAGEMENT > HTTP** to navigate to this page.

This page allows you to enable or disable Web Mode or Secure Web Mode.

- **HTTP Access:** This is the HTTP Web User Interface which is accessible using a login and password. If you disable HTTP Web Mode, you need Secure Web Mode enabled, or must use the CLI or Cisco Wireless Control System interface to configure the controller. If you disable Web Mode and Secure Web Mode, and must use the CLI interface to configure the controller.
- **HTTPS Access:** This is the HTTPS Secure Shell (SSL) interface accessible using secure certificate authentication (configured below). If you disable HTTPS Secure Web Mode, you need Web Mode enabled or need to use the CLI or Cisco Wireless Control System interface to configure the controller.
- **Current Certificate Information.** This consists of Name, Type, Serial Number, Valid, Subject Name, Issuer Name, MD5 Fingerpoint, and SHA1 Fingerpoint.
- **Download SSL Certificate:** Use to download an SSL Web Admin Certificate from a local TFTP server. Select the Download SSL Certificate checkbox to display the following entries:
  - Server IP Address: The IP address of the local TFTP server.
  - Maximum Retries: Maximum number of times each download can be attempted.
  - Timeout: The amount of time allowed for each download.
  - Certificate File Path: Usually either \ or /, as most TFTP servers automatically determine the path to their default file location. Otherwise, the TFTP server absolute file path.
  - Certificate File Name: The Web Administration Certificate filename in encrypted .PEM (Privacy Enhanced Mail) format.
  - Certificate Password: To decrypt the SSL Web Admin Certificate, enter the SSL certificate password.

Note The TFTP server cannot run on the same computer as the Cisco WCS, because the Cisco WCS and the TFTP server use the same communication port.

Caution Each certificate has a variable-length embedded RSA Key. The RSA key length varies from 512 bits, which is relatively insecure, to thousands of bits, which is very secure. When you are obtaining a new certificate from a Certificate Authority (such as the Microsoft CA), MAKE SURE the RSA key embedded in the certificate is AT LEAST 768 Bits.

Click **Apply** and **Yes** to download the SSL Web Admin Certificate. The Operating System informs you of the file transfer and the Certificate installation progress.

The SSL password decrypts the certificate, and the certificate is used for Secure Web Mode access when activated.

Note The controller must be rebooted with save after the SSL Certificate is changed.

Command Buttons

- **Apply:** Data or a Download SSL Certificate request is sent to the controller and made to take effect, but the result is not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Delete Certificate:** Instruct the Operating System to delete the current SSL Certificate.
- **Regenerate Certificate:** Instruct the Operating System to generate a new SSL Certificate to replace any existing Certificate; the Web User Interface displays the `Successfully Generated SSL Web Admin Certificate` message when done.
- **Help:** Request that the help page be displayed in a new browser window.

Telnet-SSH Configuration

Use **MANAGEMENT > Telnet-SSH** to navigate to this page.

Use this page to modify Telnet accessibility to the controller.

- **Telnet Login Timeout (minutes):** This object indicates the number of minutes a telnet session is allowed to remain inactive before being logged off. A zero means there is no timeout. May be specified as a number from 0 to 160. The factory default is 5.
- **Maximum Number of Telnet Sessions:** Selectable from a pull-down menus for values of from 0 to 5. This object indicates the number of simultaneous Telnet sessions allowed. The factory default is 5.
- **Allow New Telnet Sessions:** Indicates that new Telnet sessions are not allowed on the DS Port when set to no. The factory default value is no.

Note New Telnet sessions are allowed or disallowed on both the DS (network) port and the Service port using the **Allow New Telnet Sessions** parameter.

- **Allow New SSH Sessions:** Indicates that new Secure Shell Telnet sessions are not allowed when set to no. The factory default value is yes.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Serial Port Configuration

Use **MANAGEMENT > Serial Port** to navigate to this page.

Use this page to modify configurable serial session properties.

