CHAPTER 10

Cisco Unified Wireless Guest Access Services

The introduction of Wireless LAN (WLAN) technologies in the enterprise has changed the way corporations and small-to-medium businesses function by freeing staff and network resources from the constraints of fixed network connectivity.

WLAN has also changed how individuals access the Internet and their corporate networks from public locations. The advent of public WLAN (hotspots) has caused mobile workers to become accustomed to being able to access their corporate network from practically anywhere.

Introduction

The paradigm of public access has extended to the enterprise itself. Long gone is the scenario where it was sufficient for a company to provide its partners, visitors, and guests with a place to sit along with an outside line with which to make phone calls. Our highly mobile, information-on-demand culture requires on-demand network connectivity. A half-day spent at a partner or customer venue without access to one's own network resources can impact the productivity of a meeting, service or sales call, and reduce the overall personal productivity of an individual who is away from their office. For this reason, enterprise guest access services are becoming increasingly important and a necessity in the corporate environment.

While there is broad recognition that guest networking is becoming increasingly important, there is also well-founded apprehension over how one safeguards their internal company information and infrastructure assets. Ironically, unbeknownst to many enterprises, their network might already play host to guests who, in an uncontrolled manner, find ways to access the Internet via improperly implemented wired or wireless networks. These guests are not hackers in the true sense, but otherwise well-intentioned individuals trying to get their jobs done. So, on the surface, while it might sound risky to implement a guest access solution, when implemented correctly, an enterprise that implements a guest access solution will most likely improve their overall security posture as a result of the network audits associated with the implementation process.

In addition to overall improved security, implementing a guest access network offers these additional general benefits:

- Authentication and authorization control of guests based on variables including date, duration, and bandwidth
- An audit mechanism to track who is currently using, or has used, the network

Additional benefits of a wireless-based guest access include the following:

- It provides wider coverage by including areas such as lobbies and other common areas that otherwise might not have been wired for network connectivity.
- It removes the need for designated guest access areas or rooms.

Scope

Several architectures can be implemented to offer guest access in the enterprise. It is not the goal of this chapter to cover all possible solutions. Instead, this chapter focuses on the implementation of wireless guest networking using the Cisco Unified Wireless solution. For more information on deploying wired and wireless Guest Access services in other topology scenarios, see the following URL: http://www.cisco.com/en/US/docs/solutions/Enterprise/Network_Virtualization/GuestAcc.html.

Wireless Guest Access Overview

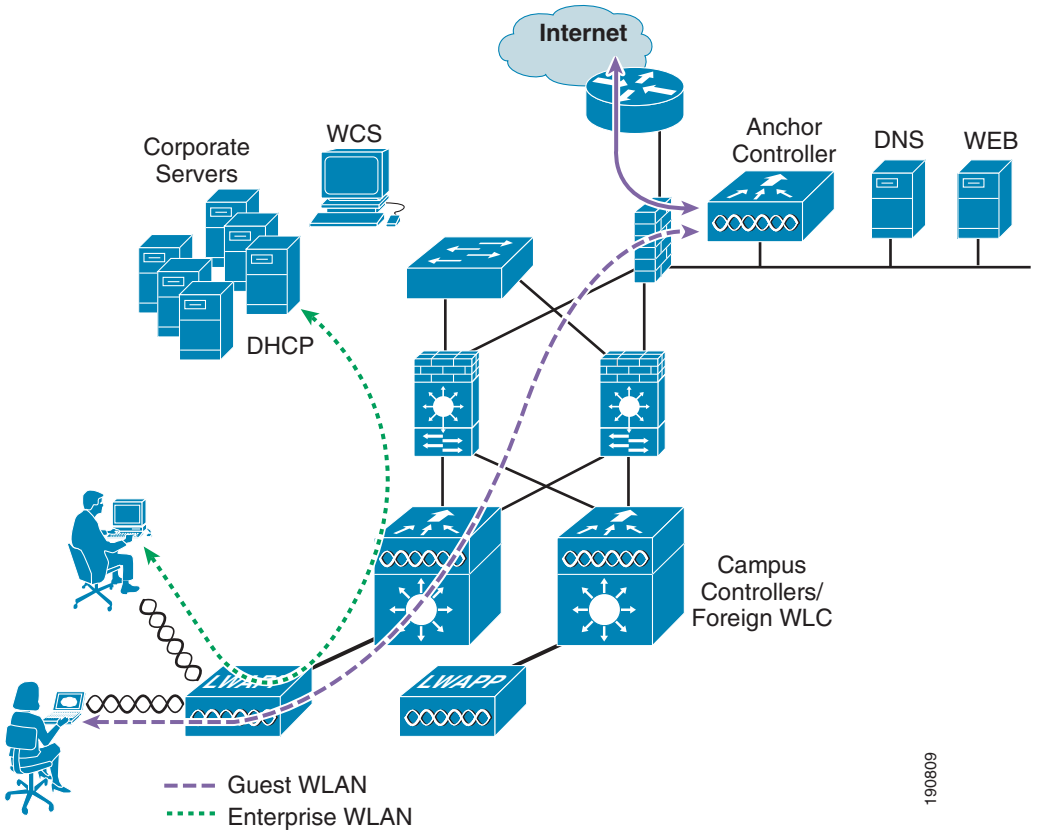
Ideally, the implementation of a wireless guest network uses as much of an enterprise's existing wireless and wired infrastructure as possible to avoid the cost and complexity of building a physical overlay network. Assuming this is the case, the following additional elements and functions are needed:

- A dedicated guest WLAN/SSID—Implemented throughout the campus wireless network wherever guest access is required.
- Guest traffic segregation—Requires implementing Layer 2 or Layer 3 techniques across the campus network to restrict where guests are allowed to go.
- Access control—Involves using imbedded access control functionality within the campus network or implementing an external platform to control guest access to the Internet from the enterprise network.
- Guest user credential management—A process by which a sponsor or lobby administrator can create temporary credentials in behalf of a guest. This function might be resident within an access control platform or it might be a component of AAA or some other management system.

Guest Access using the Cisco Unified Wireless Solution

The Cisco Unified WLAN solution offers a flexible, easy-to-implement method for deploying wireless guest access by using Ethernet in IP (RFC3378) within the centralized architecture. Ethernet in IP is used to create a tunnel across a Layer 3 topology between two WLC endpoints. The benefit of this approach is that there are no additional protocols or segmentation techniques that must be implemented to isolate guest traffic from the enterprise. See Figure 10-1 for an example of guest access topology using a centralized WLAN architecture.

Figure 10-1 Centralized Controller Guest Access



As shown in Figure 10-1, a WLC is located in the enterprise DMZ where it performs an "anchor" function. This anchor controller is responsible for terminating EoIP tunnels that originate from other campus WLCs throughout the network. These "foreign" controllers are responsible for termination, management, and standard operation of the various WLANs provisioned throughout the enterprise, including one or more guest WLANs. Guest WLANs, instead of being switched locally to a corresponding VLAN, are instead transported via an EoIP tunnel to the anchor controller. Specifically, guest WLAN data frames are encapsulated using LWAPP from the AP to the foreign controller and then encapsulated in EoIP from the foreign WLC to a guest VLAN defined on the anchor WLC. In this way, guest user traffic is forwarded to the Internet transparently, with no visibility by, or interaction with, other traffic in the enterprise.

WLAN Controller Guest Access

The WLC Guest Access solution is self-contained and does not require any external platforms to perform access control, web portal, or AAA services. All these functions are configured and run within the anchor controller. However, the option exists to implement one or all of these functions externally and will be discussed later in the chapter.

Supported Platforms

The anchor function, which includes tunnel termination, web authentication, and access control is supported on the following WLC platforms (using version 4.0 and later software images):

- Cisco 4400 Series
- Cisco 6500 Series (WISM)
- Cisco 3750 with integrated WLC

The following WLC platforms cannot be used for anchor functions, but can be used for standard controller deployments and guest mobility tunnel origination (foreign WLC) to a designated anchor controller(s):

- Cisco WLAN Controller Module for Integrated Service Routers (ISR)
- Cisco 2100 Series

Auto Anchor Mobility to Support Wireless Guest Access

Auto anchor mobility, or guest WLAN mobility, is a key feature of the Cisco Unified Wireless solution. It offers the ability to map a provisioned guest WLAN to one or more (anchor) WLCs by using an EoIP tunnel. Auto anchor mobility allows a guest WLAN and all associated guest traffic to be transported transparently across an enterprise network to an anchor controller that resides in the Internet DMZ (see Figure 10-2).

Figure 10-2 Auto Anchor EoIP Tunnels

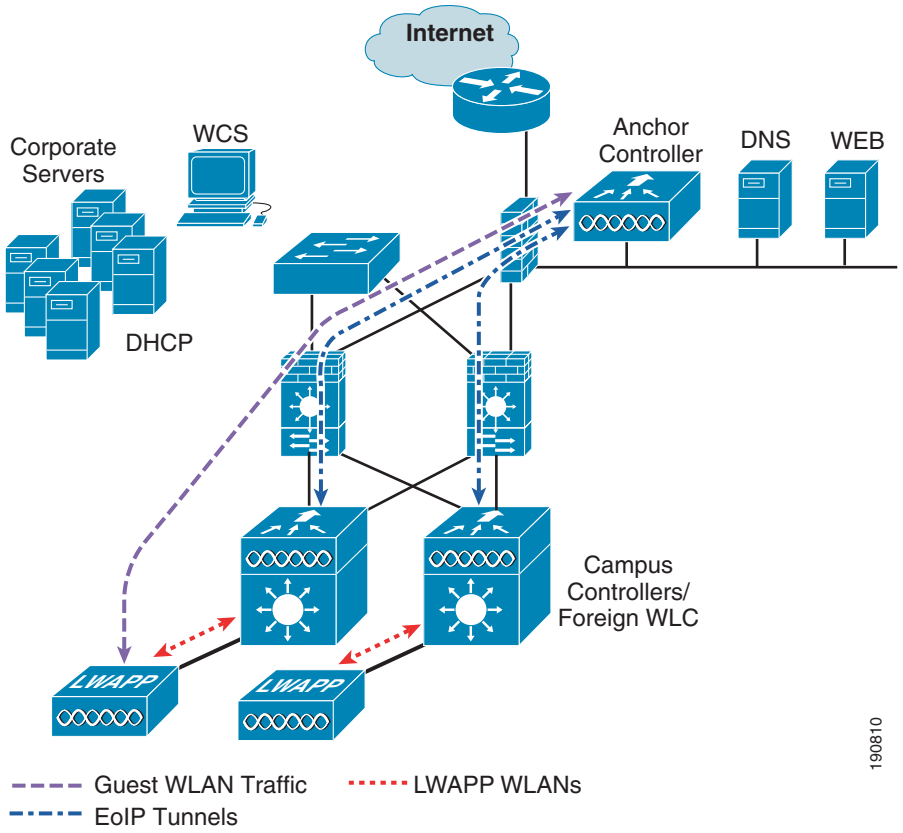
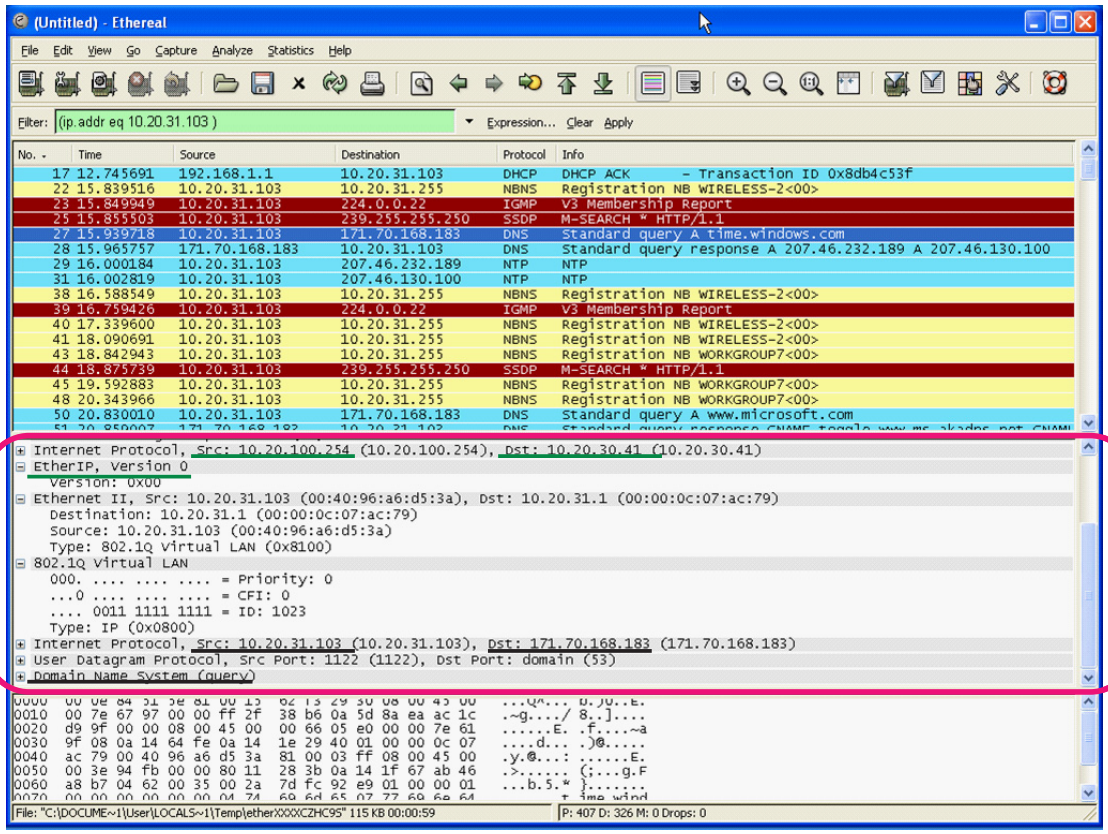


Figure 10-3 shows a sniffer trace of an Ethernet in IP tunnel (highlighted) between a foreign controller with a guest WLAN provisioned and an anchor controller that is performing local web authentication. The first IP detail shown represents the Ethernet in IP tunnel between the foreign and anchor controllers. The second IP detail is that of guest traffic (in this case, a DNS query).

Figure 10-3 Sample Ethernet in IP Sniffer Trace



Anchor Controller Deployment Guidelines

This section provides guidelines for deploying an anchor controller to support wireless guest access.

Anchor Controller Positioning

Because the anchor controller is responsible for termination of guest WLAN traffic and subsequent access to the Internet, it is typically positioned in the enterprise Internet DMZ. In doing so, rules can be established within the firewall to precisely manage communications between authorized controllers throughout the enterprise and the anchor controller. Such rules might including filtering on source or destination controller addresses, UDP port 16666 for inter-WLC communication, and IP protocol ID 97 Ethernet in IP for client traffic. Other rules that might be needed include the following:

- TCP 161 and 162 for SNMP
- UDP 69 for TFTP
- TCP 80 or 443 for HTTP, or HTTPS for GUI access
- TCP 23 or 22 for Telnet, or SSH for CLI access

Depending on the topology, the firewall can be used to protect the anchor controller from outside threats.

For the best possible performance and because of its suggested positioning in the network, it is strongly recommended that the guest anchor controller be dedicated to supporting guest access functions only. In other words, the anchor controller should not be used to support guest access in addition to controlling and managing other LWAPP APs (LAPs) in the enterprise.

DHCP Services

As previously described, guest traffic is transported at Layer 2 via EoIP. Therefore, the first point at which DHCP services can be implemented is either locally on the anchor controller or the controller can relay client DHCP requests to an external server. See Guest Access Configuration, page 10-14 for configuration examples.

Routing

Guest traffic egress occurs at the anchor controller. Guest WLANs are mapped to a dynamic interface/VLAN on the anchor. Depending on the topology, this interface might connect to an interface on a firewall, or directly to an Internet border router. Therefore, a client's default gateway IP is either that of the firewall or the address of a VLAN/interface on the first hop router. For ingress routing, it is assumed the guest VLAN is directly connected to a DMZ interface on a firewall or to an interface on a border router. In either case, the guest (VLAN) subnet is known as a directly connected network and advertised accordingly.

Anchor Controller Sizing and Scaling

The most cost-effective platform to support guest networking in most enterprise deployments is the Cisco 4400 Series controller. Assuming the controller is being deployed to support guest access with EoIP tunnel termination only, the 4402 with support for 12 APs is sufficient because it is assumed the controller is not going to be used to manage LAPs in the network.

A single 4400 Series controller can support EoIP tunnels from up to 40 foreign controllers within the enterprise. Additionally, the 4400 supports up to 2500 simultaneous users and has a forwarding capacity of 2 Gbps.

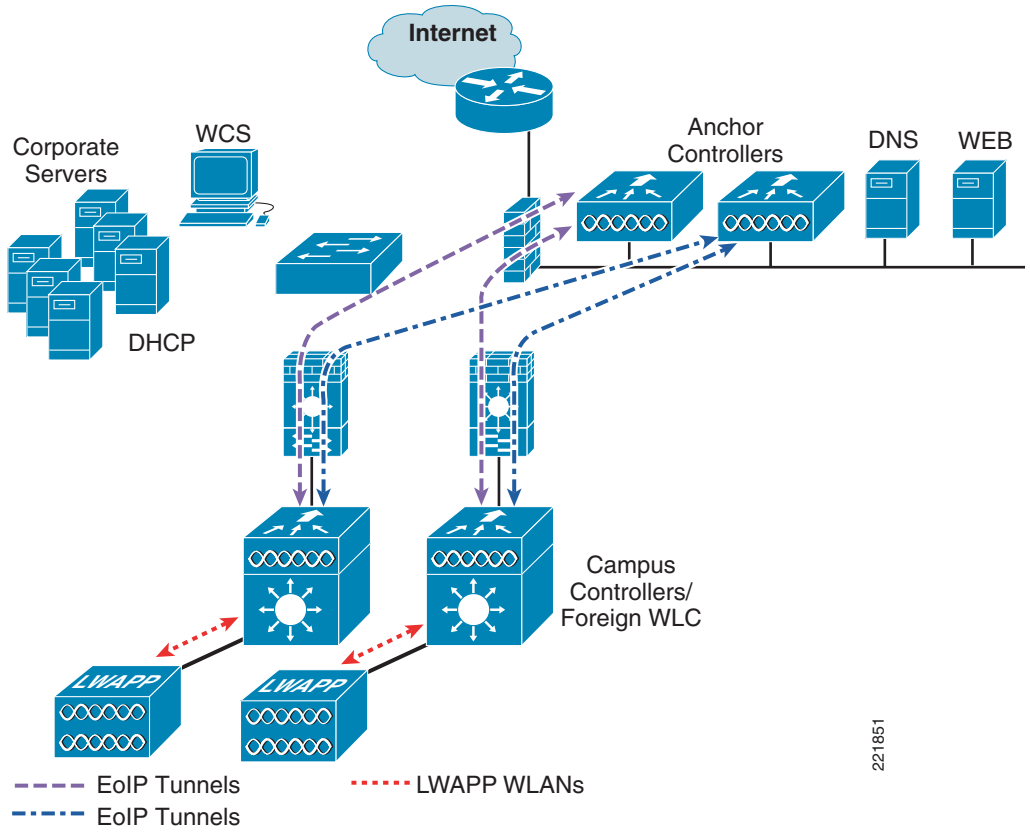
Anchor Controller Redundancy

Beginning with Release 4.1 of Unified Wireless solution software, a "guest N+1" redundancy capability was added to the auto anchor/mobility functionality. This new feature introduces an automatic ping function that enables a foreign controller to proactively ping anchor controllers to verity control and data path connectivity. In the event of failure or an active anchor becomes unreachable, the foreign controller does the following:

- Automatically detects that the anchor has become unreachable
- Automatically disassociates any wireless clients that were previously associated with the unreachable anchor
- Automatically re-associates wireless client(s) to an alternate anchor WLC

With guest N+1 redundancy, two or more anchor WLCs can be defined for a given guest WLAN. Figure 10-4 shows a generic guest access topology with anchor controller redundancy.

Figure 10-4 Guest Access Topology with Guest Anchor N+1 Redundancy



Keep in mind the following with regard to guest N+1 redundancy:

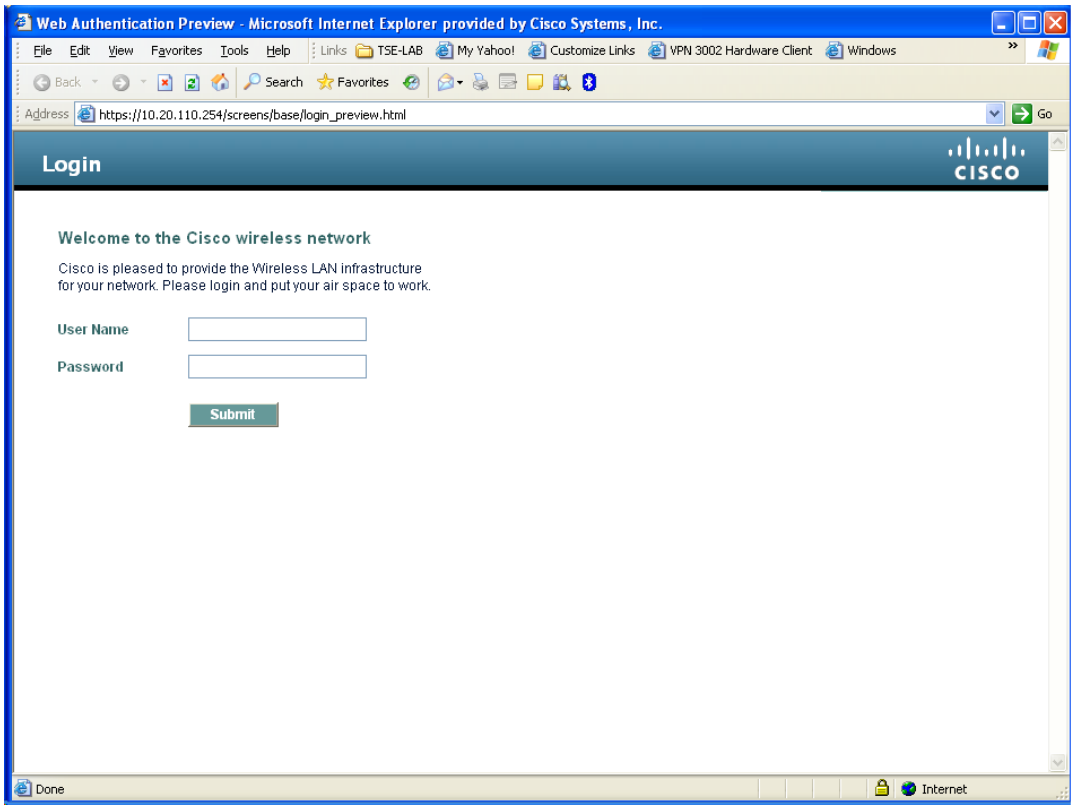
- A given foreign controller load balances wireless client connections across the list of anchor controllers configured for the guest WLAN. There is currently no method to designate one anchor as primary with one or more secondary anchors.
- Wireless clients that are associated with an anchor WLC that becomes unreachable are re-associated with another anchor defined for the WLAN. When this happens, assuming web authentication is being used, the client is redirected to the web portal authentication page and required to re-submit their credentials.

