CHAPTER 10

Using Templates

This chapter describes how to add and apply controller templates. Information on creating (adding) access point templates is also provided.

Templates allow you to set parameters that you can then apply to multiple devices without having to re-enter the common information.

Note Template information can be overridden on individual devices.

This chapter contains these sections:

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- Applying Controller Templates, page 10-74
- Adding Access Point Templates, page 10-74
- Configuring Access Point Templates, page 10-75

Adding Controller Templates

Follow these steps to add a new controller template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 Choose **Add Template** from the Select a command drop-down menu and click **GO**.

Step 3 Enter the template name.

Step 4 Provide a description of the template.

Step 5 Click **Save**.

A summary of the templates that can be added is highlighted below:

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- Configuring General Templates, page 10-4
- Configuring QoS Templates, page 10-7
- Configuring a Traffic Stream Metrics QoS Template, page 10-8
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- Configuring Access Control List Templates, page 10-50
- Configuring a Policy Name Template (for 802.11a/n or 802.11b/g/n), page 10-51
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- Configuring a Mesh Template, page 10-64
- Configuring a Known Rogue Access Point Template, page 10-66
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- Configuring a Trap Receiver Template, page 10-67
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- Configuring Access Point Templates, page 10-75

Configuring an NTP Server Template

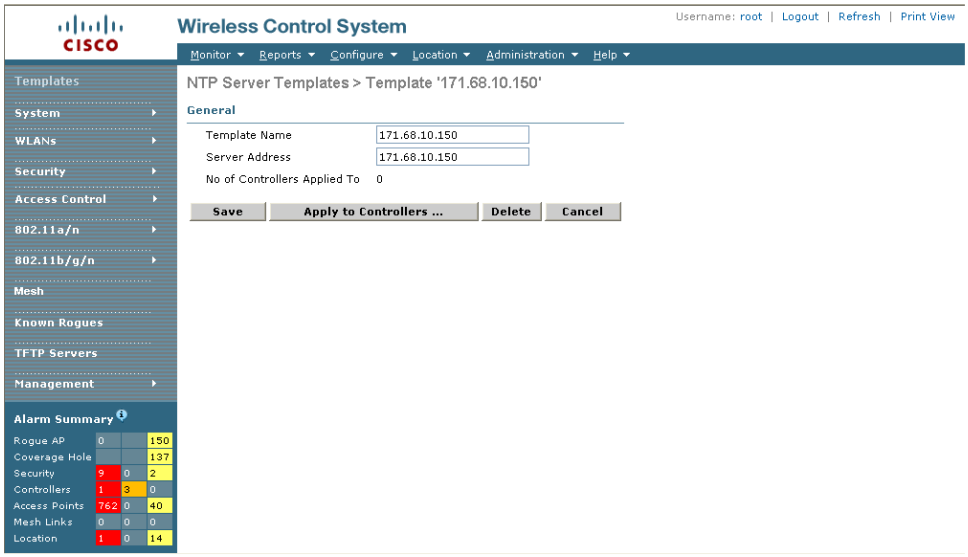
Follow these steps to add a new network time protocol (NTP) server template to the controller configuration or make modifications to an existing NTP template. NTP is used to synchronize computer clocks on the internet.

Step 1 Choose **Configure > Controller Templates**.

Step 2 Choose **System > Network Time Protocol** from the left sidebar menu.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO.** To modify an existing template, click to select a template in the Template Name column. The NTP Server Template window appears (see Figure 10-1), and the number of controllers the template is applied to automatically populates.

Figure 10-1 NTP Servers Template



Step 4 Enter the NTP server IP address.

Step 5 Click **Save**.

Configuring General Templates

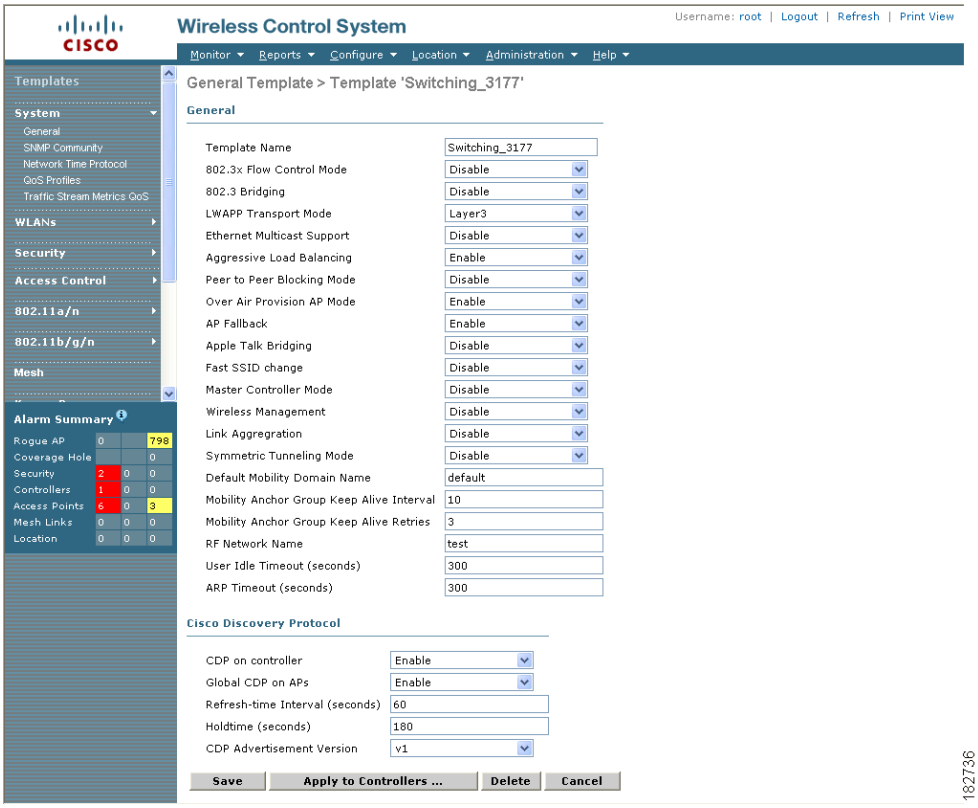
Follow these steps to add a new template with general information for a controller or make a change to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **System > General**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO.** To modify an existing template, click to select a template in the Template Name column. The General Template window appears (see Figure 10-2).

Figure 10-2 General Template



Step 4 Use the drop-down menu to enable or disable flow control mode.

Step 5 Use the drop-down menu to enable or disable 802.3 bridging.

Step 6 Specify Layer 2 or Layer 3 transport mode. When set to Layer 3, the LWAPP uses IP addresses to communicate with the access points; 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.

Step 7 At the Ethernet Multicast Support drop-drop menu, choose **Disable** to disable multicast support on the controller or **Multicast** to enable multicast support on the controller. Choose **Unicast** if the controller, upon receiving a multicast packet, forwards the packets to all the associated access points. H-REAP supports only unicast mode.

Step 8 Choose if you want to enable or disable aggressive load balancing.

Step 9 Choose to enable or disable peer-to-peer blocking mode. If you choose Disable, any same-subnet clients communicate through the controller. If you choose Enable, any same-subnet clients communicate through a higher-level router.

Step 10 At the Over Air AP Provision Mode drop-down menu, choose enable or disable.

Step 11 At the AP Fallback drop-down menu, choose enable or disable. Enabling fallback causes an access point which lost a primary controller connection to automatically return to service when the primary controller returns.

Step 12 Choose to enable or disable Apple talk bridging.

Step 13 Choose to enable or disable the fast SSID option. If enabled, the client connects instantly to the controller between SSIDs without having appreciable loss of connectivity. Normally, each client is connected to a particular WLAN identified by the SSID. If the client moves out of reach of the connected access point, the client has to reconnect to the controller using a different access point. This normal process consumes some time as the DHCP (Dynamic Host Configuration Protocol) server has to assign an IP address to the client.

Step 14 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. You may enable the controller as the master controller from the Master Controller Mode drop-down menu.

Step 15 Choose to enable or disable access to the controller management interface from wireless clients. Because of IPSec operation, management via wireless is only available to operators logging in across WPA, Static WEP, or VPN Pass Through WLANs. Wireless management is not available to clients attempting to log in via an IPSec WLAN.

Step 16 Choose to enable or disable link aggregation. Link aggregation allows you to reduce the number of IP addresses needed to configure the ports on your controller 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 whereas in a 4404 model, all four ports are combined to form a LAG.

If LAG is enabled on a 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.

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

The advantages of creating a LAG are as follows:

- It ensures that 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.

Step 17 Choose to enable or disable symmetric mobility tunneling. With symmetric mobility tunneling, the controller provides inter-subnet mobility for clients roaming from one access point to another within a wireless LAN. The client traffic on the wired network is directly routed by the foreign controller. If a

router has reverse path filtering (RPF) enabled (which provides additional checks on incoming packets), the communication is blocked. Symmetric mobility tunneling allows the client traffic to reach the controller designated as the anchor, even with RPF enabled.

Note All controllers in a mobility group should have the same symmetric tunneling mode.

Note For symmetric tunneling to take effect, you must reboot.

Step 18 Enter the operator-defined RF mobility group name in the Default Mobility Domain Name field.

Step 19 At the Mobility Anchor Group Keep Alive Interval, determine the delay between tries for clients attempting to join another access point. With this guest tunneling N+1 redundancy feature, the time it takes for a client to join another access point following a controller failure is decreased because a failure is quickly identified, the clients are moved away from the problem controller, and the clients are anchored to another controller.

Note When you hover over the parameter field with the mouse, the valid range for that field appears.

Step 20 At the Mobility Anchor Group Keep Alive Retries, specify the number of queries to anchor before the client declares it unreachable.

Note When you hover over the parameter field with the mouse, the valid range for that field appears.

Step 21 Enter the RF network group name between 8 and 19 characters. Radio Resource Management (RRM) neighbor packets are distributed among access points within an RF network group. The Cisco access points only accept RRM neighbor packets sent with this RF network name. The RRM neighbor packets sent with different RF network names are dropped.

Step 22 Specify the time out for idle clients. The factory default is 300 seconds. When the timeout expires, the client loses authentication, briefly disassociates from the access point, reassociates, and re-authenticates.

Step 23 Specify the timeout in seconds for the address resolution protocol. The factory default is 300 seconds.

Step 24 At the CDP on controller drop-down menu, choose if you want to enable CDP on the controller. CDP is a device discovery protocol that runs on all Cisco manufactured equipment (such as routers, bridges, communication servers, and so on).

Step 25 At the Global CDP on APs drop-down menu, choose if you want to enable CDP on the access point.

Step 26 At the Refresh Time Interval parameter, enter the interval at which CDP messages are generated. With the regeneration, the neighbor entries are refreshed.

Step 27 At the Holdtime parameter, enter the time in seconds before the CDP neighbor entry expires.

Step 28 At the CDP Advertisement Version parameter, enter which version of the CDP protocol to use.

Step 29 Click **Save**.

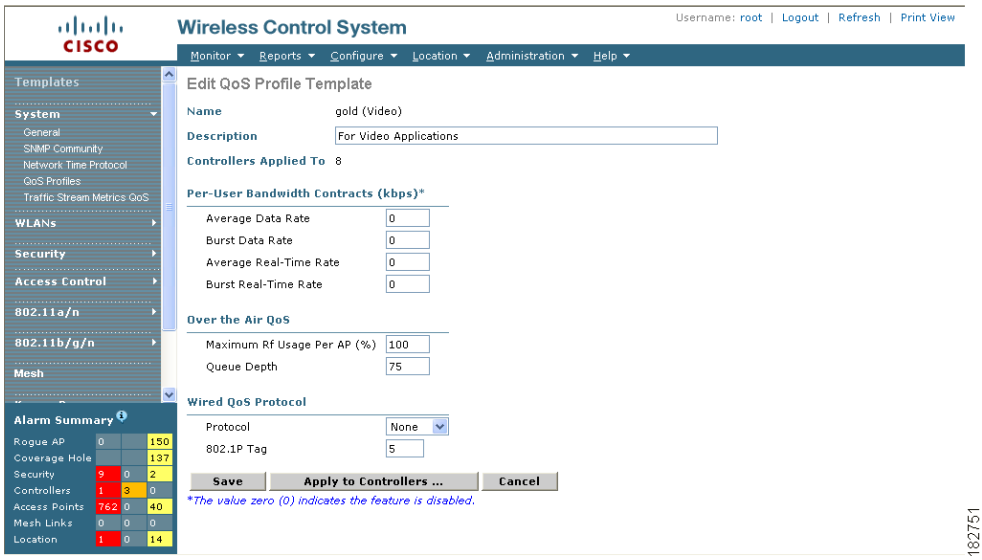
Configuring QoS Templates

Follow these steps to make modifications to the quality of service profiles.

Step 1 Choose **Configure > Controller Templates**.

Step 2 On the left sidebar menu, choose **System > QoS Profiles**. The QoS Template window appears (see Figure 10-3), and the number of controllers the template is applied to automatically populates.

Figure 10-3 QoS Profile Template



Step 3 Set the following values in the Per-User Bandwidth Contracts portion of the window. All have a default of 0 or Off.

- Average Data Rate - The average data rate for non-UDP traffic.
- Burst Data Rate - The peak data rate for non-UDP traffic.
- Average Real-time Rate - The average data rate for UDP traffic.
- Burst Real-time Rate - The peak data rate for UDP traffic.

Step 4 Set the following values for the Over-the-Air QoS portion of the window.

- Maximum QoS RF Usage per AP - The maximum air bandwidth available to clients. The default is 100%.
- QoS Queue Depth - The depth of queue for a class of client. The packets with a greater value are dropped at the access point.

Step 5 Set the following values in the Wired QoS Protocol portion of the window.

- Wired QoS Protocol - Choose 802.1P to activate 802.1P priority tags or None to deactivate 802.1P priority flags.
- 802.1P Tag - Choose 802.1P priority tag for a wired connection from 0 to 7. This tag is used for traffic and LWAPP packets.

Step 6 Click **Save**.

Configuring a Traffic Stream Metrics QoS Template

Traffic stream metrics are a series of statistics about VoIP over your wireless LAN and informs you of the QoS of the wireless LAN. These statistics are different than the end-to-end statistics provided by VoIP systems. End-to-end statistics provide information on packet loss and latency covering all the links comprising the call path. However, traffic stream metrics are statistics for only the WLAN segment of the call. Because of this, system administrators can quickly determine whether audio problems are being caused by the WLAN or by other network elements participating in a call. By observing which access points have impaired QoS, system administrators can quickly determine the physical area where the problem is occurring. This is important when lack of radio coverage or excessive interference is the root problem.

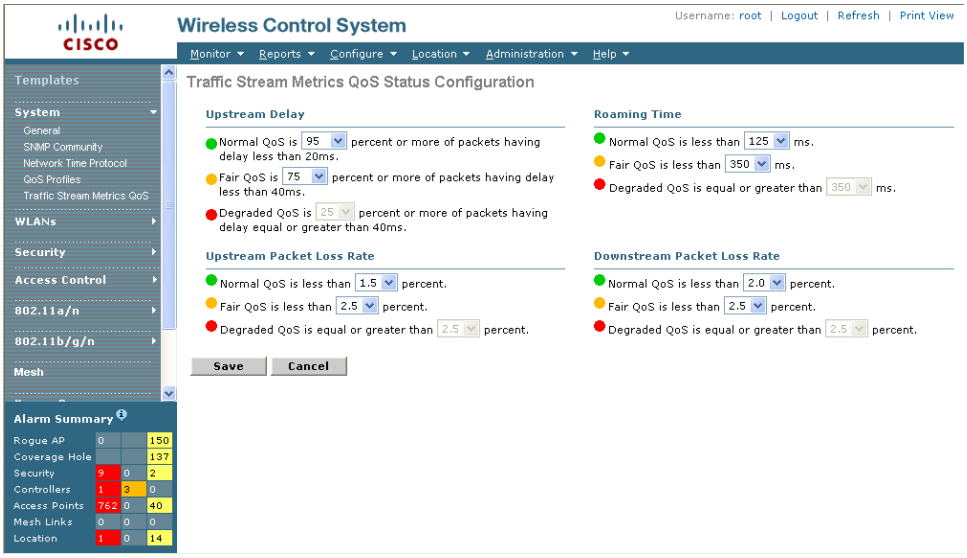
Four QoS values (packet latency, packet jitter, packet loss, and roaming time), which can affect the audio quality of voice calls, are monitored. All the wireless LAN components participate in this process. Access points and clients measure the metrics, access points collect the measurements and then send them to the controller. The access points update the controller with traffic stream metric information every 90 seconds, and 10 minutes of data is stored at one time. Cisco WCS queries the controller for the metrics and displays them in the Traffic Stream Metrics QoS Status. These metrics are compared to threshold values to determine their status level and if any of the statistics are displaying a status level of fair (yellow) or degraded (red), the administrator investigates the QoS of the wireless LAN.

For the access points to collect measurement values, traffic stream metrics must be enabled on the controller.

Step 1 Choose **Configure > Controller Templates**.

Step 2 On the left sidebar menu, choose **System > Traffic Stream Metrics QoS**. The Traffic Stream Metrics QoS Status Configuration window appears (see Figure 10-4).

Figure 10-4 Traffic Stream Metrics QoS Status Template



The Traffic Stream Metrics QoS Status Configuration window shows several QoS values. An administrator can monitor voice and video quality of the following:

- Upstream delay
- Upstream packet loss rate
- Roaming time
- Downstream packet loss rate
- Downstream delay

Packet Loss Rate (PLR) affects the intelligibility of voice. Packet delay can affect both the intelligibility and conversational quality of the connection. Excessive roaming time produces undesired gaps in audio.

There are three levels of measurement:

- Normal: Normal QoS (green)
- Fair: Fair QoS (yellow)
- Degraded: Degraded QoS (red)

System administrators should employ some judgement when setting the green, yellow, and red alarm levels. Some factors to consider are:

- Environmental factors including interference and radio coverage which can affect PLR.
- End-user expectations and system administrator requirements for audio quality on mobile devices (lower audio quality can permit greater PLR).
- Different codec types used by the phones have different tolerance for packet loss.
- Not all calls will be mobile-to-mobile; therefore, some have less stringent PLR requirements for the wireless LAN.

Configuring WLAN Templates

WLAN templates allow you to define various WLAN profiles for application to different controllers.

In WCS software release 4.0.96.0 and later releases, you can configure multiple WLANs with the same SSID. This feature enables you to assign different Layer 2 security policies within the same wireless LAN. To distinguish among WLANs with the same SSID, you need to create a unique profile name for each WLAN.

These restrictions apply when configuring multiple WLANs with the same SSID:

- WLANs with the same SSID must have unique Layer 2 security policies so that clients can make a WLAN selection based on information advertised in the beacons and probes. These are the available Layer 2 security policies:
  - None (open WLAN)
  - Static WEP or 802.1
  - CKIP
  - WPA/WPA2
- Broadcast SSID must be enabled on the WLANs that share an SSID so that the access points can generate probe responses for these WLANs.
- Hybrid-REAP access points do not support multiple SSIDs.

Follow these steps to add a new WLAN template or make modifications to an existing WLAN template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 Choose **WLANs > WLAN** from the left sidebar menu.

The WLAN Template window appears with a summary of all existing defined WLANs. The following information headings are used to define the WLANs listed on the WLAN Template General window (see Figure 10-5).

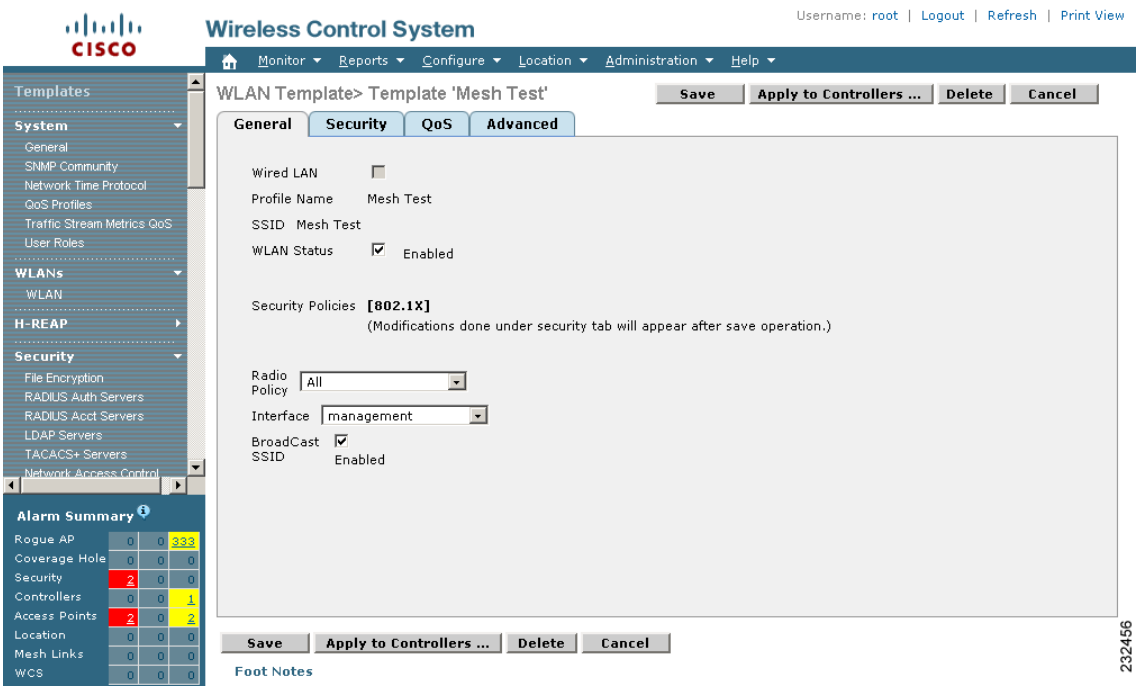
- Template Name - The user-defined name of the template. Clicking the name displays parameters for this template.
- Profile Name - User-defined profile name used to distinguish WLANs with the same SSID.

Note This heading is not present in software release prior to 4.0.96.0.

- SSID - Displays the name of the WLAN.
- WLAN Status - Sets the status of the WLAN to enabled when checked.
- Security Policies - Determines whether 802.1X is enabled. None indicates no 802.1X.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO.** To make modifications to an existing template, click a URL in the Template Name column. The WLAN Template window appears (see Figure 10-5).

Figure 10-5 WLAN Template



Step 4 Wired guest access enables guest users to connect to the guest access network from a wired Ethernet connection designated and configured for guest access. Wired guest access ports might be available in a guest office or specific ports in a conference room. Wired guest access accounts are added to the network using the Lobby Ambassador portal. (Refer to the "Creating Guest User Accounts" section on page 7-11).

Note If you are using the WLAN controller template for a guest SSID, any changes made to the template results in changes to the WLAN mapping. The new interface mapping breaks the anchor setup. You need to create a separate template for the anchor controller.

Step 5 Use the Radio Policy drop-down menu to set the WLAN policy to apply to All (802.11a/b/g/n), 802.11a only, 802.11g only, 802.11b/g/n only, or 802.11a/g/n only.

Step 6 Use the Interface drop-down menu to choose the available names of interfaces created by the Controller > Interfaces module.

Step 7 Click **Broadcast SSID** to activate SSID broadcasts for this WLAN.

Step 8 Click **Save**.

Step 9 To further configure the WLAN template, choose from the following:

- Click the **Security** tab to establish which AAA can override the default servers on this WLAN and to establish the security mode for Layer 2 and 3. Continue to the "Security" section on page 10-11.
- Click the **QoS** tab to establish which quality of service is expected for this WLAN. Continue to the "QoS" section on page 10-17.
- Click the **Advanced** tab to configure any other details about the WLAN, such as DHCP assignments and management frame protection. Continue to the "Advanced" section on page 10-18.

Security

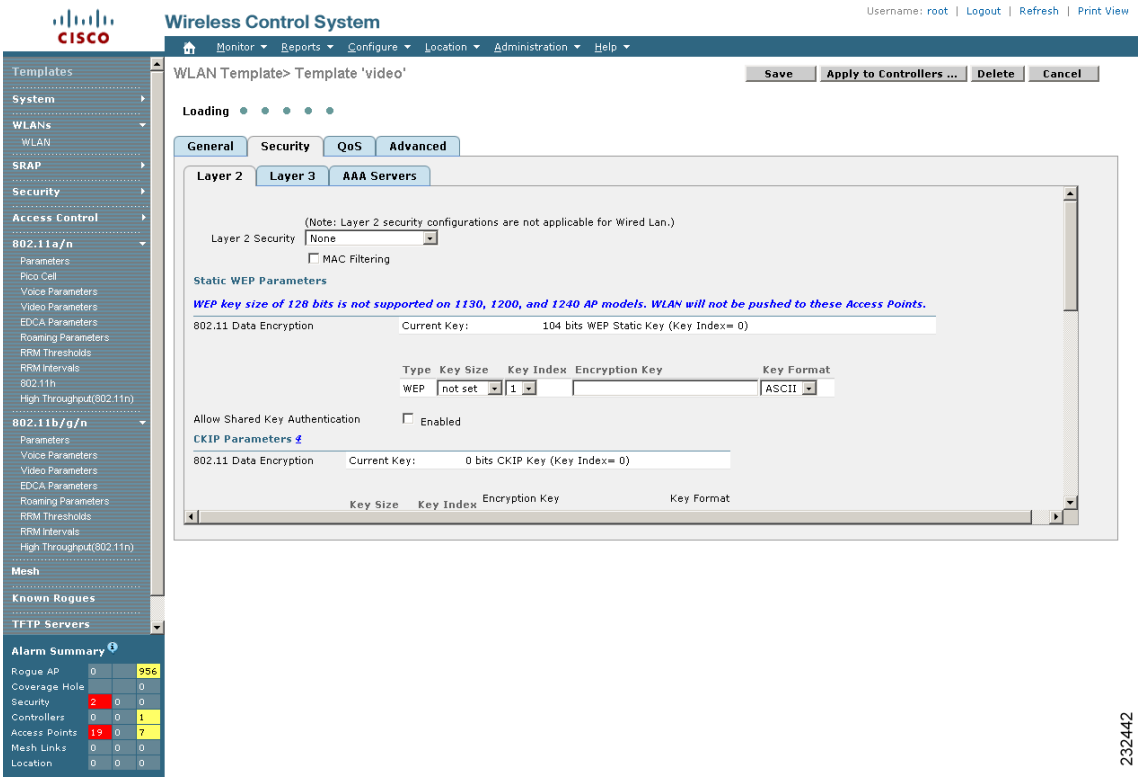
After choosing Security, you have an additional three tabs: Layer 2, Layer 3, and AAA Servers.

