AOS-W Instant 6.2.0.0-3.2

Alcatel·Lucent

User Guide

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Alcatel-Lucent Instant Overview

Thank you for choosing Alcatel-Lucent Instant 6.2.0.0-3.2. Alcatel-Lucent Instant virtualizes Alcatel-Lucent OmniAccess WLAN Switch capabilities on 802.11n access points (APs), creating a feature-rich enterprise-grade wireless LAN (WLAN) that combines affordability and configuration simplicity.

Alcatel-Lucent Instant is a simple, easy to deploy turn-key WLAN solution consisting of one or more access points. An Ethernet port with routable connectivity to the internet or a self-enclosed network, is used to deploy an Instant Wireless Network. An Instant Access Point (OAW-IAP) can be installed at a single site or deployed across multiple geographically-dispersed locations. Designed specifically for easy deployment, and proactive management of networks, Instant is ideal for small customers or remote locations without any on-site IT administrator.

Alcatel-Lucent Instant consists of an Instant Access Point (OAW-IAP) and a Virtual Controller (VC). The Virtual Controller resides within one of the access points. In an Alcatel-Lucent Instant deployment, only the first OAW-IAP needs to be configured. After the first OAW-IAP is deployed, the subsequent OAW-IAPs inherit all the required information from the Virtual Controller.

Supported Devices

The following is a list of Instant devices supported by Alcatel-Lucent:

- OAW-IAP-92
- OAW-IAP-93
- OAW-IAP-104
- OAW-IAP-105
- OAW-IAP-134
- OAW-IAP-135
- OAW-IAP-175P/175AC
- OAW-RAP-3WN/3WNP
- OAW-RAP-108
- OAW-RAP-109

NOTE

All APs support an unlimited number of OAW-IAPs, however OAW-IAP-92 and OAW-IAP-93 support up to 16 OAW-IAPs only.

Objective

This user guide describes the various features supported by Alcatel-Lucent Instant and provides detailed instructions for setting up and configuring an Alcatel-Lucent Instant network.

Intended Audience

This guide is intended for customers who configure and use Alcatel-Lucent Instant.

Conventions

The following conventions are used throughout this manual to emphasize important concepts:

Table 1 - *Conventions*

Type Style	Description
Italics	This style is used to emphasize important terms and provide cross-references to other books.
Screen input and output	This style is used to illustrate: ● Screen output ● On screen system prompt ● Filenames, software devices, and specific commands
Bold	This style is used to emphasize Instant UI elements. For example, name of a text box or the name of a drop-down list.

The following informational icons are used throughout this guide:

NOTE

Indicates helpful suggestions, pertinent information, and important things to remember.

CAUTION

Indicates a risk of damage to your hardware or loss of data.

WARNING

Indicates a risk of personal injury or death.

Contacting Support

Contact Center Online	
● Main Site	http://www.alcatel-lucent.com/enterprise
● Support Site	https://service.esd.alcatel-lucent.com
● Email	esd.support@alcatel-lucent.com
Service & Support Contact Center Telephone	

Contact Center Online	
● North America	1-800-995-2696
● Latin America	1-877-919-9526
● Europe	+33 (0) 38 855 6929
● Asia Pacific	+65 6240 8484
● Worldwide	1-818-878-4507

This section provides information required to setup Alcatel-Lucent Instant and access the Instant User Interface.

Initial Setup

This section provides a pre-installation checklist and describes the initial procedures required to set up Alcatel-Lucent Instant.

Pre-Installation Checklist

Before installing the Instant Access Point (OAW-IAP), make sure that you have the following:

- Ethernet cable of required length to connect the OAW-IAP to the home router.
- One of the following power sources:
  - IEEE 802.3af/at-compliant Power over Ethernet (PoE) source. The PoE source can be any power source equipment (PSE) switch or a midspan PSE device.
  - Alcatel-Lucent power adapter kit (this kit is sold separately).

NOTE

PoE is a method of delivering power on the same physical Ethernet wire that is used for data communication. Power for devices is provided in one of the following two ways:
Endspan— The switch that the OAW-IAP is connected to can provide power.
Midspan— A device can sit between the switch and the OAW-IAP.
The choice of endspan or midspan depends on the capabilities of the switch to which the IAP is connected. Typically if a switch is in place and does not support PoE, midspan power injectors are used.

NOTE

A DNS server functions as a phonebook for the internet and internet users. It converts human readable computer hostnames into IP addresses and vice-versa. A DNS server stores several records for a domain name, such as an address 'A' record, name server (NS), and mail exchanger (MX) records. The Address 'A' record is the most important record that is stored in a DNS server because it provides the required IP address for a network peripheral or element.
The Dynamic Host Configuration Protocol (DHCP) is an auto-configuration protocol used on IP networks. Computers or any network peripherals that are connected to IP networks must be configured before they can communicate with other computers on the network. DHCP allows a computer to be configured automatically, eliminating the need for a network administrator. DHCP also provides a central database to keep a track of computers connected to the network. This database helps in preventing any two computers from being configured with the same IP address.

To complete the initial setup, perform the following tasks in the given order:

1. Connecting an OAW-IAP on page 34
2. Assigning an IP Address to the OAW-IAP on page 34
3. Connecting to a Provisioning Wi-Fi Network on page 34
4. Log in to the Instant User Interface on page 36
5. Specifying a Country Code on page 37 — Skip this step if you are installing the OAW-IAP in United States, Japan or Israel.

Connecting an OAW-IAP

Based on the type of the power source that is used, perform one of the following steps to connect the OAW-IAP to the power source:

- PoE switch— Connect the ENET 0 port of the OAW-IAP to the appropriate port on the PoE switch.
- PoE midspan— Connect the ENET 0 port of OAW-IAP to the appropriate port on the PoE midspan.
- AC to DC power adapter— Connect the 12V DC power jack socket to the AC to DC power adapter.

Assigning an IP Address to the OAW-IAP

The OAW-IAP needs an IP address for network connectivity. When you connect the OAW-IAP to a network, the OAW-IAP receives an IP address from a DHCP server.

To get an IP address for an OAW-IAP:

1. Connect the ENET 0 port of OAW-IAP to a switch or router using an Ethernet cable. Ensure that the DHCP service is enabled on the network.
2. Connect the OAW-IAP to a power source. The OAW-IAP receives an IP address provided by the switch or router.

NOTE

If there is no DHCP service on the network, the IAP can be assigned a static IP address. If that doesn't happen, the IAP will get auto-assigned an IP within the 169.254 subnet.

Connecting to a Provisioning Wi-Fi Network

To connect to a provisioning Wi-Fi network:

1. Connect a wireless enabled client to a provisioning Wi-Fi network. The provisioning network is called **instant.**
2. In the Microsoft Windows operating system, click the wireless network connection icon in the system tray.

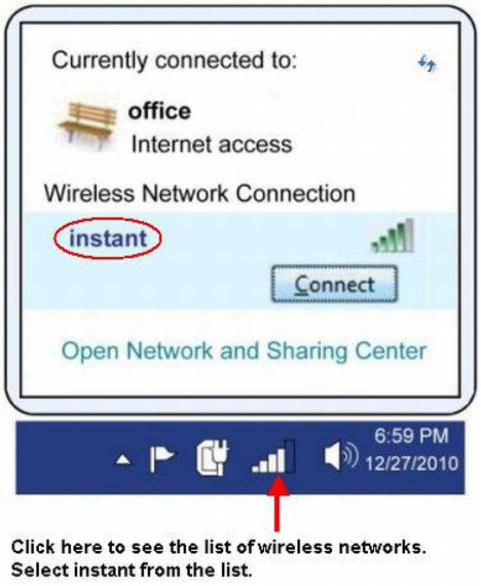
   The **Wireless Network Connection** window appears.
3. Click on the **instant** network and click **Connect.**
4. In the Mac OS, click the **AirPort** icon. A list of available Wi-Fi networks is displayed.
5. Click on the **instant** network.

NOTE

Instant SSIDs are only broadcasted in 2.4 GHz.

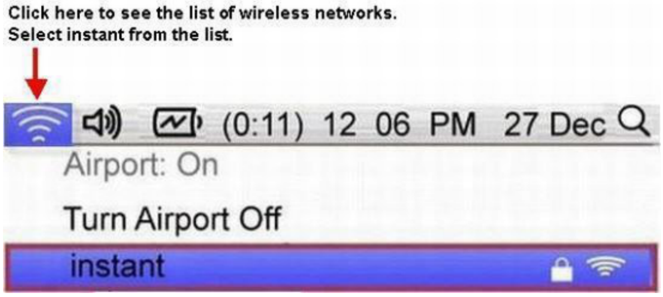
While connecting to the provisioning Wi-Fi network, ensure that the client is not connected to any wired network.

Figure 1 - *Connecting to a provisioning Wi-Fi Network — Microsoft Windows*



Click here to see the list of wireless networks.
Select instant from the list.

Figure 2 - *Connecting to a provisioning Wi-Fi Network — Mac OS*


Click here to see the list of wireless networks.
Select instant from the list.

Disabling the Provisioning Wi-Fi Network

The provisioning network is enabled by default. Instant provides the option to disable the provisioning network in APBoot through console. Use this option when you do not want the default SSID **instant** to appear in your network.

To disable the provisioning network:

1. Connect a terminal or PC/workstation running a terminal emulation program to the **Console** port on the OAW-IAP.
2. Configure the terminal or terminal emulation program to use the following communication settings.
3. Power on the OAW-IAP. You see an autoboot countdown prompt that allows you to interrupt the normal startup process and access APBoot.
4. Click **Enter** before the timer expires. The OAW-IAP goes into apboot mode through console.

Table 2 - *Terminal Communication Settings*

Baud Rate	Data Bits	Parity	Stop Bits	Flow Control
9600	8	None	1	None

5. In the apboot mode, use the following commands to disable the provisioning network:
   - `apboot> factory_reset`
   - `apboot> setenv disable_prov_ssid 1`
   - `apboot> saveenv`
   - `apboot> reset`

Assigning a Static IP

To assign a static IP to an OAW-IAP using APBoot:

1. Connect a terminal or PC/workstation running a terminal emulation program to the **Console** port on the OAW-IAP.
2. Configure the terminal or terminal emulation program to use the following communication settings.
3. Power on the IOAW-IAP. You see an autoboot countdown prompt that allows you to interrupt the normal startup process and access APBoot.
4. Click **Enter** before the timer expires. The OAW-IAP goes into apboot mode through console.
5. In the apboot mode, use the following commands to assign a static IP to an OAW-IAP.

```
Hit <Enter> to stop autoboot: 0
apboot>
apboot> setenv ipaddr 10.1.1.1
apboot> setenv netmask 255.255.255.0
apboot> setenv gatewayip 10.1.1.254
apboot> save
Saving Environment to Flash...
Un-Protected 1 sectors
.done
Erased 1 sectors
Writing
```

Use the printenv command to view the configuration.

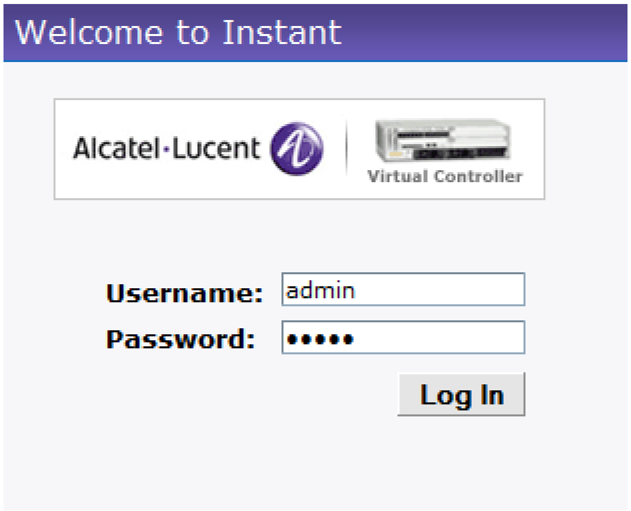
```
apboot> printenv
```

Log in to the Instant User Interface

Launch a web browser and enter http://instant.Alcatel-Lucentnetworks.com (or any URL or web address). In the login screen, enter the following credentials:

- Username— admin
- Password— admin

Figure 3 - *Instant User Interface Login Screen*



Username: admin

Password: •••••

When you use a provisioning Wi-Fi network to connect to the internet, all browser requests are directed to the Instant user interface. For example, if you enter www.example.com in the address field, you are directed to the Instant user interface. You can change the default login credentials after you log in for the first time.

Specifying a Country Code

NOTE

Skip this section if you are installing the OAW-IAP in the United States, Japan, or Israel.

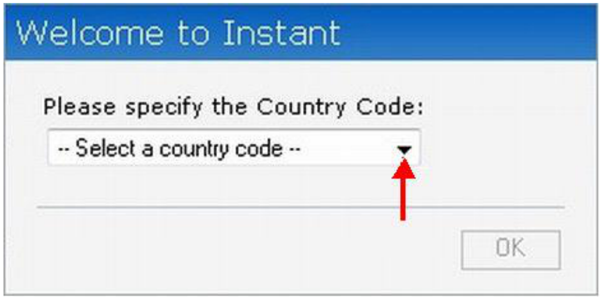
Alcatel-Lucent Instant Access Points are shipped in four variants:

- OAW-IAP-US (United States)
- OAW-IAP-JP (Japan)
- OAW-IAP-IL (Israel)
- OAW-IAP-ROW (Rest of World)

After you successfully log in to the Instant user interface, the **Country Code** window appears if OAW-IAP-ROW APs are installed. Select the country code for the OAW-IAP-ROW APs installed.

For the complete list of the countries that are supported in the OAW-IAP-ROW variant type, see Regulatory Domain on page 313.

Figure 4 - *Specifying a Country Code*



OAW-IAP Cluster

OAW-IAPs in the same VLAN automatically find each other and form a single functioning network managed by a Virtual Controller.

CAUTION

Moving an OAW-IAP from one cluster to another requires a factory reset of the OAW-IAP that is being moved. See Managing OAW-IAPs on page 99 for more information

The Instant User Interface (UI) provides a standard web based interface that allows you to configure and monitor a Wi-Fi network. It is accessible through a standard web browser from a remote management console or workstation. JavaScript must be enabled on the web browser to view the Instant UI.

Supported browsers are:

- Internet Explorer 8.0.7601.17514 and 9.0.11
- Safari 6.0.2
- Google Chrome 23.0.1271.95 m
- Mozilla Firefox 17.0

NOTE

The Instant UI logs out automatically if the window is inactive for fifteen minutes.

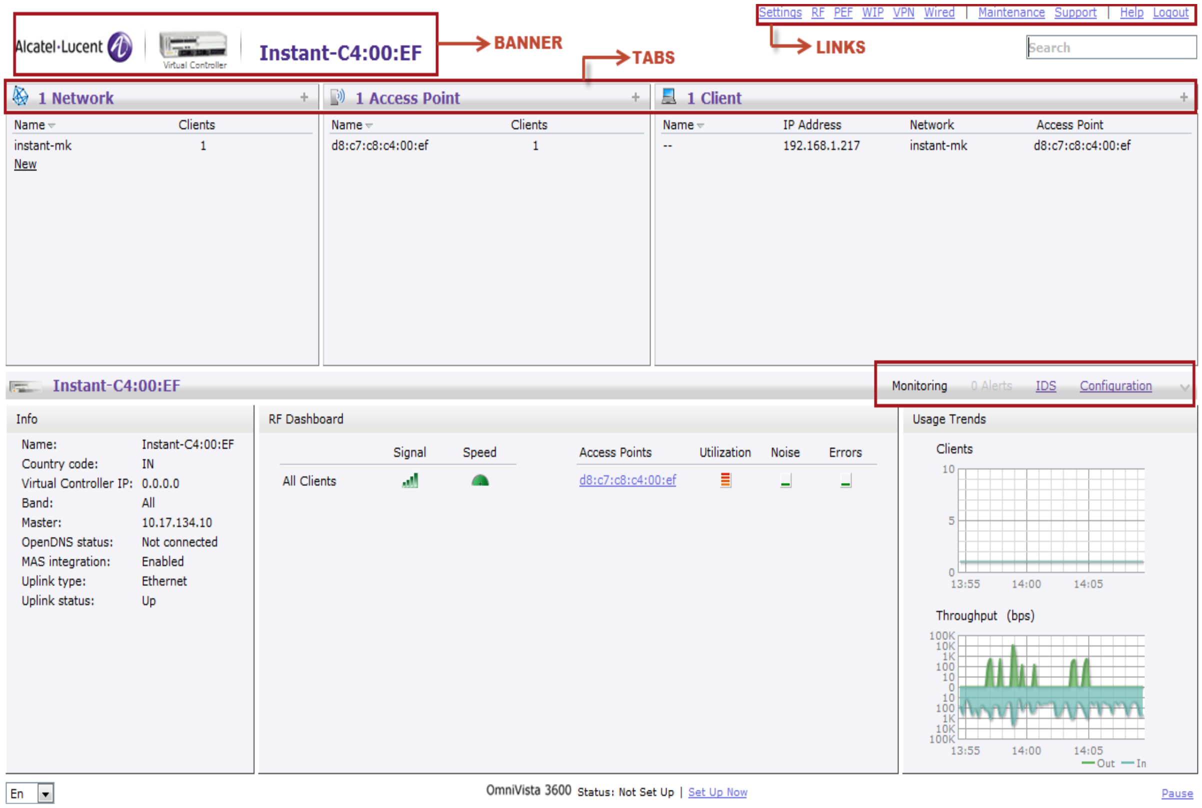
Understanding the Instant UI Layout

The Instant UI consists of the following elements:

- Banner on page 40
- Search on page 40
- Tabs on page 40
- Links on page 43
- Views on page 61

These elements are explained in the following sections.