Note Multicast traffic is not supported over guest tunnels, even if multicast is enabled on the Cisco Unified Wireless Network.

Web Portal Authentication

The Cisco Centralized Guest Access solution offers a built-in web portal that is used to solicit guest credentials for authentication and offers simple branding capabilities, along with the ability to display disclaimer or acceptable use policy information (see Figure 10-5).

Figure 10-5 Controller Web Authentication Page



The web portal page is available on all Cisco WLAN controller platforms and is invoked by default when a WLAN is configured for Layer 3 web policy-based authentication.

If a more customized page is required, administrators have the option of importing and locally storing a customized page. Additionally, if an enterprise wants to use an external web server, the controller can be configured to redirect to it in place of using the internal server. See Guest Access Configuration, page 10-14 for web page configuration guidelines.

User Redirection

As is typical for most web-based authentication systems, in order for guest clients to be redirected to the WLC web authentication page, they must launch a web browser session and attempt to open a destination URL. For redirection to work correctly, the following conditions must be met:

- DNS resolution—The guest access topology must ensure that valid DNS servers are assigned via DHCP and those DNS servers are reachable to users prior to authentication. When a client associates to a web policy WLAN for authentication, all traffic is blocked except DHCP and DNS. Therefore, the DNS servers must be reachable from the anchor controller. Depending on the topology, this might require opening up conduits through a firewall to permit DNS or modifying ACLs on an Internet border router.

Note Clients with static DNS configurations might not work depending on whether their configured DNS servers are reachable from the guest network.

- Resolvable Home Page URL—The home page URL of a guest user must be globally resolvable by DNS. If a user home page is, for example, an internal company home page that cannot be resolved outside of their company intranet, that user is not redirected. In this case, the user must open a URL to a public site such as www.yahoo.com or www.google.com.
- HTTP Port 80—If the home page of a user is resolvable, but connects to a web server on a port other than port 80, they are not redirected. Again, the user is required to open a URL that uses port 80 to be redirected to the WLC web authentication page.

Note In addition to port 80, there is an option to configure one additional port number that the controller can monitor for redirection.The setting is available only through the CLI of the controller: <*controller_name*> config> **network web-auth-port** <*port*>.

Guest Credentials Management

Guest credentials can be created and managed centrally using WCS beginning with release 4.0 and later. A network administrator can create a limited privilege account within WCS that permits lobby ambassador access for the purpose of creating guest credentials. With such an account, the only function a lobby ambassador is permitted to do is create and assign guest credentials to controllers that have web-policy configured WLANs. For configuration guidelines, see Guest Access Configuration, page 10-14.

As with many configuration tasks within WCS, guest credentials are created using templates. Beginning with release 4.1, the following new guest user template options and capabilities were introduced:

- There are two types of guest templates: one for scheduling immediate guest access with limited or unlimited lifetime, and the other permits administrators to schedule “future” guest access and offers time of day as well as day of week access restrictions.
- The solution now offers administrators the ability to e-mail credentials to guest users. Additionally, when the “schedule” guest template is used, the system automatically e-mails credentials for each new day (interval) that access is offered.
- Guest credentials can be applied to the WLC(s) based on a (guest) WLAN SSID and WCS mapping information; campus/building/floor location or based on a WLAN SSID and a specific controller or list of controllers. The latter method is used when deploying guest access using the guest mobility anchor method as discussed in this chapter.

For further information, see Guest Management Using WCS, page 10-30.

After a lobby ambassador has created a guest template, it is applied to one or more controllers depending on the guest access topology. Only controllers with a “*web” policy-configured WLAN* are listed as a candidate controller to which the template can be applied. This is also true when applying guest templates to controllers based on WCS map location criteria.

Guest credentials, once applied, are stored locally on the (anchor) WLC (under Security > Local Net Users) and remain there until expiration of the “Lifetime” variable as defined in the guest template. If a wireless guest is associated and active when their credentials expire, the WLC stops forwarding traffic and returns to the WEBAUTH_REQD policy state for that user. Unless the guest credentials are re-applied (to the controller), the user is no longer able to access the network.

Note The Lifetime variable associated with guest credentials is independent of the WLAN session timeout variable. If a user remains connected beyond the WLAN session timeout interval, they are de-authenticated. The user is then redirected to the web portal and, assuming their credentials have not expired, must log back in to regain access. To avoid annoying redirects for authentication, the guest WLAN session timeout variable should be set appropriately.

Local Controller Lobby Admin Access

In the event that a centralized WCS management system is not deployed or unavailable, a network administrator can establish a local admin account on the anchor controller, which has only lobby admin privileges. A person who logs in to the controller using the lobby admin account has access to guest user management functions. Configuration options available for local guest management are limited in contrast to the capabilities available through WCS, and include the following:

- User name
- Generate password (check box)
- Administrator-assigned password
- Confirm the password
- Lifetime—days:hours:minutes:seconds
- SSID (check box)
- Only WLANs configured for Layer 3 web policy authentication are displayed
- Description

Any credentials that may have been applied to the controller by WCS are shown when an admin logs into the controller. A local lobby admin account has privileges to modify or delete any guest credentials that were previously created by WCS. Guest credentials that are created locally on the WLC do not automatically appear in WCS unless the controller's configuration is updated/refreshed in WCS. Locally created guest credentials that are imported into WCS as a result of a WLC configuration refresh appear as a new guest template that can be edited and re-applied to the WLC.

Guest User Authentication

As previously discussed in Guest Credentials Management, page 10-10, when an administrator uses WCS or a local account on a controller to create guest user credentials, those credentials are stored locally on the controller, which in the case of a centralized guest access topology, would be the anchor controller.

When a wireless guest logs in through the web portal, the controller handles the authentication in the following order:

1. The controller checks its local database for username and password and, if present, grants access.

If no user credentials are found, then:

2. The controller checks to see if an external RADIUS server has been configured for the guest WLAN (under WLAN configuration settings). See External Radius Authentication, page 12-38 for a configuration example. If so, then the controller creates a RADIUS access-request packet with the user name and password and forwards it to the selected RADIUS server for authentication.

If no specific RADIUS servers have been configured for the guest WLAN:

3. The controller checks its global RADIUS server configuration settings. Any external RADIUS servers configured with the option to authenticate "network" users are queried with the guest user credentials. See External Radius Authentication, page 12-38 for a configuration example. Otherwise, if no RADIUS servers have "network user" checked, and the user has not authenticated as a result of 1 or 2 above, authentication fails.

Note A RADIUS server can still be used to support network user authentication even if the network user check box is cleared under the WLC Security > AAA > RADIUS settings. However, to do so, a server must then be explicitly selected under the Security > AAA Servers settings of a given WLAN. See External Radius Authentication, page 12-38 for a configuration example.

External Authentication

WLC and WCS guest account management (lobby ambassador) capabilities can be used only to create and apply guest user credentials for local authentication on the WLC. However, there may be cases where an enterprise already has an existing guest management /authentication solution deployed as part of a wired guest access or NAC solution. If this is the case, the anchor controller/guest WLAN can be configured to forward web portal authentication to an external RADIUS server, as described in Guest User Authentication, page 10-11.

The default protocol used by the controller to authenticate web users is Password Authentication Protocol (PAP). In the event you are authenticating web users to an external AAA server, be sure to verify the protocols supported by that server. The anchor controller can also be configured to use CHAP or MD5-CHAP for web authentication. The web auth protocol type is configured under the Controller configuration settings of the WLC.

External Authentication using Cisco Secure ACS and Microsoft User Databases

If a guest access deployment is planning to use a Microsoft user database in conjunction with Cisco ACS to authenticate guest users, see the following additional Cisco ACS configuration caveats: http://www.cisco.com/en/US/docs/net_mgmt/cisco_secure_access_control_server_for_windows/4.0/installation/guide/windows/postin.html.

See specifically the following URL: http://www.cisco.com/en/US/docs/net_mgmt/cisco_secure_access_control_server_for_windows/4.0/installation/guide/windows/postin.html#wp1041223

Guest Pass-through

Another variation of wireless guest access is to bypass user authentication altogether and allow open access. However, an enterprise may still need to present an acceptable use policy or disclaimer page to users before granting access. If this is the case, then a guest WLAN can be configured for web policy pass through. In this scenario, a guest user is redirected to a portal page containing disclaimer information. Pass through mode also has an option for a user to enter an e-mail address before connecting (see Figure 10-6 and Figure 10-7 for sample pages). See Guest Access Configuration, page 10-14 for configuration examples.

Figure 10-6 Pass-through Welcome AUP Page

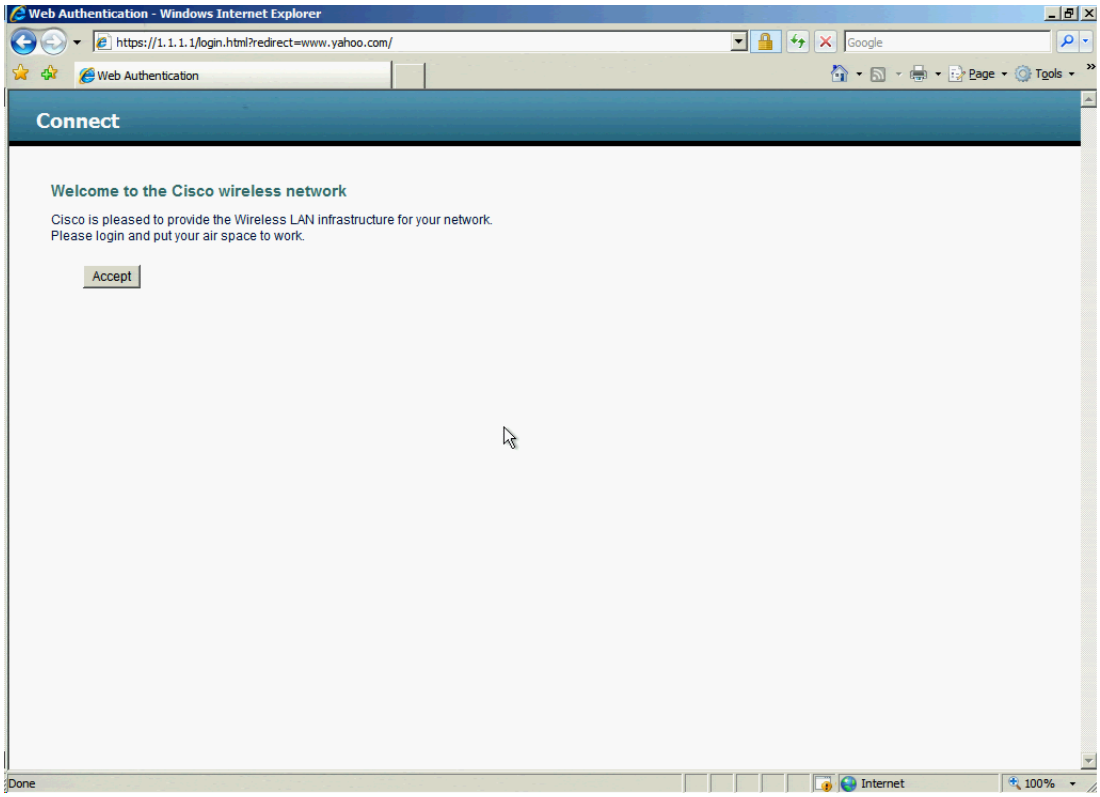
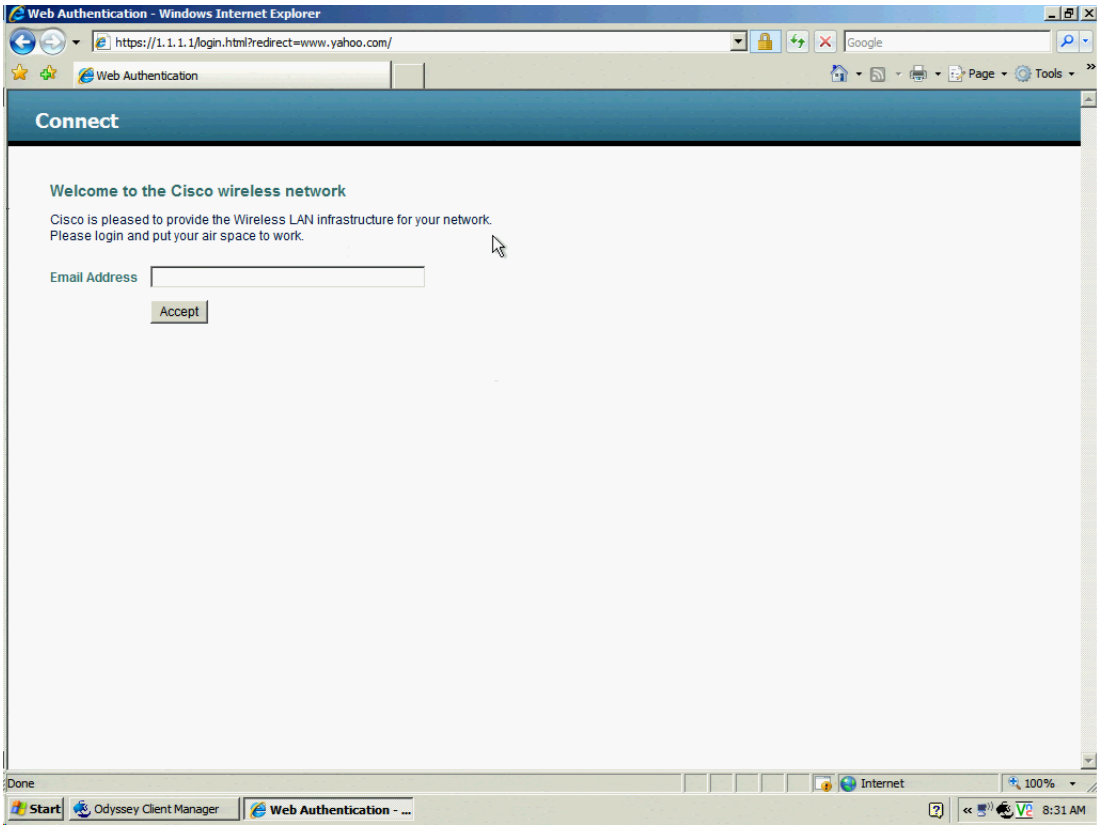


Figure 10-7 Pass-through Page with E-mail



Guest Access Configuration

This section describes how to enable a wireless guest access service within the Cisco Unified Wireless solution. The configuration tasks require the use of a web browser, Windows IE6 (only). A web session is established with the controller by opening an HTTPS session to the controller management IP address: **https://***management_IP* or optionally to a controller service port IP address.

The following procedures assume there is already a deployed infrastructure of controllers and LAPs with the possible exception of the anchor WLC(s). See Anchor Controller Deployment Guidelines, page 10-6 for more information.

Note Cisco recommends that the configuration steps outlined in this section be followed in the order in which they are presented.

The following references are used throughout the configuration sections:

- Foreign WLC—Refers to the one or more WLCs deployed throughout an enterprise campus or at branch location that are used for managing and controlling a group of LAPs. Foreign controllers map a guest WLAN into a guest mobility EoIP tunnel.
- Anchor WLC—Refers to one or more WLCs deployed in the enterprise DMZ that are used to perform guest mobility EoIP tunnel termination, web redirection, and user authentication.

Note Only the relevant portion of a given configuration screen capture is shown in this section.

The implementation of the Cisco Unified Wireless Guest Access solution can be broken into the following configuration categories:

1. Anchor WLC Installation and Interface configuration—This section briefly discusses installation requirements, steps and caveats associated with implementing one or more anchor WLCs. When implementing guest access for the first time in an existing Unified Wireless deployment, the anchor WLC is usually a new platform that is installed at the Internet edge of an Enterprise network.
2. Mobility Group Configuration—This section outlines the parameters that must be configured in order for the foreign WLCs to be able to initiate EoIP tunnels to one or more guest anchor WLCs. The mobility group configuration does not itself create the EoIP tunnels, but rather establishes peer relationships between the foreign and anchor WLCs in order to support a guest access WLAN service.
3. Guest WLAN Configuration—Highlights WLAN specific configuration parameters that are required to map the guest WLAN (originating from a foreign WLC) to the anchor WLC. It is during this portion of the guest access solution configuration that EoIP tunnels are created between the foreign and anchor WLCs. This section also covers the settings required to invoke Layer 3 redirection for web-based authentication.
4. Guest Account Management—This section outlines how to configure and apply guest user credentials locally on the anchor WLC using WCS' or the anchor WLC's lobby admin interface.
5. Other Features and Solution Options—Discusses other features that may be configured including, but not limited to:
   a. Web-portal page configuration and management
   b. Support for external web redirection
   c. Pre-authentication ACLs
   d. Anchor WLC DHCP configuration
   e. External radius authentication
   f. External access control

Anchor WLC Installation and Interface Configuration

As described in Anchor Controller Positioning, page 10-6, Cisco recommends that the anchor WLC be dedicated solely to guest access functions and not be used to control and manage LAPs in the enterprise.

This section does not address all aspects of interface configuration on the anchor WLC. It is assumed the reader is familiar with the WLC initialization and configuration process required upon initial bootup using the serial console interface. If not, see the following URL: http://www.cisco.com/en/US/docs/wireless/controller/4400/quick/guide/ctrlv32.html.

This section offers specific information and caveats as they pertain to configuring interfaces on a WLC being deployed as an anchor in a guest access topology.

As part of the initial configuration (using the serial console interface), you are required to define the following three static interfaces:

- Controller management—This interface/IP is used for communications with other controllers in the network. It is also the interface used to terminate EoIP tunnels that originate from the foreign controllers.

- AP manager interface—Even though the controller is not used to manage APs, you are still required to configure this interface. Cisco recommends the AP manager interface be configured on the same VLAN and subnet as the management interface.
- Virtual interface—The controller quickstart installation documentation recommends defining the virtual IP with an address, such as 1.1.1.1. This address needs to be the same for all controllers that are members of the same mobility group name. The virtual interface is also used as the source IP address when the controller redirects clients for web authentication.

Guest VLAN Interface Configuration

The interfaces previously described are for operations and administrative functions associated with the controller. To implement a guest access service, another interface must be defined. This is the interface through which guest traffic is forwarded for routing to the Internet. As previously described in Anchor Controller Positioning, page 10-6, the guest interface will likely connect to a port on a firewall or be switched to an interface on an Internet border router.

Defining a New Interface

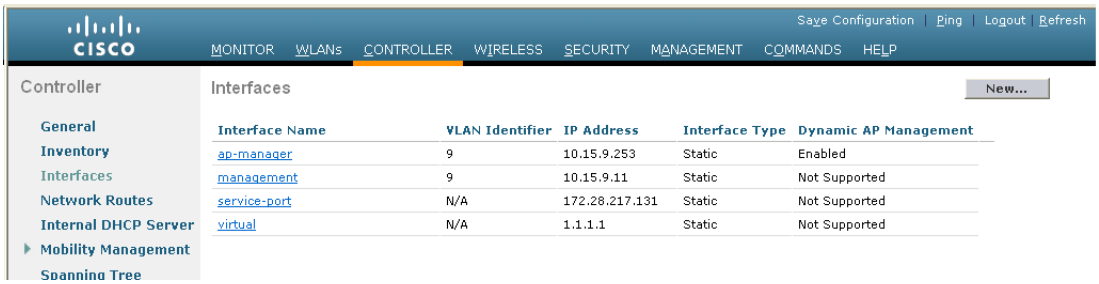
Perform the following to define and configure an interface to support guest traffic:

Step 1 Click the **Controller** tab.

Step 2 In the left pane, click **Interfaces**.

Step 3 Click **New**. (See Figure 10-8.)

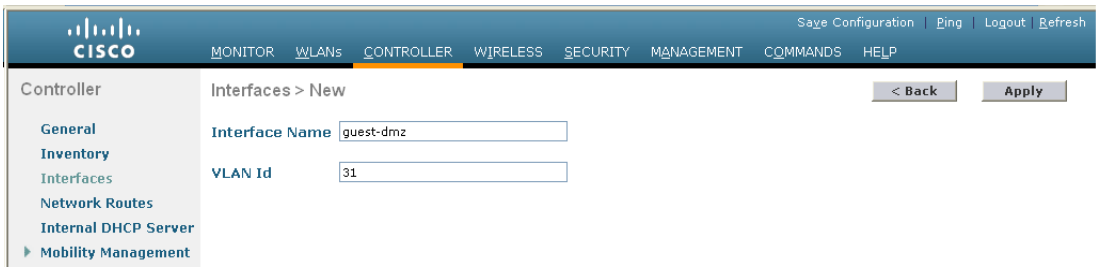
Figure 10-8 Controller Interfaces



Defining an Interface Name and VLAN ID

Step 4 Enter an interface name and VLAN ID. (See Figure 10-9.)