Layer 2

When you choose the Layer 2 tab, the window as shown in Figure 10-6 appears.

Note The screen contains different views depending on what option is chosen in the Layer 2 Security drop-down menu.

Figure 10-6 Layer 2 Window



Step 1 Use the Layer 2 Security drop-down menu to choose between None, WPA, WPA-2, Static WEP, 802.1X, Cranite, Fortress, Static WEP-802.1X, CKIP, and WPA1 + WPA2 as described in the table below.

Table 10-1 Layer 2 Security Options

Parameter	Description
None	No Layer 2 security selected.
802.1X	WEP 802.1X data encryption type (Note 1): 40/64 bit key. 104/128 bit key. 128/152 bit key.
WPA	This is a 3.2 controller code option and is not supported in 4.0 or later versions.
WPA-2	This is a 3.2 controller code option is not supported in 4.0 or later versions.

Table 10-1 Layer 2 Security Options (continued)

Parameter	Description
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). Encryption Key: Encryption key required. Key Format: Select encryption key format in ASCII or HEX. **Note** Regardless of which format you choose, for security reasons, only ASCII is visible on the WLC. For this reason, you cannot use a template to replicate the configuration on a second controller during auto provisioning. You should set the key format again in the template in case a discovered template is applied to another device.
Cranite	Configure the WLAN to use the FIPS140-2 compliant Cranite Wireless Wall Software Suite, which uses AES encryption and VPN tunnels to encrypt and verify all data frames carried by the Cisco Wireless LAN Solution.
Fortress	FIPS 40-2 compliant Layer 2 security feature.
Statis WEP-802.1X	Use this setting to enable both Static WEP and 802.1X policies. If this option is selected, static WEP and 802.1X parameters are displayed at the bottom of the page. Static WEP encryption parameters: Key sizes: 40/64, 104/128. and 128/152 bit key sizes. Key index: 1 to 4 (Note 2). Encryption Key: Enter encryption key. Key Format: Select encryption key format in ASCII or HEX. WEP 802.1X data encryption type (Note 1): 40/64 bit key. 104-128 bit key. 128/152 bit key.

Table 10-1 Layer 2 Security Options (continued)

Parameter	Description
WPA1+WPA2	Use this setting to enable WPA1, WPA2, or both. See the WPA1 and WPA2 parameters displayed on the window when WPA1+WPA2 is selected. WPA1 enables Wi-Fi Protected Access with TKIP-MIC Data Encryption. When WPA1+WPA2 is selected, you can use Cisco's Centralized Key Management (CCKM) authentication key management, which allows fast exchange when a client roams from one access point to another. When WPA1+WPA2 is selected as the Layer 2 security policy, and Pre-shared Key is enabled, then neither CCKM or 802.1X can be enabled. Although, both CCKM and 802.1X can be enabled at the same time.
CKIP	Cisco Key Integrity Protocol (CKIP). A Cisco access point advertises support for CKIP in beacon and probe response packets. CKIP can be configured only when Aironet IE is enabled on the WLAN. When selected, these CKIP parameters are displayed. Key size: Specify key length. Encryption Key: Specify encryption key. Key Format: ASCII or HEX. **Note** Regardless of which format you choose, for security reasons, only ASCII is visible on the WLC. For this reason, you cannot use a template to replicate the configuration on a second controller during auto provisioning. You should set the key format again in the template in case a discovered template is applied to another device. MMH Mode: Enabled or disabled (check box). Key Permutation: Enabled or disabled (check box).

Step 2 Check the **MAC Filtering** check box if you want to filter clients by MAC address.

Step 3 If you selected either WPA1 or WPA2 in Step 1, you must specify the type of WPA encryption: either TKIP or AES.

Step 4 Choose the desired type of authentication key management. The choices are 802.1X, CCKM, PSK, or CCKM+802.1X.

Note If you choose PSK, you must enter the password and type (ASCII or hexadecimal).

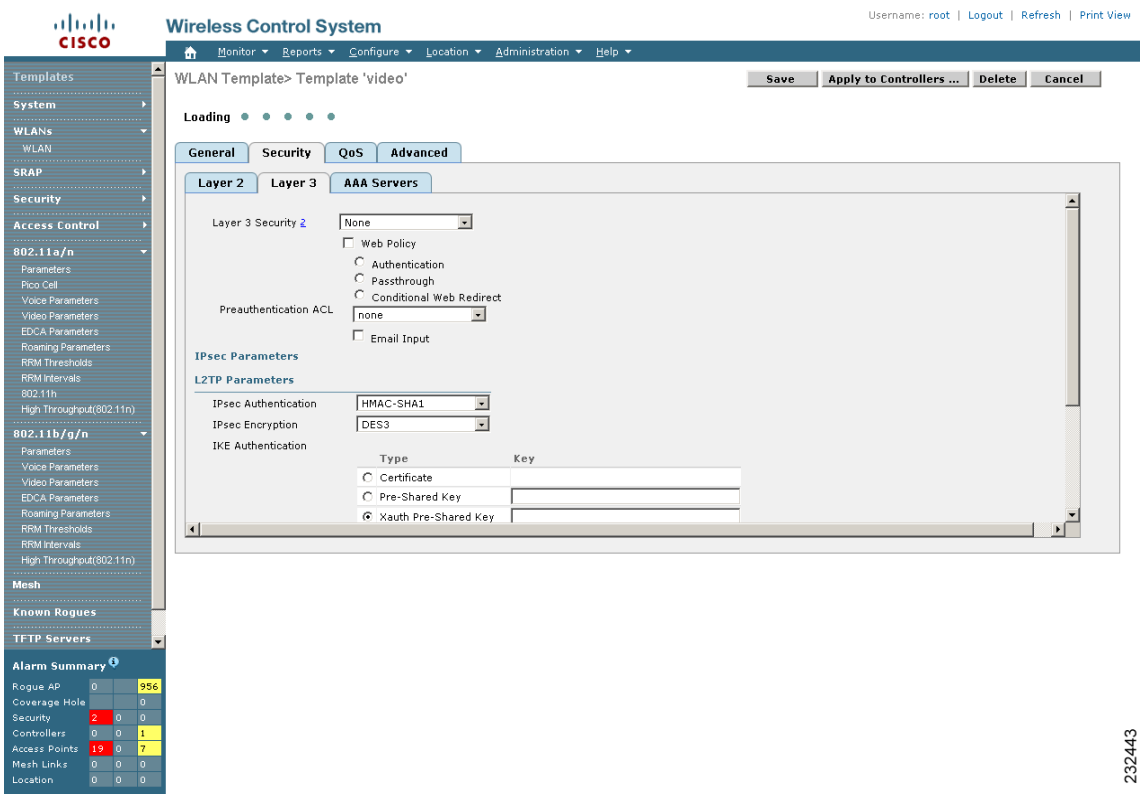
Step 5 Click **Save**.

Layer 3

When you choose the Layer 3 tab, the window shown in Figure 10-7 appears.

Note The screen contains different views depending on what option is chosen in the Layer 3 Security drop-down menu.

Figure 10-7 Layer 3 Window



Follow these steps to configure the Layer 3 tab.

Step 1 Use the Layer 3 security drop-down menu to choose between None and VPN Pass Through. The window parameters change according to the selection you make. If you choose VPN pass through, you must enter the VPN gateway address.

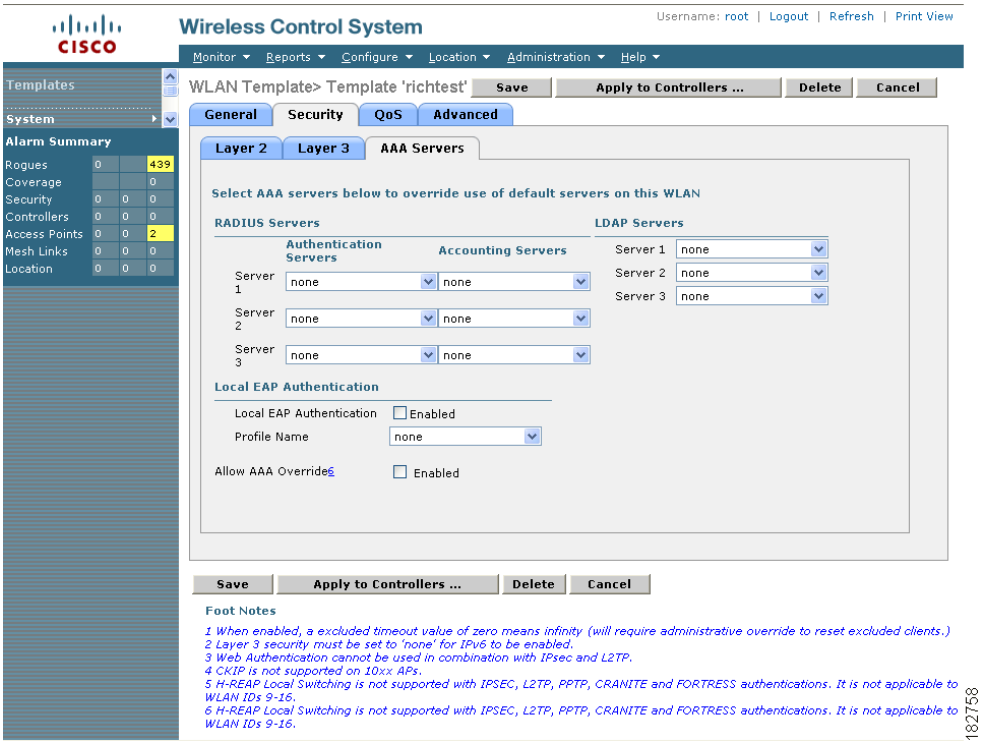
Step 2 Check the Web Policy check box if you want to select policies like authentication, passthrough, or conditional web redirect.

Step 3 Click **Save**.

AAA Servers

When you choose the AAA Servers tab, the window shown in Figure 10-8 appears.

Figure 10-8 AAA Servers Window



Follow these steps to configure the AAA Servers tab.

Step 1 Use the drop-down menus in the RADIUS and LDAP servers section to choose authentication and accounting servers. This selects the default RADIUS server for the specified WLAN and overrides the RADIUS server that is configured for the network. If all three RADIUS servers are configured for a particular WLAN, server 1 has the highest priority and so on. If no LDAP servers are chosen here, WCS uses the default LDAP server order from the database.

Step 2 Click the Local EAP Authentication check box if you have an EAP profile already configured that you want to enable. Local EAP is an authentication method that allows users and wireless clients to locally authenticate. It is designed for use in remote offices that want to maintain connectivity to wireless clients when the backend system becomes disrupted or the external authentication server goes down.

Step 3 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 moves clients from the default Cisco WLAN Solution 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 and ACL 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 WLANs do not contain any client-specific authentication parameters.

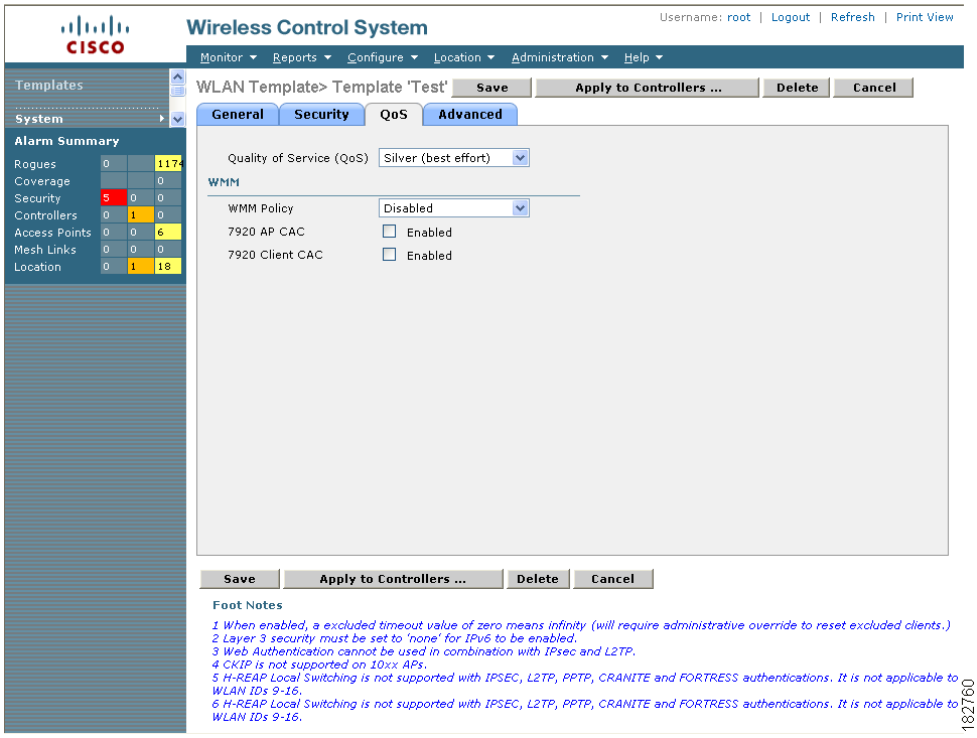
The AAA override values may come from a RADIUS server, for example.

Step 4 Click **Save**.

QoS

When you select the QoS tab from the WLAN Template window, the window as shown in Figure 10-9 appears.

Figure 10-9 QoS Window



Follow these steps to configure the QoS tab.

Step 1 Use the QoS drop-down menu to choose Platinum (voice), Gold (video), Silver (best effort), or Bronze (background). Services such as VoIP should be set to gold while non-discriminating services such as text messaging can be set to bronze.

Step 2 Use the WMM Policy drop-down menu to choose Disabled, Allowed (so clients can communicate with the WLAN), or Required to make it mandatory for clients to have WMM enabled for communication.

Step 3 Click the **7920 AP CAC** check box if you want to enable support on Cisco 7920 phones.

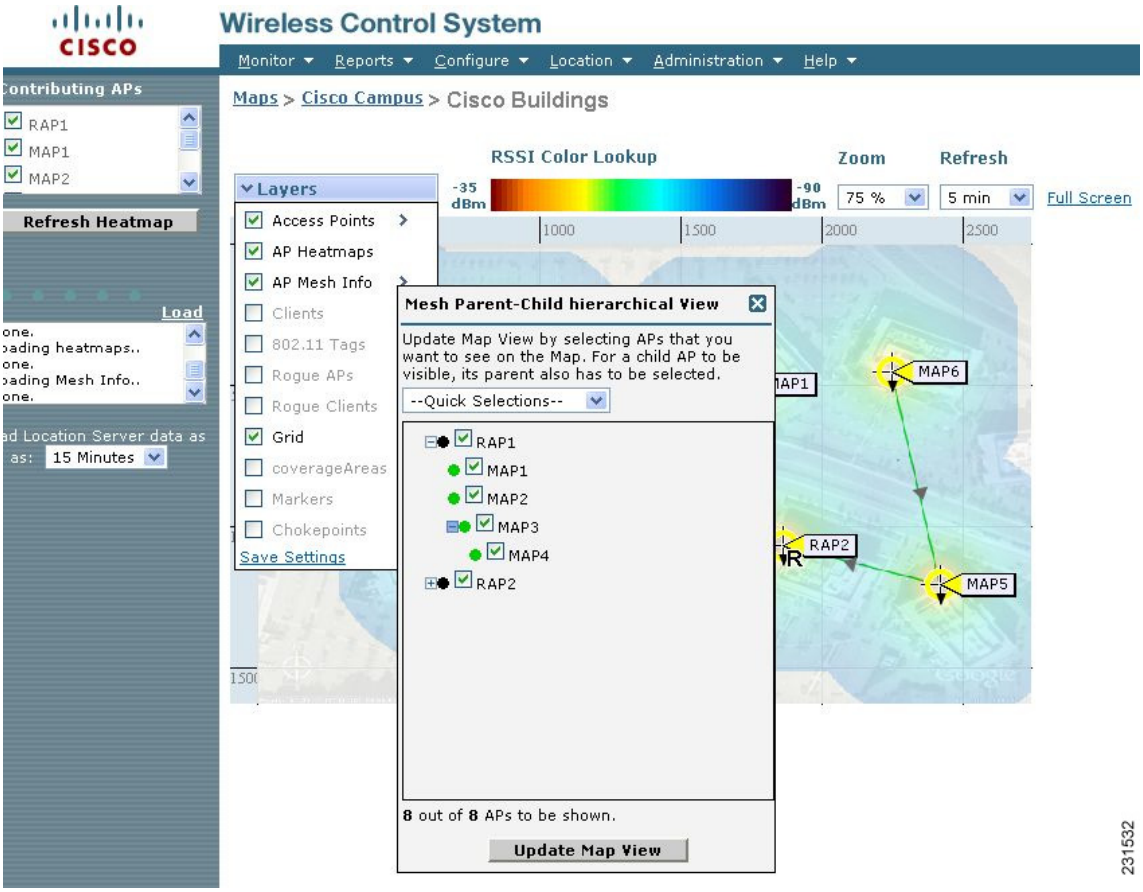
Step 4 If you want WLAN to support older versions of the software on 7920 phones, click to enable the **7920 Client CAC** check box. The CAC limit is set on the access point for newer versions of software.

Step 5 Click **Save**.

Advanced

When you click the Advanced tab on the WLAN Template window, the window shown in Figure 10-10 appears.

Figure 10-10 Advanced Window



Step 1 Click the check box if you want to enable Hybrid REAP local switching. For more information on Hybrid REAP, see the "Configuring Hybrid REAP" section on page 12-4. If you enable it, the hybrid-REAP access point handles client authentication and switches client data packets locally.

H-REAP local switching is only applicable to the Cisco 1130/1240/1250 series access points. It is not supported with L2TP, PPTP, CRANITE, and FORTRESS authentications, and it is not applicable to WLAN IDs 9-16.

Step 2 At the Session Timeout parameter, set the maximum time a client session can continue before requiring reauthorization.

Step 3 Check the Aironet IE check box if you want to enable support for Aironet information elements (IEs) for this WLAN. If Aironet IE support is enabled, the access point sends an Aironet IE 0x85 (which contains the access point name, load, number of associated clients, and so on) in the beacon and probe responses of this WLAN, and the controller sends Aironet IEs 0x85 and 0x95 (which contains the management IP address of the controller and the IP address of the access point) in the reassociation response if it receives Aironet IE 0x85 in the reassociation request.

Step 4 Click if you want to enable IPv6. You can configure IPv6 bridging and IPv4 web auth on the same WLAN. WCS disallows Layer 2 security with IPv6 bridging.

Note Layer 3 security must be set to *None* for this to be enabled.

Step 5 A list of defined access control lists (ACLs) is provided at the Override Interface ACL drop-down menu. (Refer to the "Configuring Access Control List Templates" section on page 10-50 for steps on defining ACLs.) Upon choosing an ACL from the list, the WLAN associates the ACL to the WLAN. Selecting an ACL is optional, and the default for this parameter is None.

Step 6 You can configure peer-to-peer blocking per WLAN rather than applying the status to all WLANs. At the Peer to Peer Blocking drop-down menu, choose one of the following:

- Disable—Peer-to-peer blocking is disabled, and traffic is bridged locally whenever possible.
- Drop—The packet is discarded.
- Forward Up—The packet is forwarded on the upstream VLAN, and the decision is made about what to do with the packet.

If HREAP local switching is enabled for the WLAN, which prevents traffic from passing through the controller, this drop-down menu is grayed out.

Note Peer-to-peer blocking does not apply to multicast traffic.

Step 7 Click the check box if you want to enable automatic client exclusion. If you enable client exclusion, you must also set the Timeout Value in seconds for disabled client machines. Client machines are excluded by MAC address, and their status can be observed. A timeout setting of 0 indicates that administrative control is required to re-enable the client.

Note When session timeout is not set, it implies that an excluded client remains and will not timeout from the excluded state. It does not imply that the exclusion feature is disabled.

Step 8 When you click the check box to override DHCP server, another parameter appears where you can enter the IP address of your DHCP server. For some WLAN configurations, this is required. Three valid configurations are as follows:

- DHCP Required and a valid DHCP server IP address - All WLAN clients obtain an IP address from the DHCP server.
- DHCP is not required and a valid DHCP server IP address - All WLAN clients obtain an IP address from the DHCP server or use a static IP address.
- DHCP not required and DHCP server IP address 0.0.0.0 - All WLAN clients are forced to use a static IP address. All DHCP requests are dropped.

You cannot choose to require a DHCP address assignment and then enter a DHCP server IP address.

Step 9 If the MFP Signature Generation check box is checked, it enables signature generation for the 802.11 management frames transmitted by an access point associated with this WLAN. Signature generation makes sure that changes to the transmitted management frames by an intruder are detected and reported.

Step 10 At the MFP Client Protection drop-down menu, choose Optional, Disabled, or Required for configuration of individual WLANs of a controller. If infrastructure MFP is not enabled, this drop-down menu is unavailable.

Note Client-side MFP is only available for those WLANs configured to support Cisco Compatible Extensions (version 5 or later) clients, and WPA2 must first be configured.

Step 11 Click **Save**.

Configuring H-REAP AP Groups

Hybrid REAP enables you to configure and control access points in a branch or remote office from the corporate office through a wide area network (WAN) link without deploying a controller in each office. There is no deployment restriction on the number of hybrid-REAP access points per location, but you can organize and group the access points per floor and limit them to 25 or so per building, since it is likely the branch offices share the same configuration.

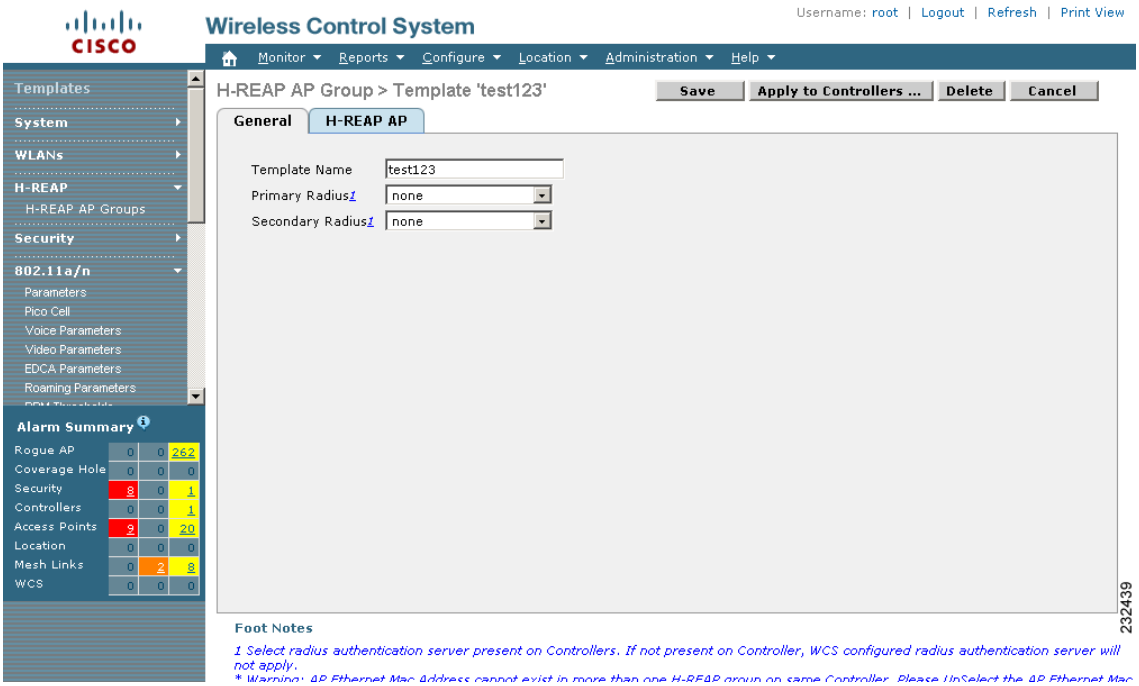
Follow these steps to set up an H-REAP AP group.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **HREAP > HREAP AP Groups**.

Step 3 The Template Name column shows the group names assigned to the HREAP access point groups. If you want to add an additional group, choose **Add HREAP AP Group** from the Select a command drop-down menu.
- or -
To make modifications to an existing template, click to select a template in the Template Name column. The General tab of the HREAP AP Groups template appears (see Figure 10-11).

Figure 10-11 AP Groups HREAP Template



Step 4 The Template Name parameter shows the group name assigned to the HREAP access point group.

Step 5 Choose the primary RADIUS authentication servers for each group. If a RADIUS authentication server is not present on the controller, the WCS configured RADIUS server does not apply. A value of 10 indicates that the primary RADIUS server is not configured for this group.

Step 6 Choose the secondary RADIUS authentication servers for each group. If a RADIUS authentication server is not present on the controller, the WCS configured RADIUS server does not apply. A value of 0 indicates that the primary RADIUS server is not configured for this group.

Step 7 If you want to add an access point to the group, click the **H-REAP AP** tab.

Step 8 An access point Ethernet MAC address cannot exist in more than one H-REAP group on the same controller. If more than one group is applied to the same controller, click the **Ethernet MAC** check box to unselect an access point from one of the groups. You should save this change or apply it to controllers.

Step 9 Click **Add AP**. The H-REAP AP Group window appears.

Step 10 Click **Submit**.