Figure 5 - *Instant UI Interface*



1 Network

Name	Clients
instant-mk	1
New	

1 Access Point

Name	Clients
d8:c7:c8:c4:00:ef	1

1 Client

Name	IP Address	Network	Access Point
--	192.168.1.217	instant-mk	d8:c7:c8:c4:00:ef

Instant-C4:00:EF

Monitoring 0 Alerts IDS Configuration

Info

Name:	Instant-C4:00:EF
Country code:	IN
Virtual Controller IP:	0.0.0.0
Band:	All
Master:	10.17.134.10
OpenDNS status:	Not connected
MAS integration:	Enabled
Uplink type:	Ethernet
Uplink status:	Up

RF Dashboard

	Signal	Speed	Access Points	Utilization	Noise	Errors
All Clients			d8:c7:c8:c4:00:ef			

Usage Trends

En

OmniVista 3600 Status: Not Set Up | Set Up Now

Pause

Banner

The banner is a horizontal grey rectangle that appears at the top left corner of the Instant UI. It displays the company name, logo, and Virtual Controller's name.

Search

Administrators can search an OAW-IAP, client, or a network using a simple **Search** window in the Instant UI. This Search option helps fill in the blank when you type in a word and suggested matches are automatically displayed in a dynamic list. The list is more relevant and detailed when more number of keywords are typed in. This is similar to the auto-complete feature of Google Search.

Tabs

The Instant UI consists of the following tabs:

- **Networks**— Provides information about the Wi-Fi networks in the Alcatel-Lucent Instant network.
- **Access Points**— Provides information about the OAW-IAPs in the Instant network.
- **Clients**— Provides information about the clients in the Instant network.

Each tab appears in a compressed view by default. A number, specifying the number of networks, OAW-IAPs, or clients in the network precedes the tab names. Click on the tabs to see the expanded view and click again to compress the expanded view. Items in each tab are associated with a triangle icon. Click on the triangle icon to sort the data in increasing or decreasing order. Each tab is explained in the following sections.

Networks Tab

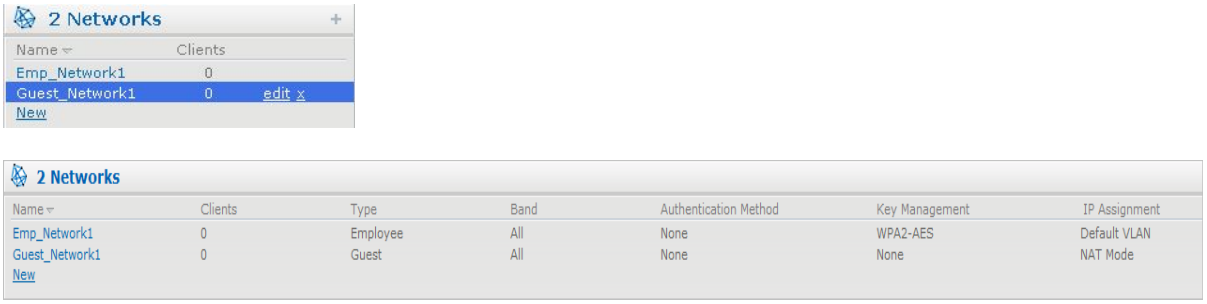
This tab displays a list of Wi-Fi networks that are configured in the Alcatel-Lucent Instant network. The network names appear as links. The expanded view displays the following information about each Wi-Fi network:

- **Name (SSID)**— Name of the network.
- **Clients**— Number of clients that are connected to the network.
- **Type**— Network type: Employee, Guest, or Voice.
- **Band**— Band in which the network is broadcast: 2.4 GHz band, 5 GHz band, or both.
- **Authentication Method**— Authentication method required to connect to the network.
- **Key Management**— Authentication key type.
- **IP Assignment**— Source of IP address for the client.

To add a Wi-Fi network, click the **New** link in the **Networks** tab. For more information about a wireless network and the procedure to add a wireless network, see Wireless Network on page 63.

An **edit** link appears on clicking the network name in the **Networks** tab. For information about editing a wireless network, see Network Types on page 63. To delete a network, click on the link **x** located next to the **edit** link.

Figure 6 - *Networks Tab— Compressed View and Expanded View*



2 Networks

Name	Clients	
Emp_Network1	0	
Guest_Network1	0	edit x
New		

2 Networks

Name	Clients	Type	Band	Authentication Method	Key Management	IP Assignment
Emp_Network1	0	Employee	All	None	WPA2-AES	Default VLAN
Guest_Network1	0	Guest	All	None	None	NAT Mode
New						

Access Points Tab

If the Auto Join Mode feature is enabled, a list of enabled and active OAW-IAPs in the Alcatel-Lucent Instant network is displayed in the **Access Points** tab. The OAW-IAP names are displayed as links.

If the Auto Join Mode feature is disabled, a **New** link appears. Click on this link to add a new OAW-IAP to the network. If an OAW-IAP is configured and not active, its MAC Address is displayed in red.

The expanded view displays the following information about each OAW-IAP:

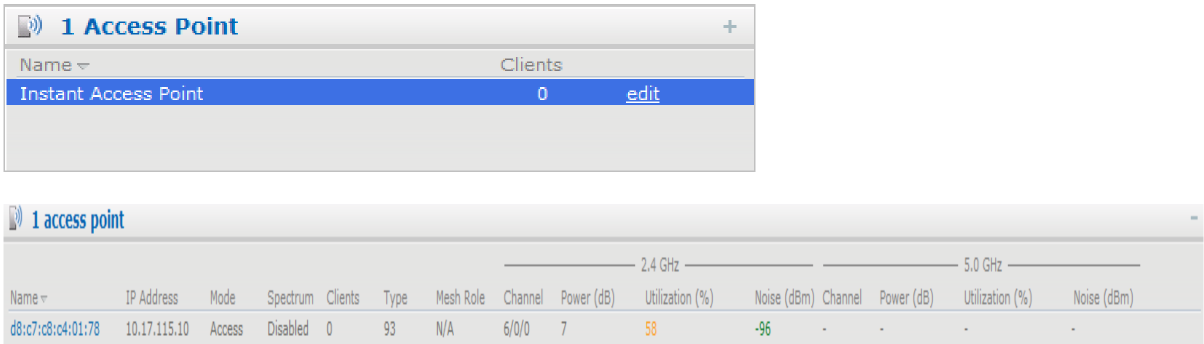
- **Name**— Name of the access point.
- **IP Address**— IP address of the OAW-IAP.
- **Mode**— Mode of the OAW-IAP.
  - **Access**— In this mode, the AP serves clients and scans the home channel for spectrum analysis while monitoring channels for rogue APs in the background
  - **Monitor** — In this mode, the AP acts as a dedicated Air Monitor (AM), scanning all channels for rogue APs and Clients.
- **Spectrum**— When enabled, the AP functions as a dedicated full-spectrum RF monitor, scanning all channels to detect interference, whether from neighboring APs or from non Wi-

Fi devices such as microwaves and cordless phones. When Spectrum is enabled, the AP does not provide access services to clients.

- **Clients**— Number of clients that are connected to the OAW-IAP.
- **Type**— Model number of the OAW-IAP.
- **Mesh Role**— Role of the mesh portal or mesh point.
- **Channel**— Channel the OAW-IAP is currently broadcasting on.
- **Power (dB)**— Maximum transmit EIRP of the radio.
- **Utilization (%)**— Percentage of time that the channel is utilized.
- **Noise (dBm)**— Noise floor of the channel.

An **edit** link appears on clicking the OAW-IAP name. For details about editing OAW-IAP settings see Editing OAW-IAP Settings on page 103.

Figure 7 - *Access Points Tab— Compressed View and Expanded View*



1 Access Point

Name	Clients	
Instant Access Point	0	edit

1 access point

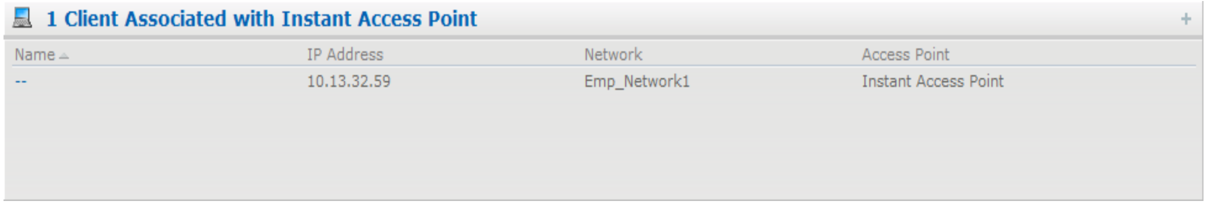
							2.4 GHz				5.0 GHz			
Name	IP Address	Mode	Spectrum	Clients	Type	Mesh Role	Channel	Power (dB)	Utilization (%)	Noise (dBm)	Channel	Power (dB)	Utilization (%)	Noise (dBm)
d8:c7:c8:c4:01:78	10.17.115.10	Access	Disabled	0	93	N/A	6/0/0	7	58	-96	-	-	-	-

Clients Tab

This tab displays a list of clients that are connected to the Alcatel-Lucent Instant network. The client names appear as links. The expanded view displays the following information about each client:

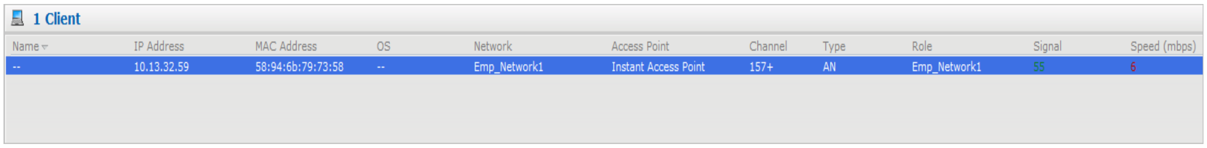
- **Name**— User name of the client or guest users if available.
- **IP Address**— IP address of the client.
- **MAC Address**— MAC address of the client.
- **OS**— Operating system that runs on the client.
- **Network**— The network to which the client is connected.
- **Access Point**— OAW-IAP to which the client is connected.
- **Channel** — The client operating channel.
- **Type**— Wi-Fi type of the client: A, G, AN, or GN.
- **Role**— Role assigned to the client.
- **Signal**— Signal strength of the client, as detected by the AP.
- **Speed (mbps)**— Current PHY rate.

Figure 8 - *Client Tab— Compressed View and Expanded View*



1 Client Associated with Instant Access Point

Name	IP Address	Network	Access Point
--	10.13.32.59	Emp_Network1	Instant Access Point



1 Client

Name	IP Address	MAC Address	OS	Network	Access Point	Channel	Type	Role	Signal	Speed (mbps)
--	10.13.32.59	58:94:6b:79:73:58	--	Emp_Network1	Instant Access Point	157+	AN	Emp_Network1	55	6

Links

The following links allow you to configure the features and settings for the Instant network. Each of these links are explained in the subsequent sections.

- New Version Available on page 43
- Settings on page 43
- RF on page 46
- PEF on page 46
- WIP on page 47
- VPN on page 48
- Wired on page 49
- Maintenance on page 49
- Support on page 49
- Help on page 49
- Logout on page 50
- Monitoring on page 50
- Spectrum on page 53
- Alerts on page 54
- IDS on page 58
- Configuration on page 59
- AirGroup on page 59
- Language on page 60
- OmniVista Setup on page 60
- Pause/Resume on page 61

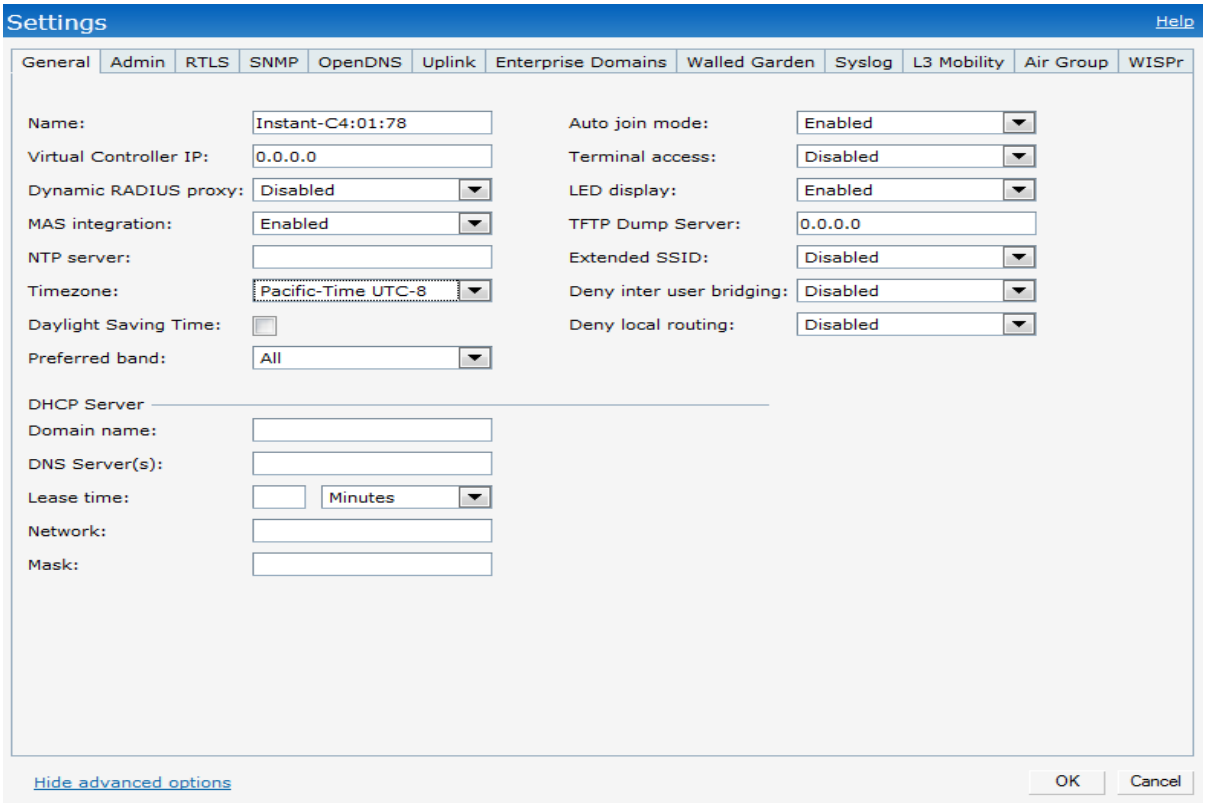
New Version Available

This link appears in the top right corner of Instant UI only if a new image version is available on the image server and OmniVista is not configured. For more information about the **New version available** link and its functions, see Firmware Image Server in Cloud Network on page 113.

Settings

This link displays the **Settings** window. The **Settings** consists of the following tabs:

Figure 9 - *Settings Link - Default View*



Name: Instant-C4:01:78

Virtual Controller IP: 0.0.0.0

Dynamic RADIUS proxy: Disabled

MAS integration: Enabled

NTP server:

Timezone: Pacific-Time UTC-8

Daylight Saving Time: ☐

Preferred band: All

DHCP Server

Domain name:

DNS Server(s):

Lease time: Minutes

Network:

Mask:

Auto join mode: Enabled

Terminal access: Disabled

LED display: Enabled

TFTP Dump Server: 0.0.0.0

Extended SSID: Disabled

Deny inter user bridging: Disabled

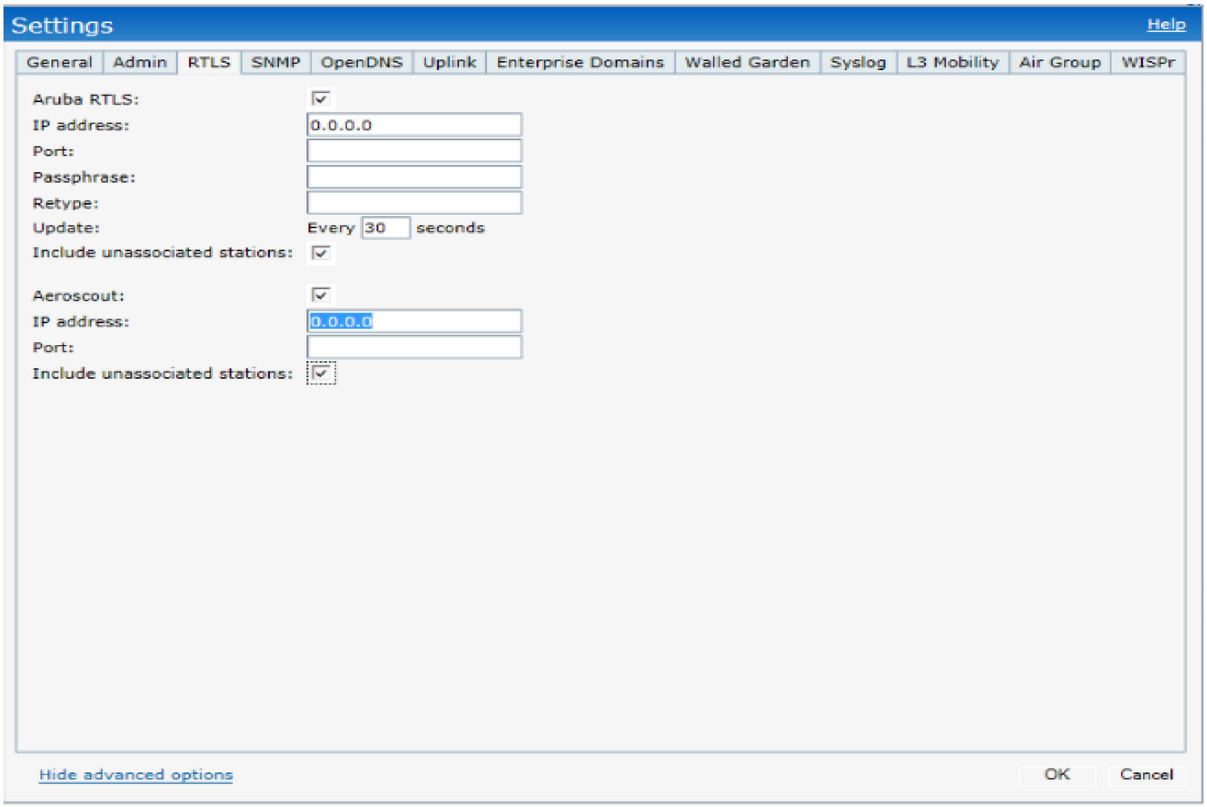
Deny local routing: Disabled

> Use the **Show/Hide Advanced** option on the bottom-left of the Settings window to view or hide the advanced options.