Figure 10-9 Interface Name and VLAN ID



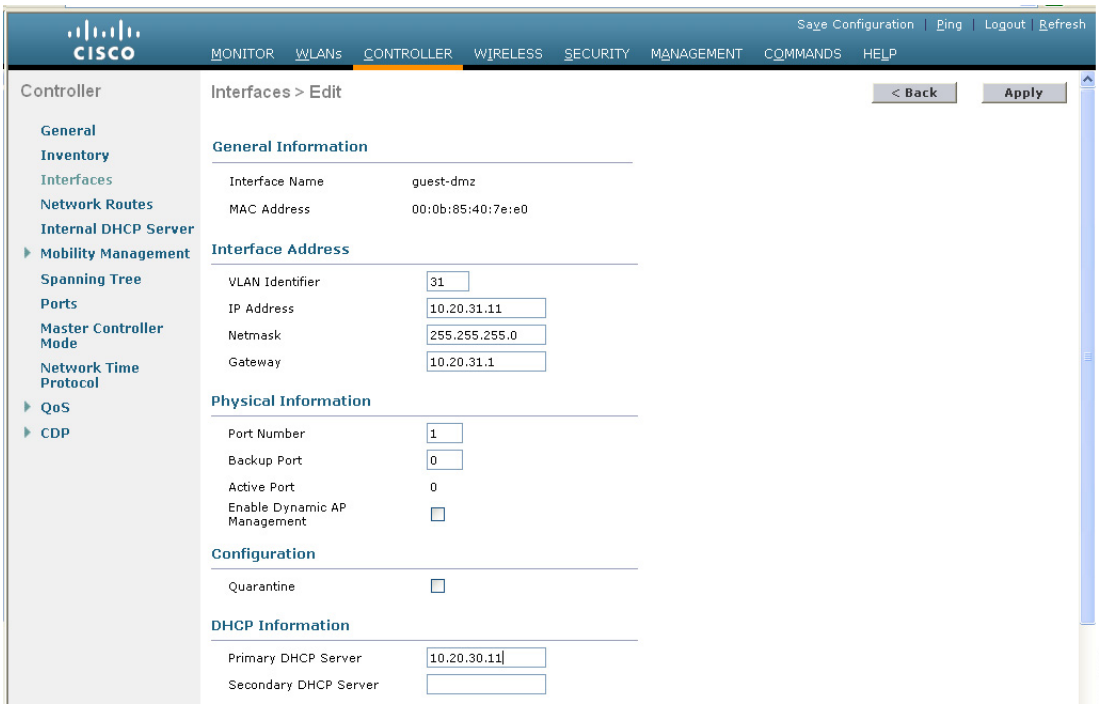
Defining Interface Properties

Step 5 Define the following properties:

- Interface IP
- Mask
- Gateway (for the firewall or next hop router connected to the anchor controller)
- DHCP Server IP (If using an external DHCP server, use the IP address of that server in the Primary DHCP Server field.)

  See Figure 10-10.

Figure 10-10 Defining Interface Properties



Note If DHCP services are to be implemented locally on the anchor controller, populate the primary DHCP server field with the management IP address of the controller. See Anchor WLC Installation and Interface Configuration, page 10-15.
If guest N+1 redundancy is being implemented in the DMZ, repeat the above interface configuration for each additional anchor WLC being deployed.

Mobility Group Configuration

The following default mobility group parameters should already be defined on the foreign WLC(s) as part of a standard centralized WLAN deployment. To support auto-anchor mobility for guest access, the anchor WLC(s) must also be configured with a mobility group domain name.

Defining the Default Mobility Domain Name for the Anchor WLC

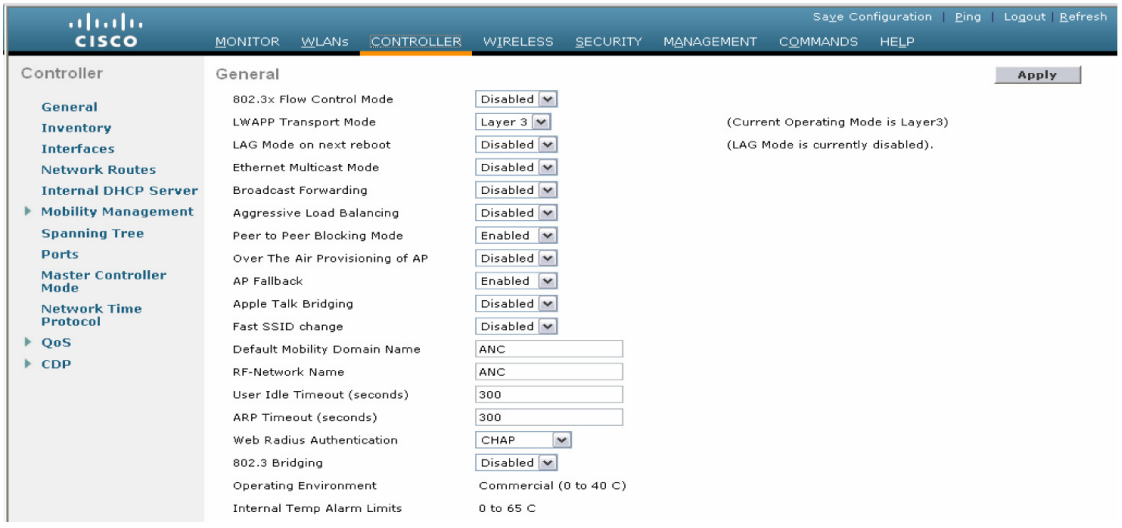
Configure a default mobility domain name for the anchor WLC. The anchor's mobility domain name should be different than what is configured for the foreign WLCs. In the examples below, the WLCs (foreign controllers) associated with the enterprise wireless deployment are all members of mobility group 'SRND'. The guest anchor WLC on the other hand, is configured with a different mobility group name: “ANC”. This is done to keep the anchor WLC logically separate from the primary mobility domain associated with the enterprise wireless deployment.

Step 1 Click the Controller tab.

Step 2 Enter a name in the Default Mobility Domain Name field.

Step 3 Click **Apply**. (See Figure 10-11.)

Figure 10-11 Defining a Default Mobility Domain Name on the Anchor WLC



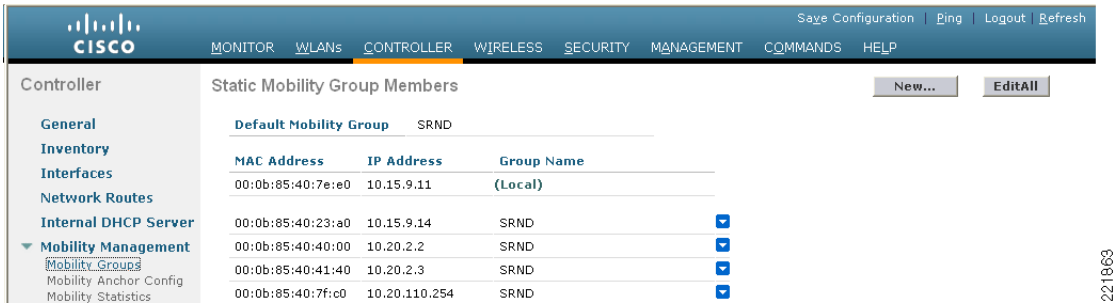
Defining Mobility Group Members of the Anchor WLC

Every foreign WLC within the enterprise deployment that is going to support the guest WLAN must be defined as a mobility group member in the guest anchor WLC(s).

Step 1 Click the **Controller** tab.

Step 2 In the left pane, click **Mobility Management** and then **Mobility Groups**. (See Figure 10-12.)

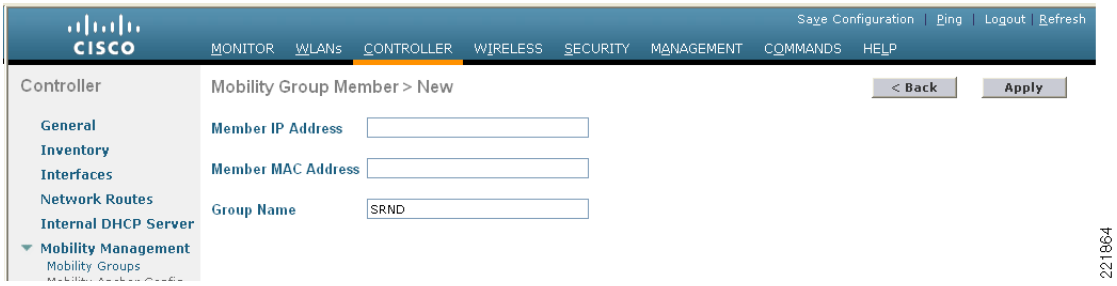
Figure 10-12 Defining Mobility Group Members



Adding Foreign Controllers as Mobility Group Members

Step 3 Click **New** to define a MAC and IP address for each foreign controller that will support the guest access WLAN. (See Figure 10-13.)

Figure 10-13 Adding Foreign Controllers to Anchor WLC



Note The 'Group Name' in Figure 10-13 above is the name configured under the foreign WLC's 'Default Mobility Domain Name', which should be different than the name used by the anchor WLC.The member IP and MAC address are those addresses shown by the **show mobility summary** command. Repeat the above steps for each additional foreign WLC that will support the guest WLAN. If more than one anchor is being deployed (guest N+1 redundancy), then repeat the steps in Defining the Default Mobility Domain Name for the Anchor WLC, page 10-18 and Defining Mobility Group Members of the Anchor WLC, page 10-19.

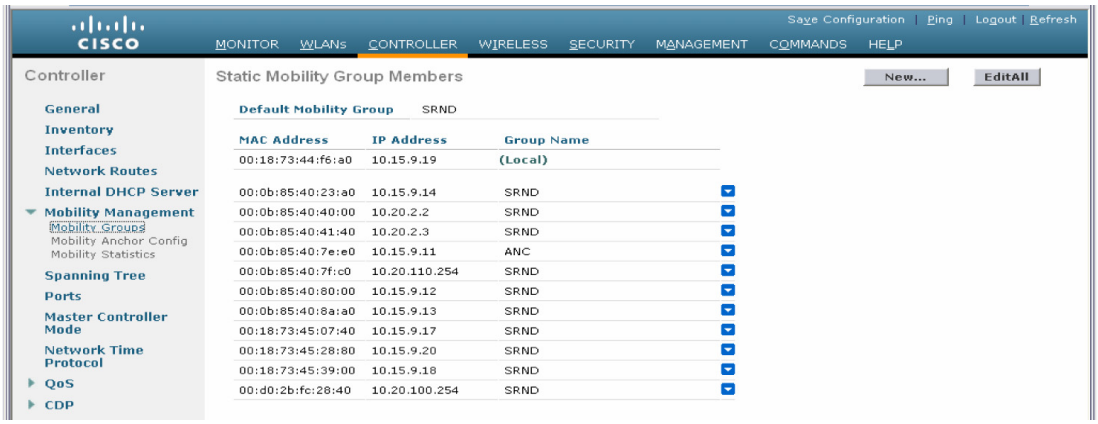
Adding the Anchor WLC as a Mobility Group Member of a Foreign WLC

As described in Auto Anchor Mobility to Support Wireless Guest Access, page 10-4, each foreign WLC maps the guest WLAN into an EoIP tunnel that terminates on the anchor WLC. Therefore, the anchor WLC(s) must be defined as a mobility group member in each foreign controller. In the example below, note that the group name entry for the anchor WLC is 'ANC' (see Defining Mobility Group Members of the Anchor WLC, page 10-19) whereas the other WLCs that comprise the enterprise wireless deployment are members of the mobility group: 'SRND'.

Step 1 Click **New** to add the anchor WLC's IP, MAC address, and Group Name to the mobility members table.

Step 2 Repeat these steps for each additional foreign controller. (See Figure 10-14.)

Figure 10-14 Adding Anchor Controller(s) to Foreign WLC



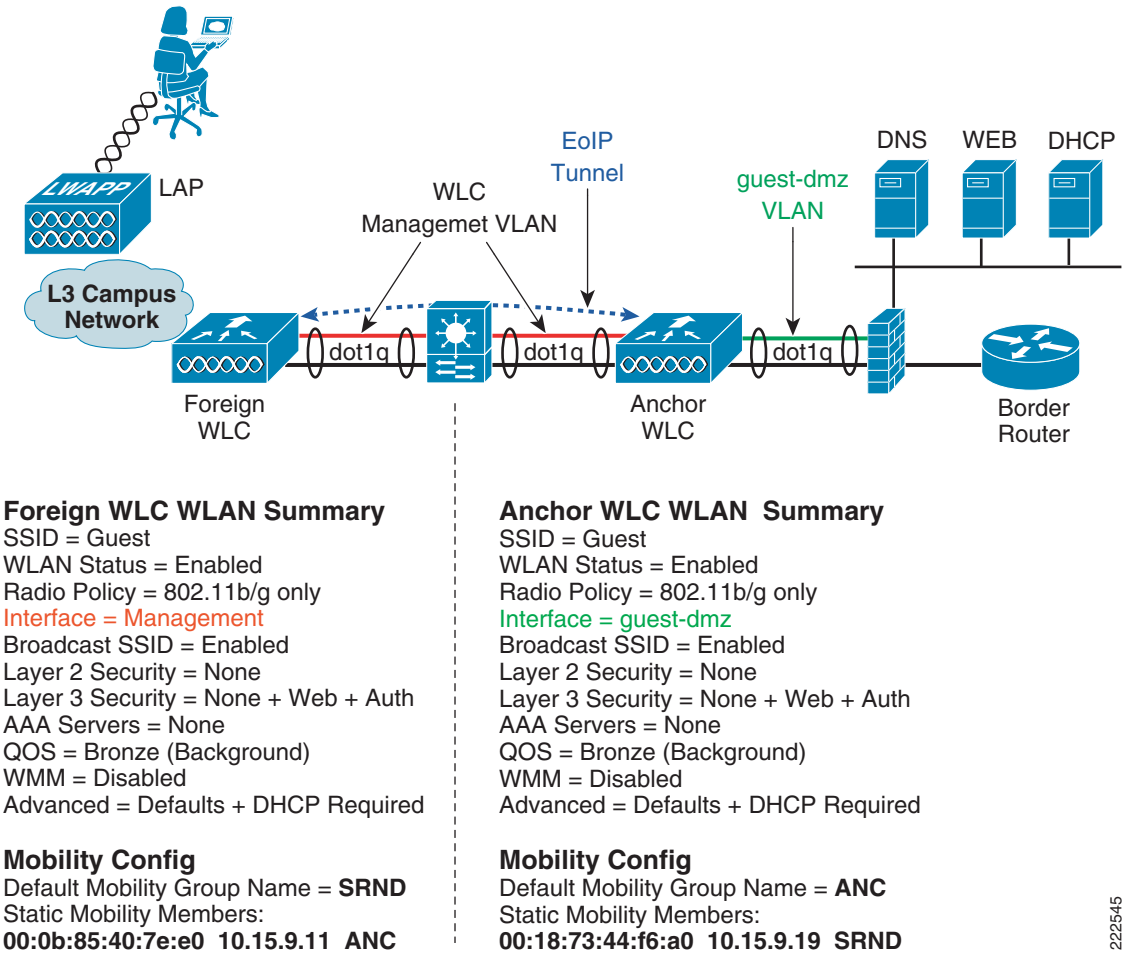
Note If guest N+1 anchor redundancy capability is being deployed, two or more anchor WLC entries are added to each foreign WLC's Mobility Group Members list.

Guest WLAN Configuration

The following section describes how to configure a single guest WLAN. The guest WLAN is configured on every foreign WLC that manages APs where guest access is required. Even though the anchor WLC(s) is not specifically used to manage LAPs associated with a guest WLAN, it must also be configured with the guest WLAN because the anchor WLC is a logical extension of the WLAN where user traffic is ultimately bridged (using LWAPP between the AP and the foreign controller, and EoIP between the foreign controller and the anchor controller) to an interface/VLAN on the anchor WLC.

Note It is extremely important to note that *all* parameters defined in the WLAN Security, QoS, and Advanced settings tabs, *must be configured identically* in both the anchor and foreign WLC(s). Figure 10-15 shows a high level diagram illustrating the WLAN configuration discussed below.

Figure 10-15 WLAN Configuration

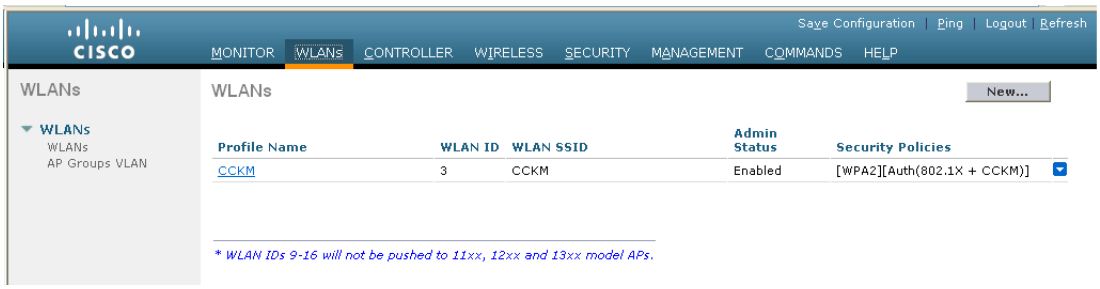


Note The parameters defined in the WLAN Security, QoS, and Advanced settings tabs, *must be configured identically* in both the anchor and foreign controller(s).

Foreign WLC—Guest WLAN Configuration

Step 1 Click the **WLANs** tab and then click **New**. (See Figure 10-16.)

Figure 10-16 Guest WLAN Configuration



Defining a Guest WLAN SSID

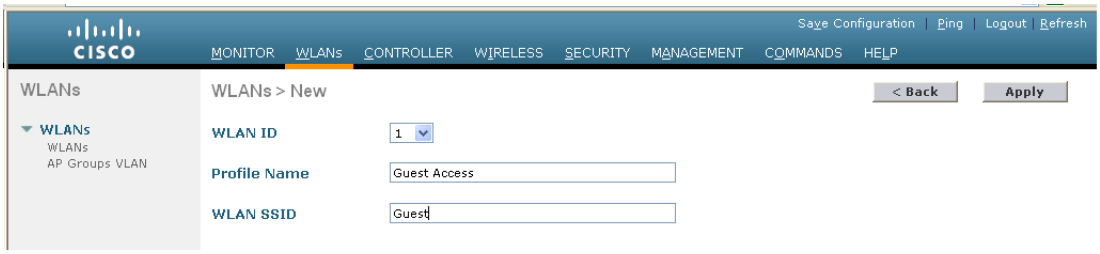
Step 2 Define an SSID that is intuitive or easily recognized by potential guest users.

The controller automatically assigns a VLAN ID. Administrators have the option selecting 1 – 16, as long as the ID is not already in use by another SSID/ WLAN.

Step 3 Define a Profile Name.

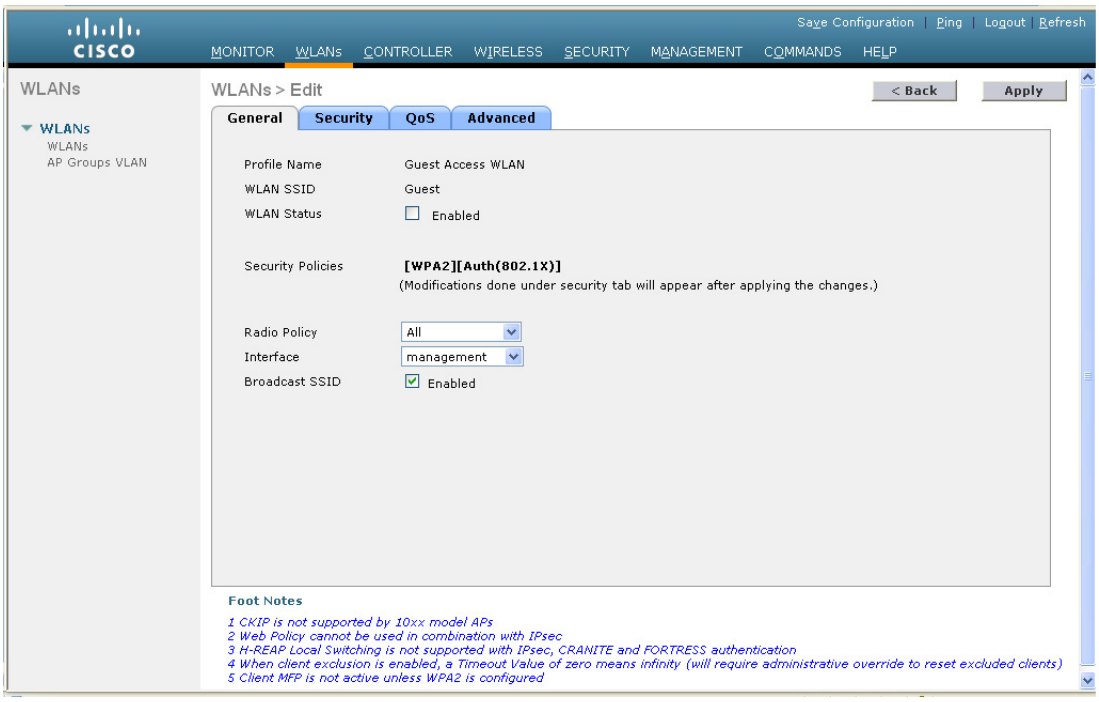
Step 4 Click **Apply**. (See Figure 10-17.)

Figure 10-17 Defining a Guest WLAN SSID



After creation of the new WLAN, the configuration page appears, as shown in Figure 10-18.

Figure 10-18 WLAN Configuration Page



Note The default interface used by the foreign WLC for the guest WLAN is the management interface. If the EoIP tunnel cannot be established with the anchor, the foreign controller will disassociate any wireless clients that were previously associated with the unreachable anchor and then assign new clients and reassociated clients to the interface configured under the guest WLAN of the foreign itself. Therefore, it is recommended to link the guest WLAN on the foreign to a non-routable network, or alternatively configure the DHCP server of the management interface with an unreachable IP address. If the anchor becomes unreachable, this prevents the guest clients to gain access to the management network.

Defining Guest WLAN Parameters and Policies

Under the General Configuration tab, perform the following steps.

Step 1 Enable the WLAN by clicking the box next to WLAN Status.

Step 2 Optionally, set the radio policy if you wish to restrict which bands support the guest access.

a. Broadcast SSID is enabled by default; leave enabled.