Configuring a File Encryption Template

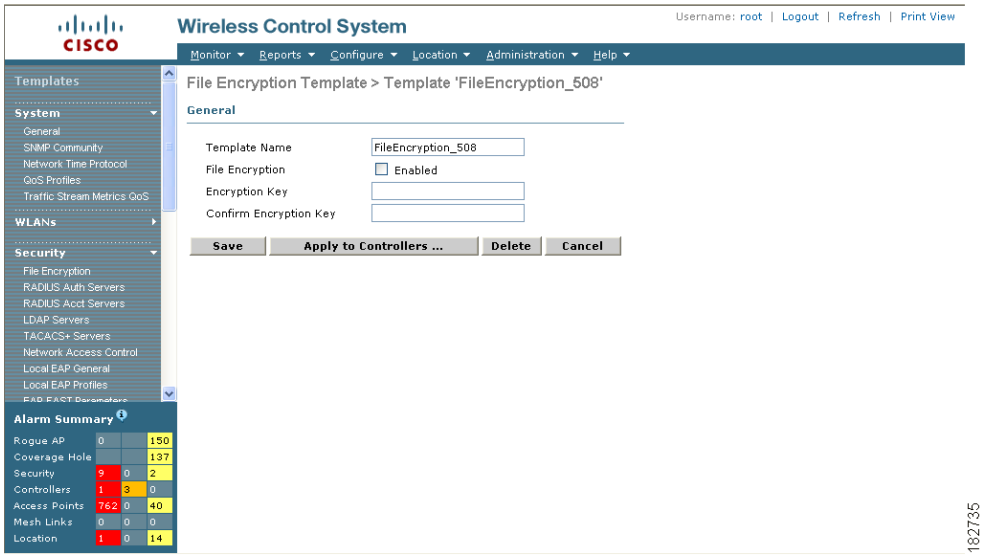
This page enables you to add a new file encryption template or make modifications to an existing file encryption template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > File Encryption**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template in the Template Name column. The File Encryption Template appears (see Figure 10-12).

Figure 10-12 File Encryption Template



Step 4 Check if you want to enable file encryption.

Step 5 Enter an encryption key text string of exactly 16 ASCII characters.

Step 6 Retype the encryption key.

Step 7 Click **Save**.

Configuring a RADIUS Authentication Template

This page allows you to add a template for RADIUS authentication server information or make modifications to an existing template. After these server templates are configured, controller users who log into the controller through the CLI or GUI are authenticated.

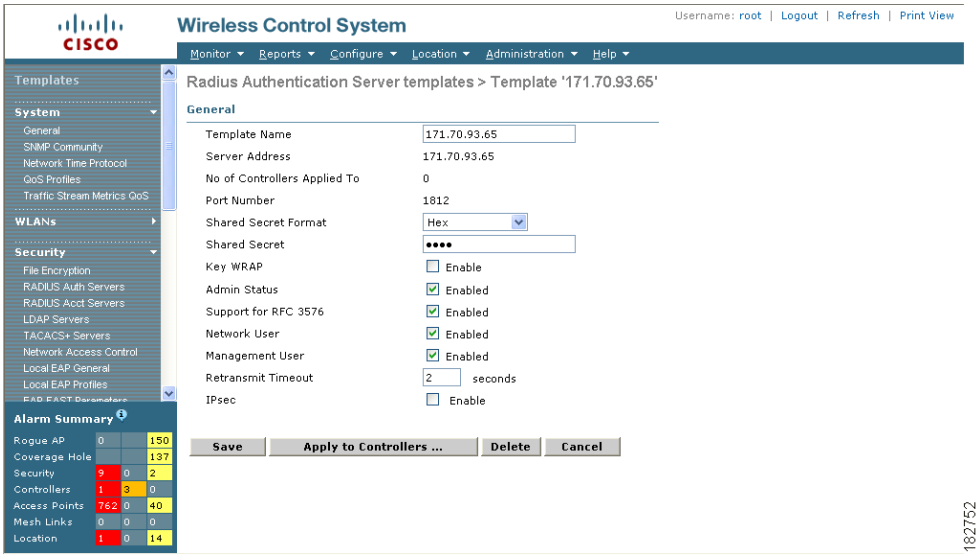
Step 1 Choose **Configure > Controller Templates**.

Step 2 On the left sidebar menu, choose **Security > RADIUS Authentication Servers**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select the template in the Template Name column. The RADIUS Authentication Server Template window appears (see Figure 10-13), and the number of controllers the template is applied to automatically populates.

The IP address of the RADIUS server and the port number for the interface protocol is also displayed.

Figure 10-13 RADIUS Authentication Server Template



Step 4 Use the drop-down menu to choose either ASCII or hex shared secret format.

Note Regardless of which format you choose, for security reasons, only ASCII is visible on the WLC. For this reason, you cannot use a template to replicate the configuration on a second controller during auto provisioning. You should set the key format again in the template in case a discovered template is applied to another device.

Step 5 Enter the RADIUS shared secret used by your specified server.

Step 6 Click if you want to enable key wrap. If this option is enabled, the authentication request is sent to RADIUS servers that have key encryption key (KEK) and message authenticator code keys (MACK) configured. Also, when enabled, the parameters below appear:

- Shared Secret Format: Determine whether ASCII or hexadecimal.
- KEK Shared Secret: Enter KEK shared secret.
- MACK Shared Secret: Enter MACK shared secret.

Note Each time the controller is notified with the shared secret, the existing shared secret is overwritten with the new shared secret.

Step 7 Click if you want to enable administration privileges.

Step 8 Click if you want to enable support for RFC 3576. RFC 3576 is an extension to the Remote Authentication Dial In User Service (RADIUS) protocol. It allows dynamic changes to a user session and includes support for disconnecting users and changing authorizations applicable to a user session. With these authorizations, support is provided for Disconnect and Change-of-Authorization (CoA) messages. Disconnect messages immediately terminate a user session, whereas CoA messages modify session authorization attributes such as data filters.

Step 9 Click if you want to enable network user authentication. If this option is enabled, this entry is considered as the RADIUS authenticating server for the network user.

Step 10 Click if you want to enable management authentication. If this option is enabled, this entry is considered as the RADIUS authenticating server for the management user.

Step 11 Specify the time in seconds after which the RADIUS authentication request times out and a retransmission is attempted by the controller. You can specify a value between 2 and 30 seconds.

Step 12 If you click to enable the IP security mechanism, additional IP security parameters are added to the window, and Steps 13 to 19 are required. If you disable it, click **Save** and skip Steps 13 to 19.

Step 13 Use the drop-down menu to choose which IP security authentication protocol to use. The options are HMAC-SHA1, HMAC-MD5, and 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 and can be used in combination with any iterated cryptographic hash function. HMAC-MD5 and HMAC-SHA1 are two constructs of the HMAC using the MD5 hash function and the SHA1 hash function. HMAC also uses a secret key for calculation and verification of the message authentication values.

Step 14 Set the IP security encryption mechanism to use. Options are as follows:

- 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 a 128-bit data path in Cipher Clock Chaining (CBC) mode.
- None—No IP security encryption mechanism.

Step 15 The Internet Key Exchange (IKE) authentication is not an editable field. Internet Key Exchange protocol (IKE) 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 data should be protected. IKE keeps track of connections by assigning a bundle of security associations (SAs) to each connection.

Step 16 Use the IKE phase 1 drop-down menu to choose either aggressive or main. This sets the IKE protocol. IKE phase 1 is used to negotiate how IKE is protected. Aggressive mode passes more information in fewer packets, with the benefit of a slightly faster connection, at the cost of transmitting the identities of the security gateways in the clear.

Step 17 At the Lifetime parameter, set the timeout interval (in seconds) when the session expires.

Step 18 Set the IKE Diffie Hellman group. The options are group 1 (768 bits), group 2 (1024 bits), or group 5 (1536 bits). Diffie-Hellman techniques are used by two devices to generate a symmetric key where you can publicly exchange values and generate the same symmetric key.

Although all 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.

Step 19 Click **Save**.

Configuring a RADIUS Accounting Template

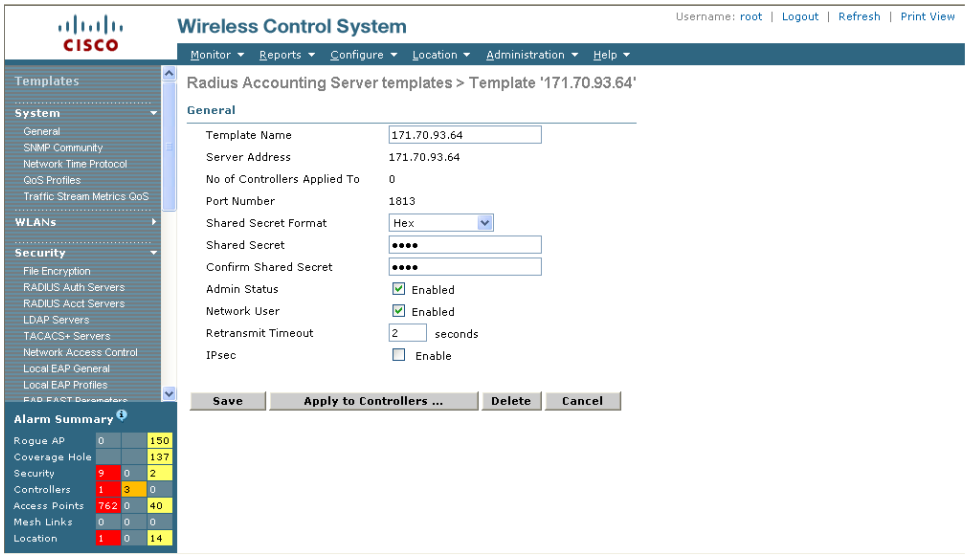
This page allows you to add a new template for RADIUS accounting server information or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > RADIUS Acct Servers**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template in the Template Name column. The RADIUS Accounting Template appears (see Figure 10-14), and the number of controllers the template is applied to automatically populates. The IP address of the RADIUS server and the port number for the interface protocols are also displayed.

Figure 10-14 RADIUS Accounting Server Templates



Step 4 Use the Shared Secret Format drop-down menu to choose either ASCII or hexadecimal.

Note Regardless of which format you choose, for security reasons, only ASCII is visible on the WLC. For this reason, you cannot use a template to replicate the configuration on a second controller during auto provisioning. You should set the key format again in the template in case a discovered template is applied to another device.

Step 5 Enter the RADIUS shared secret used by your specified server.

Step 6 Retype the shared secret.

Step 7 Click if you want to establish administrative privileges for the server.

Step 8 Click if you want to enable the network user authentication. If this option is enabled, this entry is considered as the RADIUS authenticating server for the network user.

Step 9 Specify the time in seconds after which the RADIUS authentication request will timeout and a retransmission by the controller will occur. You can specify a value between 2 and 30 seconds.

Step 10 Click **Save**.

Configuring a LDAP Server Template

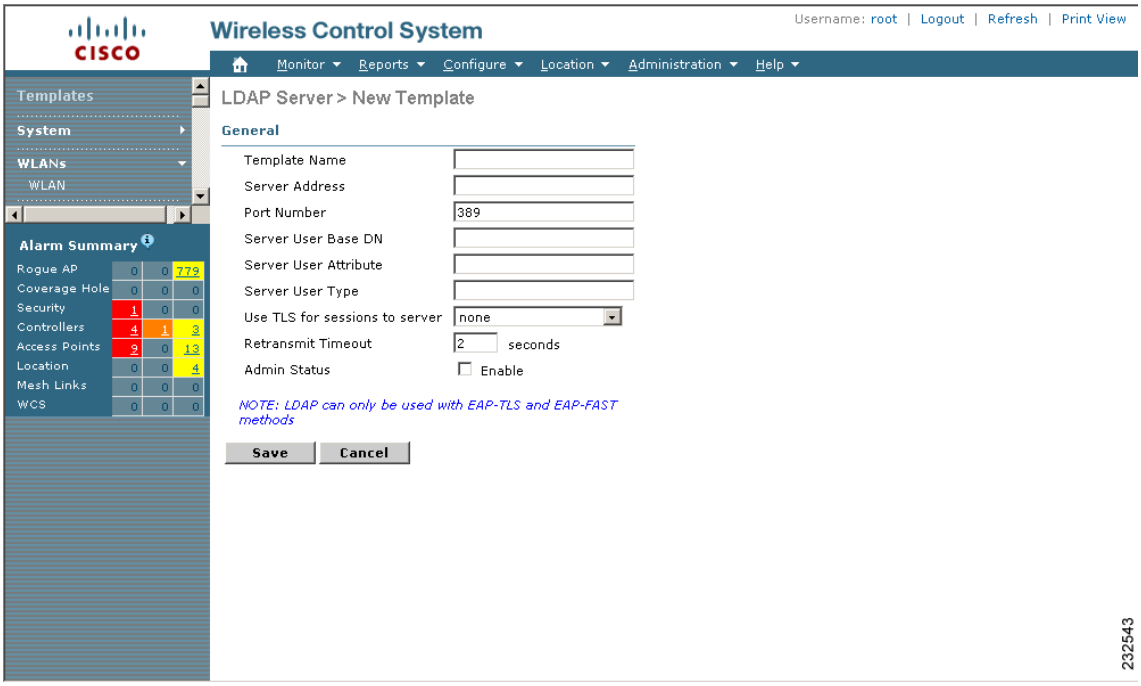
This section explains how to configure a Lightweight Directory Access Protocol (LDAP) server as a backend database, similar to a RADIUS or local user database. An LDAP backend database allows the controller to query an LDAP server for the credentials (username and password) of a particular user. These credentials are then used to authenticate the user. For example, local EAP may use an LDAP server as its backend database to retrieve user credentials. This page allows you to add a new template for an LDAP server or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > LDAP Servers**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template in the Template Name column. The LDAP Server Template appears (see Figure 10-15). The IP address of the LDAP server and the port number for the interface protocols are displayed.

Figure 10-15 LDAP Server Template



Step 4 In the Server User Base DN field, enter the distinguished name of the subtree in the LDAP server that contains a list of all the users.

Step 5 In the Server User Attribute field, enter the attribute that contains the username in the LDAP server.

Step 6 In the Server User Type field, enter the ObjectType attribute that identifies the user.

Step 7 If you are adding a new server, choose **Secure** from the Use TLS for Sessions to Server drop-down menu if you want all LDAP transaction to use a secure TLS tunnel. Otherwise, choose **none**.

Step 8 In the Retransmit Timeout field, enter the number of seconds between retransmissions. The valid range is 2 to 30 seconds, and the default value is 2 seconds.

Step 9 Check the Admin Status check box if you want the LDAP server to have administrative privileges.

Step 10 Click **Save**.

Configuring a TACACS+ Server Template

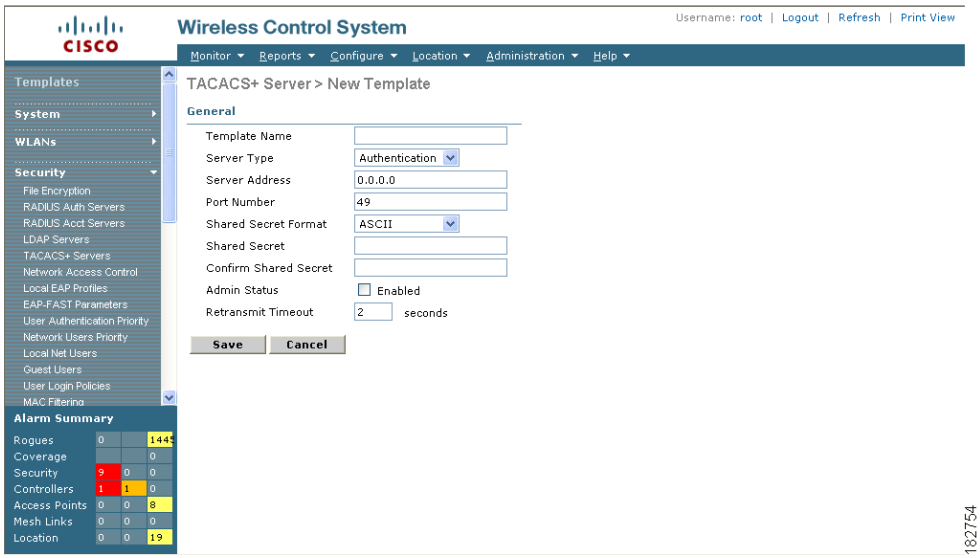
This page allows you to add a new TACACS+ server template or make modifications to an existing template. After these server templates are configured, controller users who log into the controller through the CLI or GUI are authenticated.

Step 1 Choose **Configure > Controller Templates**.

Step 2 On the left sidebar menu, choose **Security > TACACS+ Server**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a user in the Template Name column. The TACACS+ Server Template appears (see Figure 10-16). The IP address and the port number of the TACACS+ template are displayed.

Figure 10-16 TACACS+ Server Template



Step 4 Select the server type. The choices are authentication, authorization, or accounting.

Step 5 Use the drop-down menu to choose either ASCII or hex shared secret format.

Note Regardless of which format you choose, for security reasons, only ASCII is visible on the WLC. For this reason, you cannot use a template to replicate the configuration on a second controller during auto provisioning. You should set the key format again in the template in case a discovered template is applied to another device.

Step 6 Enter the TACACS+ shared secret used by your specified server.

Step 7 Re-enter the shared secret in the Confirm Shared Secret field.

Step 8 Check the Admin Status check box if you want the TACACS+ server to have administrative privileges.

Step 9 Specify the time in seconds after which the TACACS+ authentication request times out and a retransmission is attempted by the controller.

Step 10 Click **Save**.

Configuring a Network Access Control Template

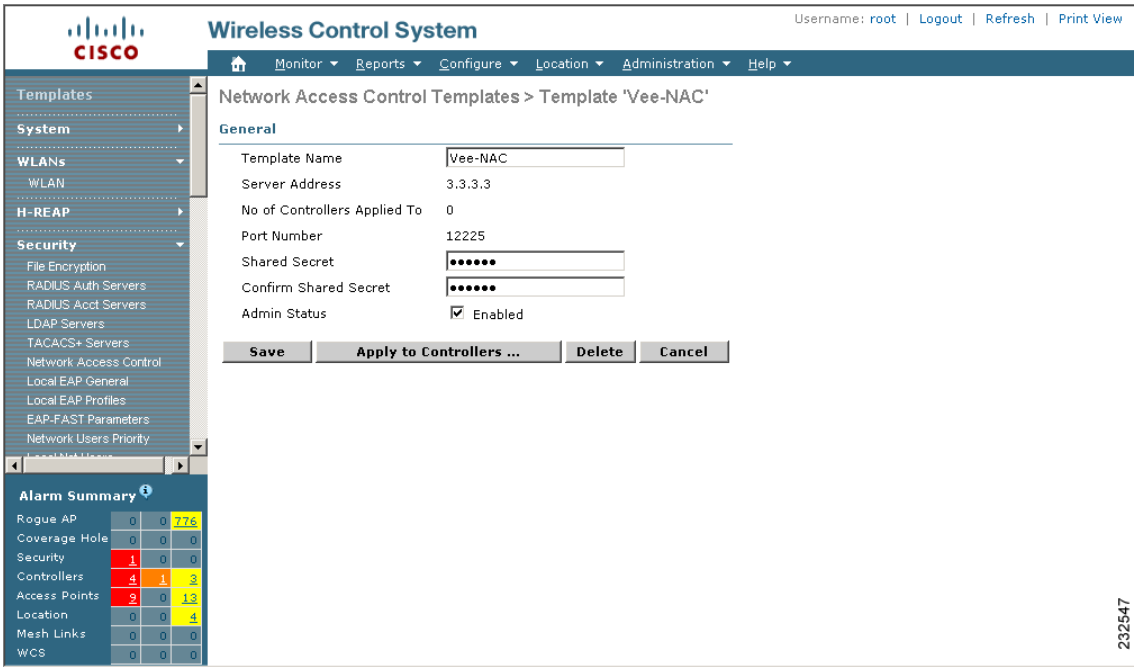
This page allows you to add a new template for network access control or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > Network Access Control**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template in the Template Name column. The Network Access Control Template appears (see Figure 10-17). The IP address and port number for the interface protocols are displayed.

Figure 10-17 Network Access Control Template



Step 4 Enter the shared secret used by your specified server.

Step 5 Re-enter the shared secret in the Confirm Shared Secret field.

Step 6 Check the Admin Status check box if you want the server to have administrative privileges.

Step 7 Click **Save**.

Configuring a Local EAP General Template

This page allows you to specify a timeout value for local EAP. You can then add a template with this timeout value or make changes to an existing template.

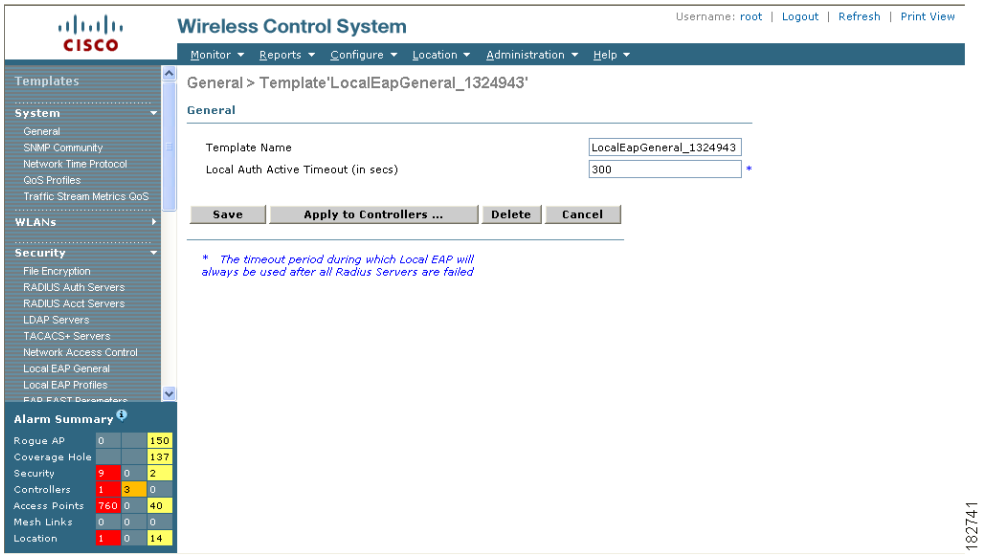
Note If any RADIUS servers are configured on the controller, the controller tries to authenticate the wireless clients using the RADIUS servers first. Local EAP is attempted only if no RADIUS servers are found, either because the RADIUS servers timed out or no RADIUS servers were configured. If four RADIUS servers are configured, the controller attempts to authenticate the client with the first RADIUS server, then the second RADIUS server, and then local EAP. If the client attempts to then reauthenticate manually, the controller tries the third RADIUS server, then the fourth RADIUS server, and then local EAP.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > Local EAP General**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template in the Template Name column. The Local EAP General Template appears (see Figure 10-18).

Figure 10-18 Local EAP General Template



Step 4 In the Local Auth Active Timeout field, enter the amount of time (in seconds) that the controller attempts to authenticate wireless clients using local EAP after any pair of configured RADIUS servers fail. The valid range is 1 to 3600 seconds, and the default setting is 1000 seconds.

Step 5 Click **Save**.

Configuring a Local EAP Profile Template

This page allows you to add a new template for the local EAP profile or make modifications to an existing template. Local EAP is an authentication method that allows users and wireless clients to be authenticated locally. It is designed for use in remote offices that want to maintain connectivity to wireless clients when the backend system becomes disrupted or the external authentication server goes

down. When you enable local EAP, the controller serves as the authentication server and the local user database, thereby removing dependence on an external authentication server. Local EAP retrieves user credentials from the local user database or the LDAP backend database to authenticate users.

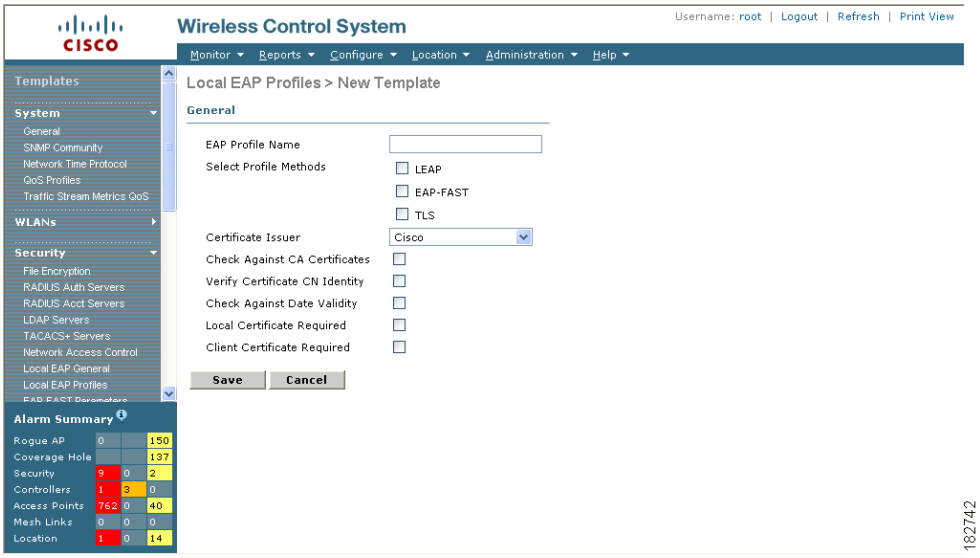
Note The LDAP backend database supports only these local EAP methods: EAP-TLS and EAP-FAST with certificates. LEAP and EAP-FAST with PACs are not supported for use with the LDAP backend database.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > Local EAP Profiles**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template in the Template Name column. The Local EAP Profiles Template appears (see Figure 10-19).

Figure 10-19 Local EAP Profiles Template



Step 4 Each EAP profile must be associated with an authentication type(s). Choose the desired authentication type from the choices below:

- LEAP — This authentication type leverages Cisco Key Integrity Protocol (CKIP) and MMH message integrity check (MIC) for data protection. A username and password are used to perform mutual authentication with the RADIUS server through the access point.
- EAP-FAST — This authentication type (Flexile Authentication via Secure Tunneling) uses a three-phased tunnel authentication process to provide advanced 802.1X EAP mutual authentication. A username, password, and PAC (protected access credential) are used to perform mutual authentication with the RADIUS server through the access point.
- TLS — This authentication type uses a dynamic session-based WEP key derived from the client adapter and RADIUS server to encrypt data. It requires a client certificate for authentication.