- **General**— View or edit the Name, IP address, NTP Server, and DHCP server settings of the Virtual Controller.
  - For information about Virtual Controller settings and NTP Server, see Virtual Controller on page 139 and Time Management on page 137.
  - For information about Auto join mode, Terminal Access, LED display, TFTP Dump Server, and Deny inter user bridging see Managing OAW-IAPs on page 99.
  - For information on MAS integration, see Mobility Access Switch Integration on page 117.
- **Admin**— View or edit the admin credentials for access to the Virtual Controller Management User Interface. See 802.1X Authentication on page 141 for more information. You can also configure OmniVista in this tab. See Configuring OmniVista on page 243 for more information.
- **RTLS**— View or edit the Real-Time Location Server (RTLS) settings.
  - **Alcatel-Lucent RTLS—** Enable this to integrate Alcatel-Lucent Instant with OmniVista Management platform, Ekahau Real-Time Location Server and Nearbuy Real Time Location Server. Specify the IP address and port number of the server (to which location reports are sent), a shared secret key, and the frequency at which packets are sent to the server.
- **Aeroscout**— Enable this option to send the RFID tag information to an AeroScout RTLS. Specify the IP address and port number of the AeroScout server, to which location reports should be sent.

- **Include unassociated stations**— Enable this option to send mobile unit reports to the Aeroscout and the Alcatel-Lucent RTLS servers for the client stations that are not associated to any OAW-IAP (unassociated stations).

Figure 10 - *RTLS*



Aruba RTLS: ☑
IP address: 0.0.0.0
Port:
Passphrase:
Retype:
Update: Every 30 seconds
Include unassociated stations: ☑

Aeroscout: ☑
IP address: 0.0.0.0
Port:
Include unassociated stations: ☑

- **SNMP**— View or specify SNMP agent settings. See SNMP on page 219 for more information.
- **OpenDNS**— Instant supports OpenDNS business solutions which requires an OpenDNS (http://www.opendns.com) account comprising a username and a password. These credentials are used by Instant to access OpenDNS to provide enterprise-level content filtering.

NOTE

For OpenDNS to work, enable **Content Filtering** feature while creating a new network. Click **New** in the **Networks** tab and then select **Enabled** from the **Content filtering** drop-down list.

NOTE

If the network firewall setup already has openDNS integration, do not configure it on the OAW-IAP.

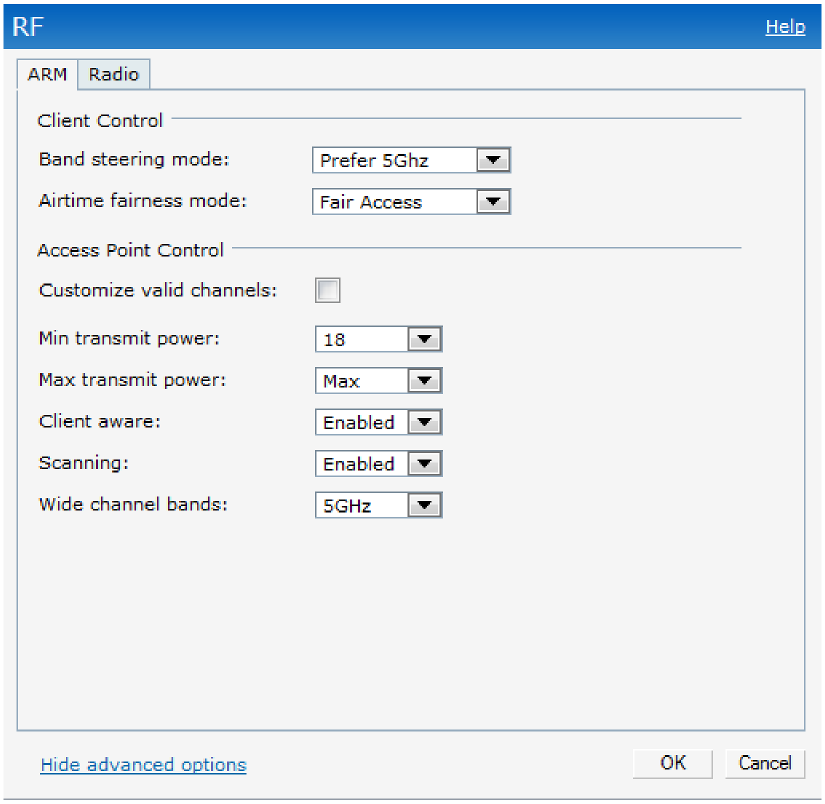
- **Uplink**— View or configure uplink settings. See Uplink Configuration on page 231 for more information.
- **Enterprise Domains**— This tab indicates (displays) the DNS domain names that are valid in the enterprise network. The domain names are used for determining the procedure for routing the DNS request from clients. When **Content Filtering** is enabled for a network, the domain names that do not match the names in the list are sent to OpenDNS server.

- **Walled Garden**— The Walled Garden directs the user's navigation within particular areas to allow access to a selection of websites and/or prevent access to other websites. For more information, see Walled Garden Access on page 166.
- **Syslog**— View or specify a Syslog Server for sending syslog messages to the external servers. See Syslog Server on page 101 for more information.
- **L3 Mobility**— View or configure the Layer-3 mobility settings. See Layer-3 Mobility on page 121 for more information.
- **AirGroup —** View or configure the AirGroup settings. See AirGroup on page 253 for more information.
- **WISPr** — View or configure the WISPr settings. See WISPr Authentication on page 163 for more information.

RF

This link displays the configuration parameters Adaptive Radio Management (ARM) and Radio features.

Figure 11 - *RF*



Band steering mode: Prefer 5Ghz

Airtime fairness mode: Fair Access

Customize valid channels: □

Min transmit power: 18

Max transmit power: Max

Client aware: Enabled

Scanning: Enabled

Wide channel bands: 5GHz

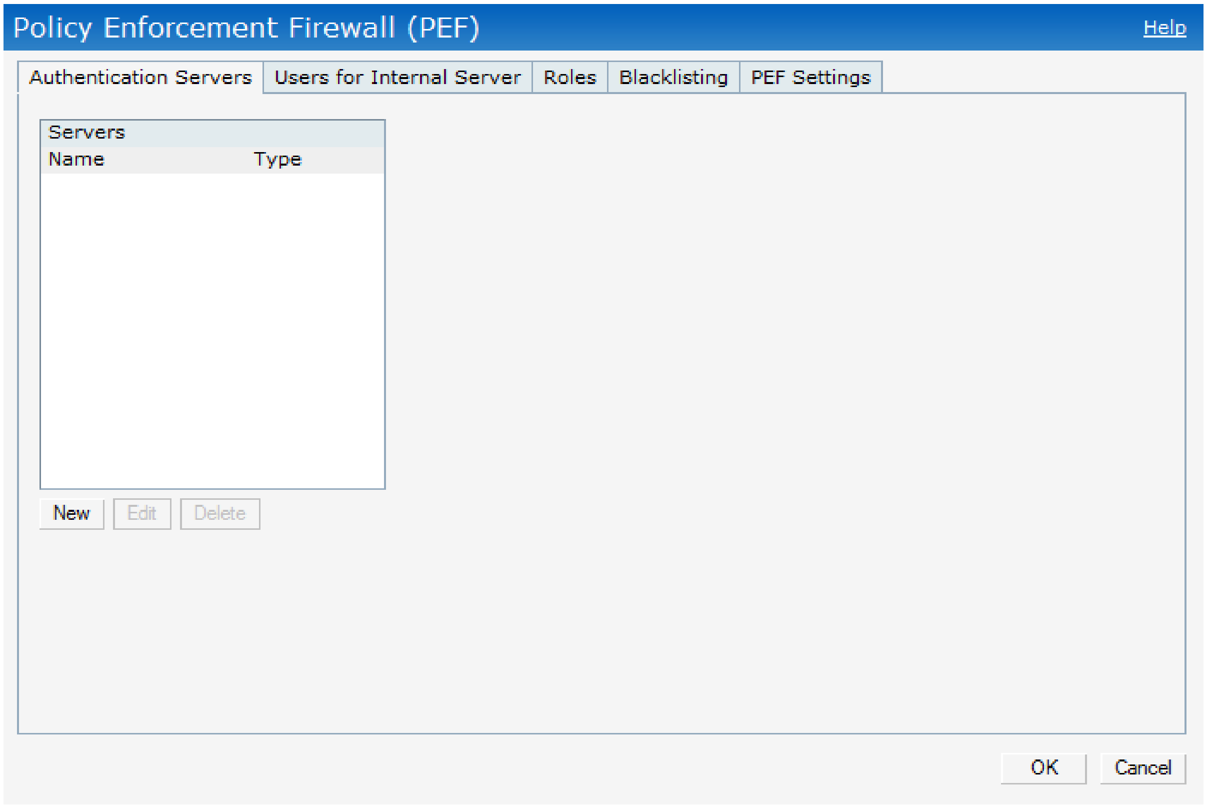
ARM — View or assign channel and power settings for all the OAW-IAPs in the network. For information about ARM (Adaptive Radio Management), see ARM Features on page 205.

Radio — View or configure radio settings for 2.4 GHz and the 5 GHz radio profiles. For information about Radio, see Configuring Radio Profiles in Instant on page 209.

PEF

This link displays the following features.

Figure 12 - *PEF*



Authentication Servers— Use this window to configure an external RADIUS server for a wireless network. See 802.1X Authentication on page 141 for more information.

Users for Internal Server— Use this window to populate the system's internal authentication server with users. This list is used by networks for which per-user authorization is specified using the Virtual Controller's internal authentication server. For more information about users, see User Database on page 311.

Roles— This window displays all the roles defined for all the Networks. The Access Rules part indicates the permissions for each role. For more information, see User Roles on page 177.

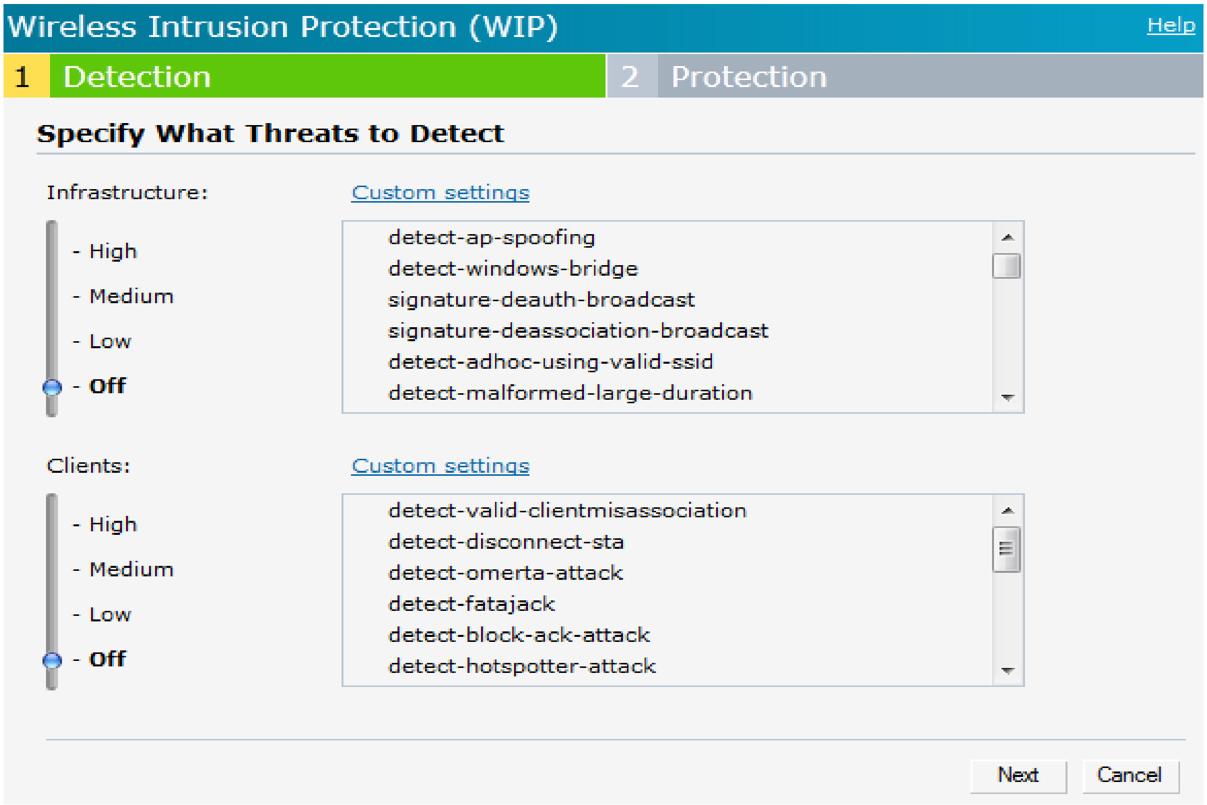
Blacklisting— Use this window to manually blacklist clients. See Client Blacklisting on page 298 for more information.

Policy Enforcement Firewell (PEF) Settings— Use this window to enable/disable Application Layer Gateway (ALG) supporting address and port translation for various protocols. See Policy Enforcement Firewall on page 293 for more information.

WIP

Wireless Intrusion Protection (WIP) offers a wide selection of intrusion detection and protection features to protect the network against wireless threats. Use this window to specify desired levels of threat detection. See Rogue AP Detection and Classification on page 213 for more information.

Figure 13 - *WIP - Default View*



Specify What Threats to Detect

Infrastructure: Custom settings

- High
- Medium
- Low
- **Off**

detect-ap-spoofing
detect-windows-bridge
signature-deauth-broadcast
signature-deassociation-broadcast
detect-adhoc-using-valid-ssid
detect-malformed-large-duration

Clients: Custom settings

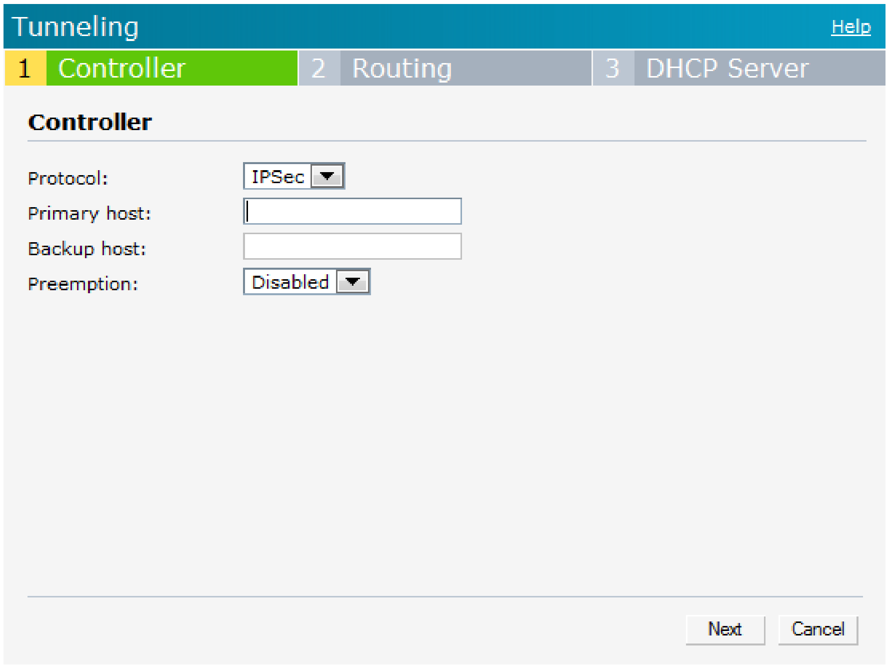
- High
- Medium
- Low
- **Off**

detect-valid-clientmisassociation
detect-disconnect-sta
detect-omerta-attack
detect-fatajack
detect-block-ack-attack
detect-hotspotter-attack

VPN

Use this window to define how the OAW-IAP communicates with the remote switch. See VPN Configuration on page 303 for more information.

Figure 14 - *VPN - Default View*



Controller

Protocol: IPSec
Primary host:
Backup host:
Preemption: Disabled

Wired

Specify the desired profile for each port of the OAW-IAP. See Ethernet Downlink on page 223 for more information.

Maintenance

This link displays the **Maintenance** window. The **Maintenance** window allows you to maintain the Wi-Fi network. It consists of the following tabs:

- **About**— Displays the Build Time, OAW-IAP model name, Alcatel-Lucent OS version, Web address of Alcatel-Lucent Networks, and Copyright information.
- **Configuration**— Displays the current configuration of the network.
  - **Clear Configuration—** Click to delete or clear the current configuration of the network and reset to provisioning configuration.
  - **Backup Configuration—** Use this feature to create local Instant configuration backup. Click **Backup Configuration** to save the configuration file named **instant.cfg**.
  - **Restore Configuration**— Click **Restore Configuration** to browse and locate the backup file to restore. Reboot the OAW-IAP for the changes to take effect.
- **Certificates** — Displays information about the current certificate installed in the network. Provides an interface to upload new certificates and to set a passphrase for the certificates. For more information, see Certificates on page 170.
- **Firmware** — Displays the current firmware version and provides options to upgrade to a new firmware version. For more information, see Firmware Image Server in Cloud Network on page 113
- **Reboot** — Displays the OAW-IAPs in the network and provides an option to reboot the required access point or all access points. For more information, see Rebooting the OAW-IAP on page 111.
- **Convert** — Provides an option to change the network from Instant to an Alcatel-Lucent Mobility Switch managed network or standalone AP. For more information, see Migrating to a Mobility Controller Managed Network on page 107.