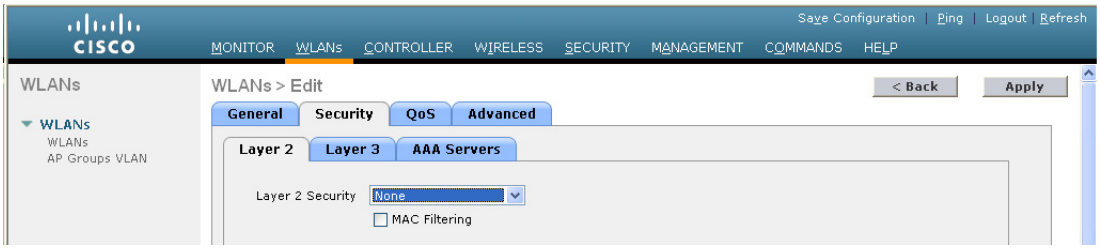
b. By default, the WLAN is assigned to the “management” interface of the WLC. Do not change this.

Step 3 Click the **Security** tab. (See Figure 10-19.)

Figure 10-19 Defining Guest WLAN General Policies

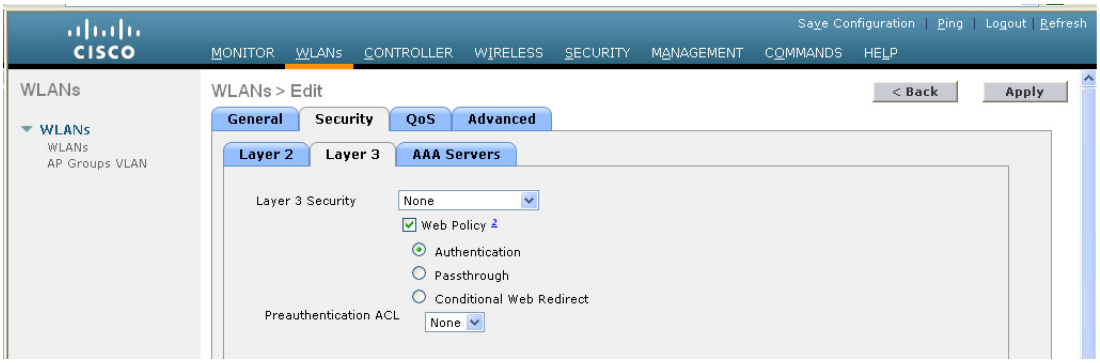
Step 4 Set the Layer 2 Security to **none** from its default setting (802.1x WPA/WPA2). (See Figure 10-20.)

Figure 10-20 WLAN Layer 2 Security Configuration



Step 5 Click the **Layer 3** tab. (See Figure 10-21.)

Figure 10-21 Guest WLAN Layer 3 Security Configuration



Step 6 Click the **Web Policy** checkbox (a list of additional options will be presented).

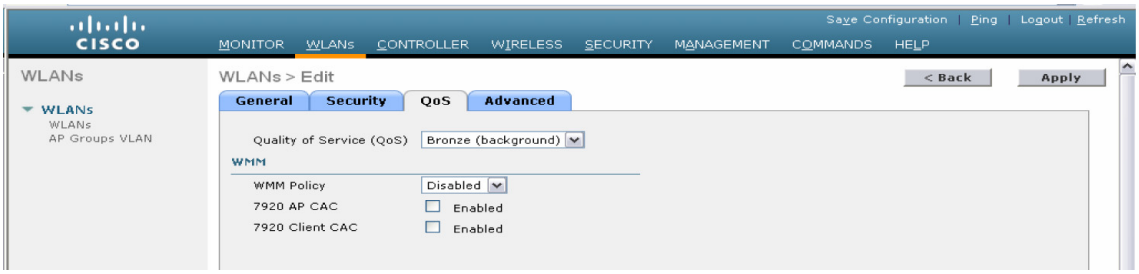
A dialog warning box appears, indicating that the WLC will pass DNS traffic to and from clients prior to authentication.

Step 7 Select **Authentication** or **Pass-through** for the web policy. (See Guest User Authentication, page 10-11.)

Note A pre-authentication ACL can be used to apply an ACL that allows un-authenticated clients to connect to specific hosts or URL destinations before authentication. The ACL is configured under Security > Access Control Lists. If a pre-authentication ACL is used in conjunction with the web auth policy, it must include a rule to permit DNS requests; otherwise, the client will be unable to resolve and connect to a destination host/URL that would otherwise be allowed by the ACL.

Step 8 Select the **QoS** tab, as shown in Figure 10-22.

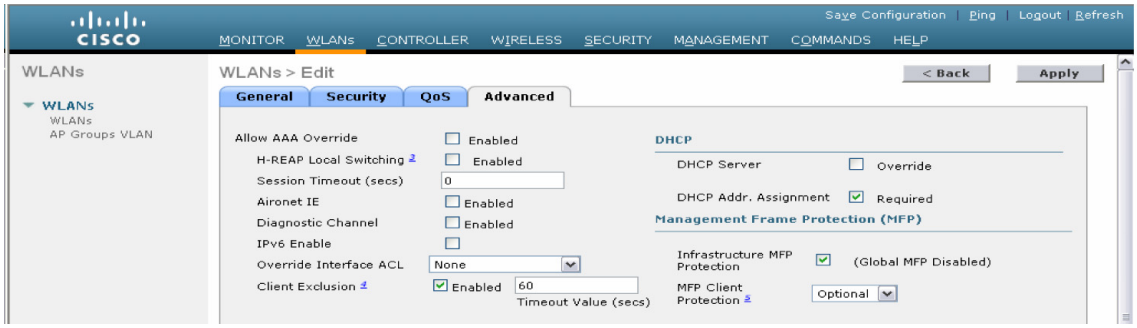
Figure 10-22 Guest WLAN QoS Configuration



Step 9 Optionally, set the upstream QoS profile for the guest WLAN. The default is 'Silver (Best Effort)'. In this example, the guest WLAN has been re-assigned to the lowest QoS class.

Step 10 Click the **Advanced** tab. (See Figure 10-23.)

Figure 10-23 Guest WLAN Advanced Configuration



Step 11 Set Session Timeout (this is optional).

Note Any session timeout greater than 0 (default) forces de-authentication after expiration, and requires the user to re-authenticate through the web portal.

Step 12 Set DHCP Addr. Assignment to “Required”.

Note Setting DHCP Addr. Assignment to “Required” is recommended to prevent guest users from attempting to use the guest network using a static IP configurations.

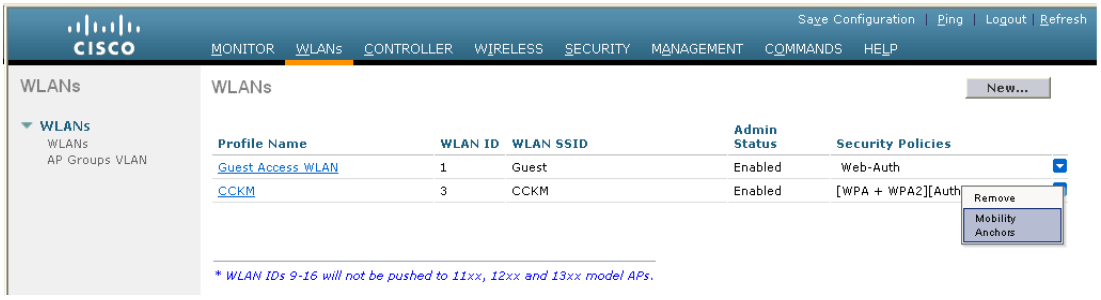
Step 13 Click **Apply** when finished.

Establishing the Guest WLAN Mobility Anchor(s)

Step 1 From the WLAN menu on the foreign WLC find the newly created guest WLAN.

Step 2 Highlight and click **Mobility Anchors** from the right-hand pull-down selection list. (See Figure 10-24.)

Figure 10-24 WLAN Mobility Anchor



Step 3 In the Switch IP Address (Anchor) pull-down selection list, select the IP address corresponding to the management interface of the anchor WLC deployed in the network DMZ. This is the same IP address configured in Adding the Anchor WLC as a Mobility Group Member of a Foreign WLC, page 10-20.

Step 4 Click **Mobility Anchor Create**. (See Figure 10-26.)

Figure 10-25 Selecting Management Interface from Switch IP Address (Anchor)

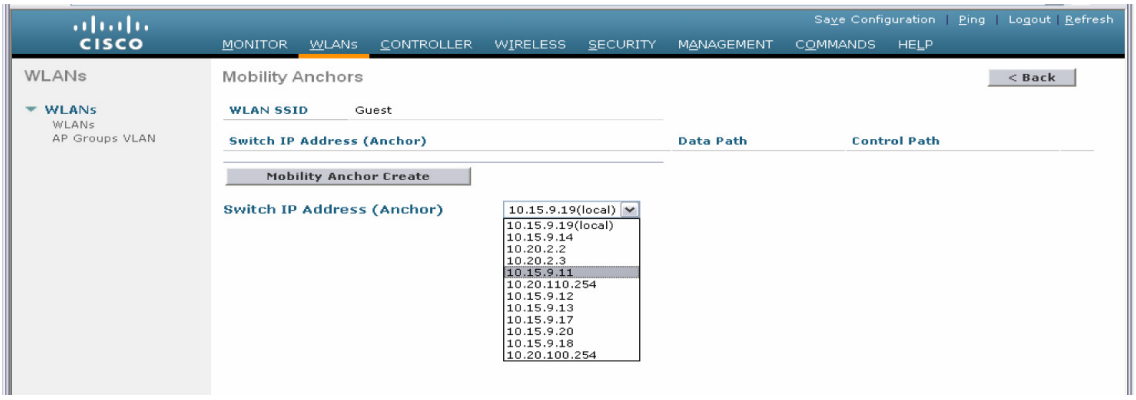
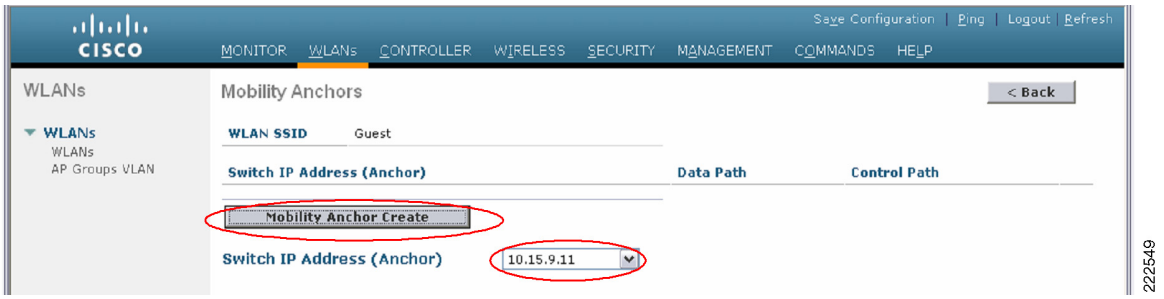


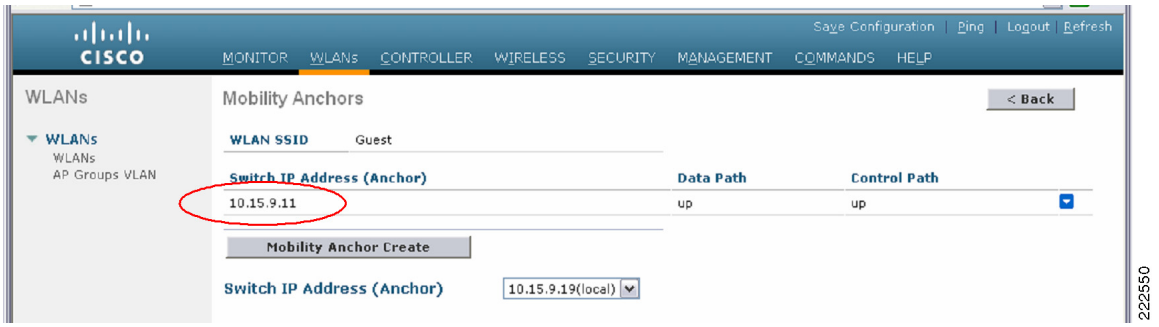
Figure 10-26 Selecting WLAN Mobility Anchor



Verifying the Guest WLAN Mobility Anchor

Once configured, the screen shown in Figure 10-27 shows the mobility anchor (selected from above), assigned to the Guest WLAN.

Figure 10-27 Verifying the Guest WLAN Mobility Anchor



For ease of verification, the page displays whether or not the mobility tunnel data path and LWAPP control path have been established with the anchor. If either or both show "down", see Troubleshooting Guest Access, page 10-54 for troubleshooting tips. The pull-down selection list to the right offers the option to send a ping to the destination anchor WLC.

Step 5 When finished, click **Back**.

Step 6 Repeat the steps above for each additional anchor WLC being deployed (guest N+1 redundancy).

This completes the guest WLAN configuration. Repeat all steps from Foreign WLC—Guest WLAN Configuration, page 10-21 through Verifying the Guest WLAN Mobility Anchor, page 10-27 for each additional foreign WLC that will support the guest WLAN.

Guest WLAN Configuration on the Anchor WLC

Guest WLAN configuration on the anchor controller(s) is identical to that of the foreign controller except for minor differences in the WLAN interface and mobility anchor configuration, which are detailed below.

Note The SSID defined for the guest WLAN must be exactly the same as what is defined on the foreign WLCs.

Anchor WLC—Guest WLAN Interface

As indicated above, the parameters configured for the guest WLAN on the anchor WLC are the same except the interface to which the WLAN is mapped. In this case, the guest WLAN is assigned to an interface/VLAN on the anchor WLC, which connects to an interface on a firewall or Internet border router.

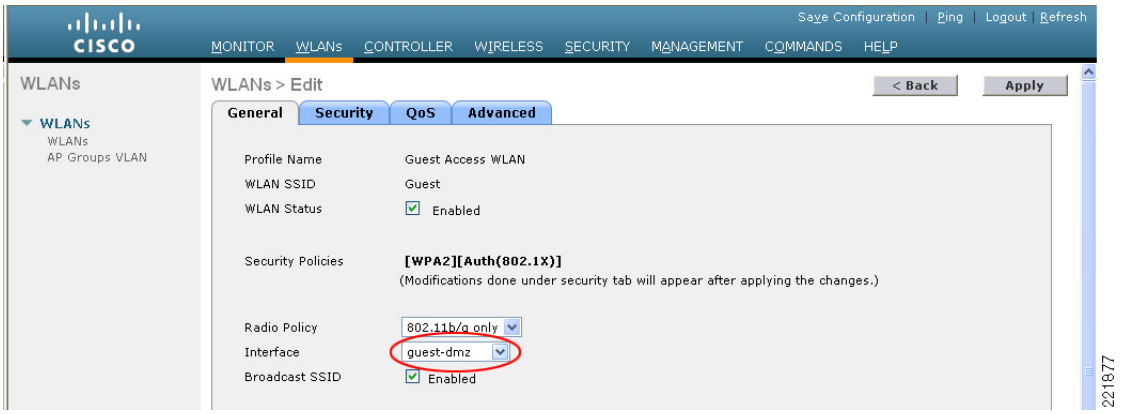
Step 1 Click the **WLANs** tab.

Step 2 Create, configure, and enable the guest WLAN the same way it was configured on the foreign WLC(s) except for the following:

In the WLANs general configuration, under **Interface,** choose the interface name created in Guest VLAN Interface Configuration, page 10-16. (See Figure 10-28.)

Step 3 Click **Apply**.

Figure 10-28 Anchor WLC Guest WLAN Interface Configuration



Anchor WLC—Defining the Guest WLAN Mobility Anchor

The second parameter that differs in configuration from the foreign WLC is the WLAN mobility anchor configuration. The guest WLAN mobility anchor is the anchor WLC itself.

Step 1 Click the **WLANs** tab.

Step 2 Find the Guest WLAN and click **Mobility Anchors**.

Step 3 From the pull-down selection list, choose the IP address representing the anchor controller. The IP address has (Local) next to it.

Step 4 Click **Mobility Anchor Create**. (See Figure 10-29.)

Figure 10-29 Defining the Guest WLAN Mobility Anchor

Note that the guest WLAN mobility anchor is *local*. (See Figure 10-30.)

Figure 10-30 Verifying Guest Mobility Anchor

Because the mobility anchor for the guest WLAN is the anchor WLC itself, the Data and Control Path status will always show “up”. If not, check to ensure that you have selected the local WLC as the anchor from the 'Switch IP Address (Anchor) drop down menu.

Step 5 If guest N+1 redundancy is being implemented, repeat the WLAN configuration for each additional anchor WLC being deployed. Otherwise, this completes the configuration steps required to create the guest WLAN on the anchor WLC.

Guest Account Management

- If guest credentials are going to be managed locally on the anchor controller, there are two methods by which they can be created and applied:
- Through a WCS lobby ambassador admin or super user/root admin account
- Directly on the controller via a local lobby admin account or other management account with read/write access

Guest Management Using WCS

The following configuration examples assume WCS version 4.1.83 or later has been installed and configured, and a lobby ambassador account has been created. For more information on installing and configuring WCS, see the following URL: http://www.cisco.com/en/US/products/ps6305/products_installation_and_configuration_guides_list.html.

Regarding the creation of guest accounts, see the following URL: http://www.cisco.com/en/US/products/ps6305/products_configuration_guide_chapter09186a008083184 1.html#wp1075155.

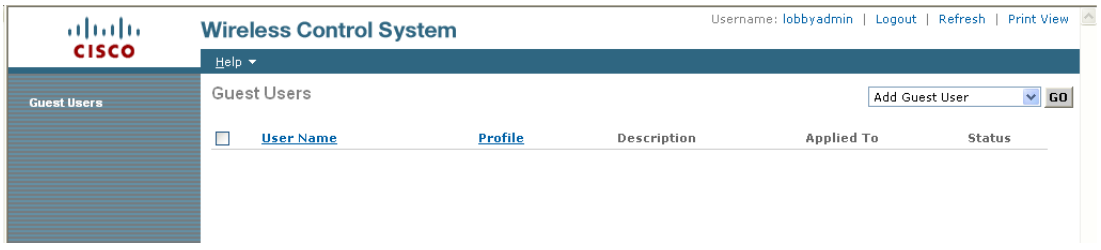
Note Ensure that the individual WLC configurations are synchronized with WCS before creating guest templates.

Log in to WCS using the Lobby Ambassador credentials assigned by the system administrator. (See Figure 10-31.)

Figure 10-31 WCS Login

After logging in, the screen shown in Figure 10-32 appears.

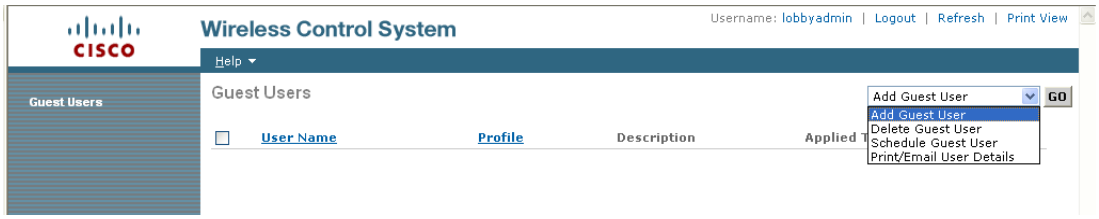
Figure 10-32 WCS Lobby Admin Interface



There are two types of guest templates:

- The **Add Guest User** template allows administrators to create and immediately apply guest credentials to one or more anchor WLCs.
- The **Schedule Guest User** template allows administrators to create guest credentials that are applied to one or more anchor WLCs at some future month, day, and time. (See Figure 10-33.)

Figure 10-33 Guest User Template Option



Using the Add Guest User Template

Step 1 From the pull-down selection list, select **Add Guest User** and click **Go.**

Step 2 The template shown in Figure 10-34 appears.