- PEAP—This authentication type is based on EAP-TLS authentication but uses a password instead of a client certificate for authentication. PEAP uses a dynamic session-based WEP key derived from the client adapter and RADIUS server to encrypt data.

Step 5 Use the Certificate Issues drop-down menu to determine whether Cisco or another vendor issued the certificate for authentication. Only EAP-FAST and TLS require a certificate.

Step 6 If you want the incoming certificate from the client to be validated against the certificate authority (CA) certificates on the controller, check the **Check Against CA Certificates** check box.

Step 7 If you want the common name (CN) in the incoming certificate to be validated against the CA certificates' CN on the controller, check the **Verify Certificate CN Identity** check box.

Step 8 If you want the controller to verify that the incoming device certificate is still valid and has not expired, check the **Check Against Date Validity** check box.

Step 9 If you want the device certificate on the controller to be used for authentication, check the **Local Certificate Required** check box. This certification is applicable only to EAP-FAST.

Step 10 If you want the wireless clients to send their device certificates to the controller in order to authenticate, check the **Client Certificate Required** check box. This certification is only applicable to EAP-FAST.

Step 11 Click **Save**.

Step 12 Follow these steps to enable local EAP on a WLAN:

a. Choose **WLAN > WLANs** from the left sidebar menu.

b. Click the profile name of the desired WLAN.

c. Click the **Security > AAA Servers** tab to access the AAA Servers page.

d. Check the **Local EAP Authentication** check box to enable local EAP for this WLAN.

Step 13 Click **Save**.

Configuring an EAP-FAST Template

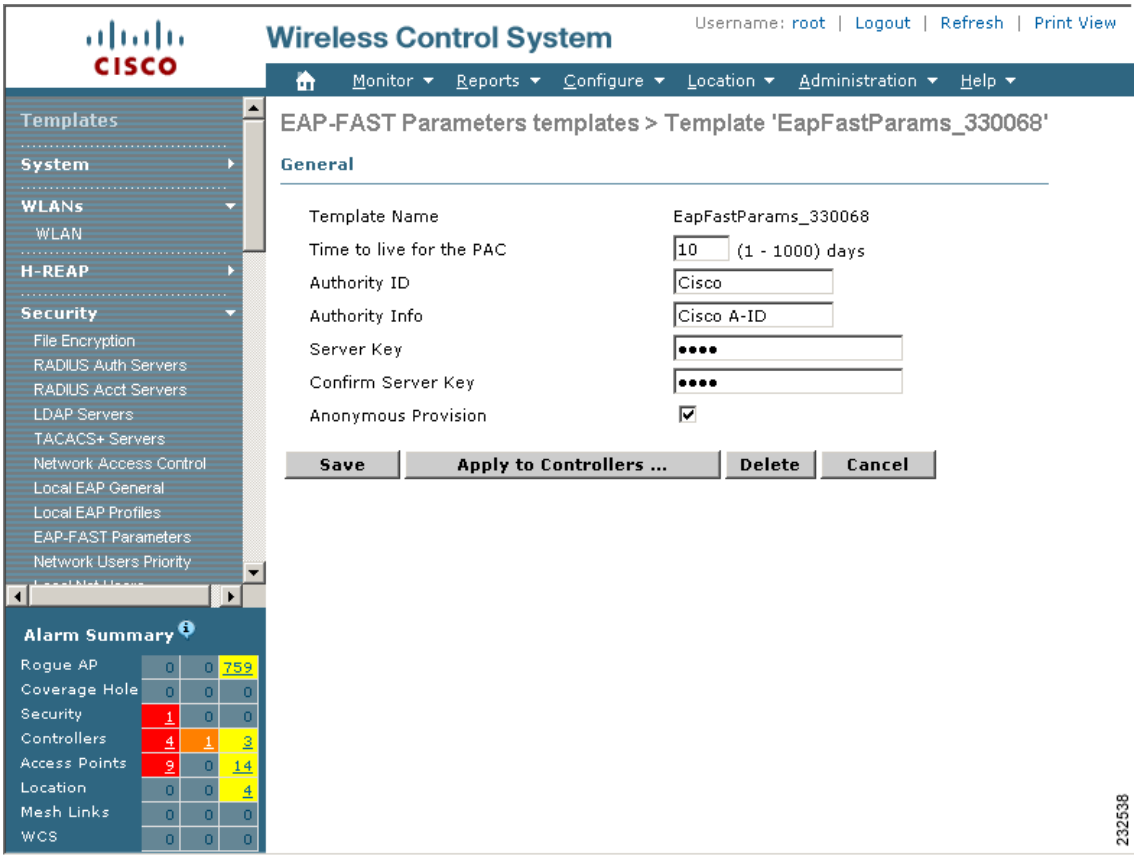
This authentication type (Flexible Authentication via Secure Tunneling) uses a three-phased tunnel authentication process to provide advanced 802.1X EAP mutual authentication. A username, password, and PAC are used to perform mutual authentication with the RADIUS server through the access point. This page allows you to add a new template for the EAP-FAST profile or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > EAP-FAST Parameters**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template in the Template Name column. The EAP-FAST Parameters Template appears (see Figure 10-19).

Figure 10-20 EAP-FAST Parameters Template



Step 4 In the Time to Live for the PAC field, enter the number of days for the PAC to remain viable. The valid range is 1 to 1000 days, and the default setting is 10 days.

Step 5 In the Authority ID field, enter the authority identifier of the local EAP-FAST server in hexadecimal characters. You can enter up to 32 hexadecimal characters, but you must enter an even number of characters.

Step 6 In the Authority ID field, enter the ID for the authority identifier of the local EAP-FAST server.

Step 7 In the Authority Info field, enter the authority identifier of the local EAP-FAST server in text format.

Step 8 In the Server Key and Confirm Server Key fields, enter the key (in hexadecimal characters) used to encrypt and decrypt PACs.

Step 9 If a local certificate is required, click the check box.

Step 10 If a client certificate is required, click the check box.

Step 11 If an anonymous provision is required, click the check box.

Step 12 If you want to enable anonymous provisioning, check the **Client Authentication Provision** check box. This feature allows PACs to be sent automatically to clients that do not have one during PAC provisioning. If you disable this feature, PACs must be manually provisioned.

Step 13 Click **Save**.

Configuring Network User Credential Retrieval Priority Templates

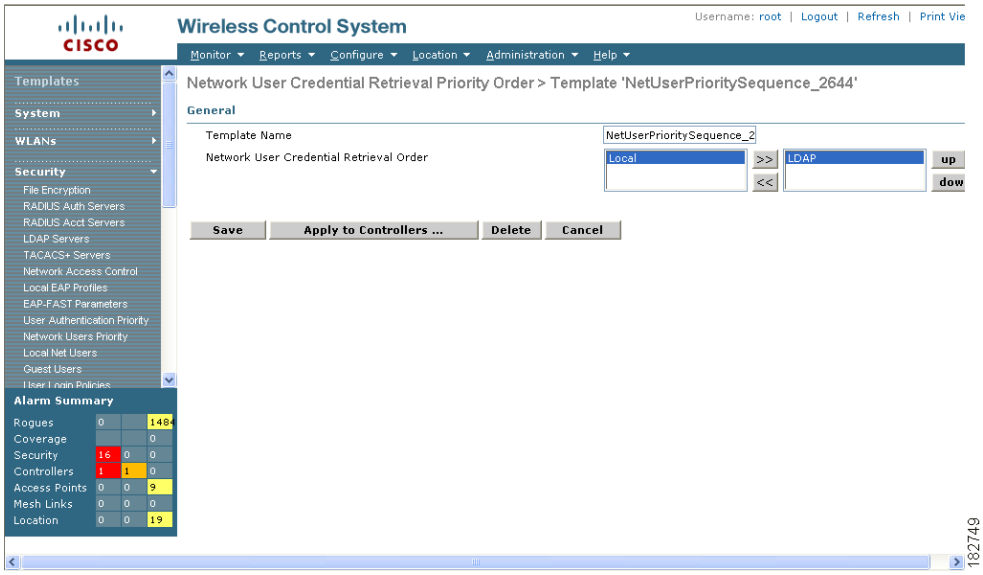
You can specify the order that LDAP and local databases use to retrieve user credential information. This page allows you to add a new template for the network user credential retrieval priority or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > Network Users Priority**.

To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template in the Template Name column. The Network User Credential Retrieval Priority Template appears (see Figure 10-21).

Figure 10-21 Network User Credential Retrieval Priority Order Template



Step 3 Use the left and right pointing arrows to include or disclude network user credentials in the right-most window.

Step 4 Use the up and down buttons to determine the order credentials are tried.

Step 5 Click **Save**.

Configuring a Local Network Users Template

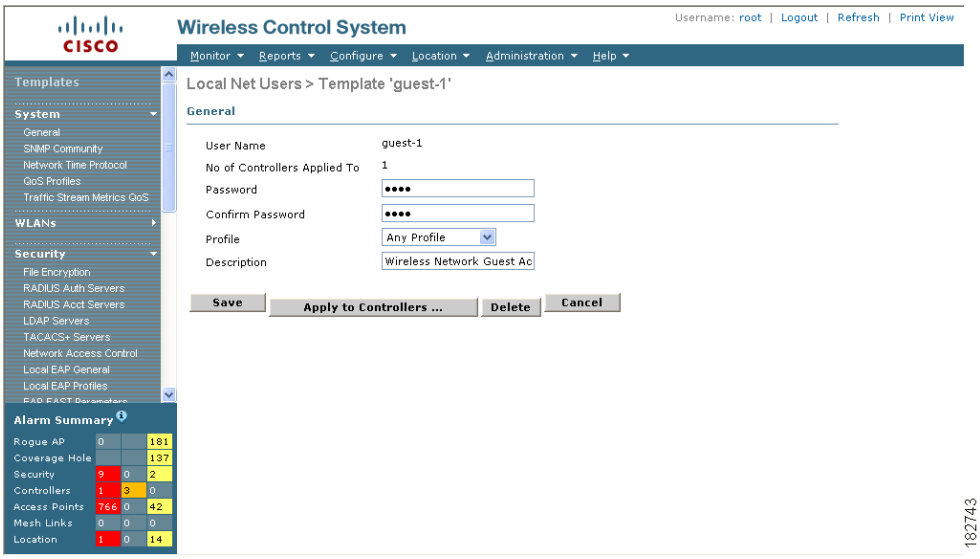
With this template, you can store the credentials (username and password) of all the local network users. These credentials are then used to authenticate the users. For example, local EAP may use the local user database as its backend database to retrieve user credentials. This page allows you to add a new local authentication template or make modifications to an existing template. You must create a local net user and define a password when logging in as a web authentication client.

Step 1 Choose **Configure > Controller Templates**.

Step 2 On the left sidebar menu, choose **Security > Local Net Users**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a user in the User Name column. The Local Net Users Template appears (see Figure 10-22).

Figure 10-22 Local Net Users Template

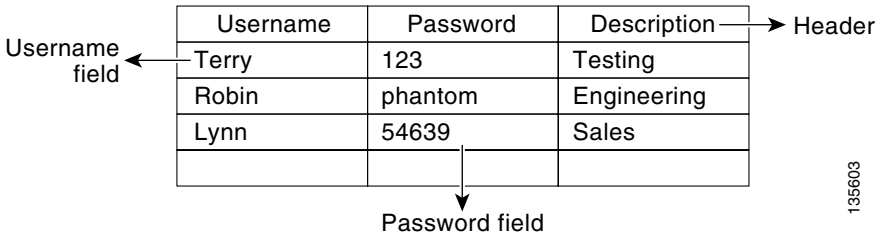


Step 4 If you keep Import from File enabled, you need to enter a file path or click the Browse button to navigate to the file path. Then continue to Step 8. If you disable the import, continue to Step 5.

Note You can only import a .csv file. Any other file formats are not supported. See Figure Figure 10-23 for CSV file format examples.

The first row in the file is the header. The data in the header is not read by the Cisco WCS. The header can either be blank or filled. The Cisco WCS reads data from the second row onwards. It is mandatory to fill the Username and Password fields in all the rows.

Figure 10-23 CSV File Format



Step 5 Enter a username and password.

Step 6 Use the drop-down menu to choose the SSID which this local user is applied to or choose the *any SSID* option.

Step 7 Enter a user-defined description of this interface. Skip to Step 9.

Step 8 If you want to override the existing template parameter, click to enable this parameter.

Step 9 Click **Save**.

Configuring Guest User Templates

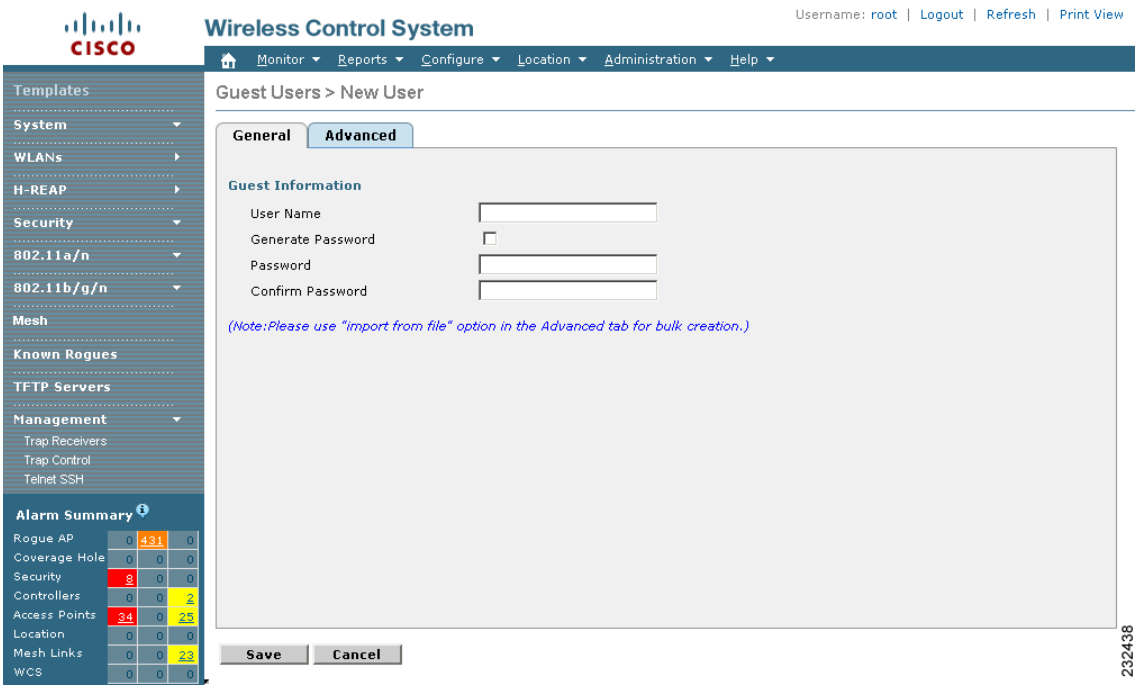
This page allows you to create a new template for guest user information or make modifications to an existing template. The purpose of a guest user account is to provide a user account for a limited amount of time. A Lobby Ambassador is able to configure a specific time frame for the guest user account to be active. After the specified time period, the guest user account automatically expires. Refer to the "Creating Guest User Accounts" section on page 7-11 for further information on guest access.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > Guest Users**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a user in the User Name column. The General Guest User Template window appears (see Figure 10-24).

Figure 10-24 Guest User Template



Step 4 Enter a guest name. Maximum size is 24 characters.

Step 5 Click the **Generate Password** check box if you want a password automatically generated. The Password and Confirm Password parameters are automatically populated. If automatic generation is not enabled, you must supply a password twice.

Note If this is enabled, a different password is supplied for each day (up to the number of days chosen). If this is disabled (unchecked), one password is supplied for a span of days.

Step 6 Click the **Advanced** tab.

Step 7 If you want to import multiple users, click the **Import From File** check box.

Step 8 Click **Browse** to go to the file path where the CSV is located. The Sample CSV file is as follows:

```
User Name| Password| Life Time| Description| Disclaimer
Guest-1,pwd1,864000,Description-1,Disclaimer-1
Guest-2,pwd2,864000,Description-2,Disclaimer-2
```

Note Table headings are not required, and description and disclaimer are not mandatory.

Step 9 Choose a user role for the guest user from the drop-down menu. User roles are predefined by the administrator and are associated with the guests' access (such as contractor, customer, partner, vendor, visitor, and so on).

User Role is used to manage the amount of bandwidth allocated to specific users within the network.

Step 10 Define how long the guest user account will be active by choosing either the Limited or Unlimited Lifetime option.

- For the limited option, you choose the period of time that the guest user account is active using the hours and minutes drop-down menus. The default value for Limited is one day (8 hours).
- When Unlimited is chosen, there is no expiration date for the guest account.

Step 11 Choose the area (indoor, outdoor), controller list, or config group to which the guest user traffic is limited from the Apply to drop-down menu.

If you choose the controller list option, a list of controller IP addresses appears. Check the check box next to all controller networks on which guest traffic is allowed.

Step 12 (Optionally) Modify the default guest user description if necessary.

Step 13 (Optionally) Modify the Disclaimer text, if necessary. If you want the supplied text to be the default, click the **Make this Disclaimer default** check box.

Step 14 Click **Save**.

Configuring a User Login Policies Template

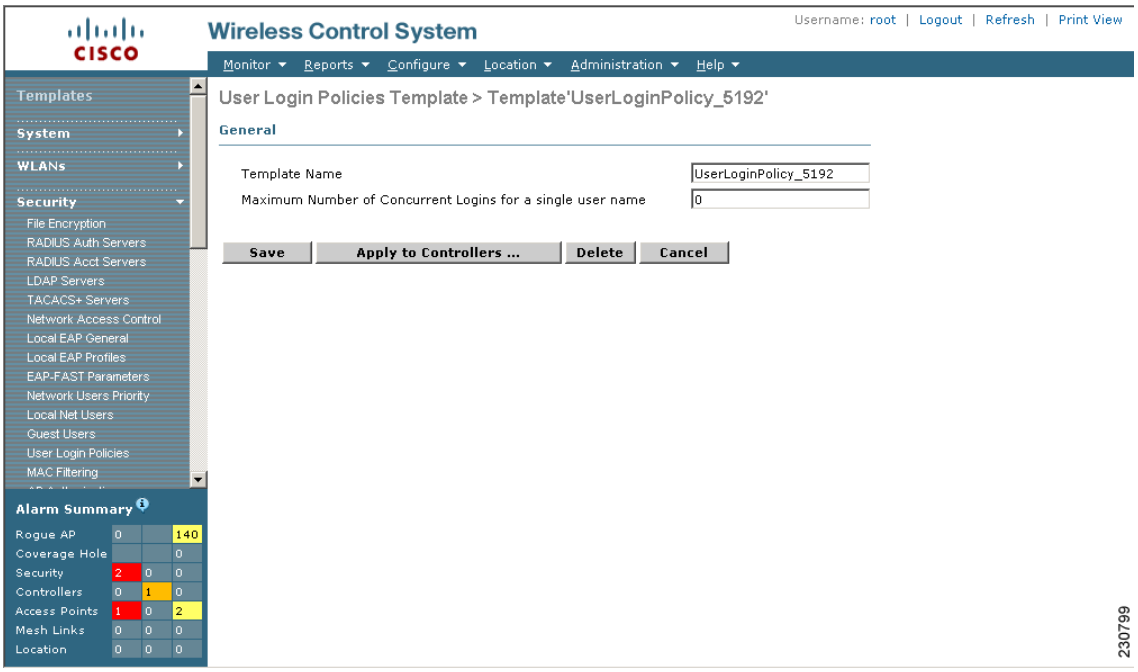
This page allows you to add a new user login policies template or make modifications to an existing template. On this template you set the maximum number of concurrent logins that each single user can have.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > User Login Policies**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a user login policy in the Template Name column. The User Login Policies Template window appears (see Figure 10-25).

Figure 10-25 User Login Policies Template



Step 4 You can adjust the maximum number of concurrent logins each single user can have.

Step 5 Click **Save** to keep this template.

Configuring a MAC Filter Template

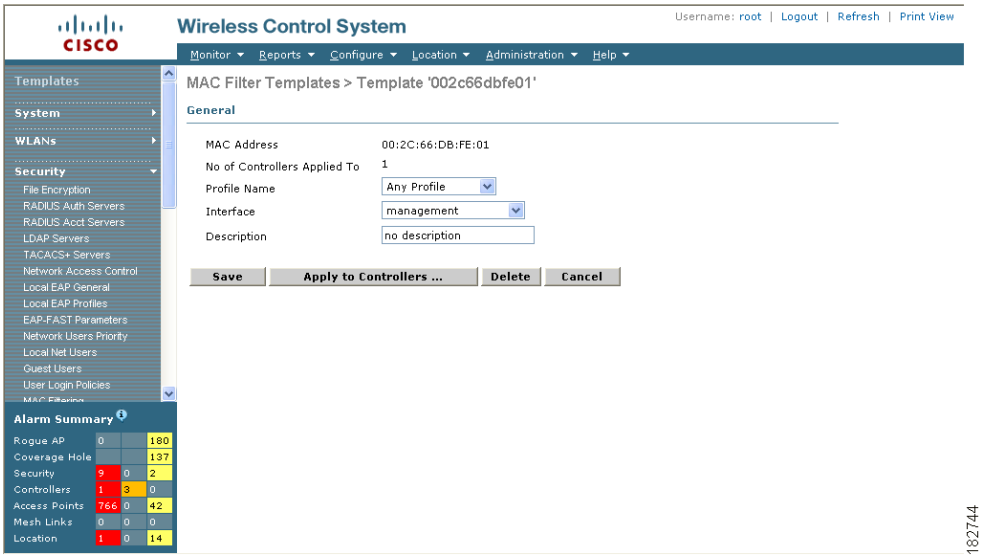
This page allows you to add a new MAC filter template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > MAC Filtering**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a MAC address in the MAC Address column. The MAC Filter Templates window appears (see Figure 10-26).

Figure 10-26 MAC Filter Templates



Step 4 If you keep Import From File enabled, you need to enter a file path or click the Browse button to navigate to the file path. Skip to Step 9. If you disable Import from File, continue to Step 5.

The client MAC address appears.

Step 5 Choose the SSID which this MAC filter is applied to or choose the *any SSID* option.

Step 6 Use the drop-down menu to choose from the available interface names.

Step 7 Enter a user-defined description of this interface. Skip to Step 9.

Step 8 If you want to override the existing template parameter, click to enable this parameter.

Step 9 Click **Save**.

Configuring an Access Point or LBS Authorization

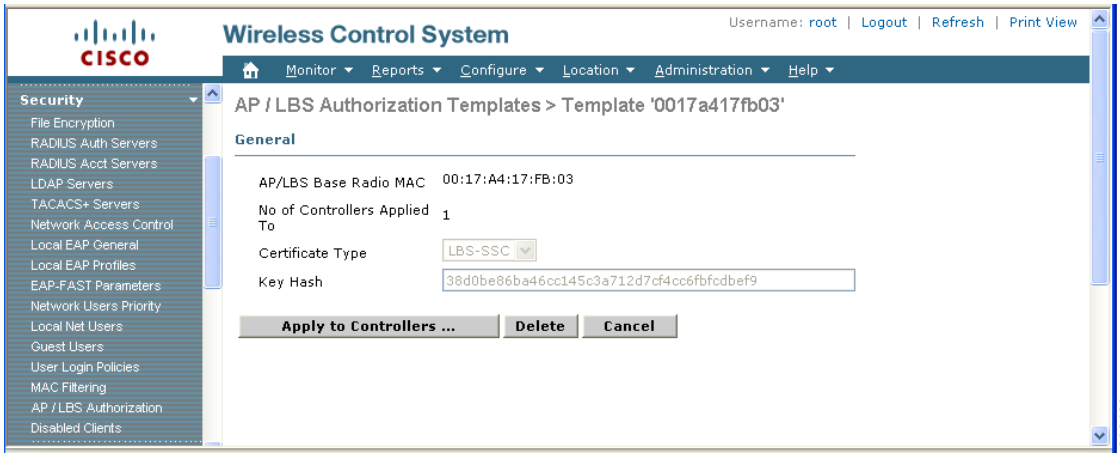
Follow these steps to add an access point or LBS authorization template or make changes to an existing template. These templates are devised for Cisco 11xx/12xx series access points converted from IOS to LWAPP or for 1030 access points connecting in bridge mode. Refer to the *Cisco Location Appliance Configuration Guide* for further information.

Step 1 Choose **Configure > Controller Templates**

Step 2 From the Security selections in the left sidebar menu, choose **AP/LBS authorization**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click a MAC address in the AP Base Radio MAC column. The AP/LBS Authorization Template appears (see Figure 10-27), and the number of controllers the template is applied to automatically populates.

Figure 10-27 AP/LBS Authorization Templates



Step 4 Select the **Import from File** check box if you want to import a file containing access point MAC addresses.

Note You can only import a .csv file. The .csv file format parallels the fields in the GUI and therefore includes access point base radio MAC, Type, Certificate Type (MIC or SSC), and key hash (such as 00:00:00:00:00:00, AP, SSC, xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx). Any other file formats are not supported.

Step 5 Enter the file path from where you want to import the file.

Step 6 Click **Save**.