Support

This link displays the **Support** window. It consists of the following fields:

- **Command**— Provides various options for which you can generate support logs.
- **Target**— Provides a list of OAW-IAPs in the network.
- **Run**— Click this to generate the support log for the selected option and OAW-IAP.
- **Auto Run**— The selected commands run on the selected APs according to the specified time schedule.
- **Filter**— Enter a string and click to display the filtered content of any command.
- **Clear**— Click to clear the text box
- **Save Results**— Click to open the results in another window and save it as an HTML or text file.

For additional details, see Troubleshooting on page 335.

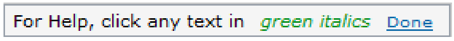
Help

The **Help** link at the top right corner of the Instant UI allows you to view a short description or definition of selected terms and fields in the Instant UI.

To activate the context-sensitive help:

1. At the top right corner of Instant UI, click the **Help** link.

Figure 15 - *Help Link*



For Help, click any text in *green italics* Done

2. Click any text or term displayed in green italics to view its description or definition.
3. To disable the help mode, click **Done**.

Logout

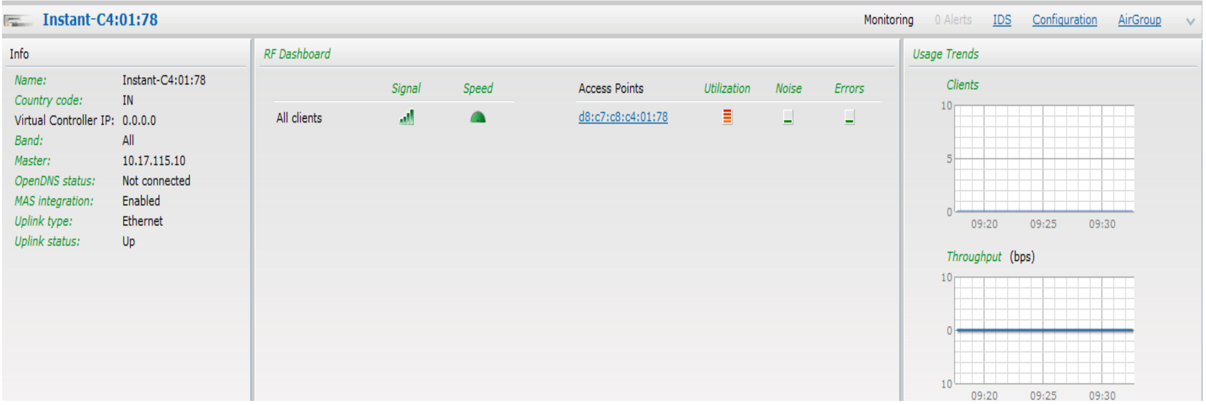
Use this link to logout of the Instant UI.

Monitoring

This link displays the Monitoring pane. This pane can be used to monitor the Alcatel-Lucent Instant network. Use the down arrow ⌄ located to the right side of these links to compress or expand the monitoring pane. The monitoring pane consists of the following sections:

- Info on page 50
- RF Dashboard on page 51
- Usage Trends on page 52

Figure 16 - *Monitoring on Instant UI*



Info

Name:	Instant-C4:01:78
Country code:	IN
Virtual Controller IP:	0.0.0.0
Band:	All
Master:	10.17.115.10
OpenDNS status:	Not connected
MAS integration:	Enabled
Uplink type:	Ethernet
Uplink status:	Up

RF Dashboard

	Signal	*Speed*
All clients		

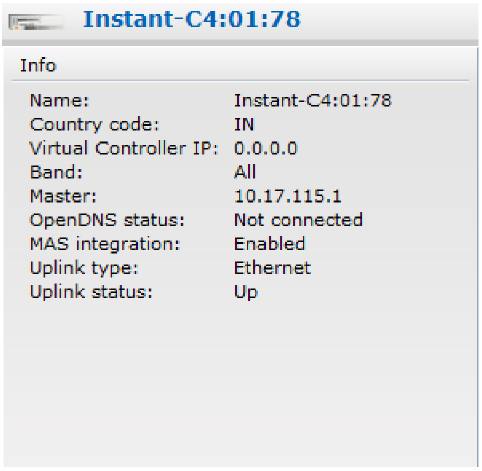
Access Points	*Utilization*	*Noise*	*Errors*
d8:c7:c8:c4:01:78			

Usage Trends

Info

Displays the configuration information of the Virtual Controller by default. In aNetwork View on page 273, this section displays configuration information of the selected network. Similarly, in an Instant Access Point View on page 275 or Client View on page 284, this section displays the configuration information of the selected OAW-IAP or the client.

Figure 17 - *Info Section in the Monitoring Pane*



Instant-C4:01:78

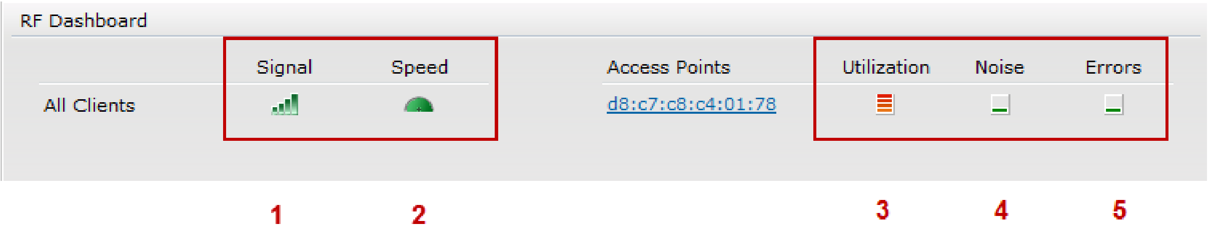
Info

Name:	Instant-C4:01:78
Country code:	IN
Virtual Controller IP:	0.0.0.0
Band:	All
Master:	10.17.115.1
OpenDNS status:	Not connected
MAS integration:	Enabled
Uplink type:	Ethernet
Uplink status:	Up

RF Dashboard

Allows you to view trouble spots in the network. It displays the following information:

Figure 18 - *RF Dashboard in the Monitoring Pane*



RF Dashboard

	Signal	Speed	Access Points	Utilization	Noise	Errors
All Clients			d8:c7:c8:c4:01:78			

The **RF Dashboard** displays the following information:

- Clients— Lists the clients with low speed or signal strength in the network.
- Access Points— Lists the OAW-IAPs whose utilization, noise, or errors are not within the specified threshold. The OAW-IAP names appear as links. When the OAW-IAP is clicked, the OAW-IAP configuration information is displayed in the Info section. The RF Dashboard section is pushed to the bottom left corner of the Instant UI. The RF Trends section appears in its place. This section consists of the Utilization, Band frames, Noise Floor, and Errors graphs. For more information on the graphs, see Monitoring on page 269.

The following table lists the icons available on the RF Dashboard pane:

Table 3 - *RF Dashboard Icons*

Icon	Name	Description
1	Signal Icon	Displays the signal strength of the client. Depending on the signal strength of the client, the color of the lines on the Signal bar changes from Green > Orange > Red. • Green— Signal strength is more than 20 decibels. • Orange— Signal strength is between 15-20 decibels. • Red— Signal strength is less than 15 decibels. To view the signal graph for a client, click on the signal icon against the client in the **Signal** column.
2	Speed icon	Displays the data transfer speed of the client. Depending on

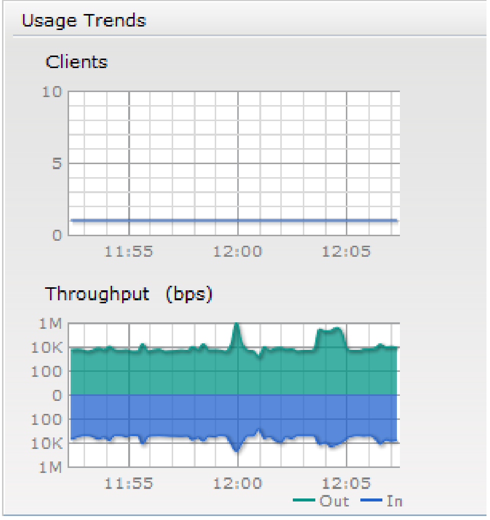
		the data transfer speed of the client, the color of the Signal bar changes from Green > Orange > Red. ● Green— Data transfer speed is more than 50 percent of the maximum speed supported by the client. ● Orange— Data transfer speed is between 25-50 percent of the maximum speed supported by the client. ● Red— Data transfer speed is less than 25 percent of the maximum speed supported by the client. To view the data transfer speed graph of a client, click on the speed icon against the client in the **Speed** column.
3	Utilization icon	Displays the radio utilization rate of the IAPs. Depending on the percentage of utilization, the color of the lines on the Utilization icon changes from Green > Orange > Red. ● Green— Utilization is less than 50 percent. ● Orange— Utilization is between 50-75 percent. ● Red— Utilization is more than 75 percent. To view the utilization graph of an IAP, click on the Utilization icon against the IAP in the Utilization column.
4	Noise icon	Displays the noise floor of the IAPs. Noise is measured in decibels/meter. Depending on the noise floor, the color of the lines on the Noise icon changes from Green > Orange > Red. ● Green— Noise floor is more than 87 dBm. ● Orange— Noise floor is between 80 dBm-87 dBm. ● Red— Noise floor is less than 80 dBm. To view the noise floor graph of an IAP, click on the noise icon against the IAP in the Noise column.
5	Errors icon	Displays the errors for the IAPs. Depending on the errors, color of the lines on the Errors icon changes from Green > Yellow > Red. ● Green— Errors are less than 5000 frames per second. ● Orange— Errors are between 5000-10000 frames per second. ● Red— Errors are more than 10000 frames per second. To view the errors graph of an IAP, click on the **Errors** icon against the IAP in the **Errors** column.

Usage Trends

Displays the following graphs:

- Clients— In the default homepage, the Clients graph displays the number of clients that were associated with the Virtual Controller in the last 15 minutes. In Network or OAW-IAP view, this graph displays the number of clients that were associated with the selected network or OAW-IAP in the last 15 minutes.
- Throughput— In the default homepage, the Throughput graph displays the incoming and outgoing throughput traffic for the Virtual Controller in the last 15 minutes. In the Network or OAW-IAP view, this graph displays the incoming and outgoing throughput traffic for the selected network or OAW-IAP in the last 15 minutes.

Figure 19 - *Usage Trends Section in the Monitoring Pane*



For more information about the graphs and monitoring procedures, see Monitoring on page 269.

Spectrum

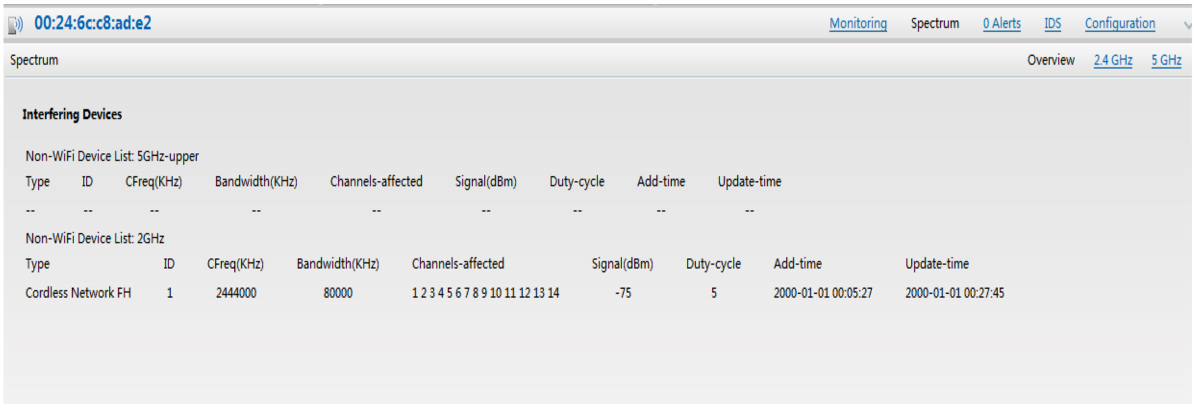
The spectrum link (in the Access Point view) displays the spectrum data that is collected by a hybrid AP or by an OAW-IAP that has enabled spectrum monitor. The spectrum data is not reported to the VC.

The spectrum link displays the following:

Overview (Device list)

The device list display consists of a device summary table and channel information for active non Wi-Fi devices currently seen by a spectrum monitor or hybrid AP radio.

Figure 20 - *Device List*



Interfering Devices

Non-WiFi Device List: 5GHz-upper

Type	ID	CFreq(KHz)	Bandwidth(KHz)	Channels-affected	Signal(dBm)	Duty-cycle	Add-time	Update-time
--	--	--	--	--	--	--	--	--

Non-WiFi Device List: 2GHz

Type	ID	CFreq(KHz)	Bandwidth(KHz)	Channels-affected	Signal(dBm)	Duty-cycle	Add-time	Update-time
Cordless Network FH	1	2444000	80000	1 2 3 4 5 6 7 8 9 10 11 12 13 14	-75	5	2000-01-01 00:05:27	2000-01-01 00:27:45

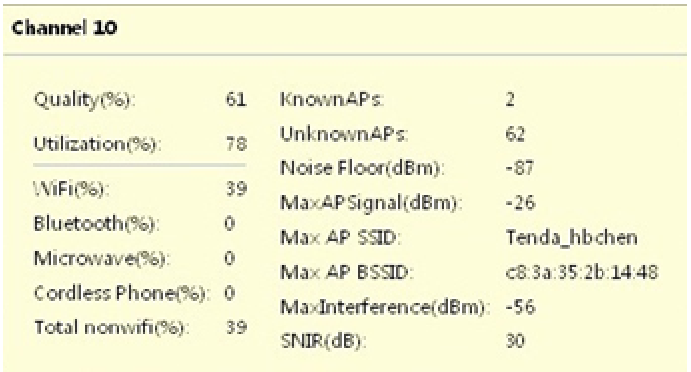
Channel Utilization and Monitoring

This graph shows channel utilization information such as channel quality, availability, and utilization metrics as seen by a spectrum monitor for the 2.4 GHz and 5 GHz radio bands. This chart provides an overview of channel quality across the spectrum. The first bar for each channel represents the percentage of air time used by non Wi-Fi interferers and Wi-Fi devices. The remaining air time is available for use. The second bar indicates the channel quality. A higher percentage value indicates better quality.

Channel Details

When you move your mouse over a channel, the channel details or the summary of the 5 GHz and 2.4 GHz channels as detected by a spectrum monitor are displayed. You can view the aggregate data for each channel seen by the spectrum monitor radio, including the maximum AP power, interference and the Signal-to-Noise and Interference Ratio (SNIR). Spectrum monitors display spectrum analysis data seen on all channels in the selected band, and hybrid OAW-IAPs display data from the one channel they are monitoring.

Figure 21 - *Channel Details Information*



Channel 10

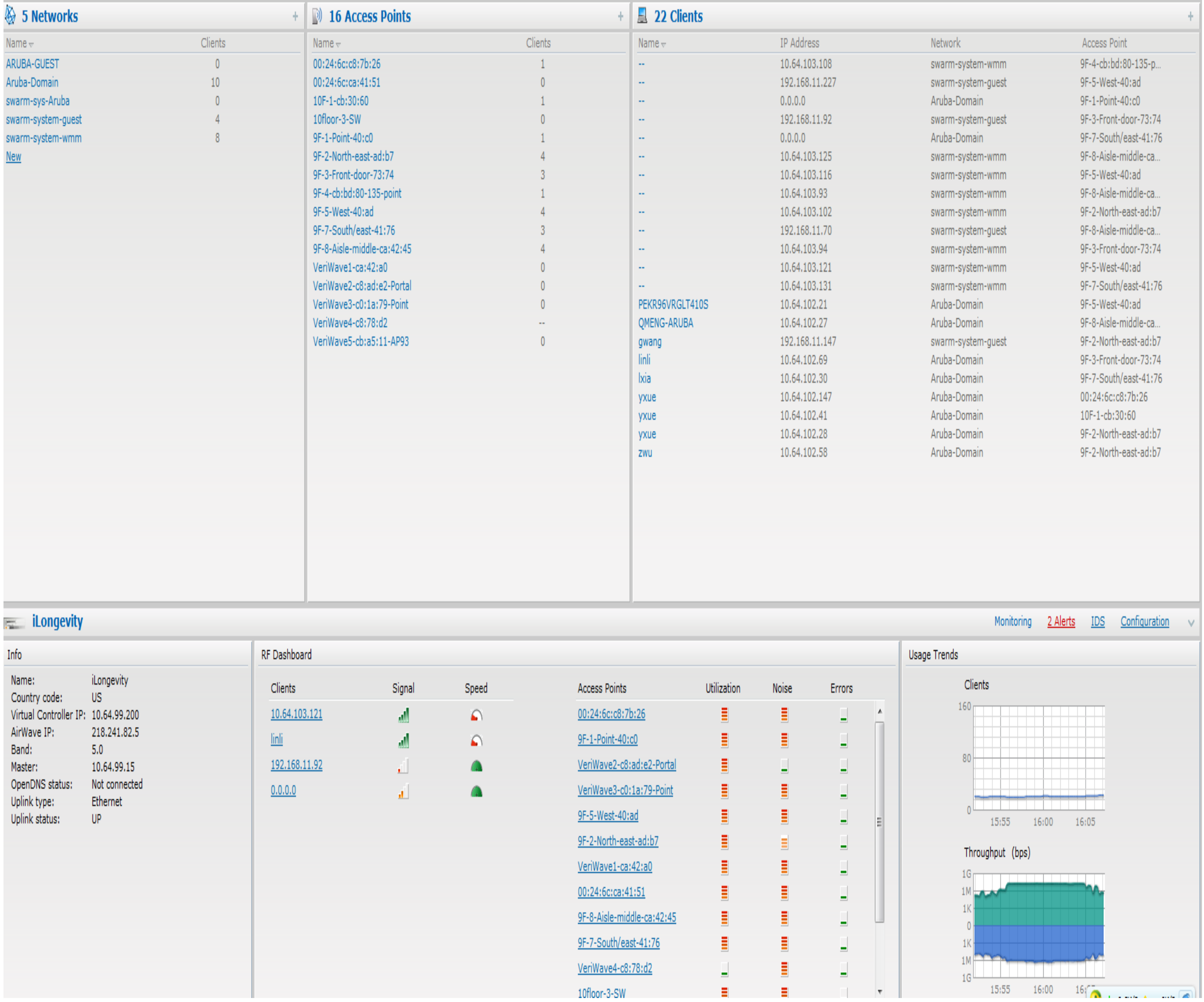
Quality(%):	61	KnownAPs:	2
Utilization(%):	78	UnknownAPs:	62
		Noise Floor(dBm):	-87
WiFi(%):	39	MaxAPSignal(dBm):	-26
Bluetooth(%):	0	Max AP SSID:	Tenda_hbchen
Microwave(%):	0	Max AP BSSID:	c8:3a:35:2b:14:48
Cordless Phone(%):	0	MaxInterference(dBm):	-56
Total nonwifi(%):	39	SNIR(dB):	30

For more information on spectrum monitoring, see Spectrum Monitor on page 127.