Figure 10-34 Add Guest User Template

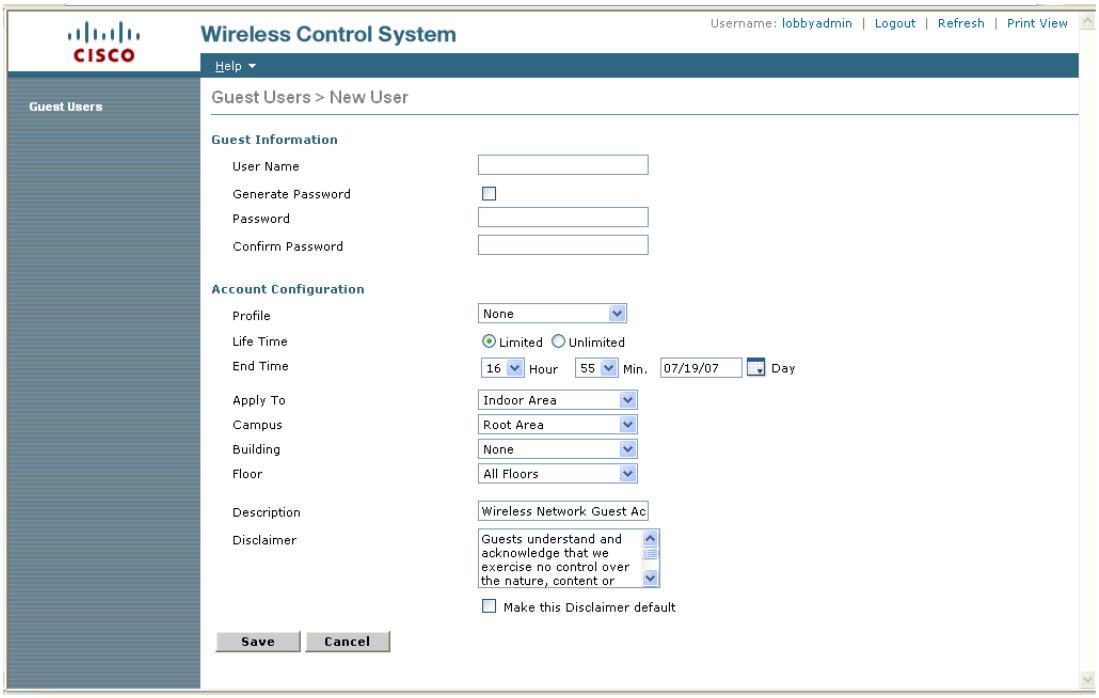
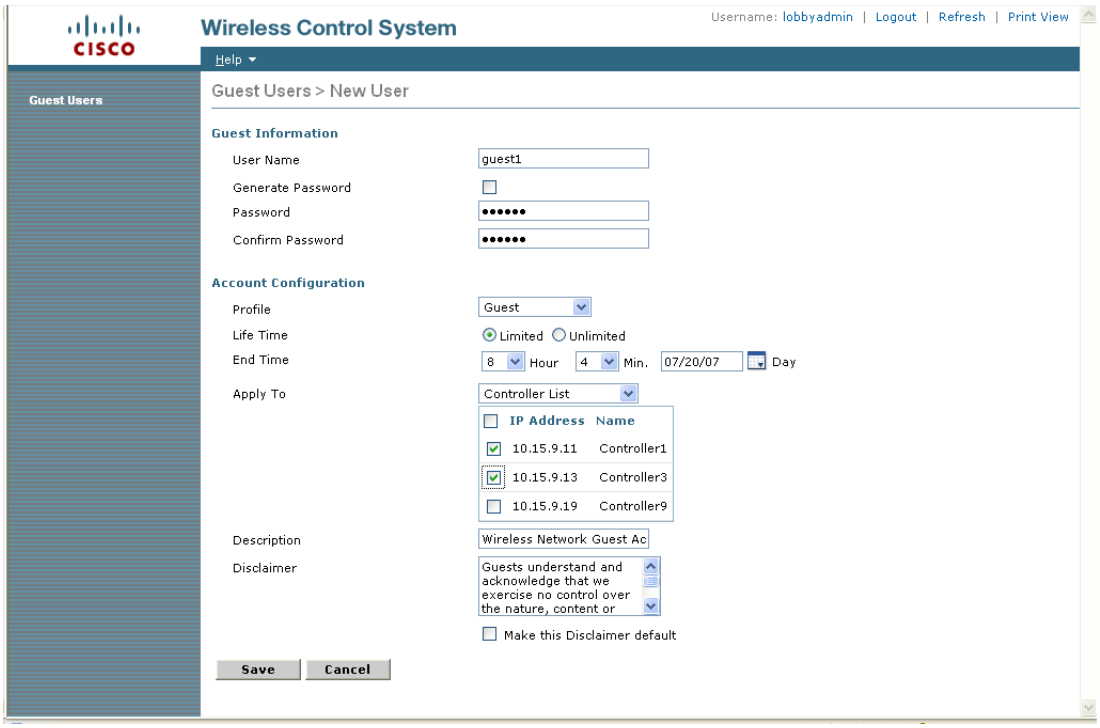


Figure 10-35 shows an example of guest user account creation.

Figure 10-35 Guest User Account Creation



Step 3 Under Guest Information, enter a User Name and Password.

Passwords are case sensitive. User names are restricted to 24 characters or less. Administrators also have an option to allow the system to automatically generate a password by clicking on the **Generate Password** check box.

Step 4 Under **Account Configuration,** select the following:

- Profile—The pull-down selection list displays a list of WLANs (SSIDs) configured with a L3 Web Policy.
- Life Time—Select “limited” or “unlimited”
- End Time—If the guest account is “limited”, select the month, day, and time the credentials are to expire.
- Apply To—From the pull-down selection list, select **Controller List** and click the check box next to the controller(s) representing anchor WLCs. Note that there will be other controllers listed; however, these represent the foreign WLCs. There is no need to apply user credentials on the foreign WLCs because the authentication enforcement point is the anchor WLC.

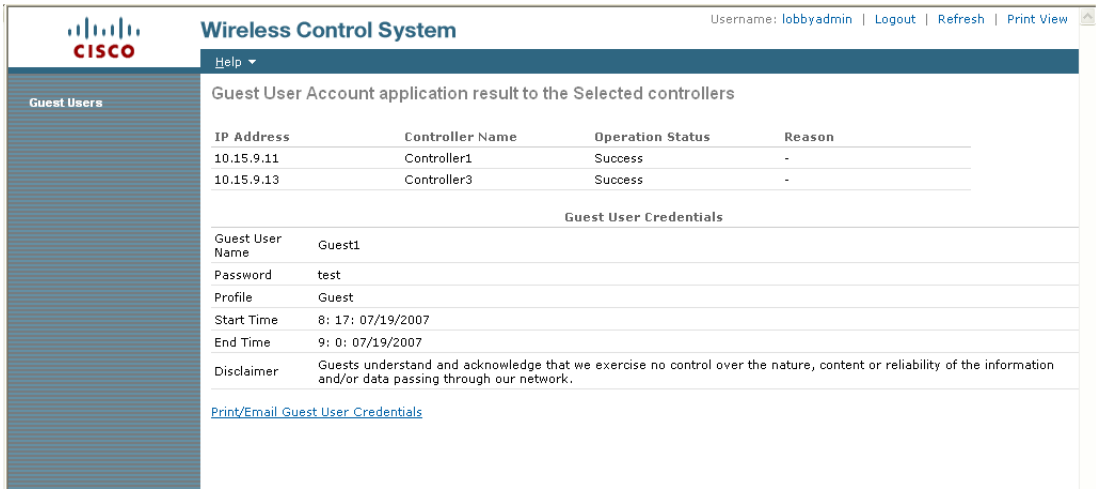
Note As seen in Figure 10-35, there are various options for where the credentials can be applied, including being able to control the physical/geographic location where a user can access the guest WLAN. These include outdoor areas, indoor areas, building, floor, and so on. This location-based access method can only be used if: 1) the WLAN deployment has been integrated into the WCS mapping database, and 2) the guest WLAN (a WLAN with web policy) does not use mobility anchors.

- Description—Enter a description. The description is displayed on the WLC to which the credentials are applied under Security > Local Net Users. It is also included in the e-mail that can be sent to a guest informing them of what credentials to use to access the network.

- Disclaimer—Used in the e-mail that can be sent to a guest user informing them of what credentials to use to access the network

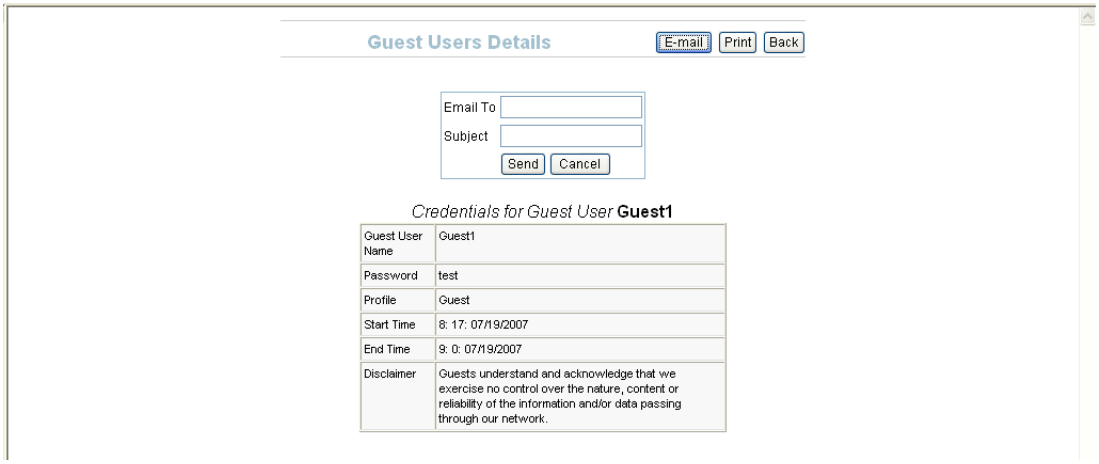
Step 5 Click **Save** when finished. The summary screen shown in Figure 10-36 appears, acknowledging that credentials have been applied to the anchor controller(s). The admin is also presented with an option to print or e-mail the credentials to the guest user.

Figure 10-36 Successful Guest Account Creation



Step 6 Click **Print/Email Guest User Credentials**. The screen shown in Figure 10-37 appears.

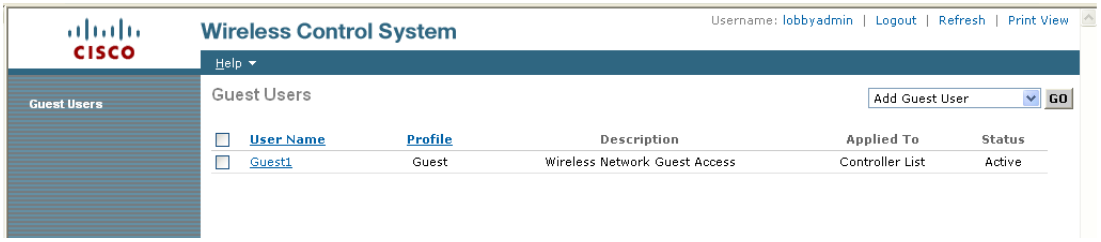
Figure 10-37 Print/Email Guest User Details



Note For details on setting up an SMTP mail server to support e-mailing guest account information to users, see the WCS Configuration guide at the following URL: http://www.cisco.com/en/US/docs/wireless/wcs/4.1/configuration/guide/wcsadmin.html.

After printing and or e-mailing the account details, the screen shown in Figure 10-38 appears. By clicking the **User Name,** an admin can go back and edit the guest account or remove it by checking the box next to the User Name and selecting **Delete Guest User** from the pull-down selection list.

Figure 10-38 WCS Guest Users Summary



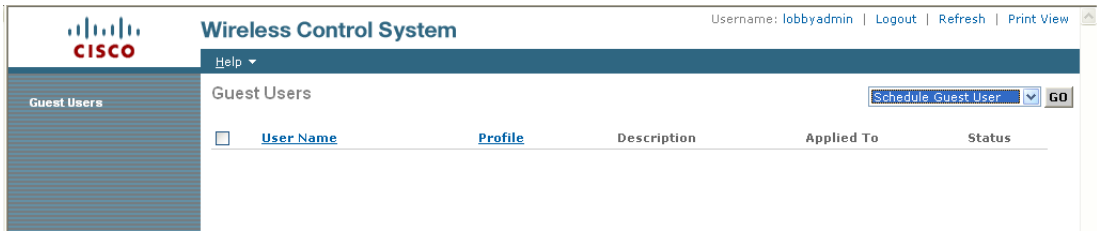
Note If a user template is deleted from WCS while a user is active, they are de-authenticated.

Using the Schedule Guest User Template

For details about configuring guest accounts, see the WCS Configuration guide at the following URL: http://www.cisco.com/en/US/docs/wireless/wcs/4.1/configuration/guide/wcsadmin.html.

Figure 10-39 shows the guest user template option.

Figure 10-39 Guest User Template Option



Step 1 From the pull-down selection list, select **Schedule Guest User** and click **Go.**

The template shown in Figure 10-40 appears.

Figure 10-40 Schedule Guest User Template

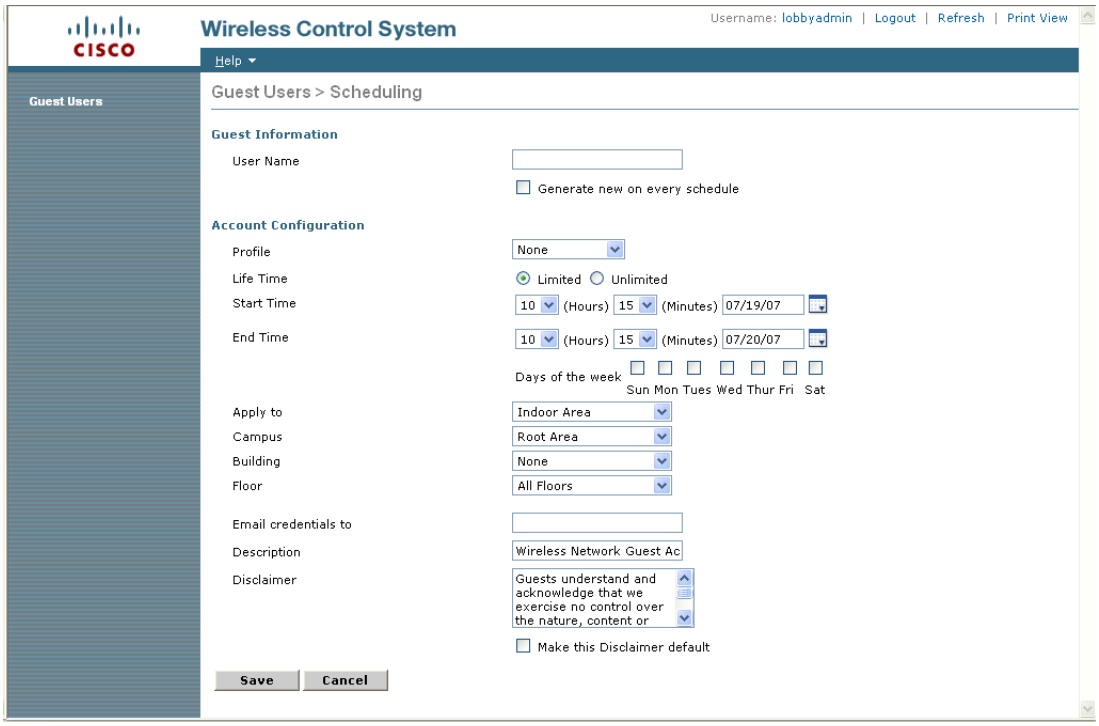
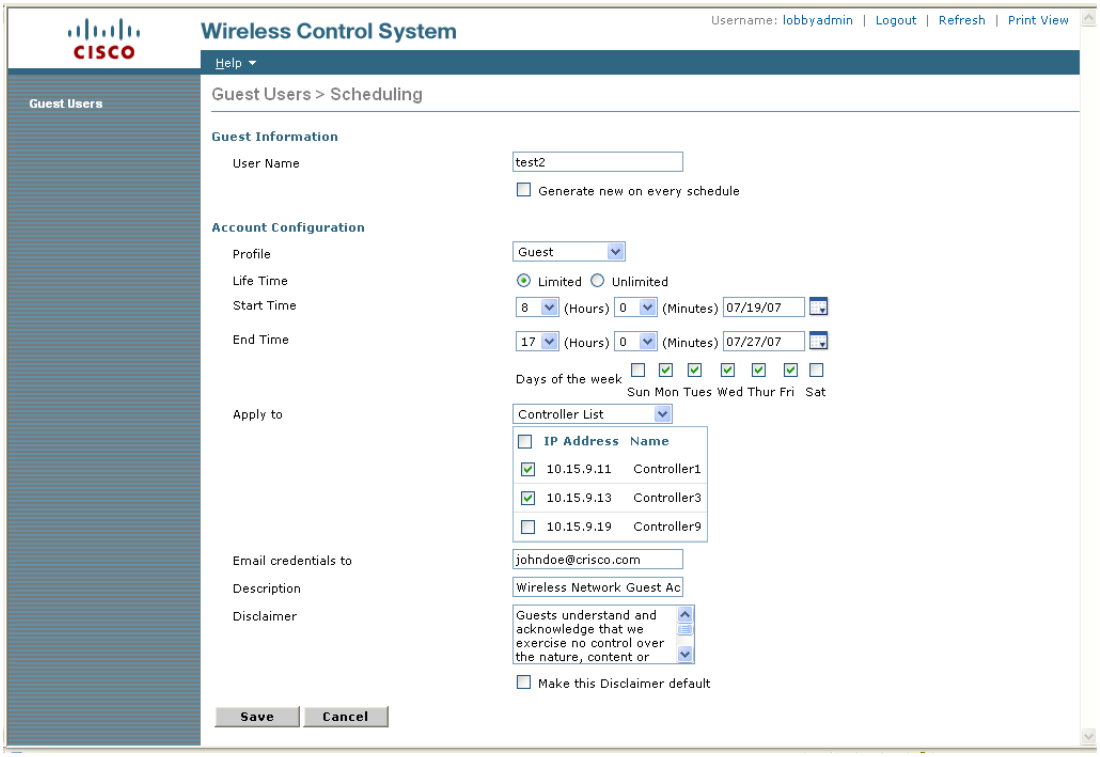


Figure 10-41 shows an example of a schedule guest user account creation.

Figure 10-41 Schedule Guest User Account Creation



Step 2 Under Guest Information, enter a User Name. User names can be up to 24 characters long. When using the schedule-based template, administrators have the option to allow the system to automatically generate the user name for each new day that access is being offered. Also, when using this template, the system automatically generates the user password. There is no option to manually assign a password.

Step 3 Under Account Configuration, select the following:

- Profile—The pull-down selection list displays a list of WLANs (SSIDs) configured with an L3 Web Policy.
- Life Time—Select “limited” or “unlimited”.
- Start Time—Select the time, month, and day when the account is to become active.

Note The start time cannot begin within the current day that the account is being created. The start day must be one or more days beyond the day the account is being created.

- End Time—If the account is limited, select the stop time, month, and day.

Note The stop day can be a period no longer than 30 days from the start day.

- Days of Week—Depending on the lifetime of the account, administrators have the ability to control for which days of the week access is available. Click the check boxes next to those days of the week access is permitted.

Note If "Days of the Week" is selected, the start and stop times represent the period within each day that access is available. Upon expiry within a given day, WCS removes the credentials from the applicable controllers. For each new day/interval that access is permitted, WCS automatically generates a new password (and optionally a username), e-mails it to the guest user, and re-applies the new credentials to the applicable WLCs. If "Days of the Week" is not defined, access begins based on the start day and time and is continuously active until the end day and time.

- Apply To—From the pull-down selection list, select **Controller List** and click the check box next to the controller(s) representing anchor WLCs. Note that there will be other controllers listed; however, these represent the foreign WLCs. There is no need to apply user credentials on the foreign WLCs because the authentication enforcement point is the anchor WLC.

Note As seen in Figure 10-41, there are various options for where the credentials can be applied, including being able to control the physical/geographic location where a user can access a guest WLAN. These include outdoor areas, indoor areas, building, floor, and so on. This location-based access method can only be used if: 1) the WLAN deployment has been integrated into the WCS mapping database, and 2) the guest WLAN (a WLAN with web policy) does not use mobility anchors.

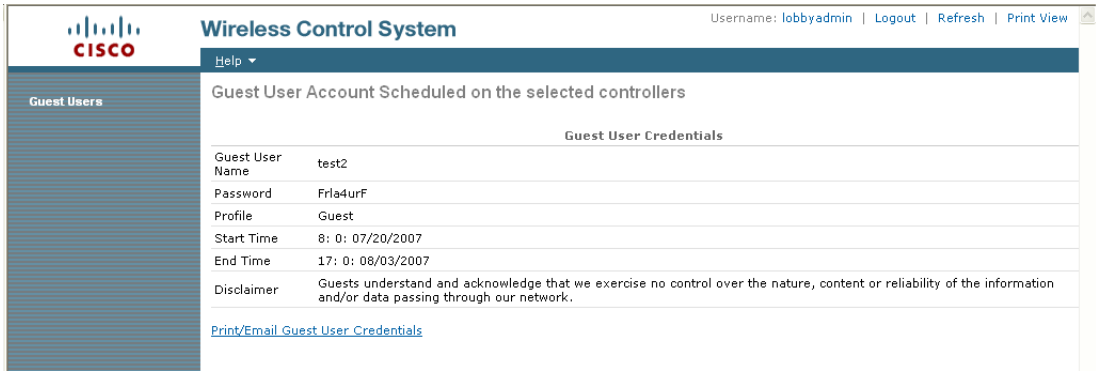
- E-mail Credentials to—Enter the e-mail address for whom an account is being established. This is a mandatory field.

Note An SMTP mail server must be configured in WCS so that it can use to send guest account information. For details, see the following URL: http://www.cisco.com/en/US/docs/wireless/wcs/4.1/configuration/guide/wcsadmin.html.

- Description—Provide a description. The description is displayed on the WLC to which the credentials are applied under Security > Local Net Users. The description is also included in an e-mail that can be sent to the guest, informing them of what credentials to use to access the network.
- Disclaimer—Used in the e-mail that is sent to a guest user, informing them of what credentials to use to access the network.

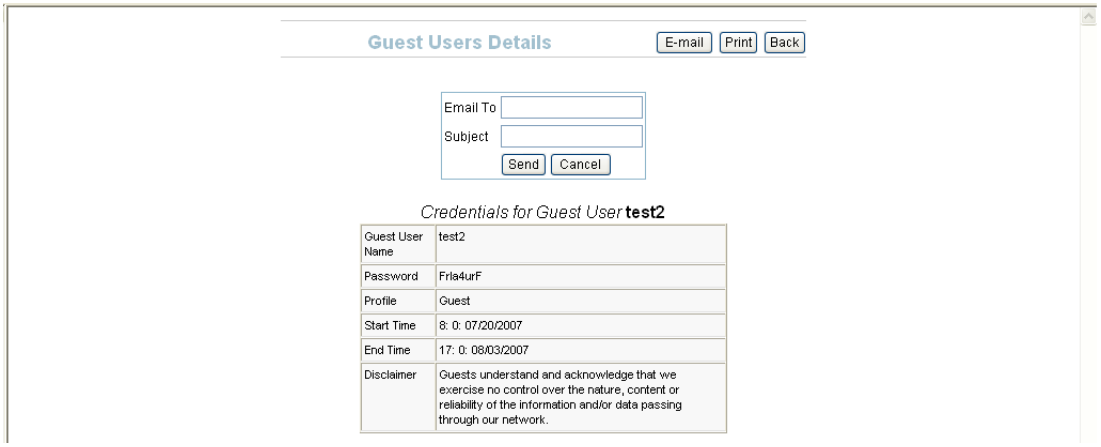
Step 4 Click **Save** when finished. The screen shown in Figure 10-42 appears, acknowledging that the scheduled account has been created. The admin is also presented with an option to print or e-mail the credentials to the guest user.