Configuring a Manually Disabled Client Template

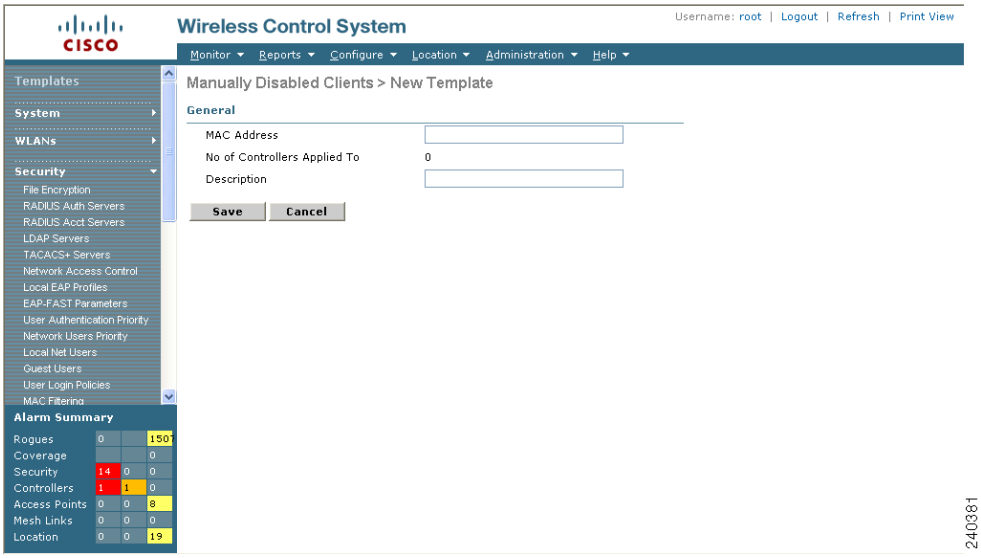
This page allows you to add a new manually disabled client template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > Disabled Clients**.

To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a disabled client in the Template Name column. The Manually Disabled Clients Template window appears (see Figure 10-28).

Figure 10-28 Manually Disabled Clients Template



Step 3 Enter the MAC address of the client you want to disable.

Step 4 Enter a description of the client you are setting to disabled.

Step 5 Click **Save**.

Configuring a CPU Access Control List (ACL) Template

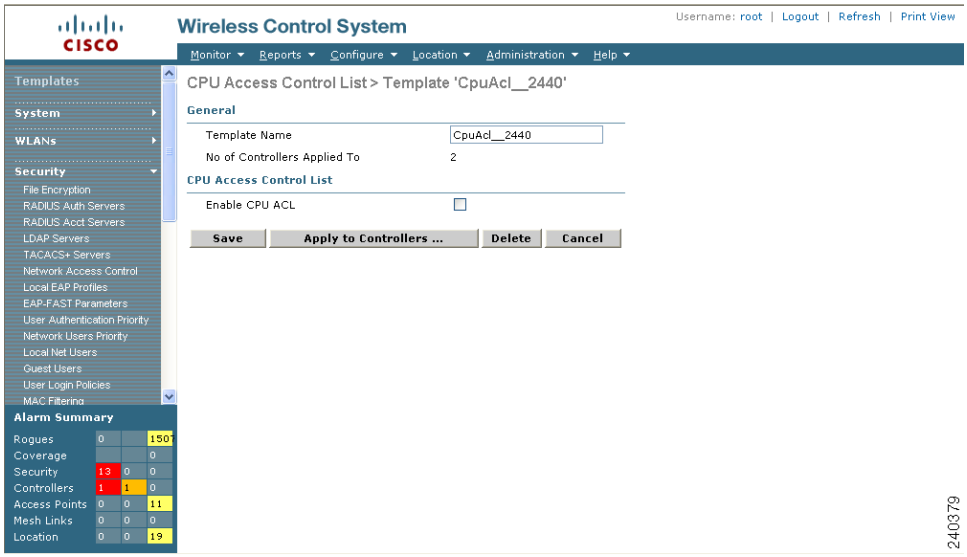
The existing ACLs established in the "Configuring Access Control List Templates" section on page 10-50 is used to set traffic controls between the central processing unit (CPU) and network processing unit (NPU). Follow these steps to add a CPU ACL template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 Choose **Security > CPU Access Control List** in the left sidebar menu.

Step 3 If you want to create a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template name in the ACL Name column. The CPU Access Control List Template appears (see Figure 10-29).

Figure 10-29 CPU Access Control List Template



Step 4 If you click the check box to enable CPU ACL, two more parameters appear. When CPU ACL is enabled and applied on the controller, WCS displays the details of the CPU ACL against that controller.

Step 5 From the ACL Name drop-down menu, choose a name from the list of defined names.

Step 6 From the CPU ACL Mode drop-down menu, choose which data traffic direction this CPU ACL list controls. The choices are the wired side of the data traffic, the wireless side of the data traffic, or both wired and wireless.

Step 7 Click **Save**.

Configuring a Rogue Policies Template

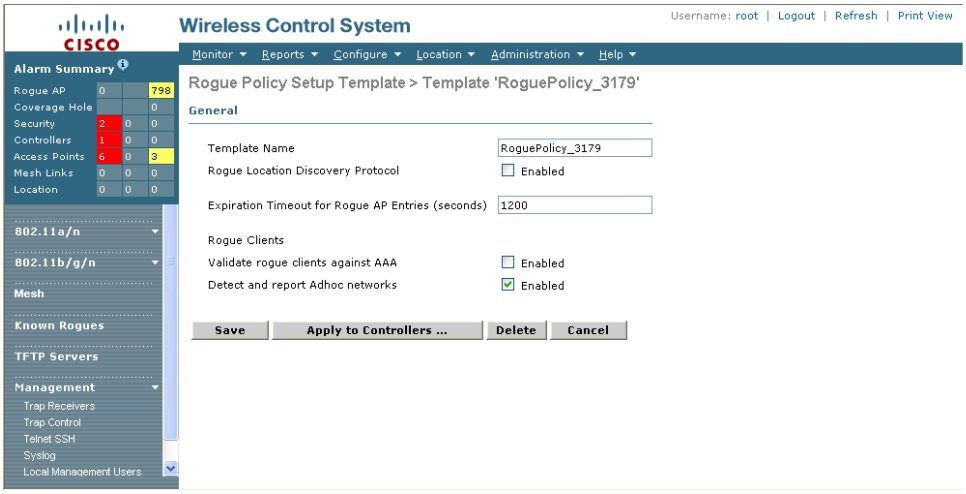
This window enables you to configure the rogue policy (for access points and clients) applied to the controller. Follow these steps to add a rogue policy template or modify an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > Rogue Policies**.

Step 3 If you want to create a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template name in the Template Name column. The Rogue Policy Setup Template appears (see Figure 10-30).

Figure 10-30 Rogue Policy Setup Template



Step 4 Check the Rogue Location Discovery Protocol to enable the discovery of rogue access points.

Step 5 Set the timeout (in seconds) for rogue access point entries.

Step 6 Check the Validate rogue clients against AAA check box to enable the AAA validation of rogue clients.

Step 7 Check the Detect and report Adhoc networks check box to enable detection and reporting of rogue clients participating in adhoc networking.

Step 8 Click **Save**.

Configuring a Trusted AP Policies Template

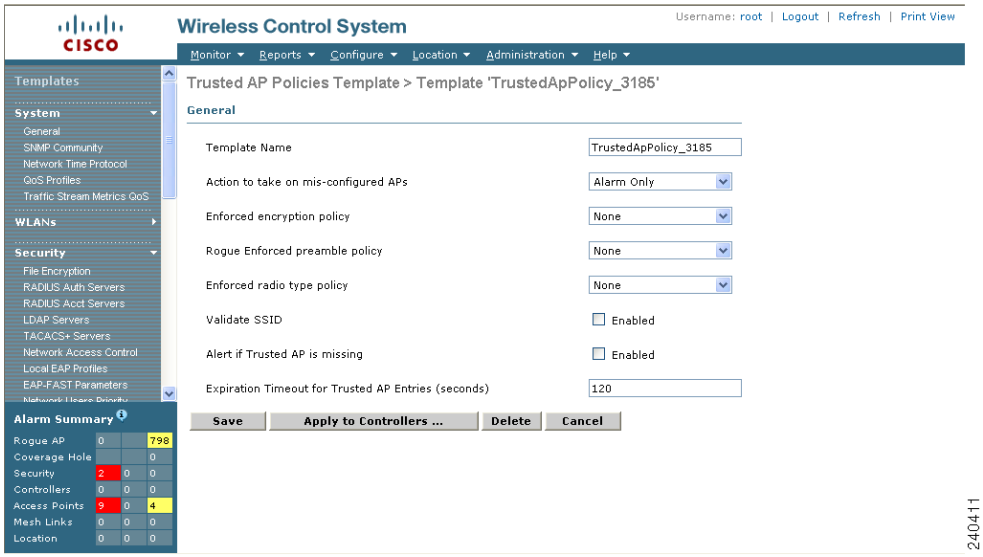
Follow these steps to add a trusted AP policy template or modify an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > Trusted AP Policies**.

Step 3 If you want to create a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template name in the Template Name column. The Trusted AP Policies Template appears (see Figure 10-31).

Figure 10-31 Trusted AP Policies Template



Step 4 Use the drop-down menu to choose which action to take with misconfigured access points. The choices are alarm only or contain.

Step 5 At the Enforced Encryption Policy drop-down menu, choose between none, open, WEP, and WPA.802.11i.

Step 6 At the Rogue Enforced Preamble Policy, choose none, short, or long.

Step 7 Check the Validate SSID checkbox to enable.

Step 8 Check if you want alerted when the trusted access point is missing.

Step 9 Determine an expiration timeout for trusted access point entries. The range is from 120 to 3600 seconds.

Step 10 Click **Save**.

Configuring a Client Exclusion Policies Template

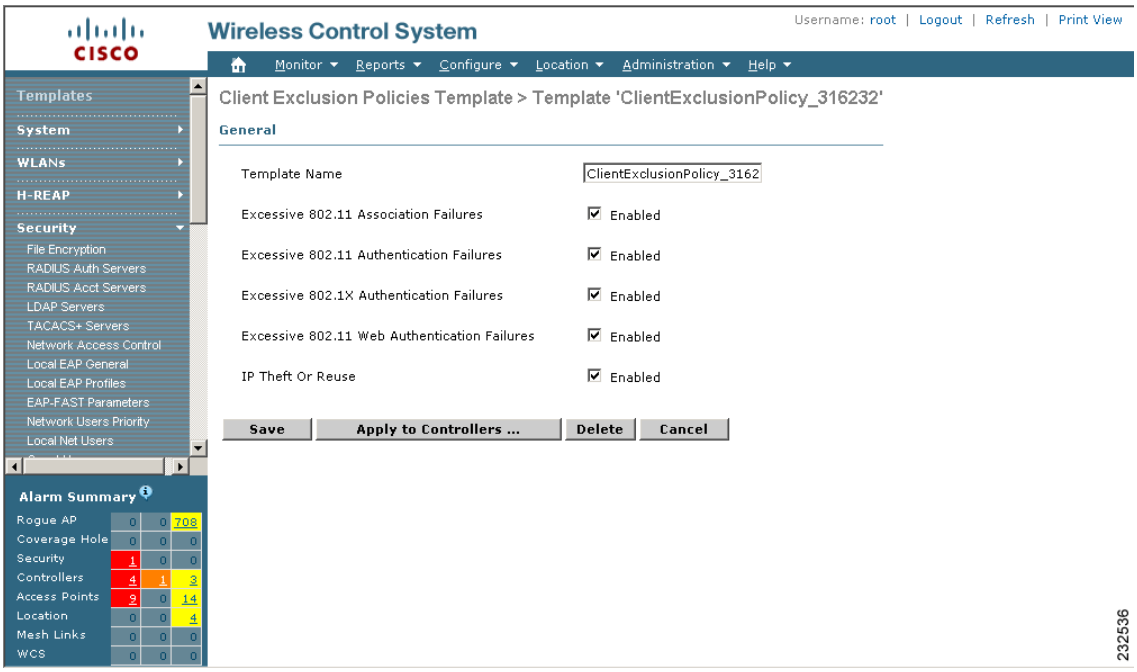
Follow these steps to add a client exclusion policies template or modify an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 Choose **Security > Client Exclusion Policies** in the left sidebar menu.

If you want to create a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template name in the Template Name column. The Client Exclusion Policies Template appears (see Figure 10-32).

Figure 10-32 Client Exclusion Policies Template



Step 3 To edit an existing client exclusion policies template, click its name in the Template Name column to go the Client Exclusion Policies Template window. Create or edit a client exclusion policies template by configuring its parameters.

Table 10-2 Client Exclusion Policies Template Parameters

Parameter	Description
Template Name	Enter a name for the client exclusion policy.
Excessive 802.11 Association Failures	Enable to exclude clients with excessive 802.11 association failures.
Excessive 802.11 Authentication Failures	Enable to exclude clients with excessive 802.11 authentication failures.
Excessive 802.1X Authentication Failures	Enable to exclude clients with excessive 802.1X authentication failures.
External Policy Server Failures	Enable to exclude clients with excessive external policy server failures.
Excessive 802.11 Web Authentication Failures	Enable to exclude clients with excessive 802.11 web authentication failures.
IP Theft or Reuse	Enable to exclude clients exhibiting IP theft or reuse symptoms.

Step 4 Click **Save**.

Configuring an Access Point Authentication and MFP Template

Management frame protection (MFP) provides for the authentication of 802.11 management frames by the wireless network infrastructure. Management frames can be protected in order to detect adversaries who are invoking denial of service attacks, flooding the network with associations and probes, interjecting as rogue access points, and affecting the network performance by attacking the QoS and radio measurement frames.

When enabled, the access point protects the management frames it transmits by adding a message integrity check information element (MIC IE) to each frame. Any attempt to copy, alter, or replay the frame invalidates the MIC, causing any receiving access point configured to detect MFP frames to report the discrepancy. An access point must be a member of a WDS to transmit MFP frames.

When MFP detection is enabled, the access point validates every management frame that it receives from other access points in the network. It ensures that the MIC IE is present (when the originator is configured to transmit MFP frames) and matches the content of the management frame. If it receives any frame that does not contain a valid MIC IE from a BSSID belonging to an access point that is configured to transmit MFP frames, it reports the discrepancy to the network management system.

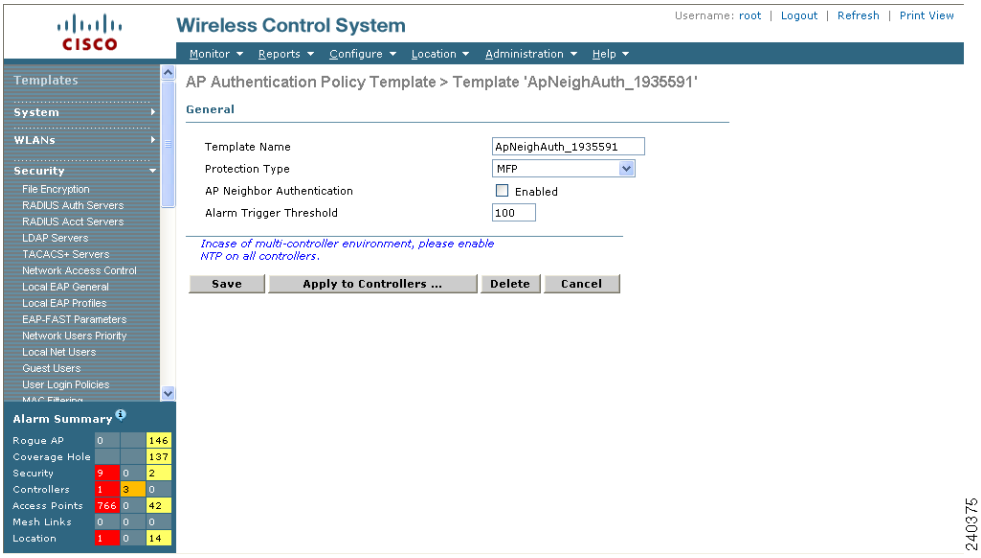
Follow these steps to add a new template for the access point authentication and management frame protection (MFP) or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, select **Security > AP Authentication and MFP**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a MAC address in the AP Base Radio MAC column. The AP Authentication Policy Template appears (see Figure 10-33), and the number of controllers the template is applied to automatically populates.

Figure 10-33 AP Authentication Policy Template



Step 4 From the Protection Type drop-down menu, choose one of the following authentication policies:

- None: No access point authentication policy.
- AP Authentication: Apply authentication policy.
- MFP: Apply management frame protection.

Step 5 Check to enable AP neighbor authentication. With this feature enabled, the access points sending RRM neighbor packets with different RF network names are reported as rogues.

Step 6 Alarm trigger threshold appears only when AP authentication is selected as a protection type. Set the number of hits from an alien access point to ignore before raising an alarm.

The valid range is from 1 to 255. The default value is 255.

Step 7 Click **Save**.

Configuring a Web Authentication Template

With web authentication, guests are automatically redirected to a web authentication page when they launch their browsers. Guests gain access to the WLAN through this web portal. Wireless LAN administrators using this authentication mechanism should have the option of providing unencrypted or encrypted guest access. Guest users can then log into the wireless network using a valid username and password, which is encrypted with SSL. Web authentication accounts may be created locally or managed by a RADIUS server. The Cisco Wireless LAN controllers can be configured to support a web authentication client. You can use this template to replace the Web authentication page provided on the controller.

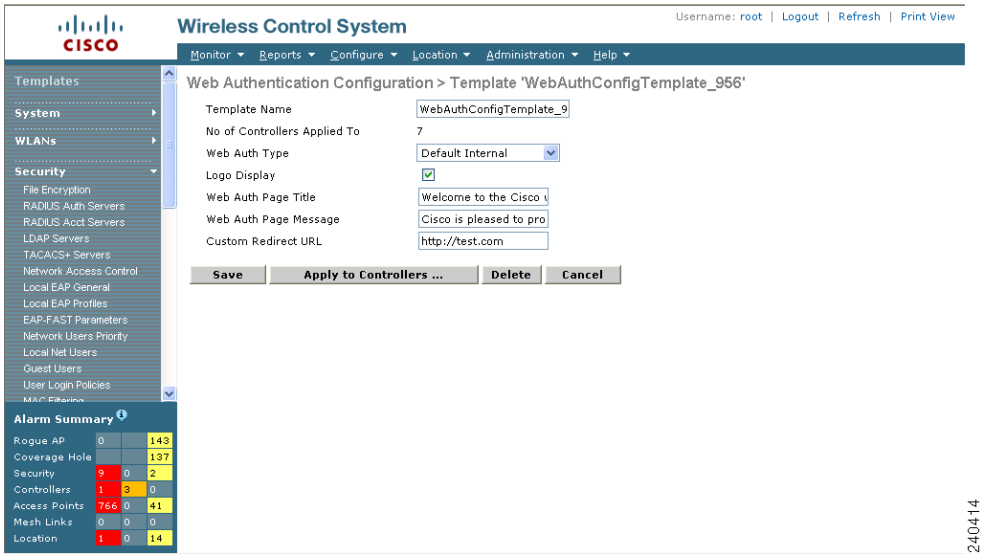
Follow these steps to add a web authentication template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Security > Web Auth Configuration**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template in the Template Name column. The Web Authentication Configuration Template window appears (see Figure 10-34), and the number of controllers the template is applied to automatically populates.

Figure 10-34 Web Authentication Configuration Template



Step 4 Choose the appropriate web authentication type from the drop-down menu. The choices are default internal, customized web authentication, or external.

- If you choose default internal, you can still alter the page title, message, and redirect URL, as well as whether the logo displays. Continue to Step 5.
- If you choose customized web authentication, click **Save** and apply this template to the controller. You are prompted to download the web authentication bundle.

Note Before you can choose customized web authentication, you must first download the bundle by going to **Config > Controller** and choose **Download Customized Web Authentication** from the Select a command drop-down menu and click **GO**.

- If you choose external, you need to enter the URL you want to redirect to after a successful authentication. For example, if the value entered for this field is http://www.company.com, the user would be directed to the company home page.

Step 5 Click to enable Logo Display if you want your company logo displayed.

Step 6 Enter the title you want displayed on the Web authentication page.

Step 7 Enter the message you want displayed on the Web authentication page.

Step 8 Provide the URL where the user is redirected after a successful authentication. For example, if the value entered for this field is http://www.company.com, the user would be directed to the company home page.

Step 9 Click **Save**.

Downloading a Customized Web Authentication Page

You can download a customized Web authentication page to the controller. A customized web page is created to establish a username and password for user web access.

When downloading customized web authentication, these strict guidelines must be followed:

- A username must be provided.
- A password must be provided.
- A redirect URL must be retained as a hidden input item after extracting from the original URL.
- The action URL must be extracted and set from the original URL.
- Scripts to decode the return status code must be included.
- All paths used in the main page should be of relative type.

Before downloading, the following steps are required:

Step 1 Download the sample login.html bundle file from the server. The .html file is shown in Figure 10-35. The login page is presented to web users the first time they access the WLAN if web authentication is turned on.

Figure 10-35 Login.html

Step 2 Edit the login.html file and save it as a .tar or .zip file.

Note You can change the text of the Submit button to read Accept terms and conditions and Submit.

Step 3 Make sure you have a Trivial File Transfer Protocol (TFTP) server available for the download. Keep these guidelines in mind when setting up a TFTP server:

- If you are downloading through the service port, the TFTP server must be on the same subnet as the service port because the service port is not routable. However, if you want to put the TFTP server on a different network while the management port is down, add a static route if the subnet where the service port resides has a gateway (config route add *IP address of TFTP server*).
- If you are downloading through the distribution system network port, the TFTP server can be on the same or a different subnet because the distribution system port is routable.
- A third-party TFTP server cannot run on the same computer as the Cisco WCS because WCS's built-in TFTP server and third-party TFTP server use the same communication port.

Step 4 Download the .tar or .zip file to the controller(s).

Note The controller allows you to download up to 1 MB of a tar file containing the pages and image files required for the Web authentication display. The 1 MB limit includes the total size of uncompressed files in the bundle.

You can now continue with the download.

Step 5 Copy the file to the default directory on your TFTP server.

Step 6 Choose **Configure > Controllers**.

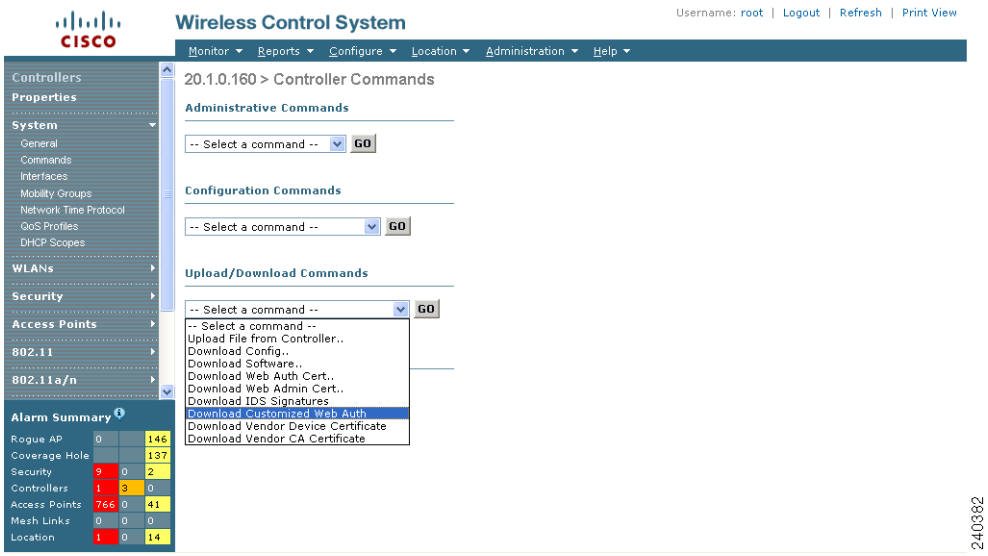
Step 7 Choose a controller by clicking the URL for the corresponding IP address. If you select more than one IP address, the customized Web authentication page is downloaded to multiple controllers.

Step 8 From the left sidebar menu, choose **System > Commands**.

Step 9 From the Upload/Download Commands drop-down menu, choose **Download Customized Web Auth** and click **GO**.

Step 10 The IP address of the controller to receive the bundle and the current status are displayed (see Figure 10-36).

Figure 10-36 Download Customized Web Auth Bundle to Controller



Step 11 Choose **local machine** from the File is Located On parameter. If you know the filename and path relative to the server's root directory, you can also select TFTP server.

Note For a local machine download, either .zip or .tar file options exists, but the WCS does the conversion of .zip to .tar automatically. If you chose a TFTP server download, only .tar files would be specified.

Step 12 Enter the maximum number of times the controller should attempt to download the file in the Maximum Retries parameter.

Step 13 Enter the maximum amount of time in seconds before the controller times out while attempting to download the file in the Timeout parameter.

Step 14 The files are uploaded to the c:\tftp directory. Specify the local file name in that directory or use the Browse button to navigate to it.

Step 15 Click **OK**.

If the transfer times out for some reason, you can simply choose the TFTP server option in the File Is Located On parameter, and the Server File Name is populated for you. The local machine option initiates a two-step operation. First, the local file is copied from the administrator's workstation to WCS's own built-in TFTP server. Then the controller retrieves that file. For later operations, the file is already in the WCS server's TFTP directory, and the download web page now automatically populates the filename.

Step 16 Click the "Click **here** to download a sample tar file" to get an option to open or save the login.tar file.

Step 17 After completing the download, you are directed to the new page and able to authenticate.

Configuring Access Control List Templates

An access control list (ACL) is a set of rules used to limit access to a particular interface (for example, if you want to restrict a wireless client from pinging the management interface of the controller). ACLs can be applied to data traffic to and from wireless clients or to all traffic destined for the controller central processing unit (CPU) and can now support reusable grouped IP addresses and reusable protocols. After ACLs are configured in the template, they can be applied to the management interface, the AP-manager interface, or any of the dynamic interfaces for client data traffic; to the network processing unit (NPU) interface for traffic to the controller CPU; or to a WAN. Follow these steps to add an ACL template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 Choose **Access Control > Access Control Lists** in the left sidebar menu.

Step 3 If you want to create a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template name in the ACL Name column. The Access Control List name appears in the window.

Step 4 To create reusable grouped IP addresses and protocols, choose **Access Control > IP Groups** from the left sidebar menu.

Step 5 All the IP address groups are listed. One IP address group can have a maximum of 128 IP address and netmask combinations. To define a new IP address group, choose **Add IP Group** from the Select a command drop-down menu and click **GO**. To view or modify an existing IP address group, click the URL of the IP address group. The IP address group window opens.