Alerts

Alerts are generated when a user faces problems while accessing or connecting to the Wi-Fi network. The Alerts link appears in red if there are any Client Alerts, or Active Faults.

Figure 22 - *Alerts Link*



5 Networks

Name	Clients
ARUBA-GUEST	0
Aruba-Domain	10
swarm-sys-Aruba	0
swarm-system-guest	4
swarm-system-wmm	8
New	

16 Access Points

Name	Clients
00:24:6c:c8:7b:26	1
00:24:6c:ca:41:51	0
10F-1-cb:30:60	1
10floor-3-SW	0
9F-1-Point-40:c0	1
9F-2-North-east-ad:b7	4
9F-3-Front-door-73:74	3
9F-4-cb:bd:80-135-point	1
9F-5-West-40:ad	4
9F-7-South/east-41:76	3
9F-8-Aisle-middle-ca:42:45	4
VeriWave1-ca:42:a0	0
VeriWave2-c8:ad:e2-Portal	0
VeriWave3-c0:1a:79-Point	0
VeriWave4-c8:78:d2	--
VeriWave5-cb:a5:11-AP93	0

22 Clients

Name	IP Address	Network	Access Point
--	10.64.103.108	swarm-system-wmm	9F-4-cb:bd:80-135-p...
--	192.168.11.227	swarm-system-guest	9F-5-West-40:ad
--	0.0.0.0	Aruba-Domain	9F-1-Point-40:c0
--	192.168.11.92	swarm-system-guest	9F-3-Front-door-73:74
--	0.0.0.0	Aruba-Domain	9F-7-South/east-41:76
--	10.64.103.125	swarm-system-wmm	9F-8-Aisle-middle-ca...
--	10.64.103.116	swarm-system-wmm	9F-5-West-40:ad
--	10.64.103.93	swarm-system-wmm	9F-8-Aisle-middle-ca...
--	10.64.103.102	swarm-system-wmm	9F-2-North-east-ad:b7
--	192.168.11.70	swarm-system-guest	9F-8-Aisle-middle-ca...
--	10.64.103.94	swarm-system-wmm	9F-3-Front-door-73:74
--	10.64.103.121	swarm-system-wmm	9F-5-West-40:ad
--	10.64.103.131	swarm-system-wmm	9F-7-South/east-41:76
PEKR96VRGLT410S	10.64.102.21	Aruba-Domain	9F-5-West-40:ad
QMENG-ARUBA	10.64.102.27	Aruba-Domain	9F-8-Aisle-middle-ca...
gwang	192.168.11.147	swarm-system-guest	9F-2-North-east-ad:b7
linli	10.64.102.69	Aruba-Domain	9F-3-Front-door-73:74
lxia	10.64.102.30	Aruba-Domain	9F-7-South/east-41:76
yxue	10.64.102.147	Aruba-Domain	00:24:6c:c8:7b:26
yxue	10.64.102.41	Aruba-Domain	10F-1-cb:30:60
yxue	10.64.102.28	Aruba-Domain	9F-2-North-east-ad:b7
zwu	10.64.102.58	Aruba-Domain	9F-2-North-east-ad:b7

iLongevity

Info

Name:	iLongevity
Country code:	US
Virtual Controller IP:	10.64.99.200
AirWave IP:	218.241.82.5
Band:	5.0
Master:	10.64.99.15
OpenDNS status:	Not connected
Uplink type:	Ethernet
Uplink status:	UP

RF Dashboard

Clients	Signal	Speed
10.64.103.121		
linli		
192.168.11.92		
0.0.0.0		

Access Points	Utilization	Noise	Errors
00:24:6c:c8:7b:26			
9F-1-Point-40:c0			
VeriWave2-c8:ad:e2-Portal			
VeriWave3-c0:1a:79-Point			
9F-5-West-40:ad			
9F-2-North-east-ad:b7			
VeriWave1-ca:42:a0			
00:24:6c:ca:41:51			
9F-8-Aisle-middle-ca:42:45			
9F-7-South/east-41:76			
VeriWave4-c8:78:d2			
10floor-3-SW			

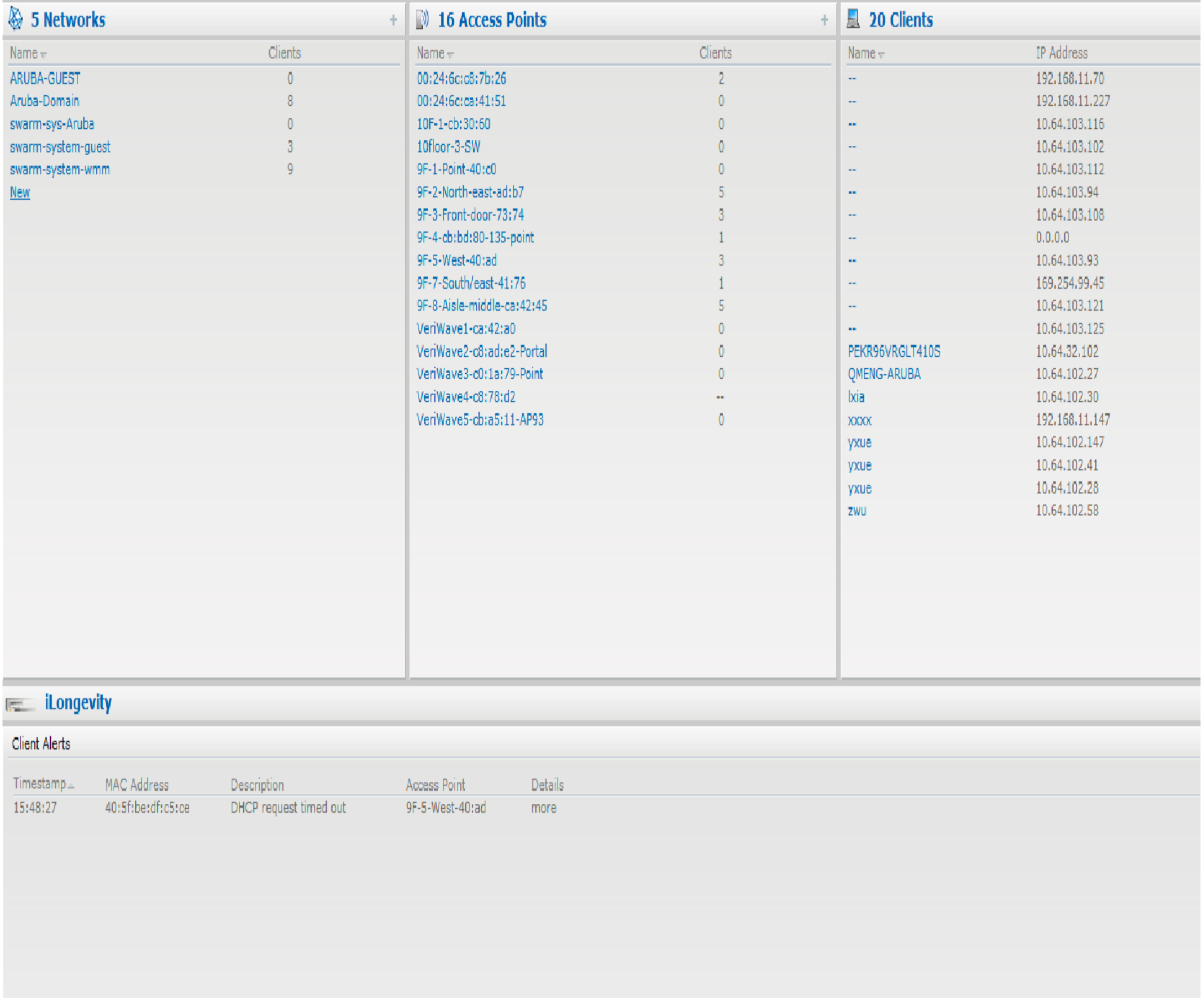
Usage Trends

Client Alerts

These alerts occur when clients are connected to the Instant network. A client alert consists of the following fields:

- Timestamp— Displays the time at which the client alert was recorded.
- MAC address— Displays the MAC address of the client which caused the alert.
- Description— Provides a short description of the alert.
- Access Points— Displays the IP address of the OAW-IAP to which the client is connected.
- Details— Provides complete details of the alert.

Figure 23 - *Client Alerts*



5 Networks

Name	Clients
ARUBA-GUEST	0
Aruba-Domain	8
swarm-sys-Aruba	0
swarm-system-guest	3
swarm-system-wmm	9
New	

16 Access Points

Name	Clients
00:24:6c:c8:7b:26	2
00:24:6c:ca:41:51	0
10F-1-cb:30:60	0
10floor-3-SW	0
9F-1-Point-40:c0	0
9F-2-North-east-ad:b7	5
9F-3-Front-door-73:74	3
9F-4-cb:bd:80-135-point	1
9F-5-West-40:ad	3
9F-7-South/east-41:76	1
9F-8-Aisle-middle-ca:42:45	5
VeriWave1-ca:42:a0	0
VeriWave2-c8:ad:e2-Portal	0
VeriWave3-c0:1a:79-Point	0
VeriWave4-c8:78:d2	--
VeriWave5-cb:a5:11-AP93	0

20 Clients

Name	IP Address
--	192.168.11.70
--	192.168.11.227
--	10.64.103.116
--	10.64.103.102
--	10.64.103.112
--	10.64.103.94
--	10.64.103.108
--	0.0.0.0
--	10.64.103.93
--	169.254.99.45
--	10.64.103.121
--	10.64.103.125
PEKR96VRGLT410S	10.64.32.102
QMENG-ARUBA	10.64.102.27
lxia	10.64.102.30
xxxx	192.168.11.147
yxue	10.64.102.147
yxue	10.64.102.41
yxue	10.64.102.28
zwu	10.64.102.58

iLongevity

Client Alerts

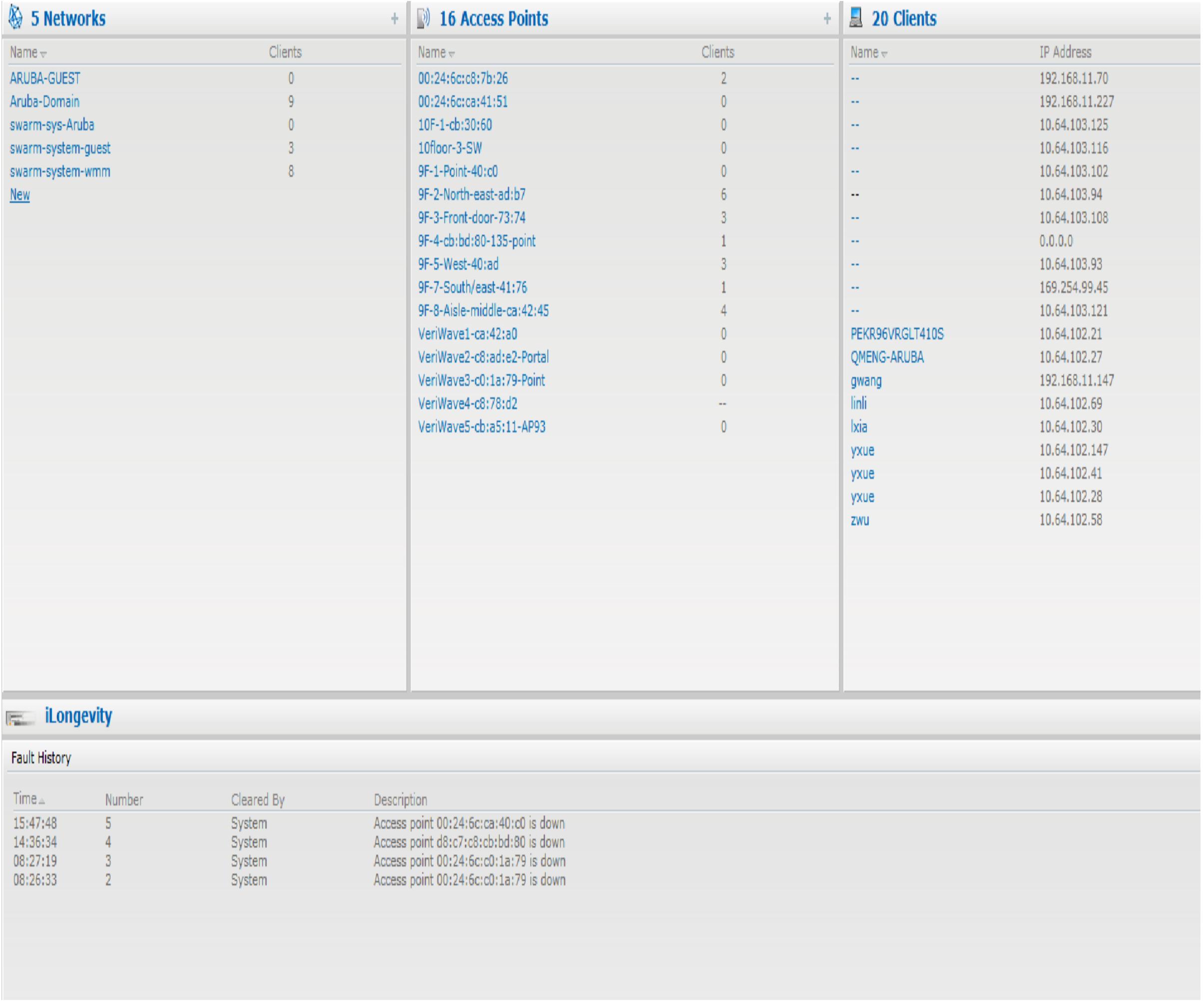
Timestamp	MAC Address	Description	Access Point	Details
15:48:27	40:5f:be:df:c5:ce	DHCP request timed out	9F-5-West-40:ad	more

Fault History

These alerts occur in the event of a system fault. A Fault History consists of the following fields:

- Time— Displays the system time when an event occurs.
- Number— Indicates the number of sequence.
- Cleared by— Displays the module which cleared this fault.
- Description— Displays the event details.