Figure 10-42 Successful Scheduled Account Creation



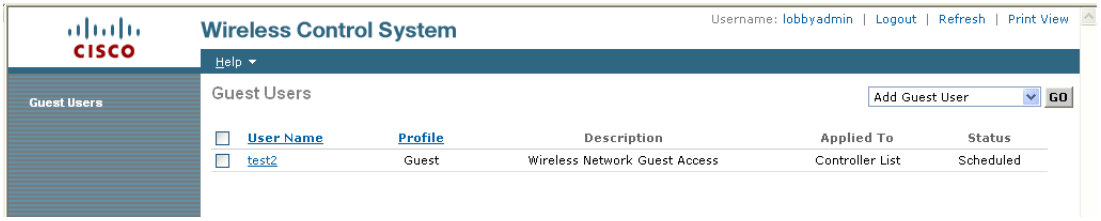
Step 5 Optionally, click **Print/Email Guest User Credentials**. The screen shown in Figure 10-43 appears.

Figure 10-43 Print/E-mail Guest User Details



After printing and/or e-mailing the account details, the summary screen shown in Figure 10-44 appears. By clicking the **User Name,** an admin can go back and edit the guest account or remove it by checking the box next to the User Name and selecting **Delete Guest User** from the pull-down selection list.

Figure 10-44 WCS Guest Users Summary



Note If a user template is deleted from WCS while a user is active, they are de-authenticated**.**

This completes the steps required to create a guest account using the lobby ambassador interface in WCS.

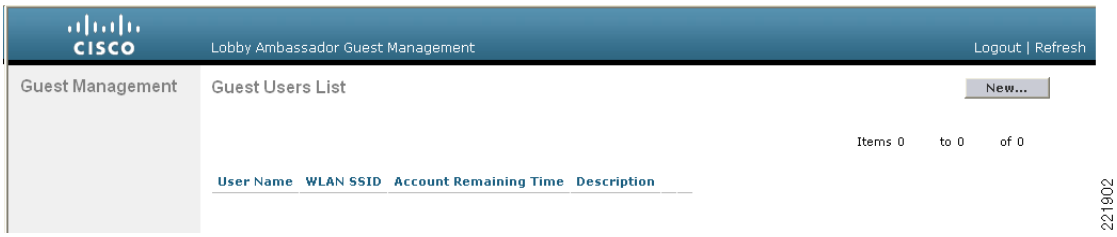
Managing Guest Credentials Directly on the Anchor Controller

The following procedure assumes that a network administrator has established a local management account with lobby admin privileges on one or more anchor controllers.

Step 1 Login to the anchor controller using the lobby admin credentials assigned by the system administrator. Remember that conduits might need to be opened through a firewall to permit HTTP/HTTPS for web administration of the controller. See Anchor Controller Positioning, page 10-6.

After login, the screen shown in Figure 10-53 appears.

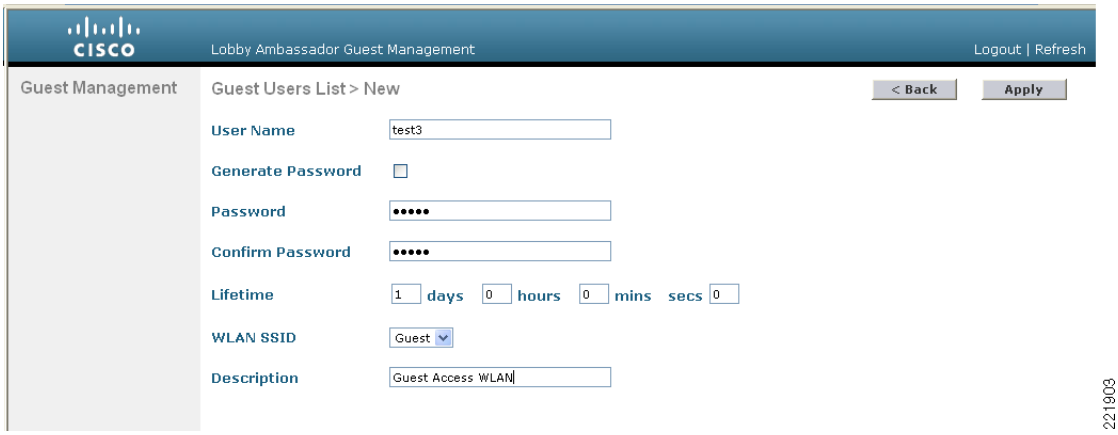
Figure 10-45 Anchor Controller Login



Step 2 Click **New**.

The screen shown in Figure 10-46 appears.

Figure 10-46 Creating Local WLC Guest Credentials



Step 3 To create user credentials, perform the following steps:

a. Enter a username and password (manual or auto).

b. Select the WLAN/SSID to which the guest account applies (only WLANs configured with an L3 web policy are displayed).

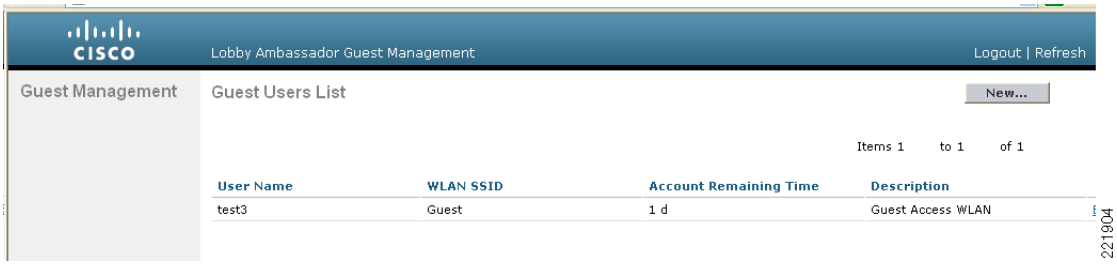
c. Enter a lifetime for the credentials.

d. Enter a description for the user.

Step 4 Click **Apply**.

The screen shown in Figure 10-47 appears and shows the newly-added guest user.

Figure 10-47 Anchor WLC Guest Users List



From this screen you have the option to do the following:

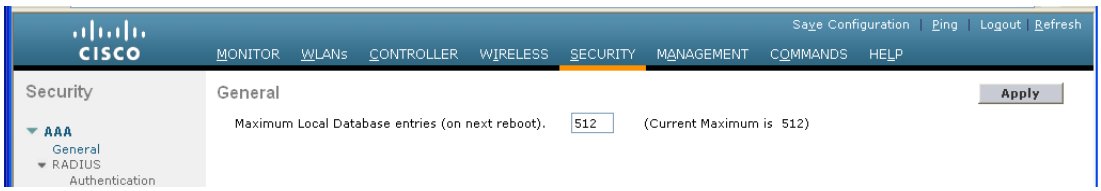
- Edit the existing user (link at far right; not visible)
- Delete the existing user (link at far right; not visible)
- Add a new user

Configuring the Maximum Number of User Accounts

The default number of guest user accounts that can be defined on the controller is 512. This value can be changed by completing the following steps.

Step 1 Click the **Security** tab. (See Figure 10-48.)

Figure 10-48 Configuring the Maximum Number of User Accounts



Step 2 In the left pane, click **General** under AAA properties.

Step 3 Configure the maximum number of user database entries (between 512 and 2048).

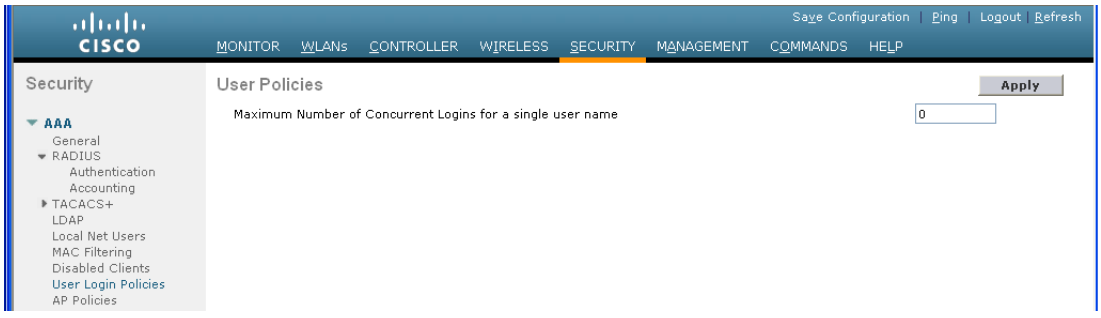
Step 4 Click **Apply**.

Maximum Concurrent User Logins

The maximum number of concurrent logins for a local user account on the WLC can be configured. Values include 0 for unlimited concurrent logins or can be limited from 1 to 8. The maximum user logins is configured by completing the following steps:

Step 1 Click the **Security** tab. (See Figure 10-49.)

Figure 10-49 User Login Policies



Step 2 In the left pane, click **User Login Policies** under AAA.

Step 3 Configure the maximum number of concurrent user logins (between 0–8).

Step 4 Click **Apply**.

Guest User Management Caveats

Note the following caveats:

- Guest accounts can be added using either method above or both methods together.
- When using WCS, the lobby admin may not have visibility of user accounts that might have been created locally on the anchor controller if the controller configuration has not been recently synchronized with WCS. If this is the case and a WCS lobby admin attempts to add an account with a user name that is already configured on the WLC, the WCS configuration overrides the local configuration.
- When adding user accounts locally on the controller, the local admin will have visibility of all accounts that have been created, including those that were created via WCS.
- If a guest user is currently authenticated to a WLAN and their credentials are deleted from WCS or locally on the controller, the user traffic stops flowing, and the user is de-authenticated.

Other Features and Solution Options

Web Portal Page Configuration and Management

The internal web server and associated functionality is hosted locally on the anchor controller. When a WLAN is configured to use the web policy, either for authentication or pass-through, the internal web server is invoked by default. No further configuration is required. The internal portal includes a few optional configuration parameters.

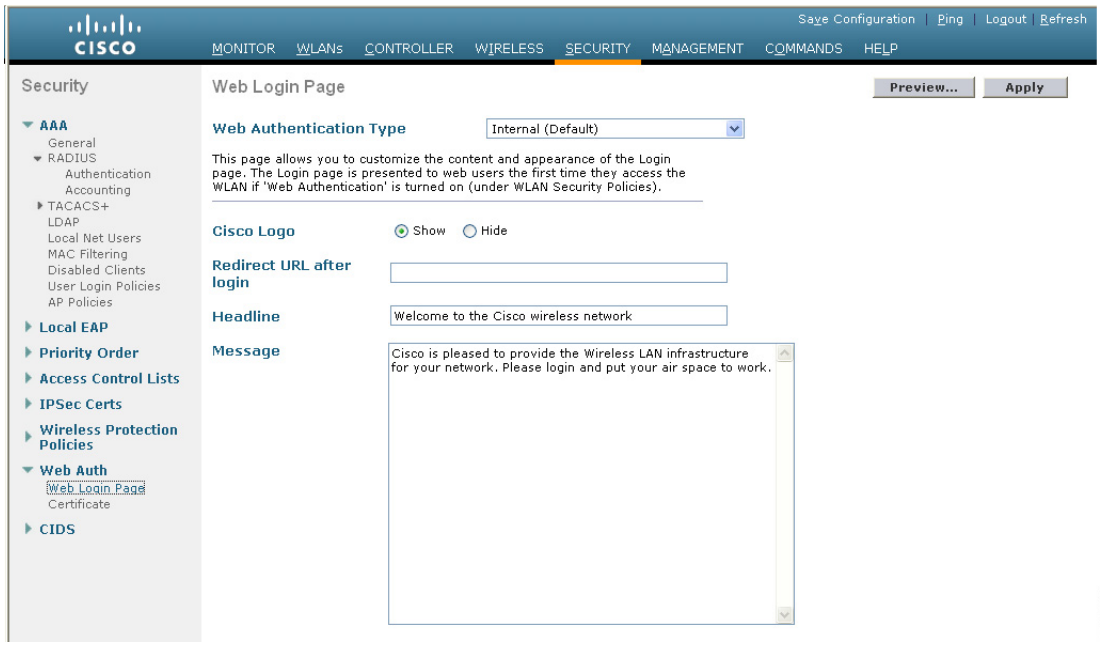
Internal Web Page Management

Step 1 Click the **Security** tab.

Step 2 In the left pane, click **Web Auth** and then **Web Login Page**.

The configuration screen shown Figure 10-50 is displayed. You can change the heading and message information that appears on the portal page. You can also choose a post-authentication redirect URL.

Figure 10-50 Web Login Page Configuration Screen



Step 3 Click **Apply**.

Step 4 Optionally, click **Preview** to view what the user sees when redirected.

Importing A Web Page

You can download a customized web page and store it locally on the anchor controller. To import a customized web page, perform the following steps.

Step 1 Click the **Commands** tab. (See Figure 10-51.)

Figure 10-51 Importing a Web Page

Step 2 Under File Type, select **Web Auth Bundle**.

Step 3 Define the IP address and file path on the TFTP server where the files reside.

Step 4 Click **Download** to begin.

Be aware of these caveats when downloading a web auth bundle:

- Select **Web Auth Bundle** from the pull-down selection list to ensure that the files are stored in the correct directory on the controller.
- The **Web Auth Bundle** must be a **.tar** file of the HTML and image files associated with the custom web login page. When downloaded, the WLC un-tars the files and places them in the appropriate directory.
- The **Web Auth Bundle** (**.tar** file) cannot be larger than 1 MB.
- The file name for the HTML login page must be **login.html**.

See the following URL for more information about downloading and using customized web pages: http://www.cisco.com/en/US/docs/wireless/wcs/4.1/configuration/guide/wcssol.html#wp1065703.

Selecting an Imported Web Auth Page

To use a customized web-auth page that has been downloaded to the controller, perform the following steps:

Step 1 Click the **Security** tab.

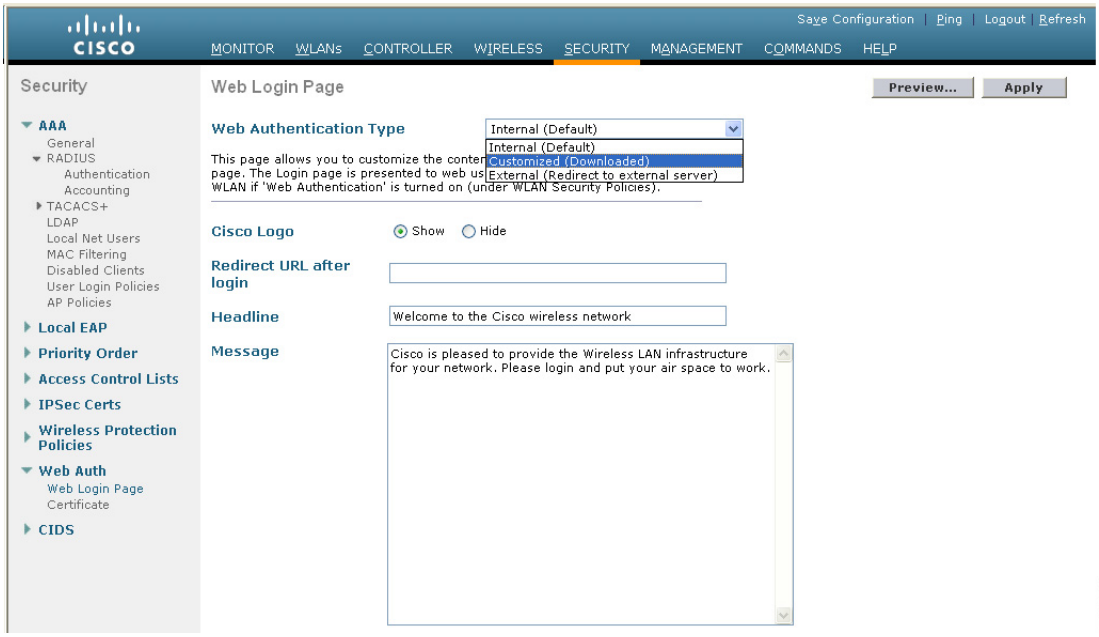
Step 2 In the left pane, click **Web auth** and then **Web Login Page**.

Step 3 From the Web Authentication Type pull-down selection list, select **Customized** (Downloaded).

Step 4 Click **Preview** to view the downloaded page.

Step 5 Click **Apply** when finished. (See Figure 10-52.)

Figure 10-52 Selecting an Imported Web Auth Page



Internal Web Certificate Management

The web auth login page uses SSL for safeguarding user credentials. For simplicity, the controller uses a self-signed certificate. Because the certificate is self-signed, guest users can expect to see a pop-up alert similar to the following when they are redirected to the authentication page shown in Figure 10-53.

Figure 10-53 Web Certificate Security Alert (IE6)

At this point, you can proceed by either clicking **Yes** or you can select **View Certificate** and manually install it as a trusted site.The web server uses the virtual interface IP address configured in Anchor WLC Installation and Interface Configuration, page 10-15, as its source address. If a hostname is defined along with the IP address, that host name must be resolvable by DNS so that:

- The client is redirected to the web auth page.
- The user does not encounter a web certificate error because of conflicts between hostname and host IP address.

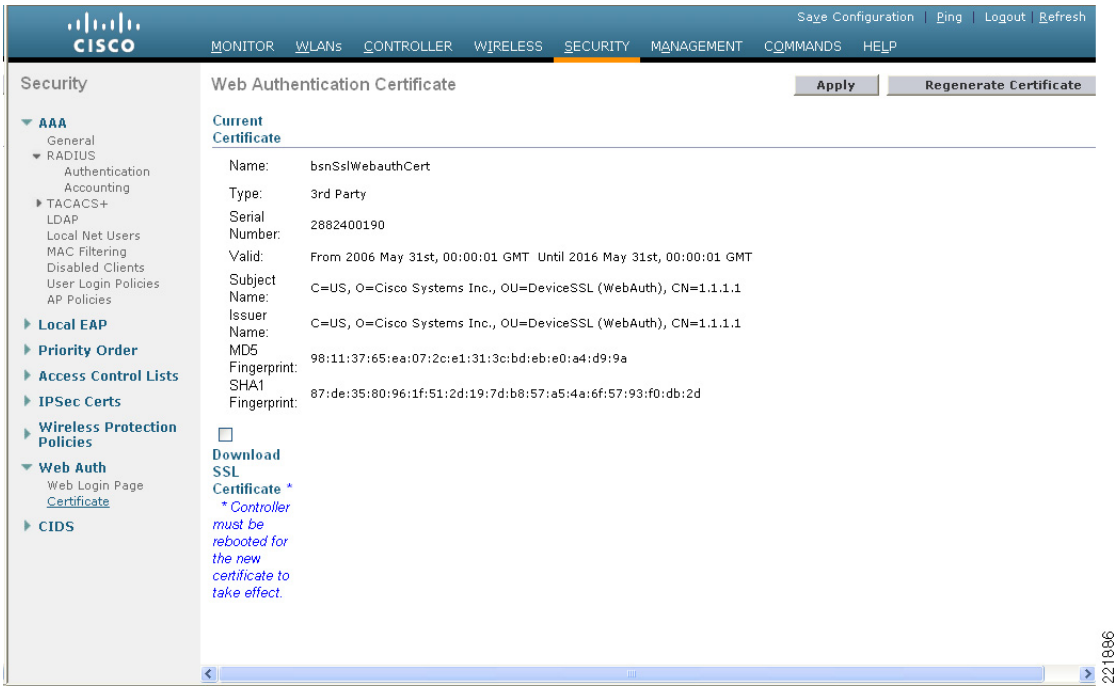
Importing an External Web Certificate

For cases where a legitimate web certificate issued by a trusted root CA is required, one can be downloaded to the controller by performing the following steps:

Step 1 Click the **Security** tab.

In the left pane, click **Web Auth** and then **Certificate**. (See Figure 10-54.)

Figure 10-54 Importing an External Web Certificate



Step 2 Place a check mark in the **Download SSL Certificate** checkbox.

Step 3 Complete the required fields for downloading the certificate.

Step 4 Click **Apply**.

Step 5 After the certificate has been downloaded, reboot the server.

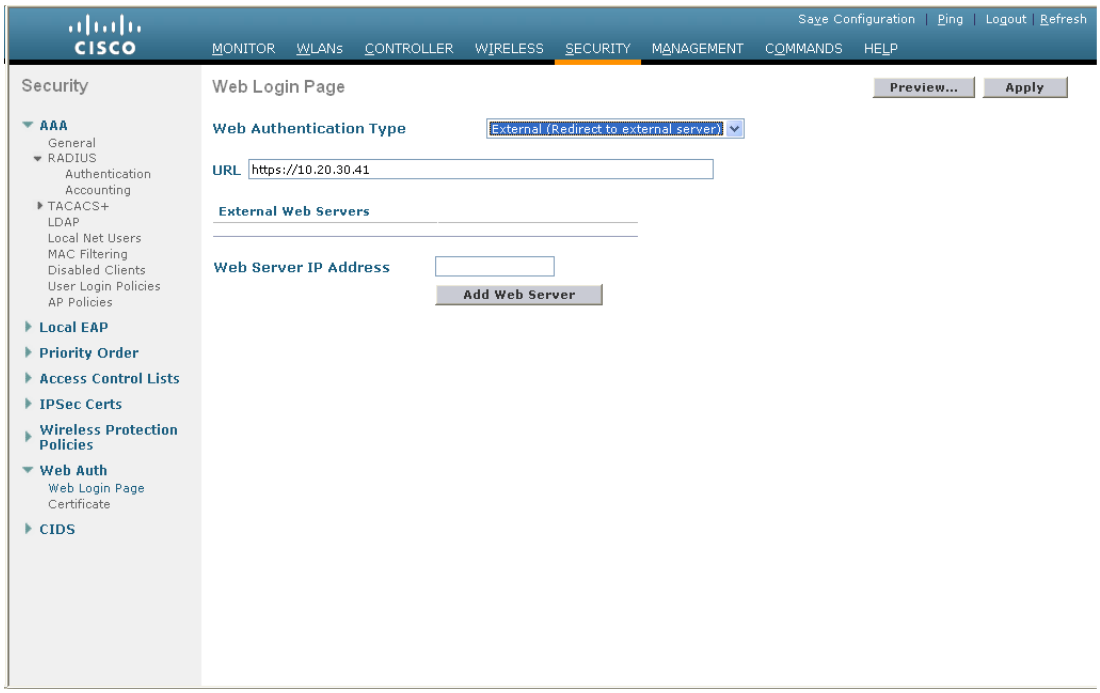
Support for External Web Redirection

In some cases, an enterprise might already have deployed a web-portal system to support wired guest access or NAC functionality. If this is the case, the anchor controller can be configured to redirect wireless guest users to an external web portal using the following steps:

Step 1 Click the **Security** tab.