Note For the IP address of any, an *any* group is predefined.

Step 6 To define an additional protocol that is not a standard predefined one, choose **Access Control > Protocol Groups** from the left sidebar menu. The protocol groups with their source and destination port and DSCP are displayed.

Step 7 To create a new protocol group, choose **Add Protocol Group** from the Select a command drop-down menu and click **GO**. To view or modify an existing protocol group, click the URL of the group. The Protocol Groups window appears.

Step 8 The rule name is provided for the existing rules, or you can now enter a name for a new rule. ACLs are not required to have rules defined. When a packet matches all the parameters of a rule, the action for this rule is exercised.

Step 9 In the Start Port parameter, enter a value (between 1 and 64) to determine the order of this rule in relation to any other rules defined for this 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 5 to 6 and sequence 6 to 7. Any rules generated can be edited individually and resequenced in the desired order.

Step 10 From the Source Port drop-down menu, specify the source of the packets to which this ACL applies.

Step 11 For the Destination drop-down menu, specify the destination of the packets to which this ACL applies.

Step 12 In the DSCP drop-down menu, choose any or a specific IP address. DSCP is a packet header code that can be used to define the quality of service across the Internet.

Step 13 Click **Save**.

Step 14 You can now create new mappings from the defined IP address groups and protocol groups. To define a new mapping, choose the ACL template to which you want to map the new groups. All ACL mappings appear on the top of the window, and all ACL rules appear on the bottom.

Step 15 To define a new mapping, choose **Add Rule Mappings** from the Select a command drop-down menu. The Add Rule Mapping windows appears.

Step 16 Choose the desired IP address groups, protocol groups, and action and click **Add**. The new mappings will populate the bottom table.

Step 17 Click **Save**.

Step 18 You can now automatically generate rules from the rule mappings you created. Choose the mappings for which you want to generate rules and click **Generate**. This automatically creates the rules. These rules are generated with contiguous sequence. That is, if rules 1 through 4 are already defined and you add rule 29, it is added as rule 5.

Existing ACL templates are duplicated into a new ACL template. This duplication clones all the ACL rules and mappings defined in the source ACL template.

Configuring a Policy Name Template (for 802.11a/n or 802.11b/g/n)

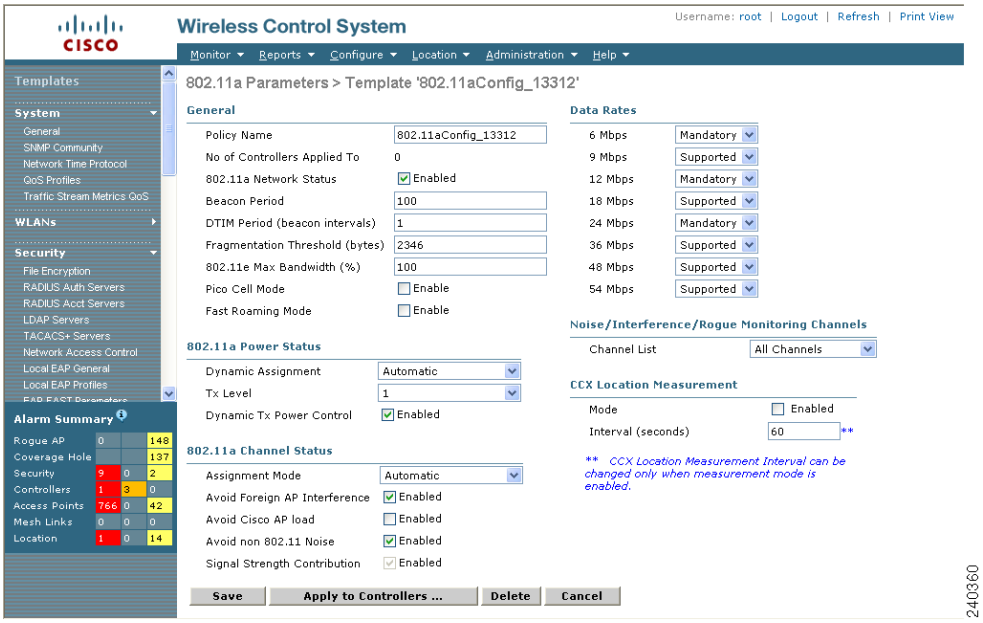
Follow these steps to add a new policy name template for 802.11a/n or 802.11b/g/n or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose either **802.11a/n > Parameters or 802.11b/g/n > Parameters**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu. To make modifications to an existing template, click to select a policy name in the Policy Name column. The 802.11a/n or b/g/n Parameters Template window appears (see Figure 10-37), and the number of controllers the template is applied to automatically populates.

Figure 10-37 802.11a/n Parameters Template



Step 4 Click the check box if you want to enable 802.11a/n or b/g/n network status.

Step 5 Enter the amount of time between beacons in kilomicroseconds. The valid range is from 100 to 600 milliseconds.

Step 6 Enter the number of beacon intervals that may elapse between transmission of beacon frames containing a traffic indicator message (TIM) element whose delivery count field is 0. This value is transmitted in the DTIM period field of beacon frames. When client devices receive a beacon that contains a DTIM, they normally wake up to check for pending packets. Longer intervals between DTIMS let clients sleep longer and preserve power. Conversely, shorter DTIM periods reduce the delay in receiving packets but use more battery power because clients wake up more often.

Step 7 At the Fragmentation Threshold parameter, determine the size at which packets are fragmented (sent as several pieces instead of as one block). Use a low setting in areas where communication is poor or where there is a great deal of radio interference.

Step 8 Enter the percentage for 802.11e maximum bandwidth.

Step 9 Click if you want short preamble enabled.

Step 10 Click the **Pico Cell Mode** check box if you want it enabled. This feature enables automatic operating system parameter reconfiguration, allowing the operating system to function efficiently in pico cell deployments.

Step 11 Click the **Fast Roaming Mode** check box if you want to enable it. Enabling Cisco's Centralized Key Management (CCKM) authentication key management allows fast exchange when a client roams from one access point to another.

Step 12 At the Dynamic Assignment drop-down menu, choose one of 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 Assign Now button is selected.
- Disabled - No dynamic transmit power assignments occur, and values are set to their global default.

Step 13 Use the Tx Level drop-down menu to determine the access point's transmit power level. The available options are as follows:

- 1 - Maximum power allowed per country code setting
- 2 - 50% power
- 3 - 25% power
- 4 - 6.25 to 12.5% power
- 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.

Step 14 The Assignment Mode drop-down menu has three dynamic channel modes:

- Automatic - The channel assignment is periodically updated for all access points that permit this operation. This is also the default mode.
- On Demand - Channel assignments are updated when desired.
- OFF - No dynamic channel assignments occur, and values are set to their global default.

Step 15 At the Avoid Foreign AP Interference check box, click if you want to enable it. Enable this parameter to have RRM consider interference from foreign Cisco access points (those non-Cisco access points outside RF/mobility domain) when assigning channels. This foreign 802.11 interference. Disable this parameter to have RRM ignore this interference.

In certain circumstances with significant interference energy (dB) and load (utilization) from foreign access points, RRM may adjust the channel assignment to avoid these channels (and sometimes adjacent channels) in access points close to the foreign access points. This increases capacity and reduces variability for the Cisco Wireless LAN Solution.

Step 16 Click the **Avoid Cisco AP Load** check box if you want it enabled. Enable this 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 RRM 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, RRM can assign better re-use patterns to those access points that carry more traffic load.

Step 17 Click the **Avoid non 802.11 Noise** check box if you want to enable it. Enable this 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 RRM ignore this interference.

In certain circumstances with significant interference energy (dB) from non-802.11 noise sources, RRM may adjust the channel assignment to avoid these channels (and sometimes adjacent channels) in access points close to the noise sources. This increases capacity and reduces variability for the Cisco Wireless LAN Solution.

Step 18 The Signal Strength Contribution check box is always enabled (not configurable). 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 Wireless LAN Solution capacity and a reduction in co-channel and adjacent channel interference.

Step 19 Data rates 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. However, it is not required that a client uses all the rates marked supported in order to associate. For each rate, a pull-down selection of Mandatory or Supported is available. Each data rate can also be set to Disabled to match client settings.

Step 20 At the Channel List drop-down menu in the Noise/Interference/Rogue Monitoring Channels section, choose between all channels, country channels, or DCA channels based on the level of monitoring you want. Dynamic Channel Allocation (DCA) automatically selects a reasonably good channel allocation amongst a set of managed devices connected to the controller.

Step 21 The Cisco Compatible Extension's location measurement interval can only be changed when measurement mode is enabled to broadcast radio measurement requests. When enabled, this enhances the location accuracy of clients.

Step 22 Click **Save**.

Configuring High Density Templates

A method to mitigate the inter-cell contention problem in high-density networks is to adjust the access point and client station receiver sensitivity, CCA sensitivity, and transmit power parameters in a relatively cooperative manner. By adjusting these variables, the effective cell size can be reduced, not by lowering the transmit power but by increasing the necessary received power before an access point and client consider the channel sufficiently clear for packet transfer. Follow these steps to add high density on a template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

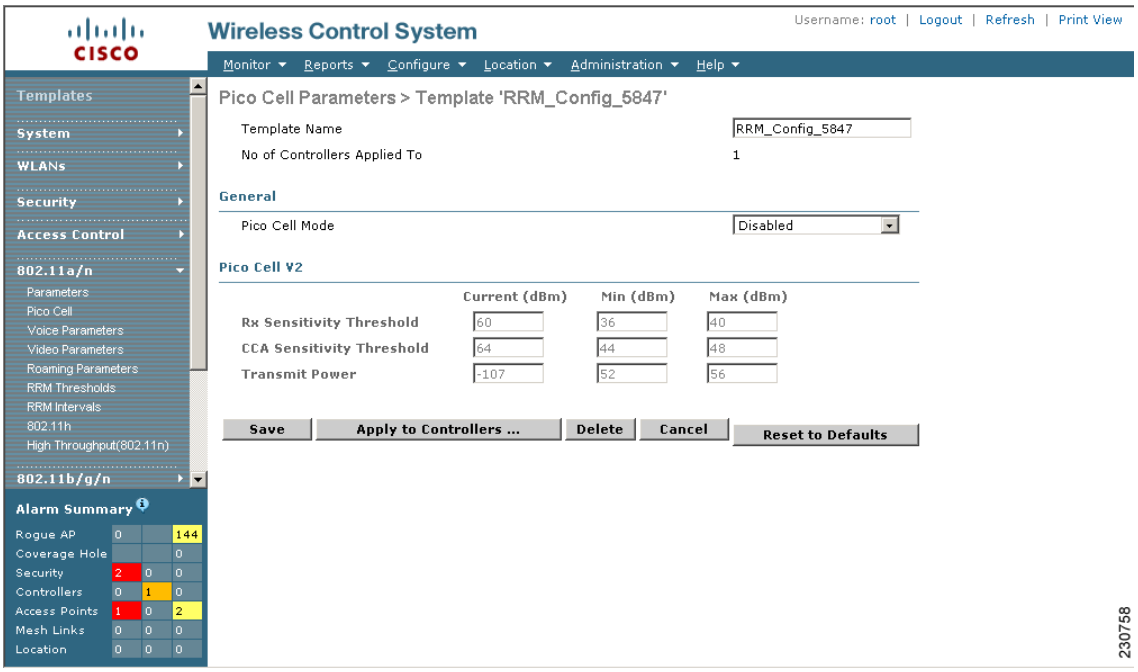
Step 2 From the left sidebar menu, choose either **802.11a/n > Parameters**.

Step 3 In the General portion of this window, you see a Pico Cell Mode parameter. Click the check box to enable pico cell.

Note In order for this check box to have validity, you must have software version 4.1 or later. If you have an earlier version, this check box value is ignored.

Step 4 Choose **802.11a/n > Pico Cell** from the left sidebar menu. Click which template in the Template Name column you want to modify or choose **Add Template** from the Select a command drop-down menu and click **GO**. The window as shown in Figure 10-38 appears.

Figure 10-38 Pico Cell Parameters Window



Note If the Pico Cell Mode parameter is set to Disabled or V1, the Pico Cell V2 parameters are grayed out.

Note For pico cell V2 to work with Intel 3945 clients, the QBSS feature also has to be enabled (i.e., WMM clients must be set to allowed), and fast roaming cannot be enabled.

Step 5 Go to **802.11a/n > Parameters** and ensure that the 802.11a/n Network Status check box is not enabled.

Step 6 From the Pico Cell Mode drop-down menu, choose **V2**. By choosing V2, the parameters for access point and clients share the same values and make communication symmetrical. This selection also allows you to put in values for Rx sensitivity, CCA sensitivity, and transmit power although the defaulted minimum and maximum values represent the Cisco recommended values for most networks.

Note You can only choose V2 if you have software version 4.1 or later.

Step 7 Set the Rx sensitivity based on the desired receiver sensitivity for 802.11a/n radios. The Current column shows what is currently set on the access point and clients, and the Min and Max columns show the range to which the access points and clients should adapt. Receiver signal strength values falling outside of this range are normally disregarded.

Step 8 Set the CCA sensitivity based on when the access point or client considers the channel clear enough for activity. The current column shows what is currently set on the access point and clients, and Min and Max columns show the range to which the access points and clients should adapt. CCA values falling outside of this range are normally disregarded.

Step 9 Click **Save** to save these values. Before choosing **Reset to Defaults** you must turn off the 802.11 network.

Configuring a Voice Parameter Template (for 802.11a/n or 802.11b/g/n)

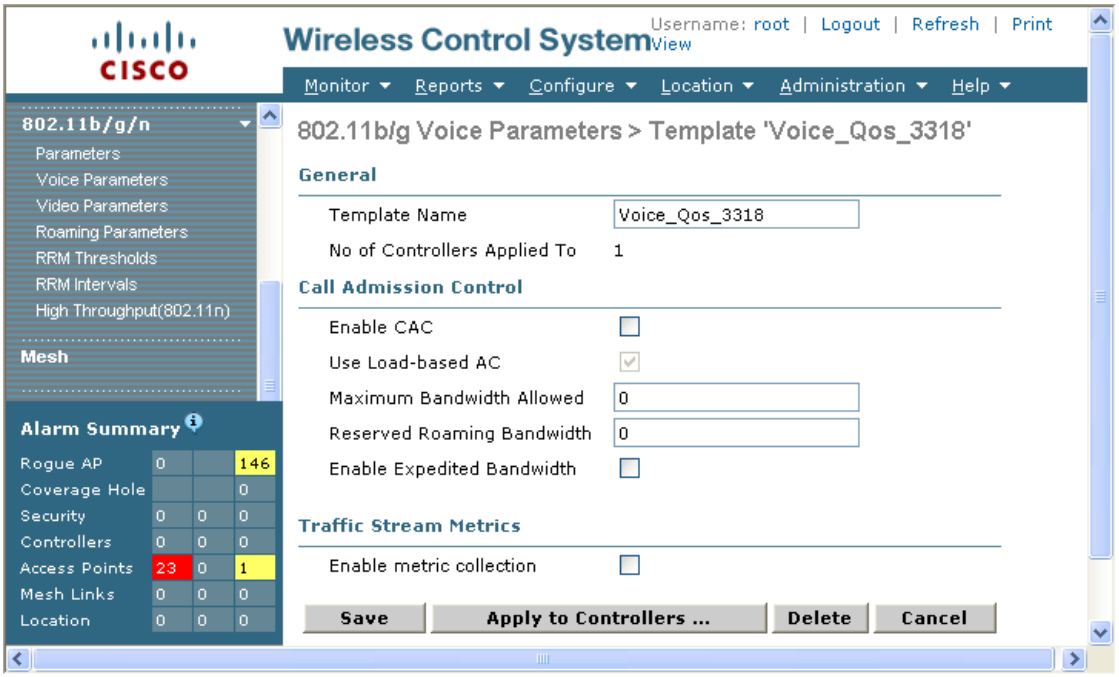
Follow these steps to add a template for either 802.11a/n or 802.11b/g/n voice parameters, such as call admission control and traffic stream metrics or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose either **802.11a/n > Voice Parameters** or **802.11b/g/n > Voice Parameters**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO.** To make modifications to an existing template, click to select a template in the Template Name column. The 802.11a/n or 802.11b/g/n Voice Parameters window appears (see Figure 10-39), and the number of controllers the template is applied to automatically populates.

Figure 10-39 802.11b/g/n Voice Parameters Template



Step 4 For end users to experience acceptable audio quality during a VoIP phone call, packets must be delivered from one endpoint to another with low latency and low packet loss. To maintain QoS under differing network loads, call admission control (CAC) is required. CAC on an access point allows it to maintain controlled QoS when the network is experiencing congestion and keep the maximum allowed number of calls to an acceptable quantity. Click the check box to enable CAC.

Step 5 Load-based CAC incorporates a measurement scheme that takes into account the bandwidth consumed by all traffic types from itself, from co-channel access points, and by co-located channel interference. Load-based CAC also covers the additional bandwidth consumption resulting from PHY and channel impairment. To enable load-based CAC for this radio band, check the Use Load-based AC check box.

Step 6 Enter the percentage of maximum bandwidth allowed.

Step 7 Enter the percentage of reserved roaming bandwidth.

Step 8 Click if you want to enable expedited bandwidth as an extension of CAC for emergency calls. You must have an expedited bandwidth IE that is Cisco Compatible Extensions (version 5) compliant so that a TSPEC request is given higher priority.

Step 9 Click the check box if you want to enable metric collection. Traffic stream metrics are a series of statistics about VoIP over your wireless LAN and informs you of the QoS of the wireless LAN. For the access point to collect measurement values, traffic stream metrics must be enabled. When this is enabled, the controller begins collecting statistical data every 90 seconds for the 802.11b/g/n interfaces from all associated access points. If you are using VoIP or video, this feature should be enabled.

Step 10 Click **Save**.

Configuring a Video Parameter Template (for 802.11a/n or 802.11b/g/n)

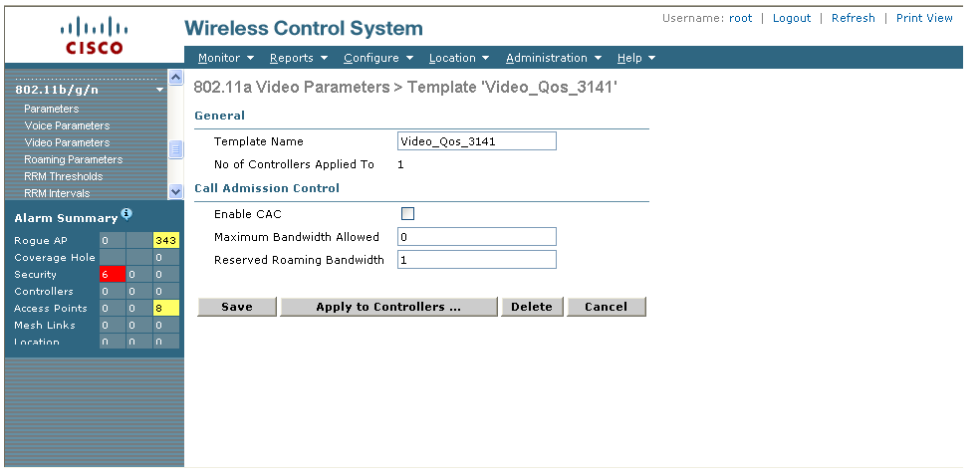
Follow these steps to add a template for either 802.11a/n or 802.11b/g/n video parameters or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose either **802.11a/n > Video Parameters** or **802.11b/g/n > Video Parameters**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO.** To make modifications to an existing template, click to select a template in the Template Name column. The 802.11a/n or 802.11b/g/n Video Parameters window appears (see Figure 10-40), and the number of controllers the template is applied to automatically populates.

Figure 10-40 802.11a/n Video Parameters Template



Step 4 For end users to experience acceptable audio quality during a VoIP phone call, packets must be delivered from one endpoint to another with low latency and low packet loss. To maintain QoS under differing network loads, call admission control (CAC) is required. CAC on an access point allows it to maintain controlled QoS when the network is experiencing congestion and keeps the maximum allowed number of calls to an acceptable quantity. Click the check box to enable CAC.

Step 5 Enter the percentage of maximum bandwidth allowed.

Step 6 Enter the percentage of reserved roaming bandwidth.

Step 7 Click **Save**.

Configuring EDCA Parameters through a Controller Template

Enhanced distributed channel access (EDCA) parameters are designed to provide preferential wireless channel access for voice, video, and other quality-of-service (QoS) traffic. Follow the instructions in this section to configure 802.11a/n or 802.11b/g/n EDCA parameters through a controller template:

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, select **802.11a/n > EDCA Parameters** or **802.11b/g/n > EDCA Parameters** to open the EDCA Parameters summary page.

Step 3 Modify or view a current template by selecting the **Template Name**
-or-
Create a new template by selecting **Add Template** from the **Select a command** drop-down menu.

Step 4 Choose one of the following options from the **EDCA Profile** drop-down menu:

- WMM—Enables the Wi-Fi Multimedia (WMM) default parameters. This is the default value. Choose this option when voice or video services are not deployed on your network.
- Spectralink Voice Priority—Enables Spectralink voice priority parameters. Choose this option if Spectralink phones are deployed on your network to improve the quality of calls.
- Voice Optimized—Enables EDCA voice-optimized profile parameters. Choose this option when voice services other than Spectralink are deployed on your network.
- Voice & Video Optimized —Enables EDCA voice- and video-optimized profile parameters. Choose this option when both voice and video services are deployed on your network.

Note Video services must be deployed with admission control (ACM). Video services without ACM are not supported.

Note You must shut down radio interface before configuring EDCA Parameters.

Step 5 Click the **Enable Streaming MAC** checkbox to enable this feature.

Note Only enable Streaming MAC if all clients on the network are WMM compliant.

Configuring a Roaming Parameters Template (for 802.11a/n or 802.11b/g/n)

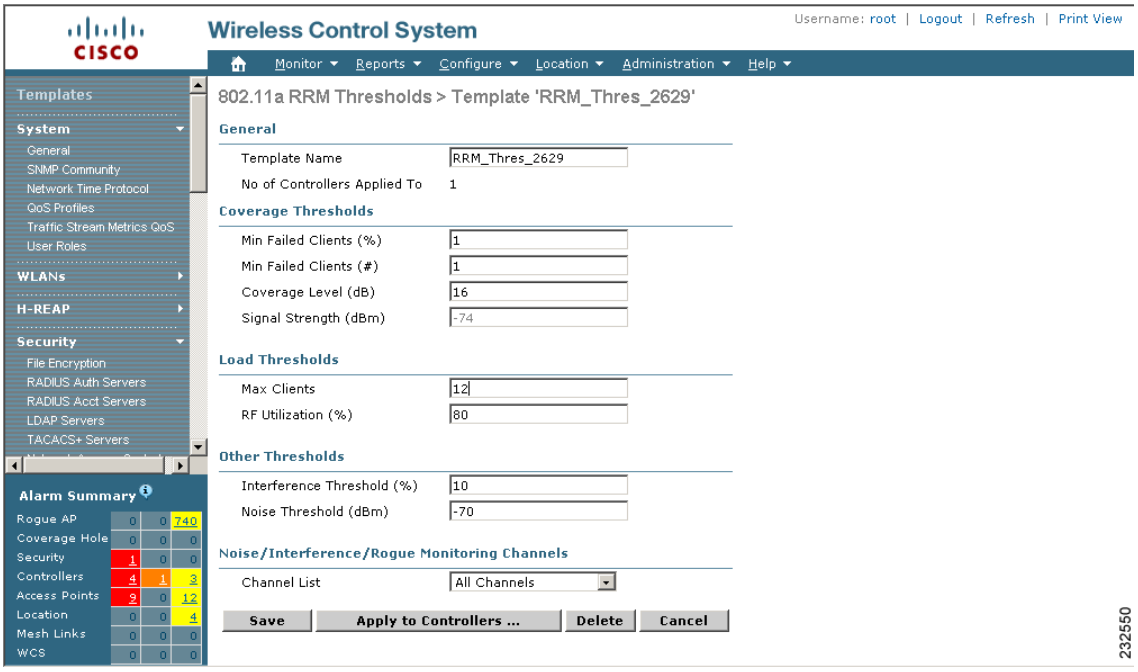
Follow these steps to add a roaming parameters template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **802.11a/n > RRM Thresholds** or **802.11b/g/n > RRM Thresholds**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO.** To make modifications to an existing template, click to select a template name in the Template Name column. The Roaming Parameters Template appears (see Figure 10-41), and the number of controllers the template is applied to automatically populates.

Figure 10-41 802.11 Roaming Parameters Template



Step 4 Use the Mode drop-down menu to choose one of the configurable modes: default values and custom values. When the default values option is chosen, the roaming parameters are unavailable with the default values displayed in the text boxes. When the custom values option is selected, the roaming parameters can be edited in the text boxes. To edit the parameters, continue to Step 5.

Step 5 In the Minimum RSSI field, enter a value for the minimum received signal strength indicator (RSSI) required for the client to associate to an access point. If the client's average received signal power dips below this threshold, reliable communication is usually impossible. Therefore, clients must already have found and roamed to another access point with a stronger signal before the minimum RSSI value is reached.

Range: -80 to -90 dBm

Default: -85 dBm

Step 6 In the Hysteresis field, enter a value to indicate how strong the signal strength of a neighboring access point must be for the client to roam to it. This parameter is intended to reduce the amount of "ping ponging" between access points if the client is physically located on or near the border between two access points.

Range: 2 to 4 dB

Default: 2 dB

Step 7 In the Adaptive Scan Threshold field, enter the RSSI value from a client's associated access point, below which the client must be able to roam to a neighboring access point within the specified transition time. This parameter also provides a power-save method to minimize the time that the client spends in active or passive scanning. For example, the client can scan slowly when the RSSI is above the threshold and scan more rapidly when below the threshold.