Figure 24 - *Fault History*



5 Networks

Name	Clients
ARUBA-GUEST	0
Aruba-Domain	9
swarm-sys-Aruba	0
swarm-system-guest	3
swarm-system-wmm	8
New	

16 Access Points

Name	Clients
00:24:6c:c8:7b:26	2
00:24:6c:ca:41:51	0
10F-1-cb:30:60	0
10floor-3-SW	0
9F-1-Point-40:c0	0
9F-2-North-east-ad:b7	6
9F-3-Front-door-73:74	3
9F-4-cb:bd:80-135-point	1
9F-5-West-40:ad	3
9F-7-South/east-41:76	1
9F-8-Aisle-middle-ca:42:45	4
VeriWave1-ca:42:a0	0
VeriWave2-c8:ad:e2-Portal	0
VeriWave3-c0:1a:79-Point	0
VeriWave4-c8:78:d2	--
VeriWave5-cb:a5:11-AP93	0

20 Clients

Name	IP Address
--	192.168.11.70
--	192.168.11.227
--	10.64.103.125
--	10.64.103.116
--	10.64.103.102
--	10.64.103.94
--	10.64.103.108
--	0.0.0.0
--	10.64.103.93
--	169.254.99.45
--	10.64.103.121
PEKR96VRGLT410S	10.64.102.21
QMENG-ARUBA	10.64.102.27
gwang	192.168.11.147
linli	10.64.102.69
lxia	10.64.102.30
yxue	10.64.102.147
yxue	10.64.102.41
yxue	10.64.102.28
zwu	10.64.102.58

iLongevity

Fault History

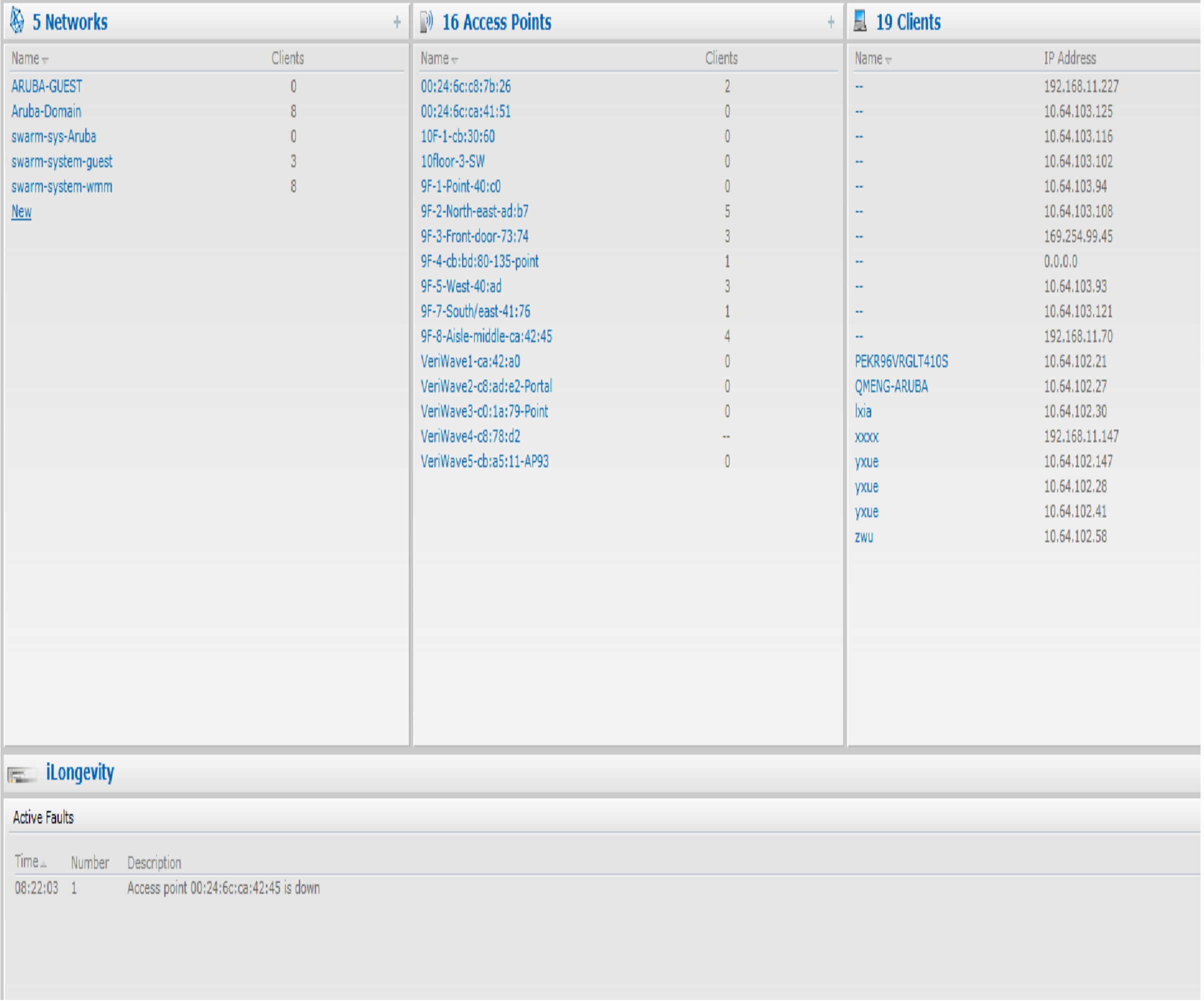
Time	Number	Cleared By	Description
15:47:48	5	System	Access point 00:24:6c:ca:40:c0 is down
14:36:34	4	System	Access point d8:c7:c8:cb:bd:80 is down
08:27:19	3	System	Access point 00:24:6c:c0:1a:79 is down
08:26:33	2	System	Access point 00:24:6c:c0:1a:79 is down

Active Faults

These alerts occur in the event of a system fault. An Active Fault consists of the following fields:

- Time— Displays the system time when an event occurs.
- Number— Indicates the number of sequence.
- Description— Displays the event details.

Figure 25 - *Active Faults*



5 Networks

Name	Clients
ARUBA-GUEST	0
Aruba-Domain	8
swarm-sys-Aruba	0
swarm-system-guest	3
swarm-system-wmm	8
New	

16 Access Points

Name	Clients
00:24:6c:c8:7b:26	2
00:24:6c:ca:41:51	0
10F-1-cb:30:60	0
10floor-3-SW	0
9F-1-Point-40:c0	0
9F-2-North-east-ad:b7	5
9F-3-Front-door-73:74	3
9F-4-cb:bd:80-135-point	1
9F-5-West-40:ad	3
9F-7-South/east-41:76	1
9F-8-Aisle-middle-ca:42:45	4
VeriWave1-ca:42:a0	0
VeriWave2-c8:ad:e2-Portal	0
VeriWave3-c0:1a:79-Point	0
VeriWave4-c8:78:d2	--
VeriWave5-cb:a5:11-AP93	0

19 Clients

Name	IP Address
--	192.168.11.227
--	10.64.103.125
--	10.64.103.116
--	10.64.103.102
--	10.64.103.94
--	10.64.103.108
--	169.254.99.45
--	0.0.0.0
--	10.64.103.93
--	10.64.103.121
--	192.168.11.70
PEKR96VRGLT410S	10.64.102.21
QMENG-ARUBA	10.64.102.27
lxia	10.64.102.30
xxxx	192.168.11.147
yxue	10.64.102.147
yxue	10.64.102.28
yxue	10.64.102.41
zwu	10.64.102.58

iLongevity

Active Faults

Time	Number	Description
08:22:03	1	Access point 00:24:6c:ca:42:45 is down

For more information about alerts, see Alert Types and Management on page 291.

IDS

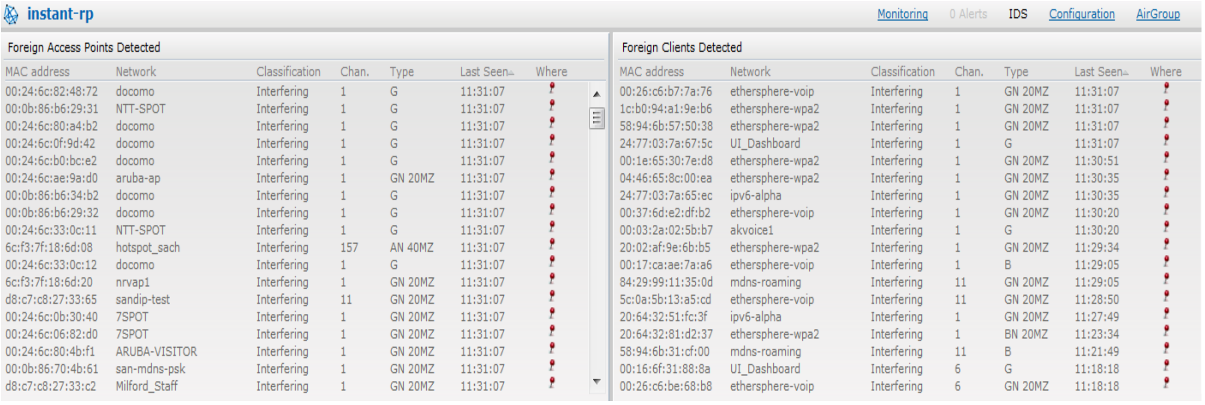
This link displays a list of foreign APs and foreign clients that are detected in the network. It consists of the following sections:

- Foreign Access Points Detected— Lists the APs that are not controlled by the Virtual Controller. The following information is displayed for each foreign AP:
  - MAC address— Displays the MAC address of the foreign AP.
  - Network— Displays the name of the network to which the foreign AP is connected.
  - Classification— Displays the classification of the foreign AP: Interfering OAW-IAP or Rogue OAW-IAP.
  - Channel— Displays the channel in which the foreign AP is operating.
  - Type— Displays the Wi-Fi type of the foreign AP.
  - Last seen— Displays the time when the foreign AP was last detected in the network.
  - Where— Provides information about the OAW-IAP that detected the foreign AP. Click the pushpin icon to view the information.
- Foreign Clients Detected— Lists the clients that are not controlled by the Virtual Controller. The following information is displayed for each foreign client:
  - MAC address— Displays the MAC address of the foreign client.
  - Network— Displays the name of the network to which the foreign client is connected.

- Classification— Displays the classification of the foreign client: Interfering client.
- Channel— Displays the channel in which the foreign client is operating.
- Type— Displays the Wi-Fi type of the foreign client.
- Last seen— Displays the time when the foreign client was last detected in the network.
- Where— Provides information about the OAW-IAP that detected the foreign client. Click the pushpin icon to view the information.

For more information on the intrusion detection feature, see Intrusion Detection System on page 213.

Figure 26 - *Intrusion Detection on Instant UI*



Foreign Access Points Detected

MAC address	Network	Classification	Chan.	Type	Last Seen	Where
00:24:6c:82:48:72	docomo	Interfering	1	G	11:31:07	📍
00:0b:86:b6:29:31	NTT-SPOT	Interfering	1	G	11:31:07	📍
00:24:6c:80:a4:b2	docomo	Interfering	1	G	11:31:07	📍
00:24:6c:0f:9d:42	docomo	Interfering	1	G	11:31:07	📍
00:24:6c:b0:bc:e2	docomo	Interfering	1	G	11:31:07	📍
00:24:6c:ae:9a:d0	aruba-ap	Interfering	1	GN 20MZ	11:31:07	📍
00:0b:86:b6:34:b2	docomo	Interfering	1	G	11:31:07	📍
00:0b:86:b6:29:32	docomo	Interfering	1	G	11:31:07	📍
00:24:6c:33:0c:11	NTT-SPOT	Interfering	1	G	11:31:07	📍
6c:f3:7f:18:6d:08	hotspot_sach	Interfering	157	AN 40MZ	11:31:07	📍
00:24:6c:33:0c:12	docomo	Interfering	1	G	11:31:07	📍
6c:f3:7f:18:6d:20	nrvap1	Interfering	1	GN 20MZ	11:31:07	📍
d8:c7:c8:27:33:65	sandip-test	Interfering	11	GN 20MZ	11:31:07	📍
00:24:6c:0b:30:40	7SPOT	Interfering	1	GN 20MZ	11:31:07	📍
00:24:6c:06:82:d0	7SPOT	Interfering	1	GN 20MZ	11:31:07	📍
00:24:6c:80:4b:f1	ARUBA-VISITOR	Interfering	1	GN 20MZ	11:31:07	📍
00:0b:86:70:4b:61	san-mdns-psk	Interfering	1	GN 20MZ	11:31:07	📍
d8:c7:c8:27:33:c2	Milford_Staff	Interfering	1	GN 20MZ	11:31:07	📍

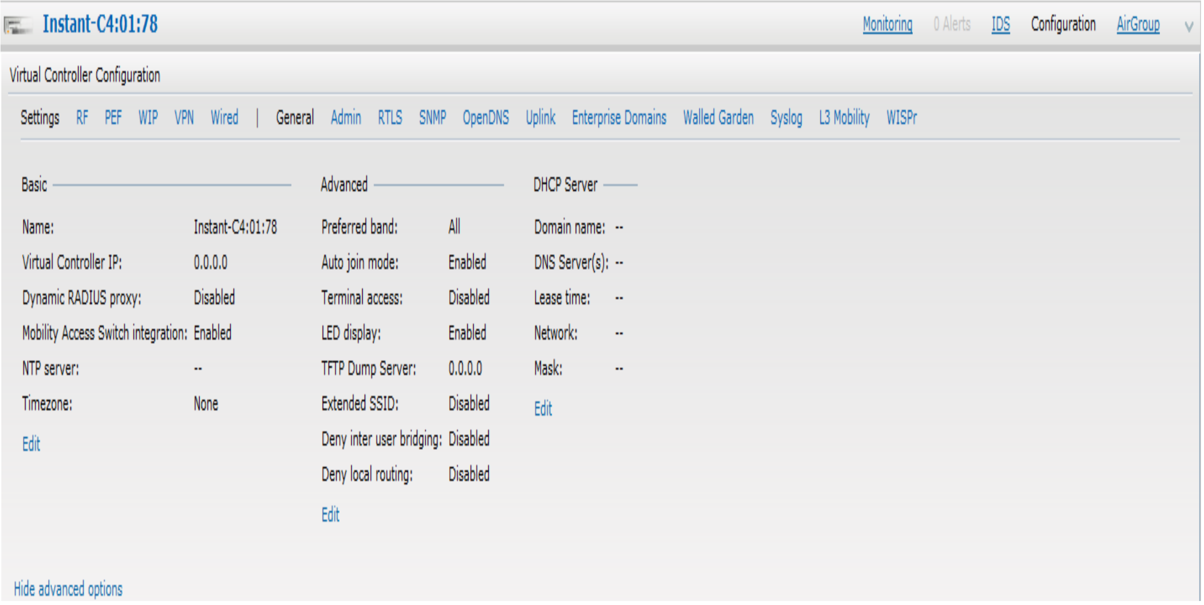
Foreign Clients Detected

MAC address	Network	Classification	Chan.	Type	Last Seen	Where
00:26:c6:b7:7a:76	ethersphere-voip	Interfering	1	GN 20MZ	11:31:07	📍
1c:b0:94:a1:9e:b6	ethersphere-wpa2	Interfering	1	GN 20MZ	11:31:07	📍
58:94:6b:57:50:38	ethersphere-wpa2	Interfering	1	GN 20MZ	11:31:07	📍
24:77:03:7a:67:5c	UI_Dashboard	Interfering	1	G	11:31:07	📍
00:1e:65:30:7e:d8	ethersphere-wpa2	Interfering	1	GN 20MZ	11:30:51	📍
04:46:65:8c:00:ea	ethersphere-wpa2	Interfering	1	GN 20MZ	11:30:35	📍
24:77:03:7a:65:ec	ipv6-alpha	Interfering	1	GN 20MZ	11:30:35	📍
00:37:6d:e2:df:b2	ethersphere-voip	Interfering	1	GN 20MZ	11:30:20	📍
00:03:2a:02:5b:b7	akvoice1	Interfering	1	G	11:30:20	📍
20:02:af:9e:6b:b5	ethersphere-wpa2	Interfering	1	GN 20MZ	11:29:34	📍
00:17:ca:ae:7a:a6	ethersphere-voip	Interfering	1	B	11:29:05	📍
84:29:99:11:35:0d	mdns-roaming	Interfering	11	GN 20MZ	11:29:05	📍
5c:0a:5b:13:a5:cd	ethersphere-voip	Interfering	11	GN 20MZ	11:28:50	📍
20:64:32:51:fc:3f	ipv6-alpha	Interfering	1	GN 20MZ	11:27:49	📍
20:64:32:81:d2:37	ethersphere-wpa2	Interfering	1	BN 20MZ	11:23:34	📍
58:94:6b:31:cf:00	mdns-roaming	Interfering	11	B	11:21:49	📍
00:16:6f:31:88:8a	UI_Dashboard	Interfering	6	G	11:18:18	📍
00:26:c6:be:68:b8	ethersphere-voip	Interfering	6	GN 20MZ	11:18:18	📍

Configuration

This link provides an overall view of your Virtual Controller configuration. Click on each of the features to view or edit the settings.

Figure 27 - *Configuration Link*



Basic

Name:	Instant-C4:01:78
Virtual Controller IP:	0.0.0.0
Dynamic RADIUS proxy:	Disabled
Mobility Access Switch integration:	Enabled
NTP server:	--
Timezone:	None

Advanced

Preferred band:	All
Auto join mode:	Enabled
Terminal access:	Disabled
LED display:	Enabled
TFTP Dump Server:	0.0.0.0
Extended SSID:	Disabled
Deny inter user bridging:	Disabled
Deny local routing:	Disabled

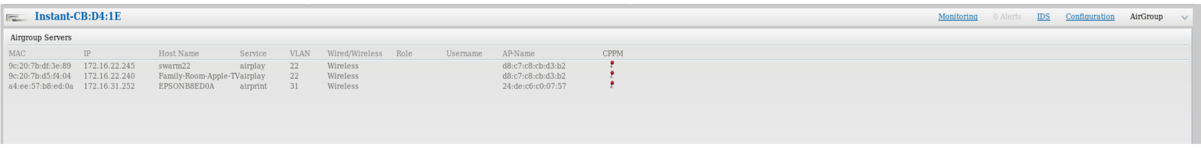
DHCP Server

Domain name:	--
DNS Server(s):	--
Lease time:	--
Network:	--
Mask:	--

AirGroup

This link provides an overall view of your AirGroup™ configuration. Click on each of the features to view or edit the settings.

Figure 28 - *AirGroup Link*



Airgroup Servers

MAC	IP	Host Name	Service	VLAN	Wired/Wireless	Role	Username	AP-Name	CPPM
9c:20:7b:df:3e:89	172.16.22.245	swarm22	airplay	22	Wireless			d8:c7:c8:cb:d3:b2	📍
9c:20:7b:d5:f4:04	172.16.22.240	Family-Room-Apple-TV	airplay	22	Wireless			d8:c7:c8:cb:d3:b2	📍
a4:ee:57:b8:ed:0a	172.16.31.252	EPSONB8ED0A	airprint	31	Wireless			24:de:c6:c0:07:57	📍

- **MAC** — Displays the MAC address of the Airgroup servers.
- **IP** — Displays the IP address of the Airgroup servers.
- **Host Name** — Displays the machine name or hostname of the Airgroup servers.
- **Service**— Displays the type of the services such as AirPlay or AirPrint.
- **Wired/Wireless** — Displays if the AirGroup server is connected via wired or wireless interface.
- **Role** — Indicates the role assigned to the specified AirGroup server. Normally it is the SSID name, in case of a wireless client.
- **Username** — If the server is connected using 802.1X, this field displays the user name. If the server is connected via PSK or open auth, this field will be blank.
- **AP-NAME**— Displays the MAC address of the IAP where the server is connected.
- **Update no/hash**— This is used for debugging issues. Use this to identify the internal database of airgroup.
- **CPPM**— By clicking on this, you get details of the registered rules in ClearPass Policy Manager (CPPM) for this server.
- **MDNS Cache**— By clicking on this, you receive MDNS record details of a particular server.