Table 7-21 Serial Session Properties

Parameter	Description	Range
Serial Port Login Timeout	Specifies the time, in minutes, of inactivity on a Serial port connection, after which the controller closes the connection.	Any numeric value between 0 and 160 is allowed. The default is 5. A value of 0 disables the timeout.
Baud Rate (bps)	The default baud rate at which the serial port tries to connect. This is selected from a pull-down menu.	The available values are 1200, 2400, 4800, 9600, 19200, 38400,57600, and 115200 baud. The Default is 9600 baud.
Character Size	The number of bits in a character.	8 (read-only).
Flow Control	Whether hardware flow-control is enabled or disabled.	Disabled (read-only).
Stop Bits	The number of Stop bits per character.	1 (read-only).
Parity	The parity method used on the Serial Port.	None (read-only).

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Local Management Users

Use **MANAGEMENT > Local Management Users** to navigate to this page.

This page lists current management user logins on the controller and the users' access privileges.

You may remove a user account by selecting **Remove**. Removing the default admin user prohibits both Web and CLI access to the controller, so you must create a user provide with administrative (read/write) privileges BEFORE you remove the default user.

Command Buttons

- **New:** Select to add a new management user (Local Management Users > New).
- **Help:** Request that the help page be displayed in a new browser window.

Local Management Users > New

Use **MANAGEMENT > Local Management Users** then click **New** to navigate to this page.

Use this page to add management user accounts on the controller and the user's access privileges.

Table 7-22 Management User Details

Parameter	Description
User Name	Login user name.
Password	Enter the user password. (Default = admin.)
Confirm Password	Confirm the user password. (Default = admin.)
User Access Mode	User privilege assignment can be ReadOnly or ReadWrite.

Command Buttons

- **Back:** Return to the previous window.
- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

CLI Sessions

Use **MANAGEMENT > User Sessions** to navigate to this page.

This page provides a list of open CLI sessions. It provides the following information.

Table 7-23 CLI Session Details

Parameter	Description
ID	Session identification.
User Name	Login user name.
Login Type	Telnet or serial session.
Connection From	Name of the client computer system or the physical port.
Idle time	Elapsed inactive session time.
Session Time	Elapsed active session time.

Select **Close** to halt an existing Telnet session.

Command Buttons

- **Help:** Request that the help page be displayed in a new browser window.

Syslog Configuration

Use **MANAGEMENT > Syslog** to navigate to this page.

- Use this page to Enable or Disable system logs.
- If you enable syslogs, enter the Syslog Server IP address.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Management Via Wireless

Use **MANAGEMENT > Mgmt Via Wireless** to navigate to this page.

Use this page to enable or disable access to the controller management interface from wireless clients. The default setting is disabled.

Note Because of IPSec operation, Management via Wireless is only available to operators logging in across WPA, Static WEP, or VPN Pass Through WLANs. Management via Wireless is not available to clients attempting to log in via an IPSec WLAN.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

Message Logs

Use **MANAGEMENT > Message logs** to navigate to this page.

This page allows you to set the Message Log filter to include the following or more critical messages:

- Critical Failure
- Software Error
- Authentication or Security Errors
- Unexpected Software Events
- Significant System Events

  Click **Apply** to implement the desired Message Log filter level.

You can view the message logs which have been captured by the controller, last to first message. Each trap entry includes the System Time, Filename and Line, Message Type and Message.

Command Buttons

- **Apply:** Data is sent to the controller and made to take effect, but not preserved across a power cycle; these parameters are stored temporarily in volatile RAM.
- **Help:** Request that the help page be displayed in a new browser window.

System Resource Information

Use **MANAGEMENT > Tech Support > System Resource Information** to navigate to this page.

You can view the current controller CPU usage, system buffer, and Web server buffers parameters on this page.

Command Buttons

- **Help:** Request that the help page be displayed in a new browser window.

Controller Crash Information

Use **MANAGEMENT > Tech Support > Controller Crash** to navigate to this page.