Step 2 In the left pane, click **Web auth** and then **Web Login Page**. (See Figure 10-55.)

Figure 10-55 Supporting External Web Redirection



Step 3 Fill in the Web Server IP and URL fields.

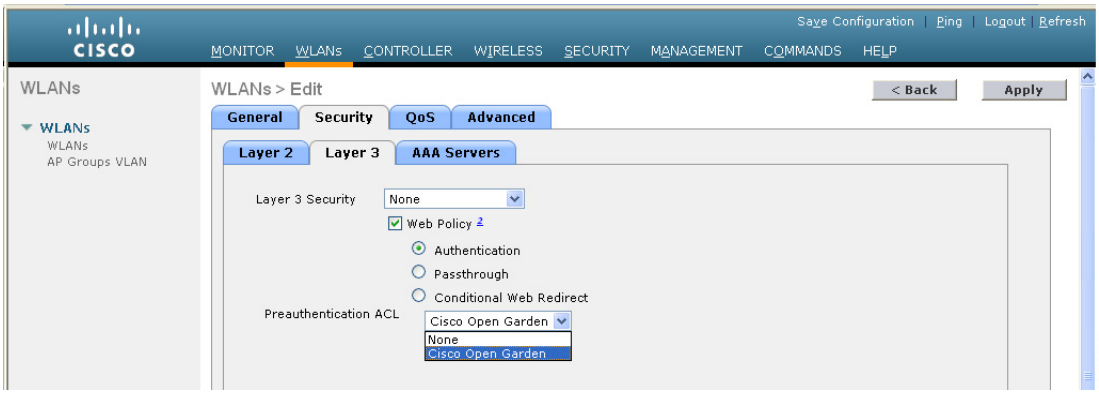
Step 4 Click **Apply**.

See the following URL for more information on the use of external web servers with controller web authentication:
http://www.cisco.com/en/US/tech/tk722/tk809/technologies_configuration_example09186a008076f974.shtml

Anchor WLC-Pre-Authentication ACL

A pre-authentication ACL (pre-auth ACL) can be applied to the guest WLAN, which allows unauthenticated clients to connect to specific hosts or URL destinations prior to authenticating. The pre-auth ACL is applied under the guest WLAN Layer 3 Security settings and, if enabled, is performed only on the anchor WLC(s). (See Figure 10-56.)

Figure 10-56 WLAN Pre-authentication ACL



The specific ACL is configured under Security > Access Control Lists. (See Figure 10-57 and Figure 10-58.)

Figure 10-57 WLC Access Control Lists

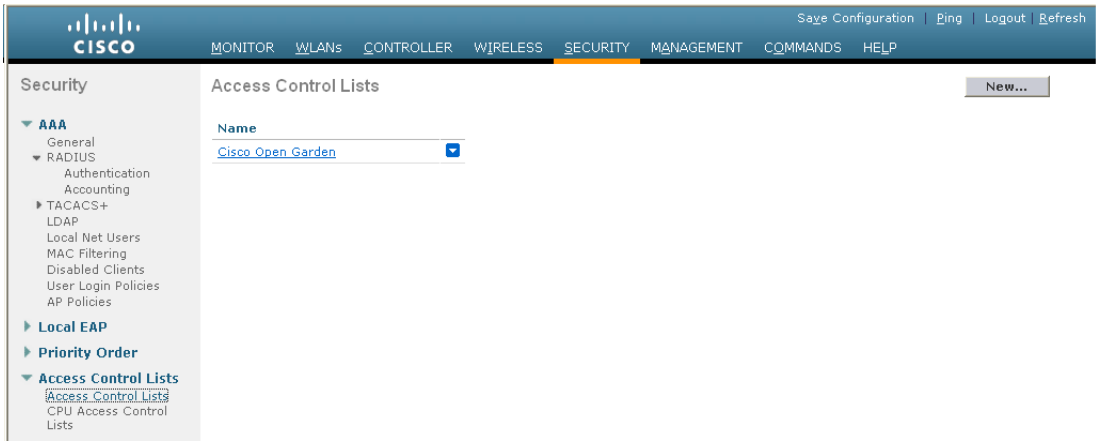
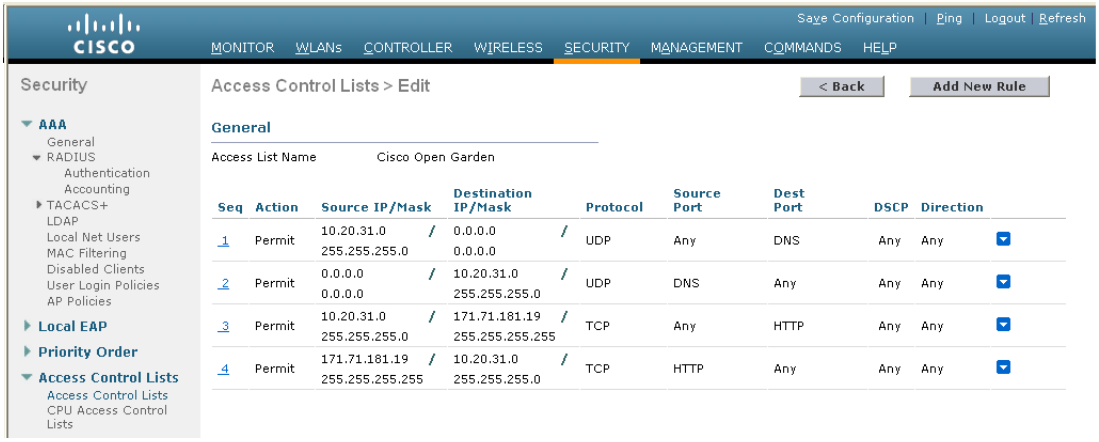


Figure 10-58 Pre-Auth ACL Example



Note If a pre-authentication ACL is used in conjunction with the web auth policy, it must include a rule to permit DNS requests; otherwise, the client is unable to resolve and connect to a destination host/URL that is otherwise allowed by the ACL.

Anchor Controller DHCP Configuration

If the anchor controller is going to manage DHCP services for the guest access WLAN, proceed with the steps below.

Note The anchor controller cannot be used to manage DHCP services if guest N+1 redundancy is being implemented, because there is no mechanism to synchronize address leases for a single guest VLAN/subnet across two or more WLCs.

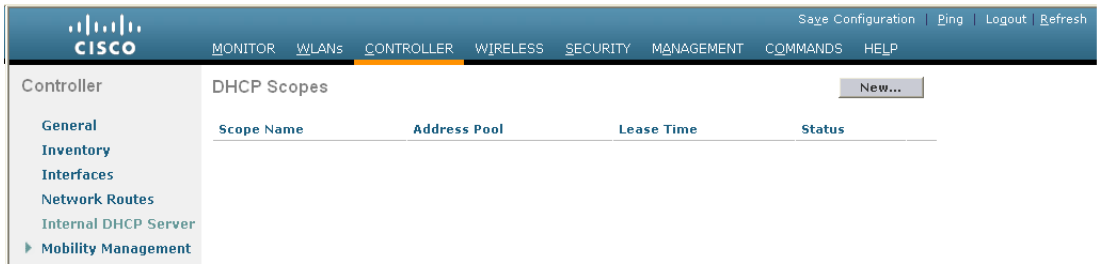
Adding a New DHCP Scope to the Anchor Controller

Step 1 Click the **Controller** tab.

Step 2 In the left pane, click **Internal DHCP Server**.

Step 3 Click **New**. (See Figure 10-59.)

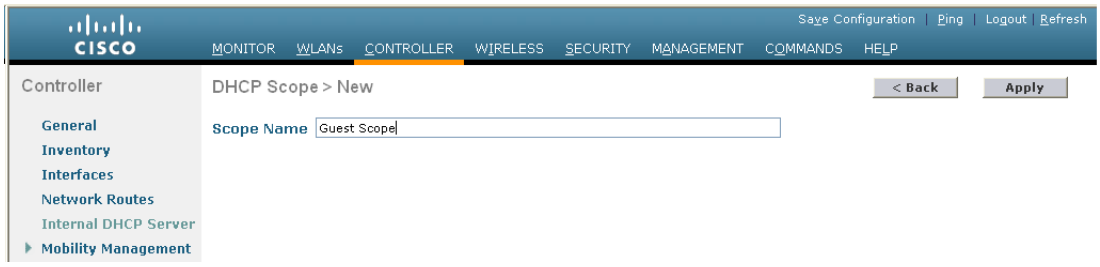
Figure 10-59 Adding a New DHCP Scope



Defining a Scope Name

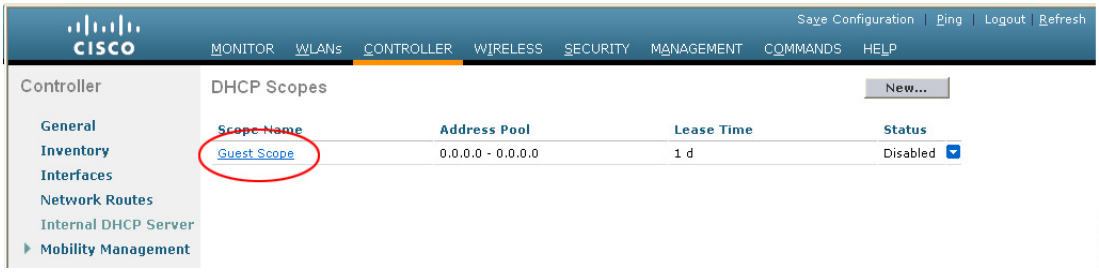
Step 4 Define a name for the scope and click **Apply**. (See Figure 10-60.)

Figure 10-60 Defining a Scope Name



Step 5 Click **Scope Name** to edit. (See Figure 10-61.)

Figure 10-61 Editing DHCP Scope



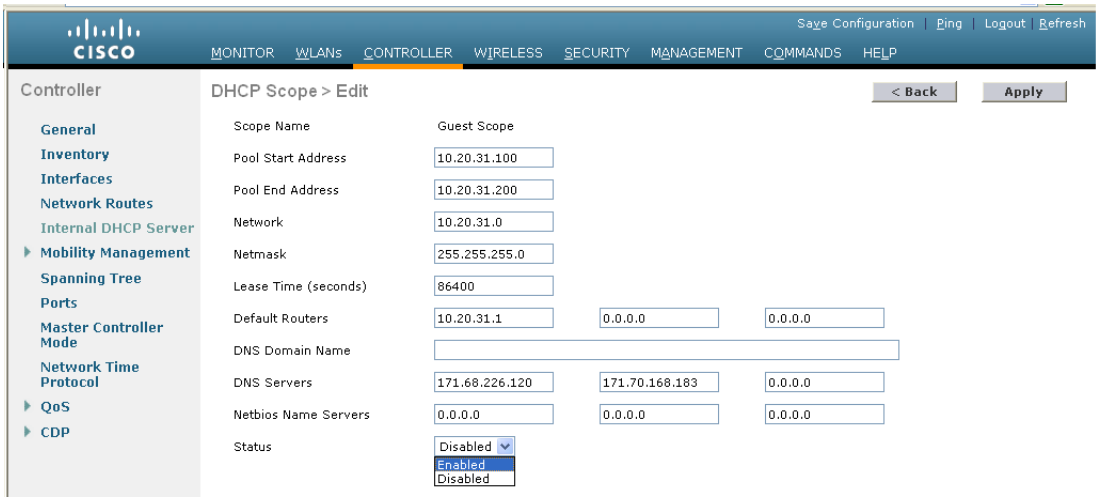
Defining Scope Properties

Step 6 Define the following minimum information:

- Pool start and stop
- Network
- Mask
- Default routers
- DNS servers

Step 7 For Status, select **Enabled** and click **Apply**. (See Figure 10-62.)

Figure 10-62 Configuring and Enabling Scope Properties



External Radius Authentication

As described in Guest User Authentication, page 10-11, an external RADIUS server can be used to authenticate guest users in place of creating and storing guest credentials locally on the anchor controller. If this method is used, the lobby admin features described in Guest Account Management, page 10-29 cannot be used. It is assumed that some other guest management system will be used in conjunction with the external RADIUS server.

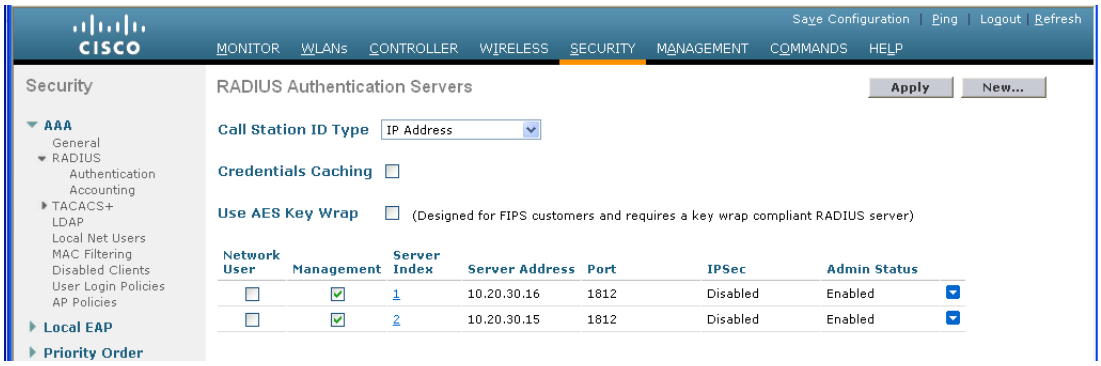
To configure a guest WLAN to use an external RADIUS server, perform the following configuration steps on the anchor controller.

Adding a RADIUS Server

Step 1 Click the **Security** tab.

A summary screen is displayed. (See Figure 10-63.)

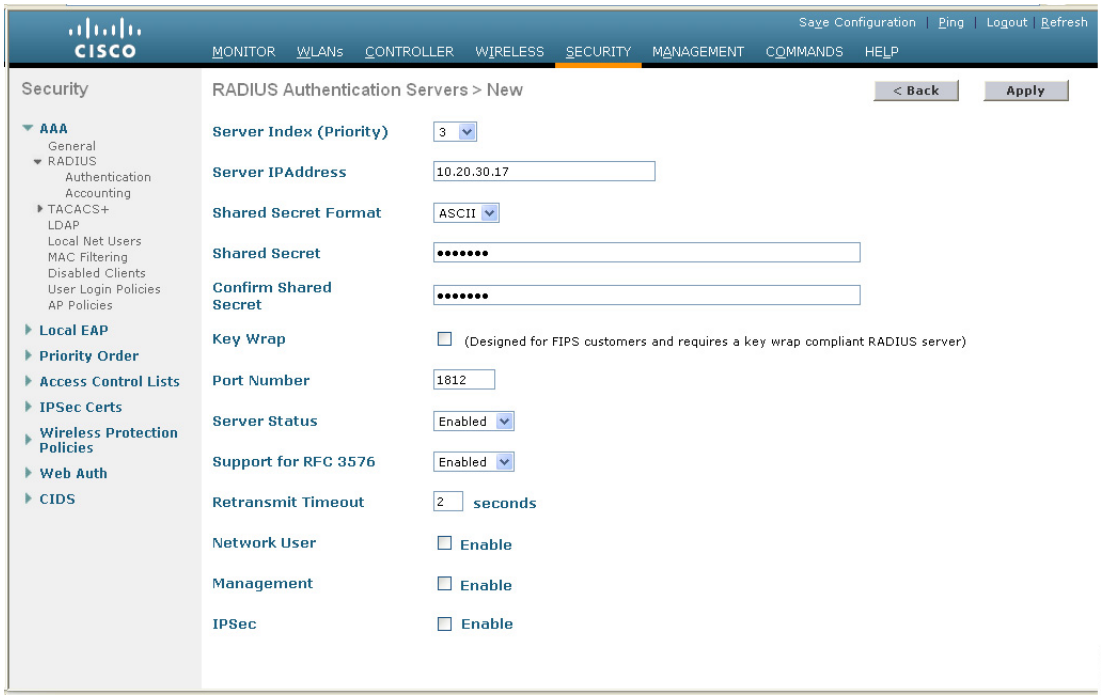
Figure 10-63 Summary Screen



Step 2 Click **New**.

The screen shown in Figure 10-64 appears.

Figure 10-64 Defining RADIUS Server Settings



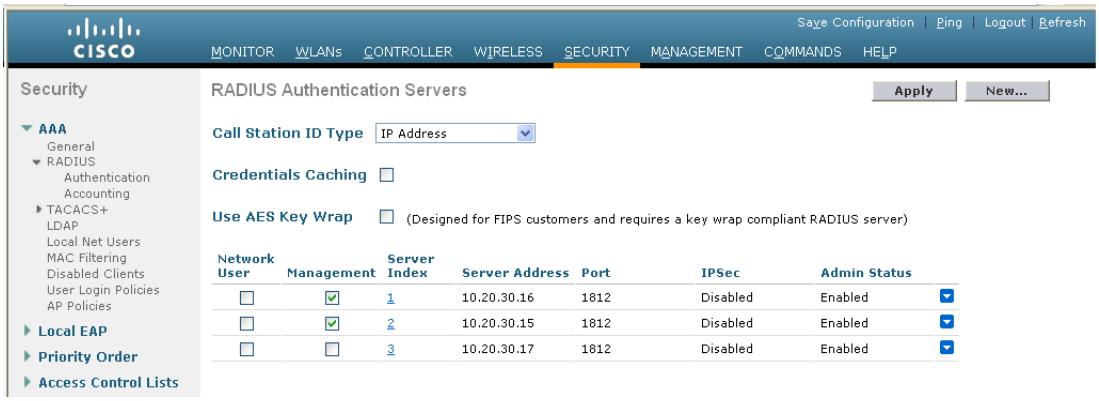
Step 3 To define RADIUS server settings, configure the IP address, shared secret, and authentication port number as defined on the RADIUS server.

If the Network User check box is cleared, the RADIUS server is used only for user authentication when it is specifically selected under the RADIUS setting of a given WLAN. Otherwise, if the Network User check box is checked, the server is used globally for all user authentications based on its server priority.

Step 4 Click **Apply**.

The summary screen shown in Figure 10-65 shows the newly-added server.

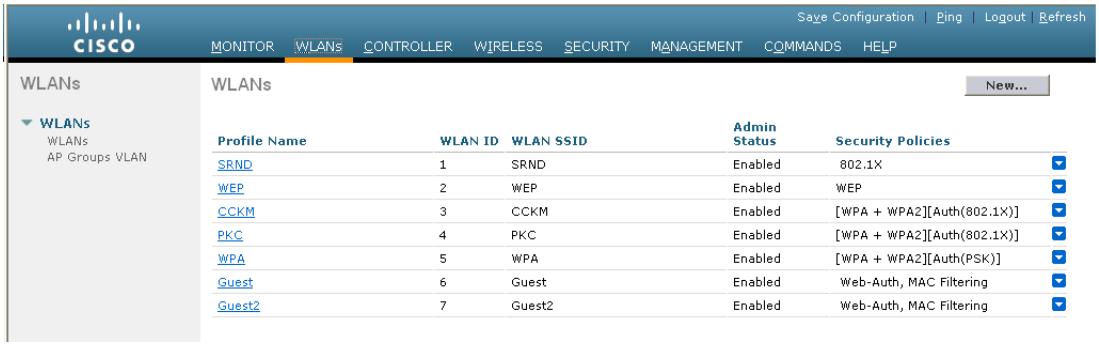
Figure 10-65 Summary Screen



Step 5 To select a RADIUS server, click the **WLANs** tab.

The screen shown in Figure 10-66 appears.

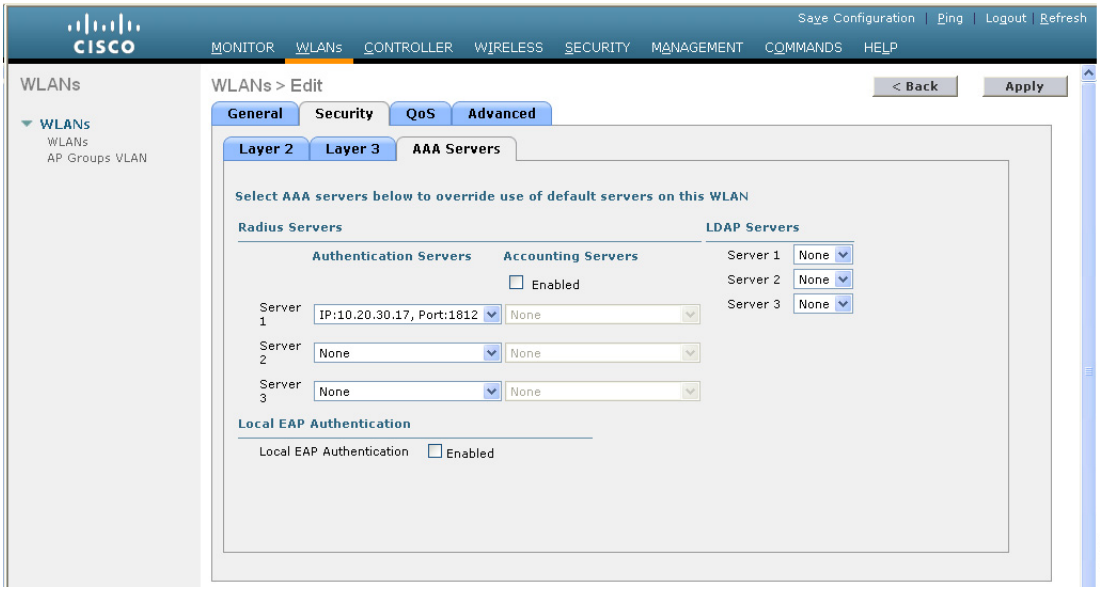
Figure 10-66 WLANs Tab



Step 6 Find the guest WLAN and click on its **Profile Name**.

The guest WLAN configuration screen is displayed, as shown in Figure 10-67.