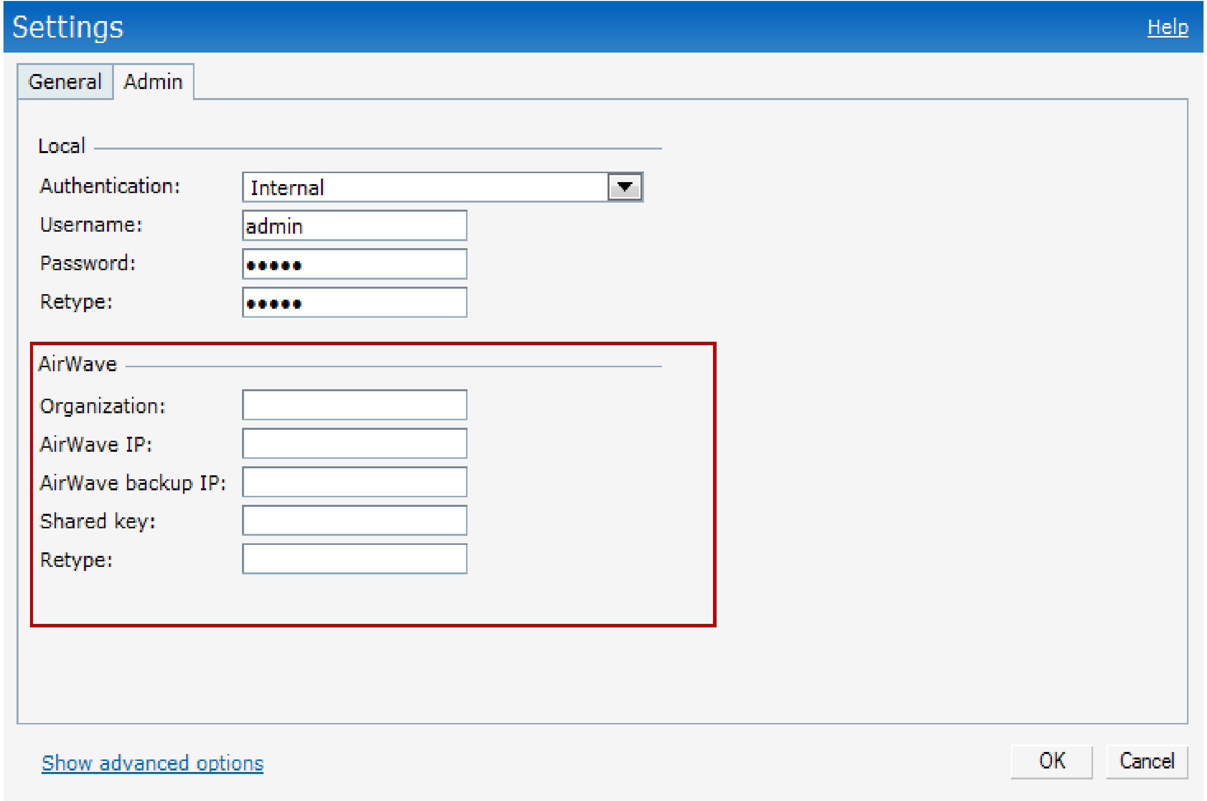
Language

The language links are provided in the login screen to allow users to select the preferred language before logging in to the Instant UI. In addition, this link is also located at the bottom left corner of the Instant UI. A default language is selected based on the language preferences in the client desktop operating system or browser. If Alcatel-Lucent Instant cannot detect the language, then English (En) is used as the default language.

OmniVista Setup

OmniVista is a solution for managing rapidly changing wireless networks. When enabled, OmniVista allows you to manage the Instant network. For more information on OmniVista, see OmniVista Integration and Management on page 241. The OmniVista status is displayed on the right side of the language links in the Instant UI. If the OmniVista status is **Not Set Up**, click the **Set Up Now** link to set up the OmniVista. The Settings window appears with **Admin** tab selected. For information to configure OmniVista, see Configuring OmniVista on page 243.

Figure 29 - *OmniVista Setup Link – OmniVista Configuration*


Settings

Help

General | Admin

Local

Authentication: Internal

Username: admin

Password: •••••

Retype: •••••

AirWave

Organization:

AirWave IP:

AirWave backup IP:

Shared key:

Retype:

Show advanced options

OK | Cancel

Pause/Resume

The **Pause/Resume** link is located at the bottom right corner of the Instant UI. The Instant UI is automatically refreshed after every 15 seconds by default.

Click the **Pause** link to pause the automatic refreshing of the Instant UI. When the automatic Instant UI refreshing is paused, the **Pause** link changes to **Resume**. Click the **Resume** link to resume automatic refreshing.

The **Pause** link is useful when you want to analyze or monitor the network or a network element and therefore do not want the user interface to refresh. Automatic refreshing allows you to get the latest information about the network and network elements.

Views

Depending on the link or tab that is clicked, the Instant UI displays information about the Virtual Controller, Wi-Fi networks, OAW-IAPs, or the clients in the Info section. The views on the Instant UI are classified as follows:

- Virtual Controller view— The Virtual Controller view is the default view. This view allows you to monitor the Alcatel-Lucent Instant network.
- Network view— The Network view provides information that is necessary to monitor a selected wireless network. All Wi-Fi networks in the Alcatel-Lucent Instant network are listed in the **Networks** tab. Click the name of the network that you want to monitor. Network view for the selected network appears.
- Instant Access Point view— The Instant Access Point view provides information that is necessary to monitor a selected OAW-IAP. All OAW-IAPs in the Alcatel-Lucent Instant network are listed in the **Access Points** tab. Click the name of the OAW-IAP that you want to monitor. Access Point view for that OAW-IAP appears.

- Client view— The Client view provides information that is necessary to monitor a selected client. In the Client view, all the clients in the Alcatel-Lucent Instant network are listed in the **Clients** tab. Click the IP address of the client that you want to monitor. Client view for that client appears.

For more information on the graphs and the views, see Monitoring on page 269.

In a Wireless LAN (WLAN), laptops, desktops, PDAs, and other computer peripherals are connected to each other without any network cables. These network elements or clients use radio signals to communicate with each other. Wireless networks are set up based on the IEEE 802.11 standards. The IEEE 802.11 is a set of standards that are categorized based on the radio wave frequency and the data transfer rate. For more information about the IEEE 802.11 standards, see Table 4.

Table 4 - *IEEE 802.11 Standards*

IEEE Network Standard	Frequency Used (in GHz)	Maximum Data Transfer Rate (in Mbps)
802.11a	5.0	54
802.11b	2.4	11
802.11g	2.4	54
802.11n	2.4 or 5.0	300

During start up, a wireless client searches for radio signals or beacon frames that originate from the nearest OAW-IAP. After locating the OAW-IAP, the following transactions take place between the client and the OAW-IAP:

1. Authentication— The OAW-IAP communicates with a RADIUS server to validate or authenticate the client.
2. Connection— After successful authentication, the client establishes a connection with the OAW-IAP.

Network Types

Alcatel-Lucent Instant wireless networks are categorized as:

- Employee Network on page 63
- Voice Network on page 74
- Guest Network on page 82

NOTE

When a client is associated to the Voice network, all data traffic is marked and placed into the high priority queue in QoS (Quality of Service). QoS refers to the capability of a network to provide better service to selected network traffic over various technologies.

Employee Network

An Employee network is a classic Wi-Fi network. This network type is supported with full customization on Alcatel-Lucent Instant. It is used by the employees in the organization.

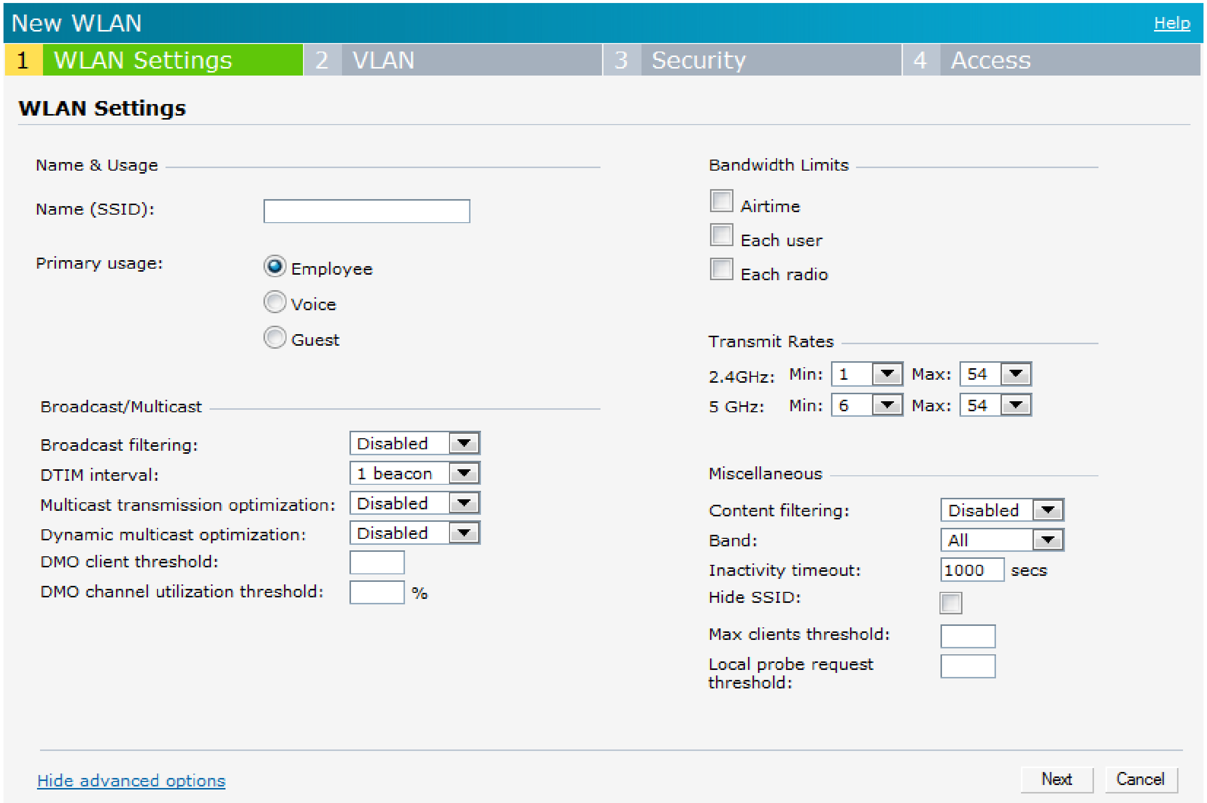
Passphrase based or 802.1X based authentication methods are supported on this network type. Employees can access the protected data of an enterprise through the employee network after successful authentication.

Adding an Employee Network

This section provides the procedure to add an employee network.

1. In the **Networks** tab, click the **New** link. The **New WLAN** window appears.

Figure 30 - *Adding an Employee Network — WLAN Settings Tab*



New WLAN

Help

1 WLAN Settings | 2 VLAN | 3 Security | 4 Access

WLAN Settings

Name & Usage

Name (SSID):

Primary usage: ● Employee ○ Voice ○ Guest

Broadcast/Multicast

Broadcast filtering: Disabled

DTIM interval: 1 beacon

Multicast transmission optimization: Disabled

Dynamic multicast optimization: Disabled

DMO client threshold:

DMO channel utilization threshold: %

Bandwidth Limits

□ Airtime

□ Each user

□ Each radio

Transmit Rates

2.4GHz: Min: 1 Max: 54

5 GHz: Min: 6 Max: 54

Miscellaneous

Content filtering: Disabled

Band: All

Inactivity timeout: 1000 secs

Hide SSID: □

Max clients threshold:

Local probe request threshold:

Hide advanced options

Next Cancel

2. In the **WLAN Settings** tab, perform the following steps:
   a. **Name (SSID)**— Enter a name that uniquely identifies a wireless network.
   b. **Primary usage—** Select **Employee** (this is selected by default) from the **Primary usage** options. This selection determines whether the network is primarily intended to be used for employee data, guest data, or voice traffic.
3. Click the **Show advanced options** link and perform the following steps.
   a. **Broadcast/Multicast**
      - **Broadcast filtering**— When set to **All**, the OAW-IAP drops all broadcast and multicast frames except for DHCP and ARP. When set to **ARP**, in addition to the above, the OAW-IAP converts ARP requests to unicast and send frames directly to the associated client. When **Disabled**, all broadcast and multicast traffic is forwarded.
      - **DTIM interval**— Indicates the DTIM (delivery traffic indication message) period in beacons. You can configure this option for every WLAN SSID profile. The default value is 1, which means the client checks for buffered data on the OAW-IAP at every beacon. You may choose to configure a larger DTIM value for power saving.
      - **Multicast transmission optimization—** When **Enabled**, the OAW-IAP chooses the optimal rate for sending broadcast and multicast frames based on the lowest of

unicast rates across all associated clients. The default values are 1 Mbps for 2.4 GHz and 6 Mbps for 5.0 GHz bands. Multicast traffic can be sent at up to 24 Mbps when this option is enabled. This option is disabled by default.

- **Dynamic multicast optimization—** When Enabled, the OAW-IAP converts multicast streams into unicast streams over the wireless link. DMO enhances the quality and reliability of streaming video, while preserving the bandwidth available to non-video clients.
- **DMO channel utilization threshold**— When dynamic multicast optimization is enabled, the OAW-IAP converts multicast streams into unicast streams as long as the channel utilization does not exceed this threshold. The default value is 90 and the maximum threshold value is 100%.

If the threshold value exceeds the maximum value, then the OAW-IAP sends multicast traffic over the wireless link.

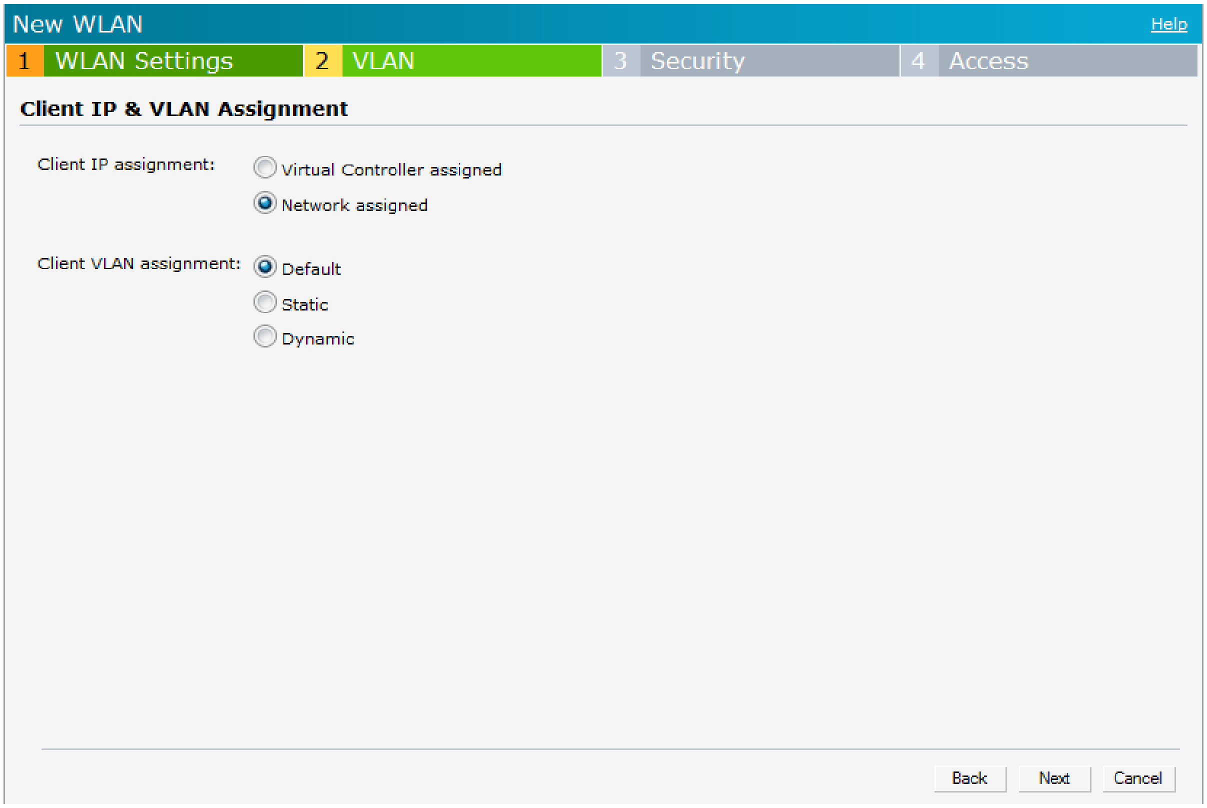
b. **Bandwidth Limits—** You can specify three types of bandwidth limits.
   - Airtime— Indicates the aggregate amount of airtime that all clients on this Network can use to send/receive data.
   - Each user— Indicates the throughput for any single user on this Network. The throughput value is specified in kbps.
   - Each radio— Indicates the aggregate amount of throughput each radio (some AP models have multiple radios) is allowed to provide for all clients connected to that radio

c. **Transmit Rates**— Indicates the ability to configure the basic and supported rates per SSID for Alcatel-Lucent Instant. Select to set the minimum and maximum legacy (non-802.11n) transmit rates for each band — 2.4 GHz and 5 GHz.

d. Miscellaneous
   - Content filtering— When enabled, all DNS requests to non-corporate domains on this wireless network are sent to OpenDNS.
   - Band**—** Set the band at which the network transmits radio signals. Available options are 2.4 GHz, 5 GHz and All. The All option is selected by default. It is also the recommended option.
   - Inactivity timeout**—** Indicates the time in seconds after which an idle client ages out. The minimum value is 60 seconds and the default value is 1000 seconds.
   - Hide SSID— Select this check box if you do not want the SSID (network name) to be visible to users.
   - Max clients threshold— Indicates the maximum number of clients that can be configured for each BSSID on a WLAN. The supported range is 0 - 255 and the default value is 64.
   - Local probe request threshold— Enter the threshold value below which incoming probe requests will get ignored. The supported range of RSSI (Received signal strength indication) values is 0-100 dB. When a client sends a broadcast probe request frame to search for all available SSIDs, this option controls whether or not the system responds for this SSID.