You can view the most recent controller CPU crash files on this page, from most to least recent as follows.

Command Buttons

- **Help:** Request that the help page be displayed in a new browser window.

AP Log Information

Use **MANAGEMENT > Tech Support > AP Log** to navigate to this page.

You can view the most recent access point log information on this page.

- AP Name
- AP ID
- MAC Address
- Admin Status
- Operational Status
- Port

Command Buttons

- **Help:** Request that the help page be displayed in a new browser window.

Web Login Page

Use **Management > Web Login Page** to navigate to this page.

Here you can customize the content and appearance of the web login page that appears the first time a user accesses the client.

Note The *Web Policy* option under WLAN security policies should be enabled for the login page to be displayed.

Table 7-24 Web Login Page Parameters

Parameter	Description
Use External Web Authentication	Enable this option and enter the URL if you want to use a customized login page configured on your web server for web authentication, instead of the default web authentication page provided by the controller. The maximum length is 254 characters. **Note** Your web server should be on a different network from the controller service port network. For more information, refer to External Web Authentication.
Note The following parameters will be displayed only if the Use External Web Authentication option is disabled.	
Cisco Logo	Show or hide Cisco logo.
Redirect URL after login	Enter the URL you want the user to be re-directed after login. For example, you may enter your company's URL here and the users will be directed to that URL after login. The maximum length is 254 characters. By default, the user is redirected to the URL that was entered in the user's browser before the login page was served.
Headline	The login page headline. For example, "Welcome to Cisco Wireless Network". The maximum length is 127 characters.
Message	The login page message. For example, "Please enter your user name and password" or "This page will not be available from 1:00 Hrs to 2:00 today due to maintenance". The maximum length is 2047 characters.

External Web Authentication

The following steps describe how external web authentication works.

Step 1 When you open a web browser with a URL say www.yahoo.com, it is verified for authentication. If it is not authenticated, the controller forwards the request to the controller web server to collect authentication details.

Step 2 The controller web server then re-directs the user to the external web server URL. The external web server leads the user to a login page. At this point, the user is also allowed to access the 'Walled Garden Sites' (Walled Garden sites are a group of websites that users can browse before they are authenticated on to your wireless network).

Note For a Cisco 2000 Series Wireless LAN Controller, you **MUST** configure a pre-authentication ACL on the WLAN for the external web server. This ACL should then be set as WLAN pre-authentication ACL under Web Policy. However, you do not need to configure any pre-authentication ACL for Cisco 4100 Series Wireless LAN Controllers and Cisco 4400 Series Wireless LAN Controllers.

Step 3 The login request is sent back to the action URL of the controller web server. The controller web server submits the username and password for authentication.

Step 4 The controller application initiates the RADIUS server request and authenticates the user.

Step 5 If successful, the controller web connects the client and the controller web server forwards the user to the configured re-direct URL or to the initially requested URL (www.yahoo.com).

Step 6 If user authentication fails, the controller web server re-directs the user to the URL of the user login page.

Cisco Support for External Web Authentication

- External Web Authentication login URL: The controller allows you to configure the login URL by making use of a flag to turn on the External Web Authentication mode. If this is configured, the user will be re-directed to the customized login page instead of Cisco's default Web Authentication page.
- CLI commands for External Web Authentication: The following commands are available for configuring external web authentication:

```
custom-web ext-webauth-url <url>

custom-web ext-webauth-mode enable
```

- Provide AP MAC address: The controller web server appends the MAC address of the AP with which the user is associated to the external webauth URL.
- Provide the connect back URL: The external webauth URL is appended with the controller web server URL that can be used by you to connect back and forward the user credentials.

Template for customer login page

You can use the login page template provided by Cisco to develop your own login screen. The template contains the following:

- Hidden attribute names that will enable the controller to authenticate the user.
- A javascript function that will extract the AP MAC address and the redirect back URL from the query string.
- A function that sets your web auth page's action URL.