Range: -70 to -77 dB

Default: -72 dB

Step 8 In the Transition Time field, enter the maximum time allowed for the client to detect a suitable neighboring access point to roam to and to complete the roam, whenever the RSSI from the client's associated access point is below the scan threshold.

The Scan Threshold and Transition Time parameters guarantee a minimum level of client roaming performance. Together with the highest expected client speed and roaming hysteresis, these parameters make it possible to design a wireless LAN network that supports roaming simply by ensuring a certain minimum overlap distance between access points.

Range: 1 to 10 seconds

Default: 5 seconds

Step 9 Click **Save**.

Configuring an RRM Threshold Template (for 802.11a/n or 802.11b/g/n)

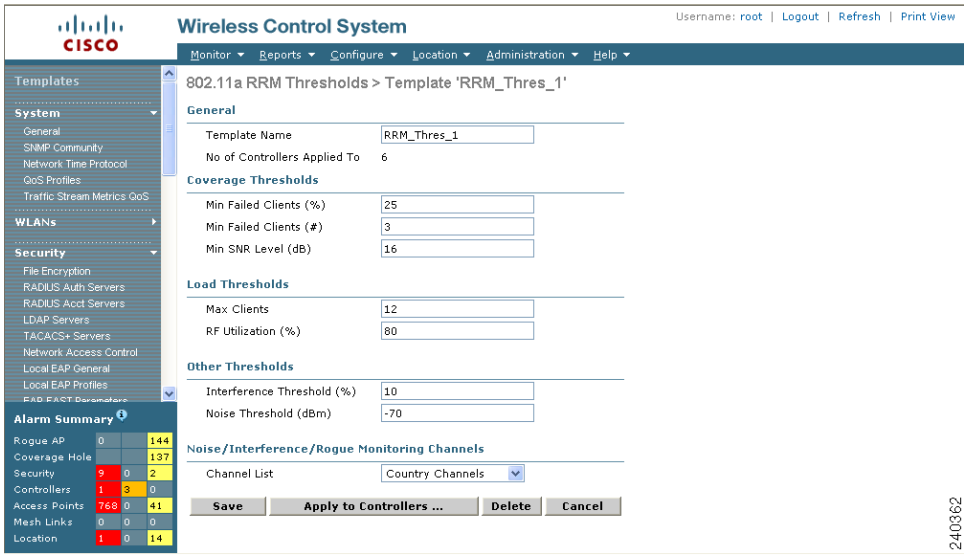
Follow these steps to add a new 802.11a/n or 802.11b/g/n RRM threshold template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **802.11a/n > RRM Thresholds** or **802.11b/g/n > RRM Thresholds**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO.** To make modifications to an existing template, click to select a template name in the Template Name column. The 802.11a/n or 802.11b/g/n RRM Thresholds Template appears (see Figure 10-42), and the number of controllers the template is applied to automatically populates.

Figure 10-42 802.11b/g/n RRM Thresholds Template



Step 4 Enter the minimum percentage of failed clients that are currently associated with the controller.

Step 5 Enter the minimum number of failed clients that are currently associated with the controller.

Step 6 At the Min SNR Level parameter, enter the minimum signal-to-noise ratio of the client RF session.

Note When the Min SNR Level (dB) parameter is adjusted, the value of the Signal Strength (dB) automatically reflects this change. The Signal Strength (dB) parameter provides information regarding what the target range of coverage thresholds will be when adjusting the SNR value.

Step 7 Enter the maximum number of clients currently associated with the controller.

Step 8 At the RF Utilization parameter, enter the percentage of threshold for either 802.11a/n or 802.11b/g/n.

Step 9 Enter an interference threshold.

Step 10 Enter a noise threshold between -127 and 0 dBm. When outside of this threshold, the controller sends an alarm to WCS.

Step 11 At the Channel List drop-down menu in the Noise/Interference/Rogue Monitoring Channels section, choose between all channels, country channels, or DCA channels based on the level of monitoring you want. Dynamic Channel Allocation (DCA) automatically selects a reasonably good channel allocation amongst a set of managed devices connected to the controller.

Step 12 Click **Save**.

Configuring an RRM Interval Template (for 802.11a/n or 802.11b/g/n)

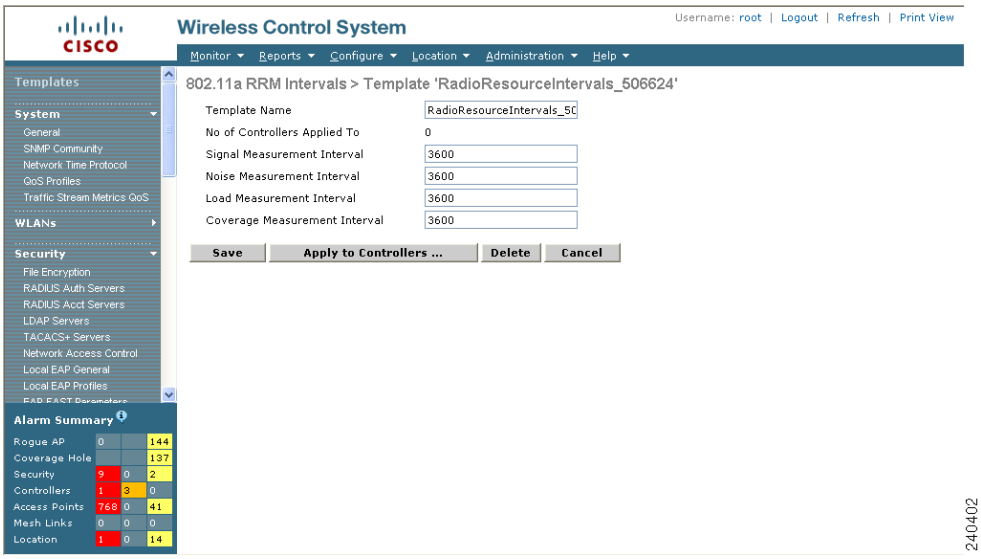
Follow these steps to add an 802.11a/n or 802.11b/g/n RRM interval template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **802.11a/n > RRM Intervals** or **802.11b/g/n > RRM Intervals**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template name from the Template Name column. The 802.11a/n or 802.11b/g/n RRM Threshold Template appears (see Figure 10-43), and the number of controllers the template is applied to automatically populates.

Figure 10-43 802.11a/n RRM Intervals Template



Step 4 In the Neighbor Packet Frequency field, enter (in seconds) how frequently neighbor packets (messages) are sent, which eventually builds the neighbor list. The valid range is 60 to 3600 seconds, and the default value is 60 seconds for 802.11a radios and 180 seconds for 802.11b/g radios.

Step 5 Enter at which interval you want noise and interference measurements taken for each access point. The default is 300 seconds.

Step 6 Enter at which interval you want load measurements taken for each access point. The default is 300 seconds.

Step 7 In the Channel Scan Duration field, enter (in seconds) the sum of the time between scans for each channel within a radio band. The entire scanning process takes 50 ms per channel, per radio and runs at the Channel Scan Duration interval. The time spent listening on each channel is determined by the non-configurable 50-ms scan time and the number of channels to be scanned. For example, in the U.S. all 11 802.11b/g channels are scanned for 50 ms each within the default 180-second interval. So every 16 seconds, 50 ms is spent listening on each scanned channel (180/11 = ~16 seconds). The Channel Scan Duration parameter determines the interval at which the scanning occurs. The valid range is 60 to 2600 seconds, and the default value is 60 seconds for 802.11a radios and 180 seconds for the 802.11b/g radios.

Step 8 Click **Save**.

Configuring an 802.11h Template

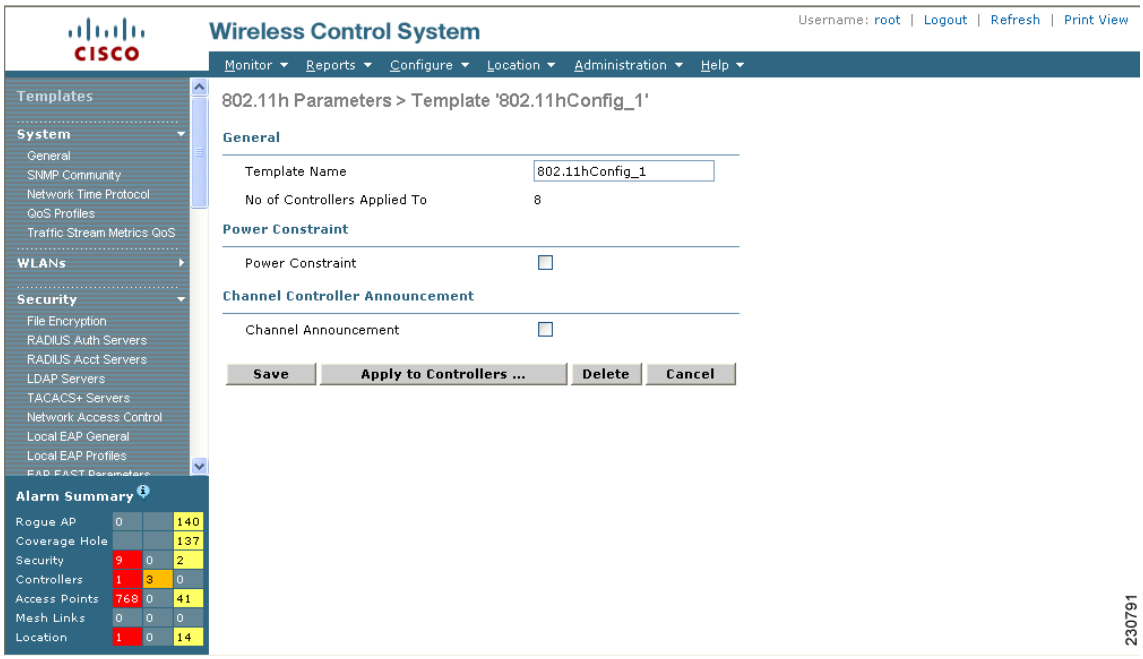
Follow these steps to add an 802.11h template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **802.11a/n > 802.11h**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template name from the Template Name column. The 802.11h Template appears (see Figure 10-44), and the number of controllers the template is applied to automatically populates.

Figure 10-44 802.11h Template



Step 4 Check the power constraint check box to enable TPC.

Step 5 Check the channel announcement 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.

Step 6 Click **Save**.

Configuring a High Throughput Template (for 802.11a/n or 802.11b/g/n)

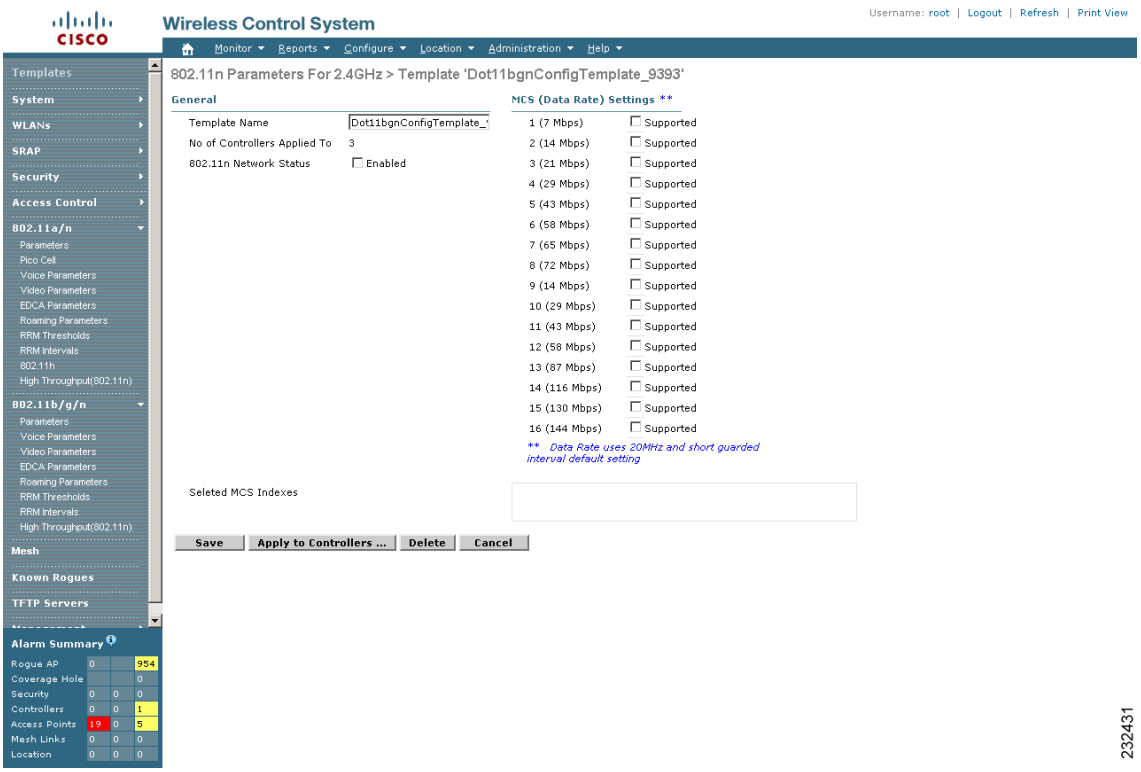
Follow these steps to add an 802.11a/n or 802.11b/g/n high throughput template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **802.11a/n > High Throughput** or **802.11b/g/n > High Throughput**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template name from the Template Name column. The 802.11n Parameters for 2.4 GHz or 802.11n Parameters for 5 GHz template appears (see Figure 10-45), and the number of controllers the template is applied to automatically populates.

Figure 10-45 802.11n Parameters for 2.4GHz Template



Step 4 Click the 802.11n Network Status Enabled check box to enable high throughput.

Step 5 In the MCS (Data Rate) Settings column, choose which level of data rate you want supported. Modulation coding schemes (MCS) are similar to 802.11a data rate. As a default, 20 MHz and short guarded interval is used.

Note When you click the Supported check box, the chosen numbers appear in the Selected MCS Indexes window.

Step 6 Click **Save**.

Configuring a Mesh Template

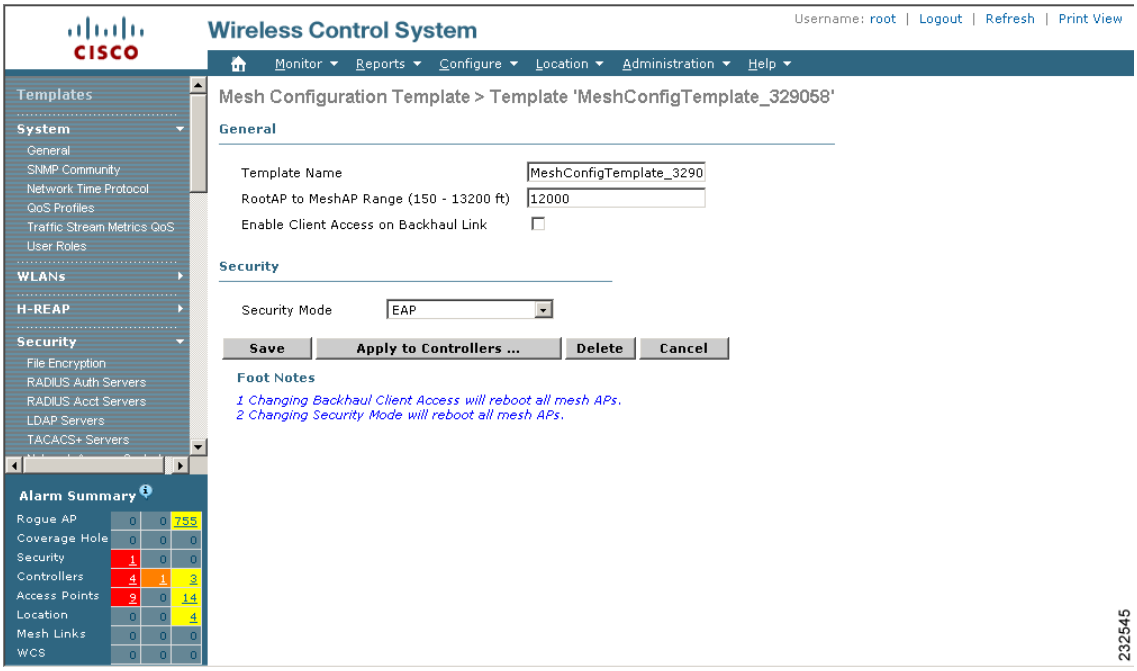
You can configure an access point to establish a connection with the controller. Follow these steps to add a mesh template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Mesh**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click a specific template name. The Mesh Configuration Template window appears (see Figure 10-46).

Figure 10-46 Mesh Configuration Template



Step 4 The Root AP to Mesh AP Range is 12,000 feet by default. Enter the optimum distance (in feet) that should exist between the root access point and the mesh access point. This global parameter applies to all access points when they join the controller and all existing access points in the network.

Step 5 The Mesh Mac Filter is enabled by default. When enabled, this feature secures your network against any rogue access points and does not allow access points to attach if they are not defined in the MAC filter list.

However, if you disable this feature, mesh access points can join the controller.

Note The ability to join a controller without specification within a MAC filter list is only supported on mesh access points.

Note For releases prior to 4.1.82.0, mesh access points do not join the controller unless they are defined in the MAC filter list.

You may want to disable the MAC filter list to allow newly added access points to join the controller. Before enabling the MAC filter list again, you should enter the MAC addresses of the new access points.

After you check the Enable Mesh MAC Filter check box, the access points reboot and then rejoin the controller if defined in the MAC filter list. Access points that are not defined in the MAC list cannot join the controller.

Step 6 The Enable Client Access on Backhaul Link check box is not checked by default. When this option is enabled, mesh access points are able to associate with 802.11a/n wireless clients over the 802.11a/n backhaul. This client association is in addition to the existing communication on the 802.11a/n backhaul between the root and mesh access points.

Note This feature is only applicable to access points with two radios.

Step 7 Click **Save**.

Configuring a Known Rogue Access Point Template

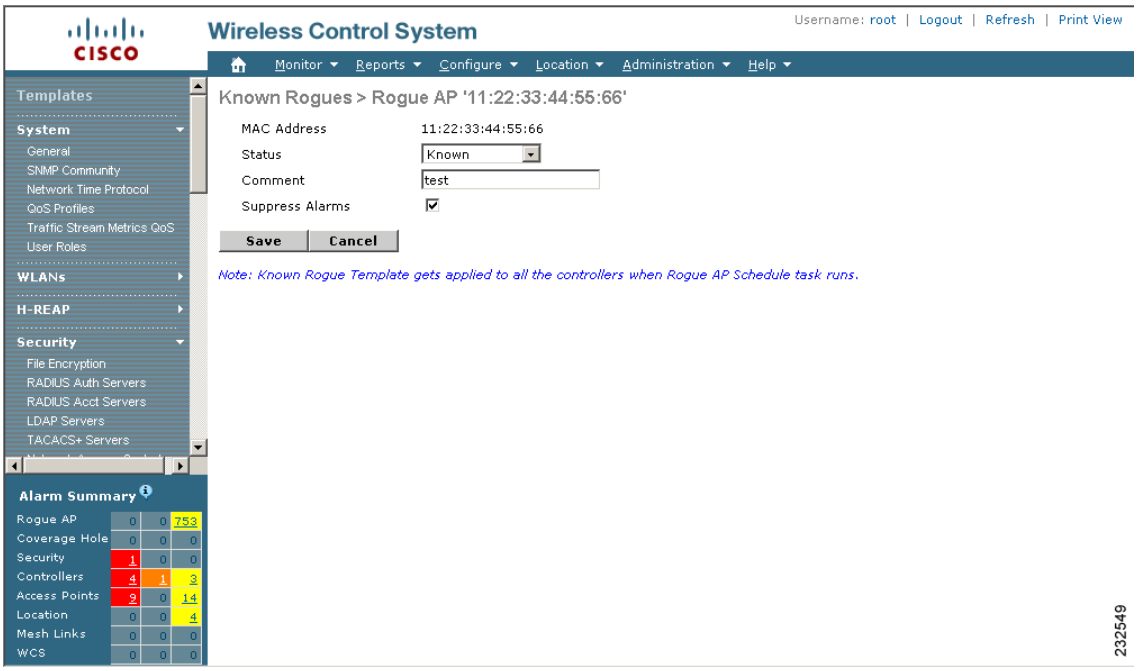
If you have an established list of known rogue devices, you can configure a template to pass these rogue details to multiple controllers. Follow these steps to add a known rogue template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Known Rogues**.

Step 3 To add a new template, choose **Add Known Rogue** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click a specific MAC address in the MAC Address column. The Known Rogues Template window appears (see Figure 10-47).

Figure 10-47 Known Rogues Template



Step 4 The Import from File check box is enabled. This enables you to import a .csv file which contains the MAC addresses of access points into the Cisco WCS. If you click to disable the check box, you are required to enter the MAC address of the access point manually (enter this and skip to Step 6). If you are importing a .csv file, continue to Step 5.

Step 5 Enter the file path where the .csv file exists or use the Browse button to navigate there. Skip to Step 9.

Step 6 Use the Status drop-down menu to specify whether the rogue is known or acknowledged.

Step 7 Enter a comment that may be useful to you later.

Step 8 Click the Suppress Alarms check box if you do not want an alarm sent to WCS.

Step 9 Click **Save**.

Configuring a TFTP Server Template

A Trivial File Transfer Protocol (TFTP) server is often available for the download. Keep these guidelines in mind when setting up a TFTP server:

- If you are downloading through the service port, the TFTP server must be on the same subnet as the service port because the service port is not routable. However, if you want to put the TFTP server on a different network while the management port is down, add a static route if the subnet where the service port resides has a gateway (config route add *IP address of TFTP server*).
- If you are downloading through the distribution system network port, the TFTP server can be on the same or a different subnet because the distribution system port is routable.
- A third-party TFTP server cannot run on the same computer as the Cisco WCS because WCS's built-in TFTP server and third-party TFTP server use the same communication port.

Follow these steps to add a new TFTP server template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **TFTP Servers**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click a specific template in the TFTP Server Name column. The TFTP Server window appears.

Step 4 Enter the IP address for the TFTP server.

Step 5 Click **Save**.

Configuring a Trap Receiver Template

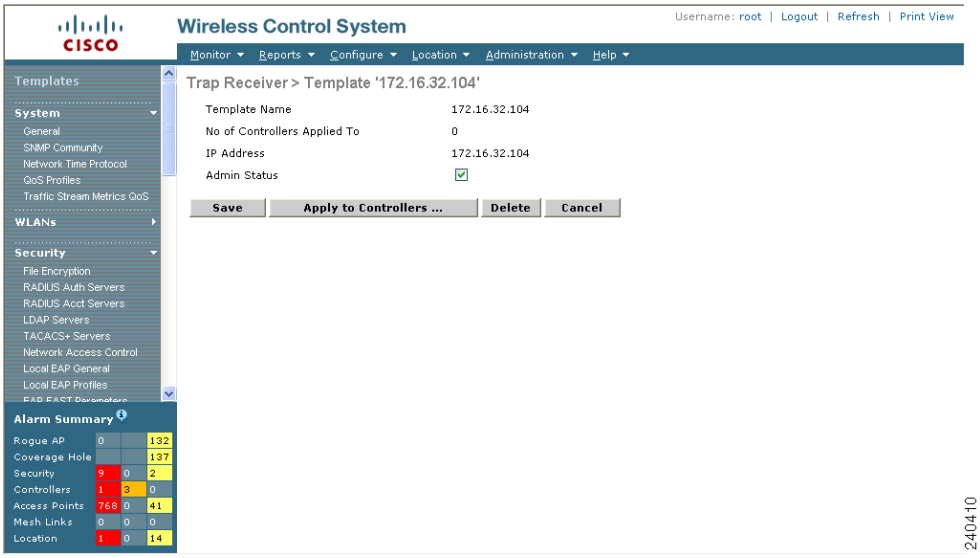
Follow these steps to add a new trap receiver template or make modifications to an existing template. If you have monitoring devices on your network that receive SNMP traps, you may want to add a trap receiver template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Management > Trap Receivers**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click a specific template in the Template Name column. The Trap Receiver Template window appears (see Figure 10-48), and the number of controllers the template is applied to automatically populates.

Figure 10-48 Trap Receiver Template



Step 4 Enter the IP address of the server.

Step 5 Click to enable the admin status if you want SNMP traps to be sent to the receiver.

Step 6 Click **Save**.

Configuring a Trap Control Template

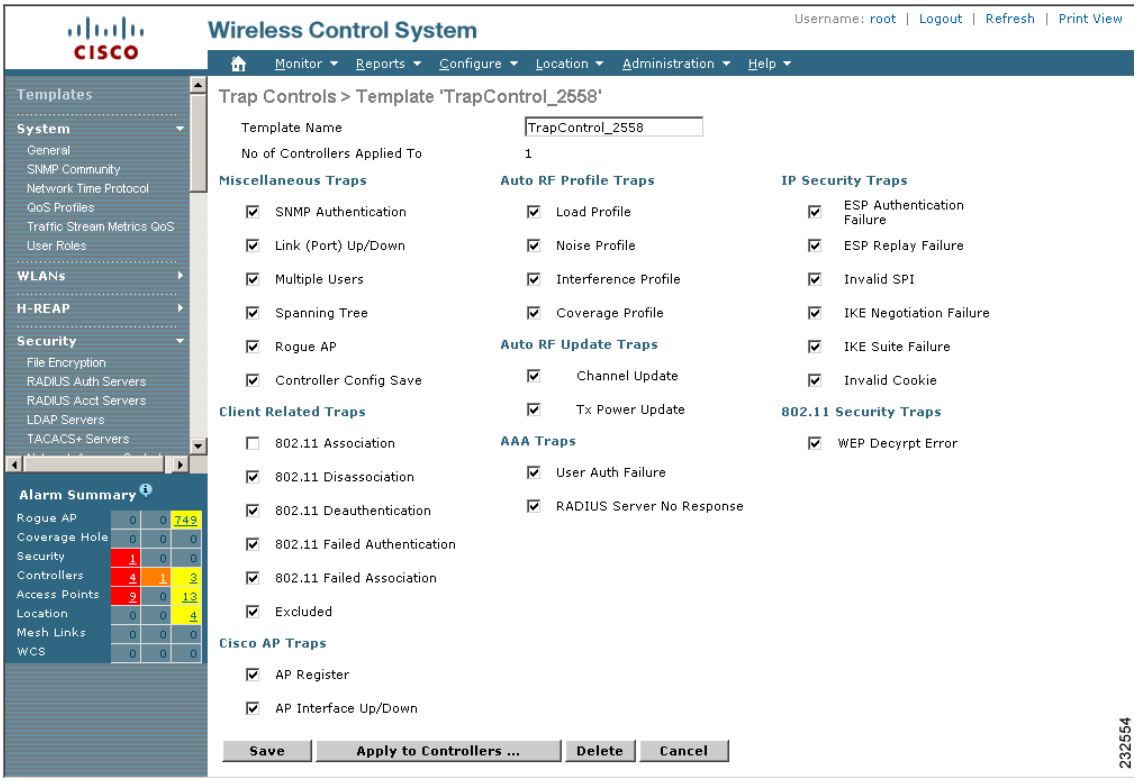
Follow these steps to add a trap control template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Management > Trap Control**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template in the Template Name column. The Trap Controls Template window appears (see Figure 10-49), and the number of controllers the template is applied to automatically populates.