Figure 10-67 Guest WLAN Configuration Screen



Step 7 Select **AAA Servers** under the WLAN Security tab

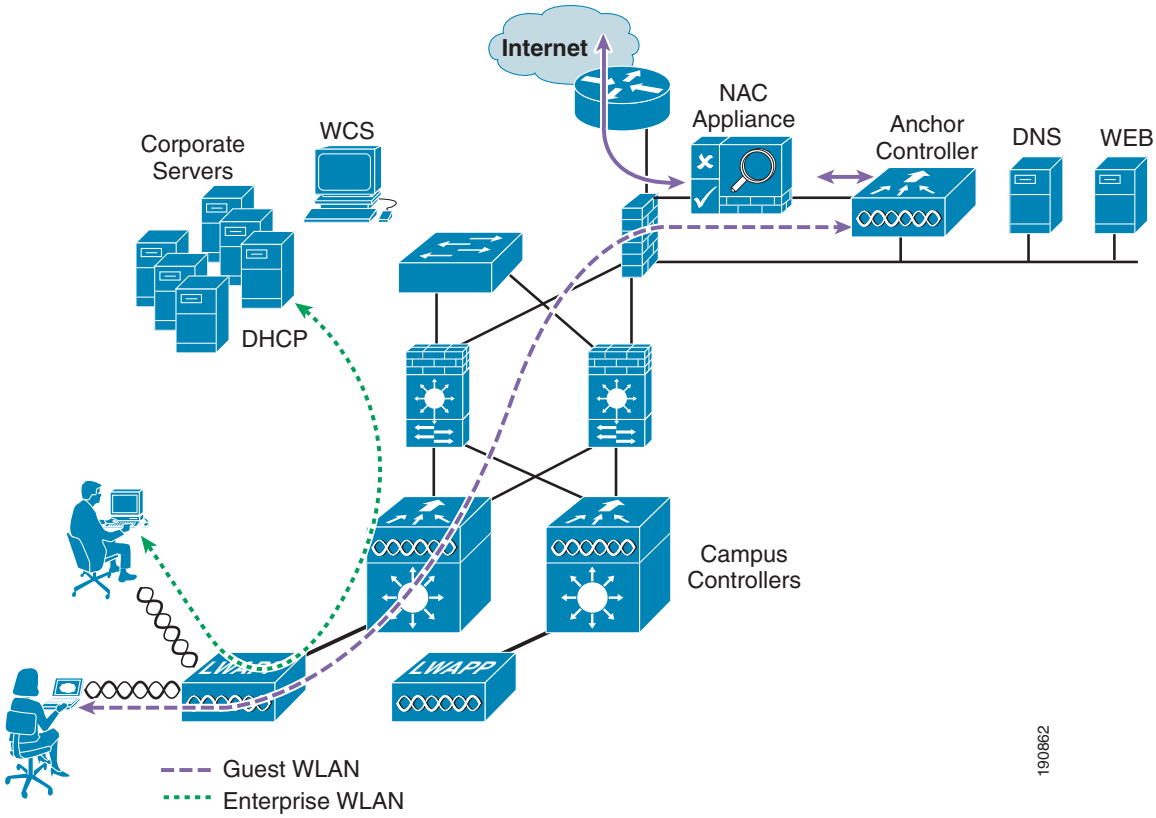
Step 8 Select the RADIUS server to be used for web authentication from the pull-down selection list under Authentication Servers.

External Access Control

The centralized guest access topology described in this chapter can be integrated with an external access control platform such the Cisco NAC Appliance.

In this scenario, an enterprise might have already deployed an access control platform in their Internet DMZ to support wired guest access services (see Figure 10-68).

Figure 10-68 Wireless Guest Access with External Access Control



As shown in Figure 10-68, the wireless guest access topology remains the same except that the guest VLAN interface on the anchor controller, instead of connecting to a firewall or border router, connects to an inside interface on an access control platform such as the Cisco NAC Appliance.

In this scenario, the NAC Appliance is responsible for redirection, web authentication, and subsequent access to the Internet. The campus and anchor controllers are used only to tunnel guest WLAN traffic across the enterprise into the DMZ, where the NAC appliance or some other platform is used to control guest access.

Configuration of the guest WLAN, campus, and anchor controllers is the same as described in the previous examples. The only exception is that Layer 3 web policy is not enabled under the guest WLAN security settings (see Figure 10-69 and Figure 10-70).

Figure 10-69 Guest WLAN Layer 3 Security Policy

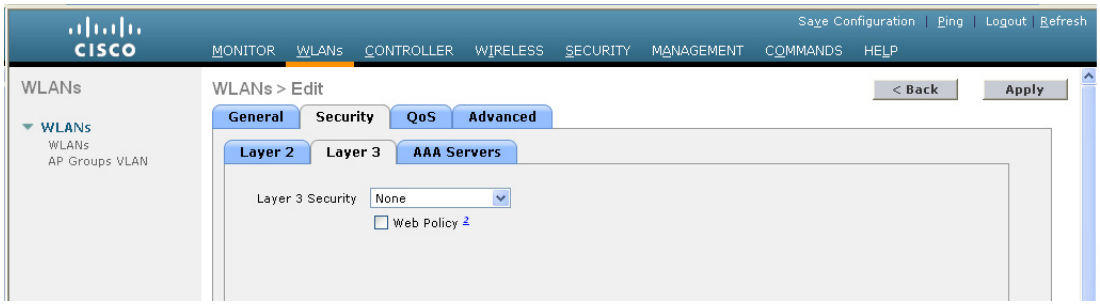
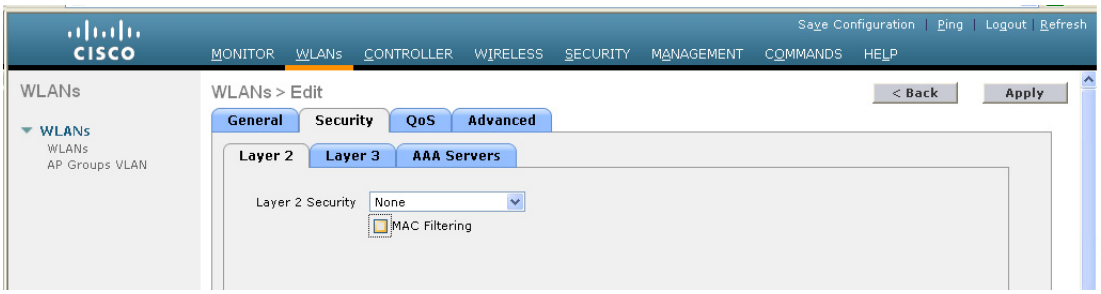


Figure 10-70 Guest WLAN L2 Security Settings



The configurations above establishes a WLAN with no security policies. Guest traffic passes through the anchor controller to the inside or untrusted interface of the Cisco NAC Appliance, where it is blocked until the user has authenticated.

DHCP can be hosted locally on the controller or externally via the NAC Appliance or dedicated server.

Its beyond the scope of this chapter to address Cisco NAC Appliance or other external access control platform specific configurations. See the specific platform documentation for additional configuration guidelines.

Verifying Guest Access Functionality

The guest access service is working correctly if a user:

- Can associate to the guest WLAN
- Receives an IP address via DHCP
- Opens their browser and is redirected to the web authentication page
- Enters their credentials and connects to the Internet (or other authorized upstream services)

Troubleshooting Guest Access

The following verifications and troubleshooting tasks assume the following:

- The solution is using the web authentication functionality resident in the anchor controller(s).
- User credentials are created and stored locally on the anchor controller(s).

Before attempting to troubleshoot the various symptoms below, at the very least you should be able to ping from the campus (foreign) controller to the anchor controller(s). If not, verify routing.

Next, you should be able to perform the following advanced pings. These can only be performed via the serial console interfaces of the controllers:

- **mping** *neighbor WLC ip*

  This pings the neighbor controller through the LWAPP control channel.

- **eping** *neighbor WLC ip*

  This pings the neighbor controller through the LWAPP data channel.

If a standard ICMP ping goes through, but mpings do not, ensure that the default mobility group name of each WLC is the same, and ensure that the IP, MAC, and mobility group name of each WLC is entered in the mobility members list of every WLC.

If pings and mpings are successful, but epings are not, check the network to make sure that IP protocol 97 (Ethernet-over-IP) is not being blocked.

User Cannot Associate to the Guest WLAN

- Verify that the guest WLAN is enabled on the anchor controller and all foreign controllers that support the guest WLAN
- Verify that the guest WLAN SSID is being broadcast.
- Verify client adapter/software configuration.

User Does Not Obtain an IP Address via DHCP

- Verify that WLAN configuration settings are identical on the anchor and foreign controllers (except for WLAN interface and mobility anchors; see Guest WLAN Configuration on the Anchor WLC, page 10-27)
- Verify that the guest WLAN is enabled on the anchor WLC(s)
- Check for a proper DHCP server address under the guest VLAN interface settings on the anchor controller(s)
  - If using an external DHCP server, the IP address should be that of the external server.
  - Verify reachability to the external DHCP server from the anchor controller.
  - If using the anchor controller for DHCP services, the DHCP server IP address should be the management IP address of the controller.
  - Verify that a DHCP scope has been configured and enabled on the controller.
  - Verify that the network mask of the DHCP scope is consistent with the mask on the guest VLAN interface.
  - Verify that the DHCP scope does not overlap with any addresses assigned to the network infrastructure.

User is Not Redirected to Web Auth Page

The following assumes the user is able to associate to the guest WLAN and obtain an IP address:

- Verify that valid DNS servers are being assigned to the client via DHCP.
- Ensure that the DNS servers are reachable from the anchor controller.
- Verify that the URL being opened in the web browser is resolvable.
- Verify that the URL being opened in the web browser is connecting to HTTP port 80.

Note The internal web auth server does not redirect incoming requests on ports other than 80 and one other user defined port number (see User Redirection, page 10-9).

User Cannot Authenticate

- Verify that user credentials are active on the anchor controller(s).

  Guest credentials typically have a lifetime associated with them. If the credentials have expired, they do not appear under the Security > Local Net Users list on the anchor controller. Use WCS to re-apply the user template or re-create user credentials locally on the controller. See Guest Management Using WCS, page 10-30 and Guest Credentials Management, page 10-10.

- Verify user password.

User Cannot Connect to Internet or Upstream Service

- Verify routing to and from the anchor controller from the firewall or border router connecting to the anchor controller(s)
- Verify NAT configuration on firewall or Internet border router (if applicable)

System Monitoring

Following are some monitoring commands that might be helpful in troubleshooting.

Anchor Controller

From the serial console port:

```
Cisco Controller) >show client summary

Number of Clients................................ 1

MAC Address        AP Name            Status         WLAN  Auth  Protocol  Port

-----------------  -----------------  -------------  ----  ----  --------  ----

00:40:96:ac:5f:f8  10.15.9.19         Associated     3     Yes   Mobile    1
```

Note that the protocol is mobile. The Auth field reflects the actual status of the user. If the user has passed web auth, the field displays YES. If not, the field shows NO.

Also notice the AP name. This is the management IP address of the foreign controller (originating controller).

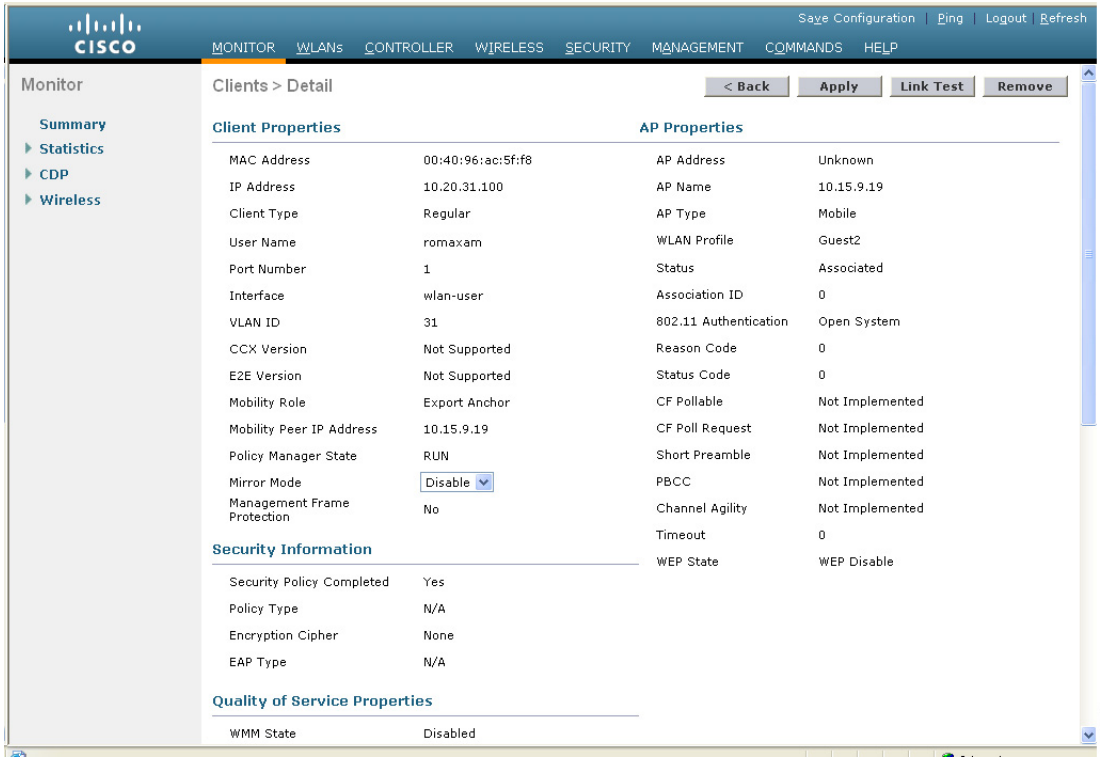
From the summary information, use the client MAC to show more detail:

```
(Cisco Controller) >show client detail 00:40:96:ac:5f:f8
Client MAC Address.............................. 00:40:96:ac:5f:f8
Client Username ................................ romaxam
AP MAC Address.................................. 00:00:00:00:00:00
Client State.................................... Associated
Wireless LAN Id................................. 3
BSSID........................................... 00:00:00:00:00:02
Channel......................................... N/A
IP Address...................................... 10.20.31.100
Association Id.................................. 0
Authentication Algorithm........................ Open System
Reason Code..................................... 0
Status Code..................................... 0
Session Timeout................................. 86316
Client CCX version.............................. No CCX support
Mirroring....................................... Disabled
QoS Level....................................... Silver
Diff Serv Code Point (DSCP)..................... disabled
802.1P Priority Tag............................. disabled
WMM Support..................................... Disabled
Mobility State.................................. Export Anchor
Mobility Foreign IP Address..................... 10.15.9.19
Mobility Move Count............................. 1
Security Policy Completed....................... Yes
Policy Manager State............................ RUN
Policy Manager Rule Created..................... Yes
NPU Fast Fast Notified.......................... Yes
Policy Type..................................... N/A
```

```
Encryption Cipher.............................. None
Management Frame Protection.................... No
EAP Type....................................... Unknown
Interface...................................... wlan-user
VLAN........................................... 31
Client Capabilities:
      CF Pollable.............................. Not implemented
      CF Poll Request.......................... Not implemented
      Short Preamble........................... Not implemented
      PBCC..................................... Not implemented
      Channel Agility.......................... Not implemented
      Listen Interval.......................... 0
Client Statistics:
      Number of Bytes Received................. 0
      Number of Bytes Sent..................... 0
      Number of Packets Received............... 0
      Number of Packets Sent................... 0
      Number of Policy Errors.................. 0
      Radio Signal Strength Indicator.......... Unavailable
      Signal to Noise Ratio.................... Unavailable
Nearby AP Statistics:
        TxExcessiveRetries: 0
        TxRetries: 0
        RtsSuccessCnt: 0
        RtsFailCnt: 0
        TxFiltered: 0
        TxRateProfile: [0,0,0,0,0,0,0,0,0,0,0,0]
```

The same information can be obtained through the web configuration and management interface of the controller under Clients > Detail. (See Figure 10-71.)

Figure 10-71 Anchor WLC Monitor > Client Detail



Campus (Foreign) Controller

From the serial console port:

```
(WiSM-slot3-1) >show client summary

Number of Clients.............................. 2

MAC Address        AP Name            Status         WLAN  Auth  Protocol  Port
-----------------  -----------------  -------------  ----  ----  --------  ----

00:40:96:ac:5f:f8  AP3_.18e5.7fdc     Associated     1     Yes   802.11g   29
```

Note that the protocol field is 802.11g, whereas the protocol field on the anchor controller for the same client is mobile. The campus (foreign) controller always shows the user as authenticated and the AP name reflects the actual AP to which the client is associated.

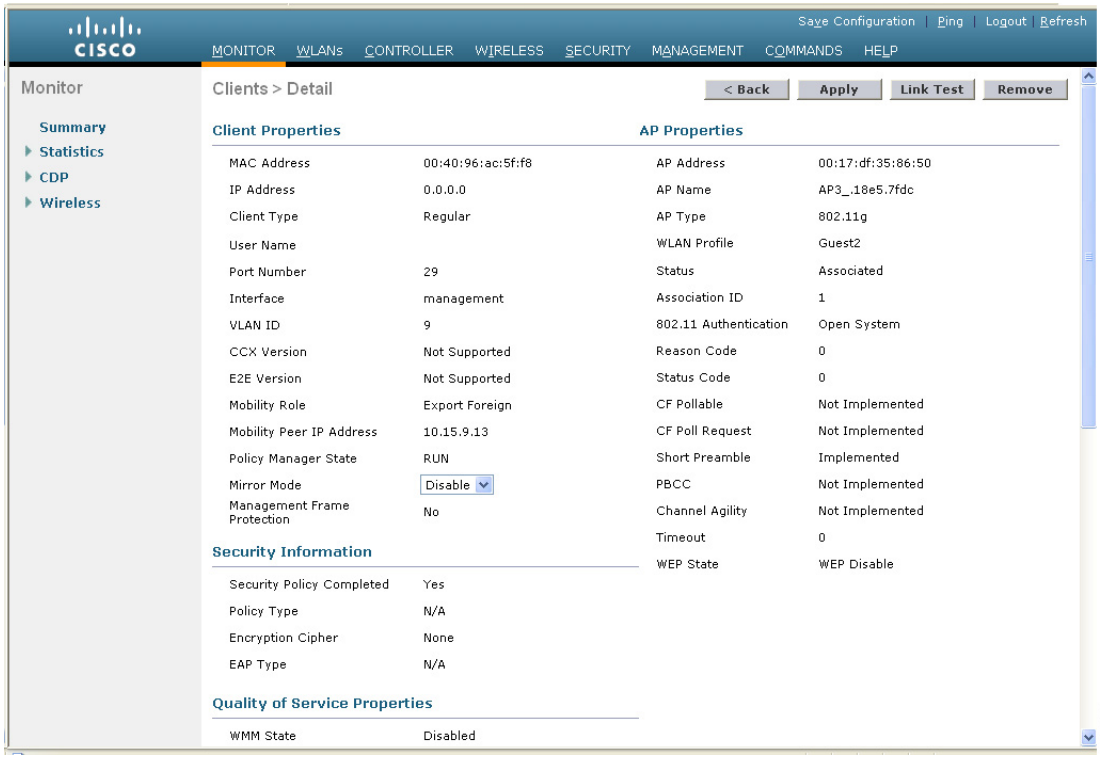
Additional details can be obtained using the following:

```
(WiSM-slot3-1) >show client detail 00:40:96:ac:5f:f8
Client MAC Address............................. 00:40:96:ac:5f:f8
Client Username ............................... N/A
AP MAC Address................................. 00:17:df:35:86:50
Client State................................... Associated
Wireless LAN Id................................ 1
BSSID.......................................... 00:17:df:35:86:50
Channel........................................ 11
IP Address..................................... Unknown
Association Id................................. 1
Authentication Algorithm....................... Open System
Reason Code.................................... 0
Status Code.................................... 0
Session Timeout................................ 0
Client CCX version............................. No CCX support
Mirroring...................................... Disabled
QoS Level...................................... Silver
Diff Serv Code Point (DSCP).................... disabled
802.1P Priority Tag............................ disabled
WMM Support.................................... Disabled
Mobility State................................. Export Foreign
Mobility Anchor IP Address..................... 10.15.9.13
Mobility Move Count............................ 0
Security Policy Completed...................... Yes
Policy Manager State........................... RUN
Policy Manager Rule Created.................... Yes
NPU Fast Fast Notified......................... Yes
Policy Type.................................... N/A
Encryption Cipher.............................. None
Management Frame Protection.................... No
EAP Type....................................... Unknown
Interface...................................... management
VLAN........................................... 9
Client Capabilities:
      CF Pollable.............................. Not implemented
      CF Poll Request.......................... Not implemented
      Short Preamble........................... Implemented
      PBCC..................................... Not implemented
      Channel Agility.......................... Not implemented
      Listen Interval.......................... 0
Client Statistics:
      Number of Bytes Received................. 308244
      Number of Bytes Sent..................... 700059
      Number of Packets Received............... 2527
      Number of Packets Sent................... 1035
```

```
      Number of Policy Errors..................... 0
      Radio Signal Strength Indicator............. -75 dBm
      Signal to Noise Ratio....................... 25 dB
Nearby AP Statistics:
        TxExcessiveRetries: 0
        TxRetries: 0
        RtsSuccessCnt: 0
        RtsFailCnt: 0
        TxFiltered: 0
        TxRateProfile: [0,0,0,0,0,0,0,0,0,0,0,0]
      AP3_.18e5.7fdc(slot 0) .....................
antenna0: 37 seconds ago -73 dBm.................. antenna1: 4294510568 seconds ago -128
dBm
```

The same information can be obtained through the controller web configuration and management interface under Clients > Detail (see Figure 10-72).

Figure 10-72 Foreign WLC Monitor > Client Detail



Debug Commands

Additional debug commands that might be used from the serial console include the following:

```
debug mac addr <client mac address>
debug mobility handoff enable
debug mobility directory enable
debug dhcp packet enable
debug pem state enable
debug pem events enable
debug dot11 mobile enable
debug dot11 state enable
```