Thus, based on the AP MAC address, you can change your login page using scripts or display a message to the user.

The html code for the customer login page template is given below:

```
<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 = "";
      if(equalIndex >= 0) {
            equalIndex += searchString.length;
            redirectUrl = "http://";
            redirectUrl += link.substring(equalIndex);
      }
      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 controller URL is " + args.switch_url);
      document.forms[0].action = args.switch_url;
}

</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;</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;<input type="TEXT" name="username" SIZE="25"
MAXLENGTH="63" VALUE="">
</td>
```

```
</tr>
<tr align="center" >
<td colspan="2"> Password &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>
```

CHAPTER 8

Commands Menu Bar Selection

This menu bar selection provides access to the controller Operating System software management commands. Use the selector area to access the Operating System software management data pages. Making this selection from the menu bar opens the Download File to Controller page.

You can access the following pages from the Commands Menu Bar Selection:

- Download File to Controller
- Upload File from Controller
- System Reboot
- System Reboot > Save?
- System Reboot > Confirm
- Reset to Factory Default
- Set Time

Download File to Controller

Use **COMMANDS > Download File** to navigate to this page.

Use this page to download and install new controller Operating System software (code), a signature file or a configuration file to your controller from a local TFTP (trivial file transfer protocol) server.

Note The TFTP server cannot run on the same computer as the Cisco WCS, because the Cisco WCS and the TFTP server use the same communication port.

To download a file to the controller, perform these steps:

Step 1 From the **File Type** drop-down list, select the kind of file (Code, Configuration, or Signature file) you want to download.

Step 2 Enter the configuration file encryption key that enables the data in the file to be encrypted when the file is downloaded.

Step 3 Configure the IP address of the TFTP server, the Maximum Retries, the Timeout (in seconds), the directory path on the server (default = /), and the name of the file to be transferred.

Step 4 Click the **Download** button.

The Cisco WCS downloads and installs the new controller Operating System software. This process takes at least three minutes and overwrites your existing code and configuration.

Note You must reboot the controller after the new Operating System software is installed.

Command Buttons

- **Clear:** Entries in the TFTP data fields are deleted.
- **Download:** Begin the download from the TFTP server; you are prompted to continue.
- **Help:** Request that the help page be displayed in a new browser window.

Upload File from Controller

Use **COMMANDS > Upload File** to navigate to this page.

Use this page to upload files from your controller to a local TFTP (trivial file transfer protocol) server. You can upload the following files:

- Configuration file
- Event Log
- Message Log
- Trap Log
- Crash file
- Signature file
- Configuration File Encryption: File encryption ensures that data is encrypted while uploading or downloading the controller configuration file through a TFTP server. Enable this option and enter the encryption key.

Enter the IP address of the TFTP server, the directory path on the server (default = /), and a name for the file you have selected for upload.

Note The TFTP server cannot run on the same computer as the Cisco Wireless Control System, because the Cisco WCS and the TFTP server use the same communication port.

When you click **Upload**, the selected file is uploaded to your TFTP server and is saved with the same name that you entered in the *File Name* field.

System Reboot

Use **COMMANDS > Reboot** to navigate to this page.

This page allows you to restart the controller. You are prompted to save your configuration changes on the next page, if you have not already saved configuration changes using the Save Configuration Administrative Tool at the top right of your screen.

Command Buttons

- **Reboot:** Restart the controller. (You are prompted for confirmation (System Reboot > Save?).
- **Help:** Request that the help page be displayed in a new browser window.

System Reboot > Save?

Use **COMMANDS > Reboot** then **Reboot** to navigate to this page.

This page prompts you to restart the controller after saving your configuration changes or restart without saving. Select the appropriate command button.

Command Buttons

- **Reboot:** Restart the controller after saving your existing applied changes (System Reboot > Confirm).
- **Help:** Request that the help page be displayed in a new browser window.