Figure 10-49 Trap Controls Template



Step 4 Check the appropriate check box to enable any of the following miscellaneous traps:

- SNMP Authentication - The SNMPv2 entity has received a protocol message that is not properly authenticated. When a user who is configured in SNMP V3 mode tries to access the controller with an incorrect password, the authentication fails and a failure message is displayed. However, no trap logs are generated for the authentication failure.
- Link (Port) Up/Down - Link changes states from up or down.
- Multiple Users - Two users log in with the same login ID.
- Spanning Tree - Spanning Tree traps. Refer to the STP specification for descriptions of individual parameters.
- Rogue AP - Whenever a rogue access point is detected or when a rogue access point was detected earlier and no longer exists, this trap is sent with its MAC address.
- Controller Config Save - Notification sent when the configuration is modified.

Step 5 Check the appropriate check box to enable any of the following client-related traps:

- 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.

- Excluded - The associate failure notification is sent when a client is excluded.

Step 6 Check the appropriate check box to enable any of the following access point traps:

- AP Register - Notification sent when an access point associates or disassociates with the controller.
- AP Interface Up/Down - Notification sent when access point interface (802.11a/n or 802.11b/g/n) status goes up or down.

Step 7 Check the appropriate check box to enable any of the following auto RF profile traps:

- 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.

Step 8 Check the appropriate check box to enable any of the following auto RF update traps:

- Channel Update - Notification sent when access point's dynamic channel algorithm is updated.
- Tx Power Update - Notification sent when access point's dynamic transmit power algorithm is updated.

Step 9 Check the appropriate check box to enable any of the following AAA traps:

- User Auth Failure - This trap is to inform you that a client RADIUS authentication failure has occurred.
- RADIUS Server No Response - This trap is to indicate that no RADIUS server(s) are responding to authentication requests sent by the RADIUS client.

Step 10 Check the appropriate check box to enable the following 802.11 security trap:

- WEP Decrypt Error - Notification sent when the controller detects a WEP decrypting error.

Step 11 Check the appropriate check box to enable the following WPS trap:

- Rogue Auto Containment - Notification sent when a rogue access point is auto-contained.

Step 12 Click **Save**.

Configuring a Telnet SSH Template

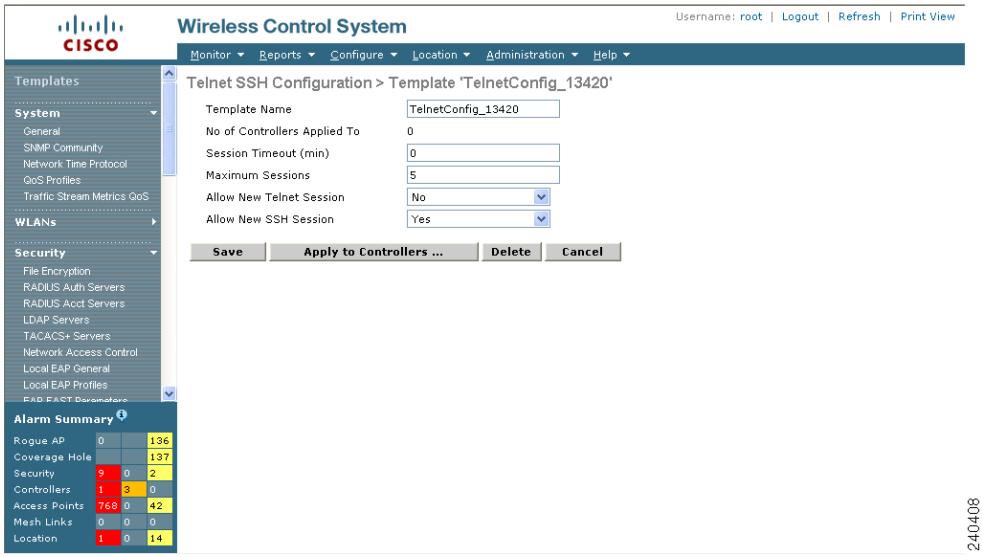
Follow these steps to add a Telnet SSH configuration template or make changes to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Management > Telnet SSH**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template in the Template Name column. The Telnet SSH Configuration Template window appears (see Figure 10-50), and the number of controllers the template is applied to automatically populates.

Figure 10-50 Telnet SSH Configuration Template



Step 4 Enter the number of minutes a Telnet session is allowed to remain inactive before being logged off. A zero means there is no timeout. The valid range is 0 to 160, and the default is 5.

Step 5 At the Maximum Sessions parameter, enter the number of simultaneous Telnet sessions allowed. The valid range is 0 to 5, and the default is 5. New Telnet sessions can be allowed or disallowed on the DS (network) port. New Telnet sessions are always allowed on the service port.

Step 6 Use the Allow New Telnet Session drop-down menu to determine if you want new Telnet sessions allowed on the DS port. New Telnet sessions can be allowed or disallowed on the DS (network) port. New Telnet sessions are always allowed on the service port. The default is no.

Step 7 Use the Allow New SSH Session drop-down menu to determine if you want Secure Shell Telnet sessions allowed. The default is yes.

Step 8 Click **Save**.

Configuring a Syslog Template

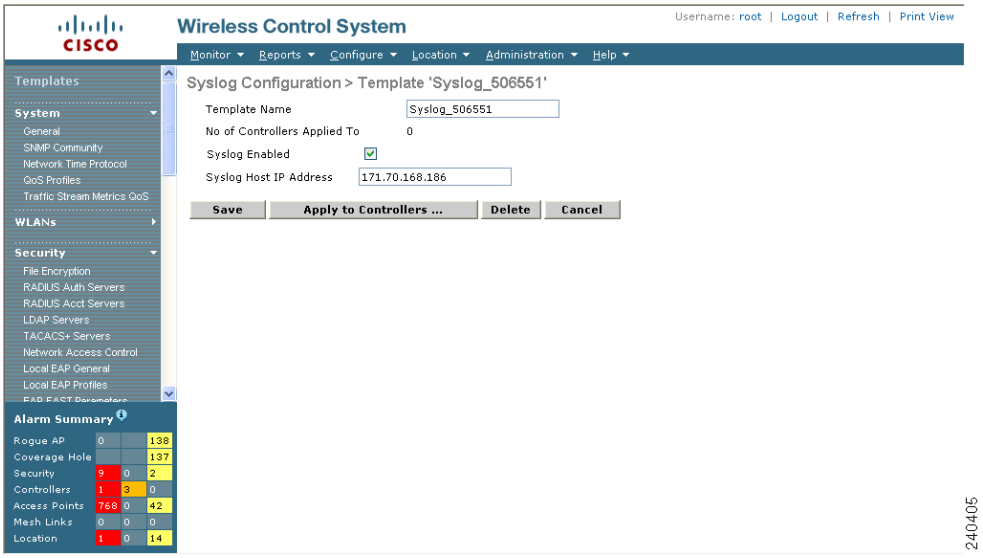
Follow these steps to add a syslog configuration template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Management > Syslog**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a template in the Template Name column. The Syslog Configuration Template window appears (see Figure 10-51), and the number of controllers the template is applied to automatically populates.

Figure 10-51 Syslog Configuration Template



Step 4 Enter a template name. The number of controllers to which this template is applied is displayed.

Step 5 Click to enable syslog.

Step 6 Click **Save**.

Configuring a Local Management User Template

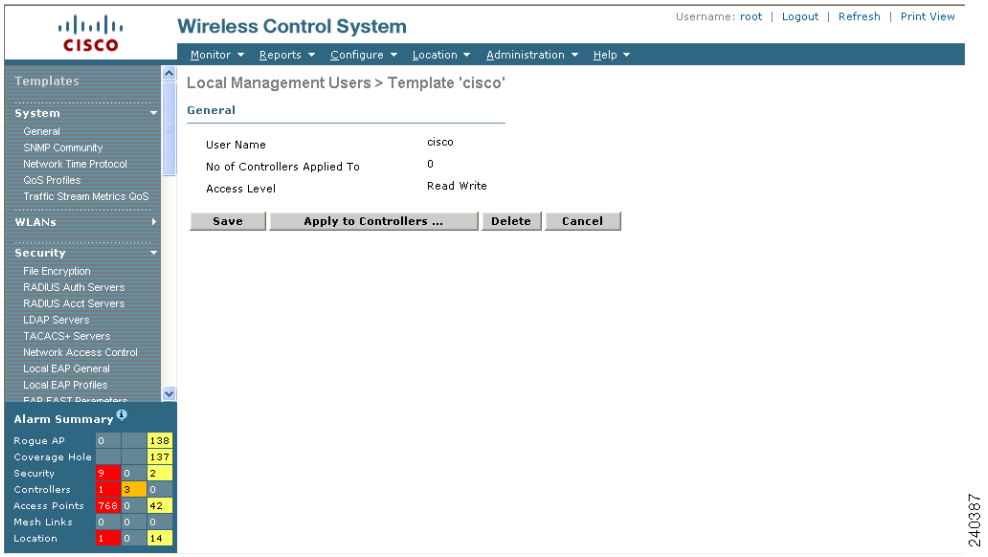
Follow these steps to add a local management user template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Management > Local Management Users**.

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a username in the User Name column. The Local Management Users Template appears (see Figure 10-52).

Figure 10-52 Local Management Users Template



Step 4 Enter a template username.

Step 5 Enter a password for this local management user template.

Step 6 Re-enter the password.

Step 7 Use the Access Level drop-down menu to choose either Read Only or Read Write.

Step 8 Click **Save**.

Configuring a User Authentication Priority Template

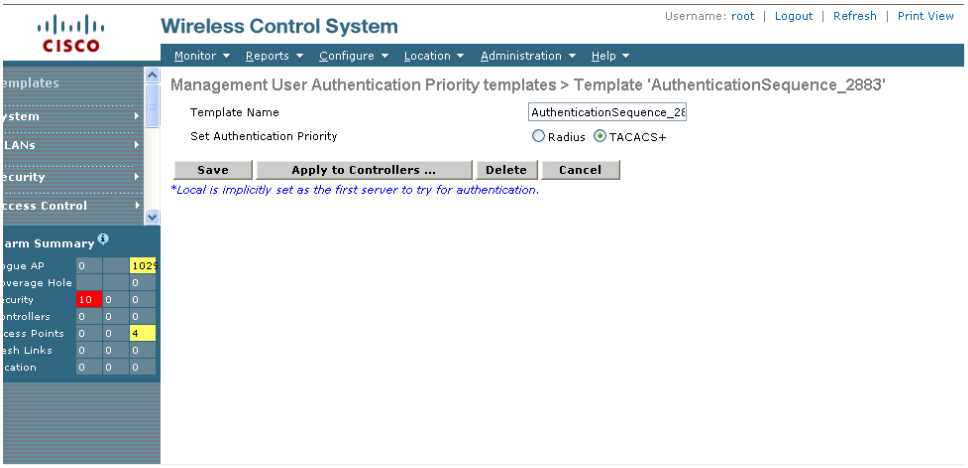
Management user authentication priority templates control the order in which authentication servers are used to authenticate a controller's management users. Follow these steps to add a user authentication priority template or make modifications to an existing template.

Step 1 Choose **Configure > Controller Templates**.

Step 2 From the left sidebar menu, choose **Management > Authentication Priority.**

Step 3 To add a new template, choose **Add Template** from the Select a command drop-down menu and click **GO**. To make modifications to an existing template, click to select a username in the Template Name column. The Local Management Users Template appears (Figure 10-53).

Figure 10-53 Authentication Priority Template



Step 4 Enter a template name.

Step 5 The local server is tried first. Choose either **RADIUS** or **TACACS+** to try if local authentication fails.

Step 6 Click **Save**.

Applying Controller Templates

You can apply a controller template to a controller.

Step 1 Go to **Configure > Controller Templates**.

Step 2 Using the left sidebar menu, choose the category of templates to apply.

Step 3 Click the URL from the Template Name column that you want to apply to the controller.

Step 4 Click the **Apply to Controllers** button.

Adding Access Point Templates

This page allows you to add a new access point template.

Step 1 Choose **Configure > Access Point Templates**.

Step 2 Choose **Add Template** from the Select a command drop-down menu and click **GO**.

Step 3 Enter the template name.

Step 4 Provide a description of the template.

Step 5 Click **Save**.

Configuring Access Point Templates

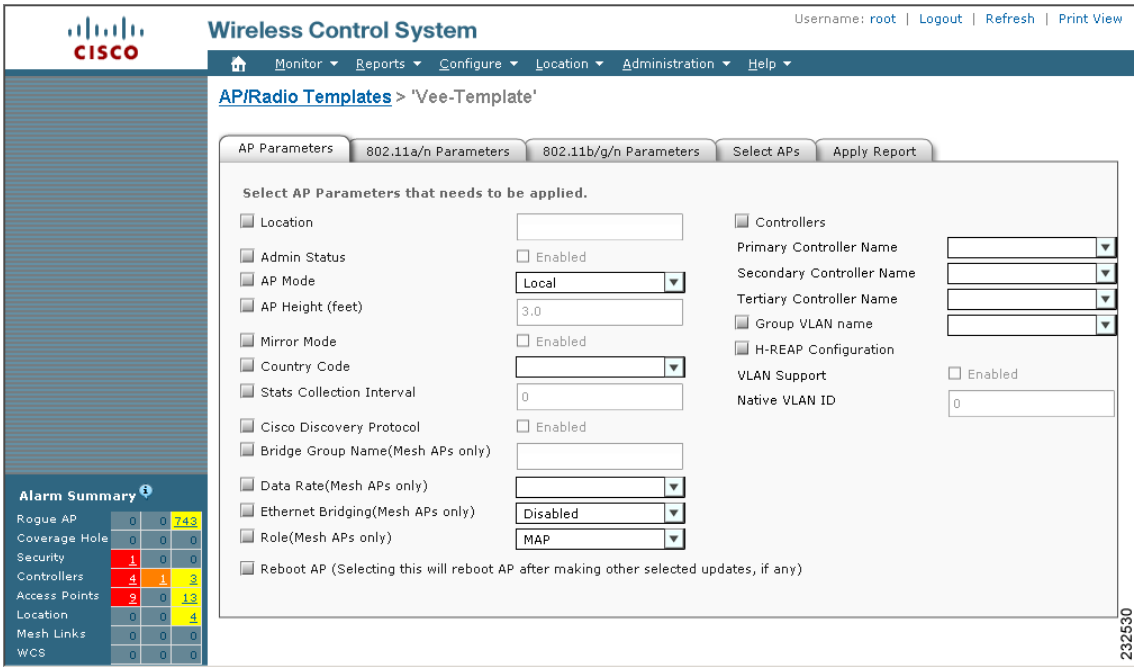
This page allows you to configure a template of access point information that you can apply to one or more access points.

Step 1 Choose **Configure > Access Point Templates**.

Step 2 From the Template Name column, click on the template name you want to configure.

Step 3 Choose the **AP Parameters** tab. The AP/Radio Templates window appears (see Figure 10-54).

Figure 10-54 AP/Radio Templates



Step 4 Click the Location check box and enter the access point location.

Step 5 Click both the **Admin Status** and **Enabled** check box to enable access point administrative status.

Step 6 Click the **AP Mode** check box and use the drop-down menu to set the operational mode of the access point as follows:

- Local - Default
- Monitor - Monitor mode only
- REAP - Cisco 1030 remote edge lightweight access point (REAP) used for Cisco 1030 IEEE 802.11a/b/g/n remote edge lightweight access points.
- Rogue Detected - Monitors the rogue access points but does not transmit or contain rogue access points.
- Sniffer - The access point “sniffs” the air on a given channel. It captures and forwards all the packets from the client on that channel to a remote machine that runs airopeek (a packet analyzer for IEEE 802.11 wireless LANs). It includes information on timestamp, signal strength, packet size, and so on. If you choose Sniffer as an operation mode, you are required to enter a channel and server IP address on the AP/Radio Templates 802.11b/g/n or 802.11a/n parameters tab.

Note The 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, see http://www.wildpackets.com/products.

Step 7 Enter the access point height in feet. The height defaults to the floor height. The height must be greater than 3 feet and must not exceed the floor height. The specified height is applied to all selected access points in the template.

Note To change the height for a specific access point, go to Monitor > Maps > Floor > Position Access Points.

Step 8 You must click both the **Mirror Mode** and **Enabled** check box to enable access point mirroring mode.

Step 9 Click the check box to enable the country code drop-down menu. A list of country codes is returned. For this access point, choose which country code selection to allow. Access points are designed for use in many countries with varying regulatory requirements. You can configure a country code to ensure that it complies with your country's regulations.

Note Access points may not operate properly if they are not designed for use in your country of operation. For example, an access point with part number AIR-AP1030-A-K9 (which is included in the Americas regulatory domain) cannot be used in Australia. Always be sure to purchase access points that match your country's regulatory domain. For a complete list of country codes supported per product, go to http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a_ps430_Products_Data_Sheet.html.

Step 10 Click to enable **Stats Collection Interval** and then enter the collection period (in seconds) for access point statistics.

Step 11 Choose the bridging option if you want the access point to act as a bridging access point. This feature applies only to Mesh access points.

Step 12 Use the Data Rate drop-down menu to choose a data rate of 6, 9, 12, 18, 24, 36, 48, or 54 Mbps.

Step 13 Use the Ethernet Bridging drop-down menu to choose to enabled or disabled.

Step 14 Click the **Cisco Discovery Protocol check box** and click **Enabled** to allow CDP on a single access point or all access points. CDP is a device discovery protocol that runs on all Cisco manufactured equipment (such as routers, bridges, communication servers, and so on).

Step 15 Click the **Controllers** check box, and then you are required to enter the Primary, Secondary, and Tertiary Controller names.

Step 16 Click the **Group VLAN Name** check box and then use the drop-down menu to select an established Group VLAN name.

Step 17 Enable local switching by checking the **H-REAP Configuration** check box. When you enable local switching, any remote access point that advertises this WLAN is able to locally switch data packets (instead of tunneling to the controller).

Step 18 Check the **VLAN Support** check box to enable it and enter the number of the native VLAN on the remote network (such as 100) in the **Native VLAN ID** field. This value cannot be zero.

Note By default, a VLAN is not enabled on the hybrid-REAP access point. Once hybrid REAP is enabled, the access point inherits the VLAN name (interface name) and the VLAN ID associated to the WLAN. This configuration is saved in the access point and received after the successful join response. By default, the native VLAN is 1. One native VLAN must be configured per hybrid-REAP access point in a VLAN-enabled domain. Otherwise, the access point cannot send and receive packets to and from the controller. When the client is assigned a VLAN from the RADIUS server, that VLAN is associated to the locally switched WLAN.

Step 19 The SSID-VLAN Mappings section lists all the SSIDs of the controllers which are currently enabled for HREAP local switching. You can edit the number of VLANs from which the clients will get an IP address by clicking the check box and adjusting the value.

Step 20 Save the template.

Step 21 If the updates require a reboot to be reflected, click to check the **Reboot AP** check box.

Step 22 Choose the **Select APs** tab. Use the drop-down menu to apply the parameters by controller, floor area, outdoor area, or all. Click **Apply**.

Note When you apply the template to the access point, WCS checks to see if the access point supports REAP mode and displays the application status accordingly. Clicking Apply saves and applies the template parameters to the selected access points. After applying a report, it appears in the Apply Report tab.

Configuring Radio Templates

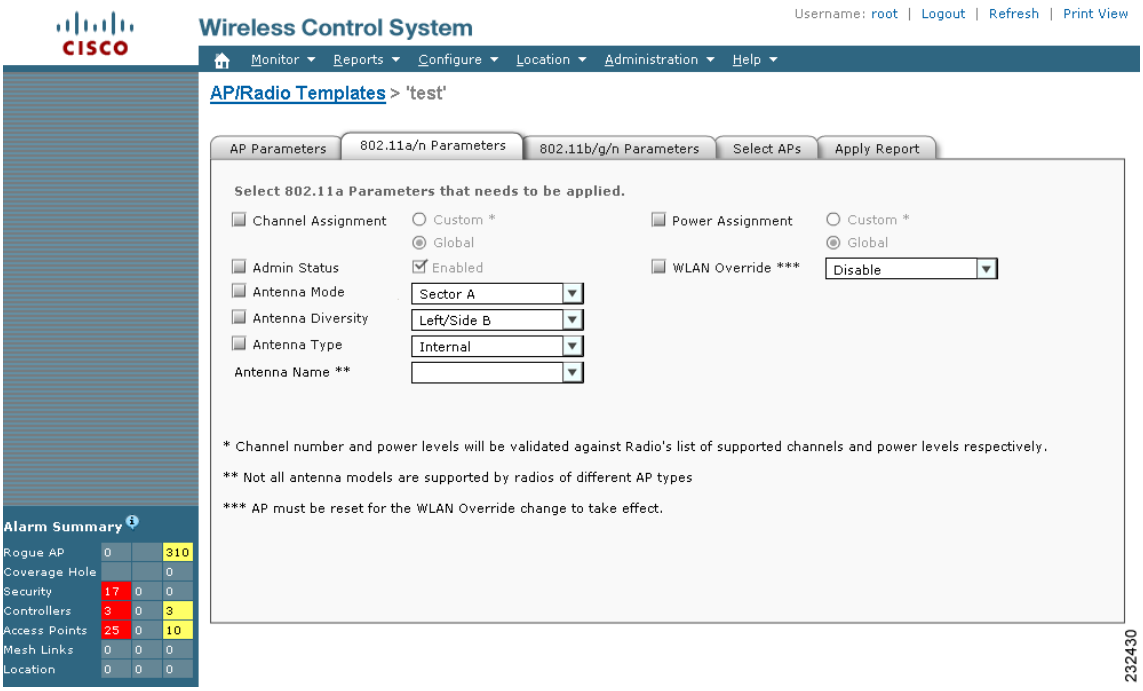
This page allows you to configure a template of radio information that you can apply to one or more access points.

Step 1 Choose **Configure > Access Point Templates**.

Step 2 From the Template Name column, click on the template name you want to configure.

Step 3 Choose the **802.11a/n Parameters or 802.11b/g/n Parameter** tab. The AP/Radio Templates window appears (see Figure 10-55).

Figure 10-55 802.11a/n Parameters



Step 4 Click the Channel Assignment checkbox to enable it. To choose a specific channel, click **Custom** and use the drop-down to designate the channel. Otherwise, click **Global**.

Note The channel assignment is validated against the radio's list of supported channels.

Step 5 Click both the **Admin Status** and **Enabled** check box to enable access point administrative status.

Step 6 Use the Antenna Mode drop-down menu to choose the antenna model. The choices are omni, sector A, and sector B.

Note Not all antenna models are supported by radios of different access point types.

Step 7 For external antennas, choose one of the following:

- Enabled—Use this setting to enable diversity on both the left and right connectors of the access point.
- Left/Side B—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/Side A—Use this setting if your access point has removable antennas and you install a high-gain antenna on the access point's right connector.

For internal antennas, choose one of the following:

- Enabled—Use this setting to enable diversity on both Side A and Side B.
- Left/Side B—Use this setting to enable diversity on Side B (rear antenna) only.
- Right/Side A—Use this setting to enable diversity on Side A (front antenna) only.

Step 8 Click to enable Antenna Type and use the drop-down menu to specify if the antenna is external or internal.

Step 9 Use the Antenna Name drop-down menu to determine whether the antenna is a Kodiak directional, AIR-ANT1000, CUSH-S5157WP, etc.

Step 10 Check the Power Assignment check box and choose the power level currently being used to transmit data. (Some PHYs also use this value to determine the receiver sensitivity requirements.) If you choose Global, the power level is assigned by dynamic algorithm. If you choose Custom, you can select a value using the drop-down menu. Power level 1is the maximum.

Step 11 Enable or disable WLAN override for this access point. When you enable WLAN override, the operating system displays a table showing all current Cisco WLAN Solution WLANs. In the table, choose WLANs to enable WLAN operation and deselect WLANs to disallow WLAN operation for this access point 802.11b/g Cisco Radio.

Note The access point must be reset for the WLAN override change to take effect.

Selecting Access Points

After you have completed the radio template configuration, you must pick the access point to which these attributes are applied. Follow these steps to select access points.

Step 1 Click the **Select APs** tab.

Step 2 Use one of the search criterias to choose the access points and click **Search**. For example, you can search for access points that this template was last applied to or search by controller name, by floor area, etc. The search criterias change based on the selection you choose.

The AP name, ethernet MAC, controller and map information displays.

Step 3 Click the checkbox in the AP Name column and select to which access points you want the access point and radio parameters applied. You can also click the **Select All** or **Unselect All** options.

Step 4 Click **Save** to save the parameter selection or click **Apply** to save and apply the access point and radio parameters to the selected access points.

Applying the Report

After access points are selected and applied, click the **Apply Report** tab.