System Reboot > Confirm

Use **COMMANDS > Reboot** then **Reboot** to navigate to this page.

This page allows you to confirm the restart of your controller after saving your configuration changes. All system connections are lost so you must open a new session and log back into the controller.

Command Buttons

- **Reboot:** Restart the controller.
- **Help:** Request that the help page be displayed in a new browser window.

Reset to Factory Default

Use **COMMANDS > Reset to Factory Default** to navigate to this page.

This page allows you to reset the controller configuration to the factory default. This overwrites all applied and saved configuration parameters! You are prompted for confirmation to re-initialize your controller.

All configuration data files are deleted, and upon reboot, the controller is restored to its original unconfigured state. This removes all IP configuration, and you need a serial connection to restore its base configuration.

Note After confirming configuration removal, you must reboot the controller and select the "Reboot Without Saving" option.

Command Buttons

- **Reset:** Return configuration to factory default.
- **Help:** Request that the help page be displayed in a new browser window.

Set Time

Use **COMMANDS > Set Time** to navigate to this page.

Use this page to set the current time and date on the controller. Select the date and time from the drop-down menus and select **Apply**.

Command Buttons

- Set Date and Time
- Set Timezone
- **Help:** Request that the help page be displayed in a new browser window.

Using the Configuration Wizard

When the controller is activated for the first time from the factory, or when it has been rebooted after a Reset to Factory Default, the Web User Interface displays the Web Configuration Wizard. Use the Configuration Wizard to configure the controller for initial operation.

Perform the following steps to enter the initial controller configuration:

- Collect the Initial Configuration Settings
- Connect Your Web Browser to a Controller
- Configuration Wizard System Information
- Service Interface Configuration
- Management Interface Configuration
- Miscellaneous Configuration
- Virtual Interface Configuration
- WLAN Policy Configuration
- RADIUS Server Configuration
- 802.11 Configuration
- Configuration Wizard Completed

Collect the Initial Configuration Settings

Collect the high-level controller parameters:

System Parameters

- Controller name.
- Supported protocols: 802.11a and/or 802.11b/g.
- New usernames and passwords (optional).

Network (Distribution System) Parameters

- Distribution System (network) port static IP Address, netmask, and optional default gateway IP Address from the network planner.
- Service port static IP Address and netmask from the network planner (optional).
- Distribution System physical port (1000Base-T, 1000Base-SX, or 10/100Base-T). Note that the 1000Base-SX (UNUSED PRODUCT) provides a 100/1000 Mbps wired connection to a network through an 850nM (SX) fiber-optic link using an LC physical connector.
- Distribution System port VLAN assignment (optional).
- Distribution System port Web and Secure Web mode settings, enabled or disabled.
- Distribution System port Spanning Tree Protocol: enabled/disabled, 802.1D/fast/off mode per port, path cost per port, priority per port, bridge priority, forward delay, hello time, maximum age.

WLAN Parameters

- WLAN Configuration: VLAN assignments, Layer 2 Security settings, Layer 3 Security settings, QoS assignments.

Mobility Parameters

- Mobility Settings: Mobility Group Name (optional).

RADIUS Parameters

- RADIUS Settings.

SNMP Parameters

- SNMP Settings.

Other Parameters

- Other Port and Parameter Settings: Service port, Radio Resource Management (RRM), third-party APs, Serial/CLI Console port, 802.3x Flow Control, and System Logging.

Other Actions

- Collect all files that may need uploading or downloading to the controller, including the latest Operating System code.

Connect Your Web Browser to a Controller

1. Temporarily configure your Web Browser device with a **`192.168.1.2`** IP address. Connect your Web Browser to the controller front-panel Service Port, either using a crossover ethernet cable or through an ethernet hub or controller.
2. Type **`192.168.1.1`** into the address line of your Web Browser to log into the Web User Interface as described in the Commands Menu Bar Selection section. The Web server built into the controller responds with the login prompt.
3. Enter **`admin`** and **`admin`** as the login and password, respectively. The controller displays theConfiguration Wizard System Information page, in which you will configure the controller name and administrative user login.

Configuration Wizard System Information

1. In the Configuration Wizard System Information page, enter the controller name.
2. Also in the Configuration Wizard page, enter a new administrative user name and password. (Default = `admin` and `admin`, respectively.)
3. Click **Next** to have the controller save your inputs and display the Service Interface Configuration page, in which you will configure the Service Port Interface.

Service Interface Configuration

1. Click the DHCP Protocol **Enable** box when the Service Port Interface is to obtain an IP address from a DHCP server. When the Service Port Interface is to use a fixed IP address, leave this box unchecked.
2. The IP Address box contains the current Service Port Interface IP address. If desired, enter a different Service Port Interface IP address.
3. The Netmask box contains the current Service Port IP netmask. If desired, enter a different Service Port Interface IP netmask.
4. Click **Next** to have the controller save your inputs and display the Management Interface Configuration page, in which you will configure the Management Interface.

Management Interface Configuration

1. The VLAN Identifier box contains the current VLAN assignment (0 if untagged). If desired, enter a different Management Interface VLAN assignment (or 0 if untagged).
2. The IP Address box contains the current Management Interface IP address. If desired, enter a different Management Interface IP address.
3. The Netmask box contains the current Management Interface netmask. Enter a different Management Interface netmask.
4. The Gateway box contains the default Management Interface gateway. If desired, enter a different Management Interface gateway.
5. The Port Number box contains the current Management Interface physical port. If desired, enter a different Management Interface physical port.
6. The Primary DHCP Server box contains the default Management Interface primary DHCP server IP address. If necessary, enter a valid primary DHCP server IP address for the Management Interface.
7. The Secondary DHCP Server box contains the default Management Interface secondary DHCP server IP address. If necessary, enter a valid secondary DHCP server IP address for the Management Interface.
8. Click **Next** to have the controller save your inputs and display the Miscellaneous Configuration page, in which you will configure some Cisco WLAN Solution parameters.

Miscellaneous Configuration

1. The LWAPP Transport Mode box contains the current LWAPP Transport Mode (default = Layer 2). When you plan to use the controller in an existing Layer 3 Cisco WLAN Solution, enter Layer 3. Otherwise, leave as Layer 2.
2. The RF Mobility Domain Name box contains the default RF Mobility Domain Name. If desired, enter a different RF Mobility Domain Name.
3. The Country Code box contains the current Country Code. If desired, enter a different Country Code.
4. Click **Next** to have the controller save your inputs and display the Virtual Interface Configuration page, in which you will configure the Virtual Interface parameters.

Virtual Interface Configuration

1. The IP Address box contains the default Virtual Interface IP address. Enter a different Virtual Interface IP address. Note that the Virtual Interface uses any fictitious, unassigned IP address (such as 1.1.1.1) to be used by Layer 3 Security and Mobility managers.
2. The DNS Host Name box contains a space for a Web Auth ID Certificate DNS Host Name. If the controller uses an externally-generated Web Auth ID Certificate that includes a DNS Host Name, enter the DNS Host Name here.
3. Click **Next** to have the controller save your inputs and display the WLAN Policy Configuration page, in which you will configure the WLAN 1 parameters.

WLAN Policy Configuration

Refer to the WLANs > Edit page for a description of these parameters.

1. The WLAN SSID box contains the current WLAN 1 SSID. If desired, enter a different SSID.
2. The Radio Policy box contains the default bands controlled by the WLAN 1 policy. If desired, enter a different WLAN 1 policy: 802.11a only, 802.11g only, 802.11b/g only, 802.11a/g only, or All.
3. The Admin Status box contains the default administrative status (unchecked, or disabled). If desired, enable the WLAN 1 policy by checking the Admin Status box.
4. The Session Timeout box contains the default 802.11 session timeout (0, or no timeout). If desired, enter a different 802.11 session timeout in minutes.
5. The Quality of Service (QoS) box contains the default QoS status (Silver, or Best Effort QoS). If desired, enter a different QoS: Platinum = Voice, Gold = Video, Bronze = Background, or leave as Silver = Best Effort. VoIP clients should be set to Platinum, Gold or Silver, while low-bandwidth clients can be set to Bronze.
6. The Allow AAA Override box contains the default AAA Override status (unchecked, or disabled). If desired, enable AAA Override by checking the AAA Override box.
7. The Blacklist Exclusion List Timeout box contains the default client Exclusion List (blacklist) timeout status (checked, or enabled). If desired, disable Exclusion List (Blacklist) Timeout by unchecking the Blacklist Timeout box.
8. When Blacklist (Exclusion List) Timeout is enabled, enter the number of seconds a client is added to the Exclusion List (blacklisted) upon failing to authenticate three consecutive times.
9. The DHCP Server Override box contains the current status (unchecked, or disabled). If desired, enable DHCP Server Override by checking the Override box.
10. The DHCP Addr. Assignment Required box contains the current status (unchecked, or not required). If desired, enable DHCP Address Assignment Required parameter by checking the Required box.
11. The Interface Name box contains the current WLAN 1 Interface (management). Leave this setting unchanged.
12. The Layer 2 Security box contains the default Layer 2 Security setting (802.1X). If desired, select a different Layer 2 Security setting: None, WPA, 802.1X, Static WEP, Cranite, or Fortress. Refer to the WLANs > Edit page for a description of these parameters, and the related parameters that can be set for Layer 2 Security.

13. The Layer 3 Security box contains the default Layer 3 Security setting (None). If desired, select a different Layer 3 Security setting: None, IPSec, or VPN Pass Through. Refer to the WLANs > Edit page for a description of these parameters, and the related parameters that can be set for Layer 3 Security.
14. Click **Next** to have the controller save your inputs and display the RADIUS Server Configuration page, in which you will configure the RADIUS server parameters.

RADIUS Server Configuration

If you do not want to configure a RADIUS server at this time, click **Skip** to ignore this section, and continue with the 802.11 Configuration section. If you do want to configure a RADIUS server, continue with this section.

1. If required, enter a RADIUS Server IP address.
2. If required, enter a RADIUS Server Shared Secret (password) in the Shared Secret and Confirm Shared Secret boxes.
3. The Port Number box contains the default communication port number (1812). If required, enter a different, unused communication port number.
4. The Server Status box contains the default RADIUS server status (Disabled). If desired, enable the RADIUS configuration by selecting Enabled.
5. Click **Apply** to have the controller save your inputs and display the 802.11 Configuration page, in which you will activate or deactivate the different 802.11 bands and the Radio Resource Management (RRM) (RRM software).

802.11 Configuration

1. The 802.11a Network Status box contains the current status (unchecked = disabled). If desired, check the box to activate the 802.11a Network in the Cisco WLAN Solution.
2. The 802.11b Network Status box contains the current status (unchecked = disabled). If desired, check the box to activate the 802.11b Network in the Cisco WLAN Solution.
3. The 802.11g Network Status box contains the current status (unchecked = disabled). If desired, check the box to activate the 802.11g Network in the Cisco WLAN Solution.
4. The Radio Resource Management box contains the current Radio Resource Management, or Radio Resource Management, status (checked = enabled). If desired, uncheck the box to disable the Radio Resource Management dynamic channel number and transmit power level assignment functions.
5. Click **Next** to have the controller save your inputs and display the **Configuration Wizard Completed** page, in which the controller saves your changes in nonvolatile RAM and reboots the controller.

Configuration Wizard Completed

1. Click the **Save and Reboot** button to have the controller save your changes in nonvolatile RAM and reboot.
2. The Operating System prompts you to confirm the operation. Click **OK** to continue.

You have configured the controller using the Web User Interface.

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