4. Click **Next** to continue.

Figure 31 - *Adding an Employee Network— VLAN Tab*



New WLAN

Client IP & VLAN Assignment

Client IP assignment: ○ Virtual Controller assigned ● Network assigned

Client VLAN assignment: ● Default ○ Static ○ Dynamic

5. Select the required Client IP assignment option — **Virtual Controller assigned** or **Network assigned**.

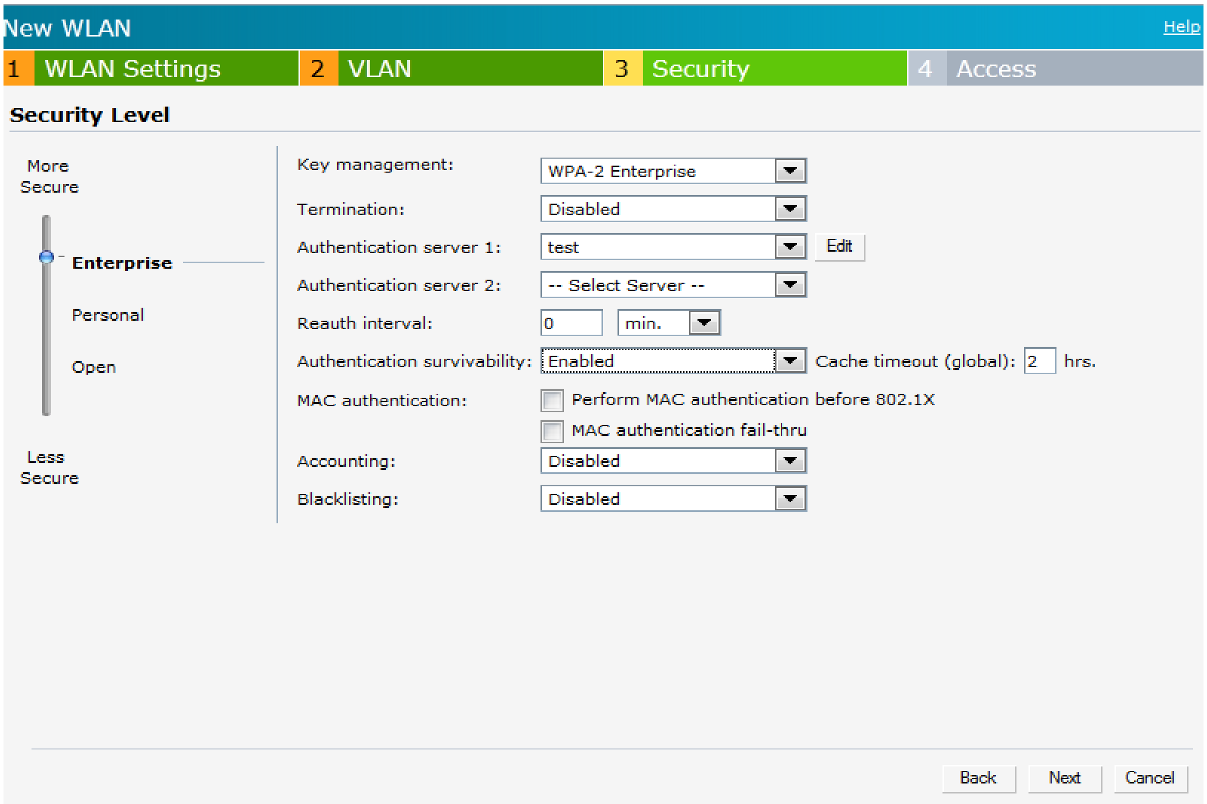
Table 5 - *Conditions for Client IP and VLAN assignment*

If you select	then
Virtual Controller assigned	The client gets the IP address from the Virtual Controller. The Virtual Controller creates a private subnet and VLAN on the OAW-IAP for the wireless clients. The Virtual Controller NATs all traffic that passes out of this interface. This setup eliminates the need for complex VLAN and IP address management for a multi site wireless network. See Virtual Controller on page 139 for configuring the DHCP server.
Network assigned	By default, the client VLAN is assigned to the native VLAN on the wired network. • Default— The client gets the IP address in the same subnet as the OAW-IAPs. • Static— Select to specify a single VLAN, a comma separated list of VLANS, or a range of VLANs for all clients on this network. • Dynamic— Select to create rules for per-user VLAN assignment. See VLAN

If you select	then
	Derivation Rule on page 185 for more information. **NOTE:** Select the **Static** option in the **Client VLAN assignment** section to configure VLAN pooling. See VLAN Pooling on page 92 for additional details.

6. Click **Next** to continue.
7. Set the appropriate security levels using the slider in the **Security** tab. The default level is **Personal.** The available options are **Enterprise, Personal,** and **Open** which are described in the following tables**.**

Figure 32 - *Employee Security Tab— Enterprise*



Key management: WPA-2 Enterprise

Termination: Disabled

Authentication server 1: test

Authentication server 2: -- Select Server --

Reauth interval: 0 min.

Authentication survivability: Enabled Cache timeout (global): 2 hrs.

MAC authentication: □ Perform MAC authentication before 802.1X

□ MAC authentication fail-thru

Accounting: Disabled

Blacklisting: Disabled

Table 6 - *Conditions for Adding an Employee Network— Security Tab*

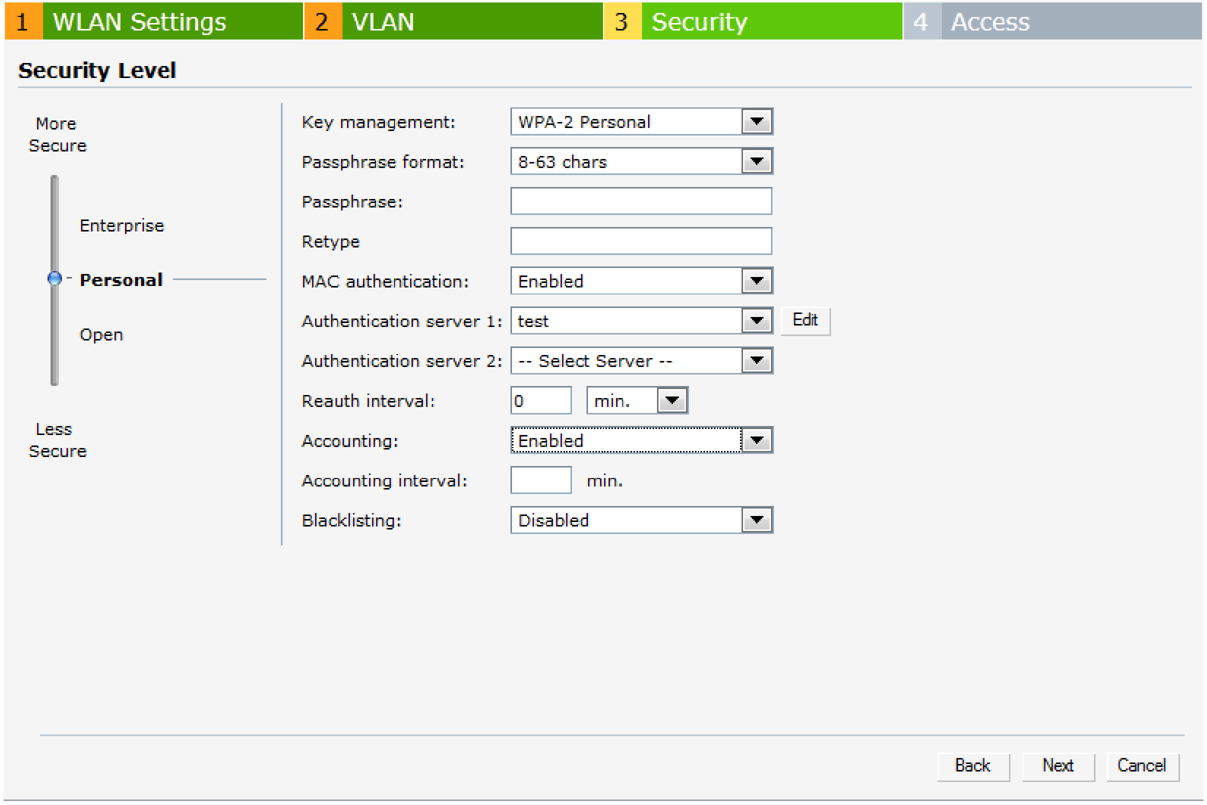
If	then,
You select the **Enterprise** security level	Perform the following steps: 1. Select the required key options from the **Key management** drop-down list. Available options are: • WPA-2 Enterprise • WPA Enterprise • Both (WPA-2 & WPA) • Dynamic WEP with 802.1X • **Use Session Key for LEAP—** Use

If	then,
	the **Session Key for LEAP** instead of using Session Key from the RADIUS Server to derive pair wise unicast keys. This is required for old printers that use dynamic WEP via LEAP authentication. This is **Disabled** by default. For more information on encryption and recommended encryption type, see Encryption on page 175. 2. **Termination**— Enable this option to terminate the EAP portion of 802.1X authentication on the OAW-IAP instead of the RADIUS server. For more information, see External RADIUS Server on page 142. 3. **Authentication server 1—** Select the required Authentication server option from the drop-down list. Available options are: - **New**— If you select this option, an external RADIUS server has to be configured to authenticate the users. For information on configuring an external RADIUS server, see Authentication on page 141. - **InternalServer**— If you select this option, users who are required to authenticate with the internal RADIUS server must be added. Click the **Users** link to add the users. For information on adding a user, see Adding a User on page 311. 4. **Reauth interval—** When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients. 5. **Blacklisting**— Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures. 6. **Authentication survivability**— This feature requires ClearPass Policy Manager (6.0.2 and above) and is visible in the UI only when you select **New** to configure an external RADIUS server for authentication. If you select your RADIUS server as an internal server, then this feature is not applicable. When enabled, this feature allows Instant to authenticate the previously connected clients using EAP-PEAP authentication even when connectivity to ClearPass Policy Manager is temporarily lost. **Cache timeout (global)**—Indicates the duration after which the authenticated credentials in the cache expire. When the cache expires, the clients are required to authenticate

If	then,
	again. The supported range is 1 - 99 hours and the default value is 24 hours. 7. **MAC authentication** — Indicates per-user authentication using MAC address. **Perform MAC authentication before 802.1X**—Indicates per-user authentication using MAC address. This feature is optional. **MAC authentication fail-thru**—When this option is enabled, if MAC authentication fails, 802.1X authentication will be attempted. When this option is disabled, if MAC authentication fails, no further authentication will be attempted. 8. Click **Upload Certificate** and browse to upload a certificate file for the internal server. See Certificates on page 170 for more information.
You want to use the default security level, **Personal**	Perform the following steps: 1. Select the required key options from the **Key management** drop-down list. Available options are: - WPA-2 Personal - WPA Personal - Both (WPA-2 & WPA) - Static WEP— If you have selected **Static WEP**, do the following: - Select appropriate **WEP key size** from the WEP key size drop-down list. Available options are 64-bit and 128-bit. - Select appropriate Tx key from the **Tx Key** drop-down list. Available options are **1**, **2**, **3**,and **4**. - Enter an appropriate **WEP key** and reconfirm. For more information on encryption and recommended encryption type, see Encryption on page 175. 2. WPA-2 Personal— - Select a passphrase format from the **Passphrase format** drop-down list. Available options are: - 8-63 alphanumeric chars - 64 hexadecimal chars 3. Enter a passphrase in the **Passphrase** text box and reconfirm. 4. Select the required option from the **MAC authentication** drop-down list. Available options are Enabled and Disabled. When **Enabled**, user must configure at least one RADIUS server for authentication server. See MAC

If	then,
	Authentication on page 165 for further details. 5. **Authentication server 1—** Select the required Authentication server option from the drop-down list. Available options are: ● **New**— If you select this option, an external RADIUS server has to be configured to authenticate the users. For information on configuring an external RADIUS server, see Authentication on page 141. 6. **Reauth interval—** When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients. 7. **Accounting —** When enabled, the Access Points posts accounting information as RADIUS START and RADIUS STOP accounting records to the RADIUS server. 8. **Accounting interval** — When set to a value greater than zero, the Access Point periodically posts accounting information as RADIUS INTERIM accounting records to the RADIUS server. 9. **Blacklisting**— Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures. 10.**Max authentication failures**— Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10. 11.**Internal server**— If you select this option, users who are required to authenticate with the internal RADIUS server must be added. Click the **Users** link to add the users.For information on adding a user, see Adding a User on page 311. **NOTE:** Navigate to **PEF > Blacklisting** in the Instant UI to specify the duration of the blacklisting on the Blacklisting tab of the PEF window. 12.Click **Upload Certificate** and browse to upload a certificate file for the internal server. See Certificates on page 170 for more information.

Figure 33 - *Employee Security Tab— Personal*



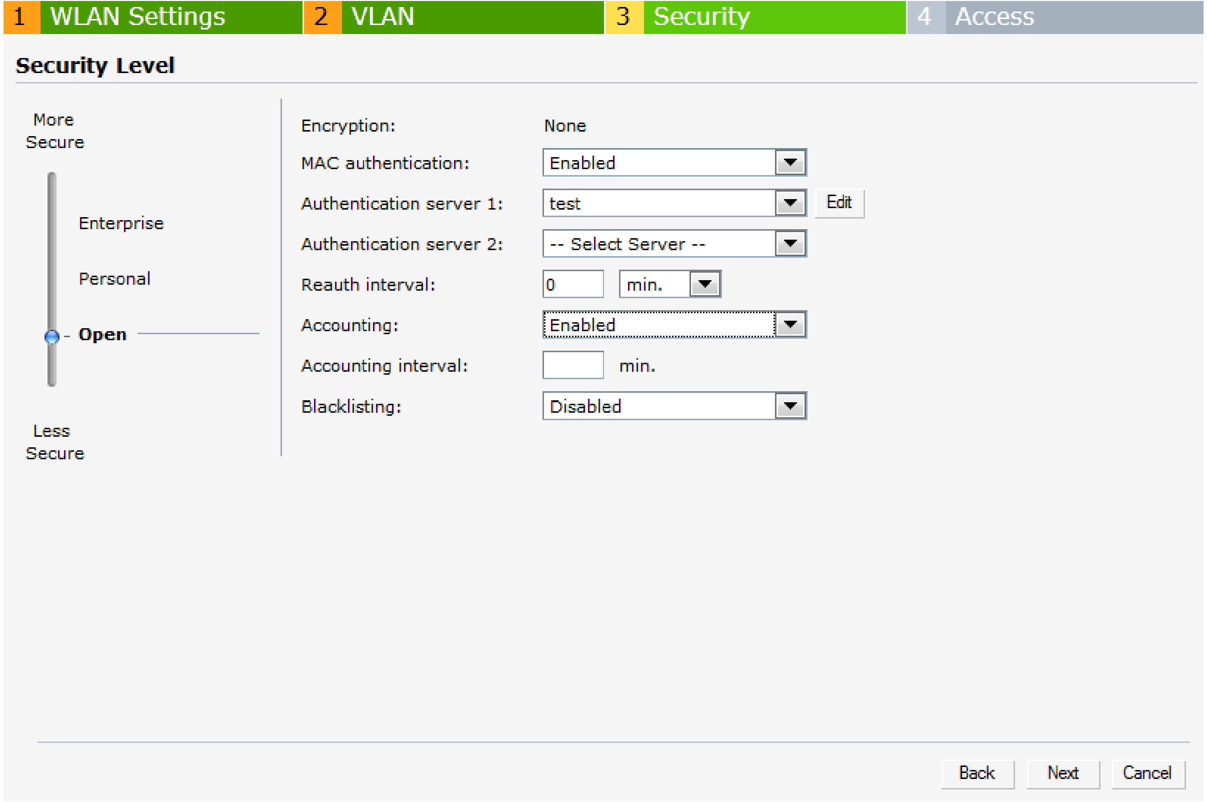
Key management:	WPA-2 Personal
Passphrase format:	8-63 chars
Passphrase:	
Retype	
MAC authentication:	Enabled
Authentication server 1:	test
Authentication server 2:	-- Select Server --
Reauth interval:	0 min.
Accounting:	Enabled
Accounting interval:	min.
Blacklisting:	Disabled

Table 7 - *Conditions for Adding an Employee Network— Security Tab*

If	then,
You select the **Open** security level	1. Select the required MAC authentication from the **MAC authentication** drop-down list. Available options are— Enabled and Disabled • When **Enabled**, user must configure at least one RADIUS server for authentication server. See MAC Authentication on page 165 for further details. 2. **Authentication server 1**— Select the required Authentication server option from the drop-down list. Available options are: • **New**— If you select this option, an external RADIUS server has to be configured to authenticate the users. For information on configuring an external RADIUS server, seeAuthentication on page 141. 3. **Reauth interval**— When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients. 4. **Accounting** — When enabled, the

If	then,
	Access Points posts accounting information as RADIUS START and RADIUS STOP accounting records to the RADIUS server. 5. **Accounting interval** — When set to a value greater than zero, the Access Point periodically posts accounting information as RADIUS INTERIM accounting records to the RADIUS server. 6. **Blacklisting**— Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures. 7. **Max authentication failures**— Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10. **NOTE:** Navigate to **PEF > Blacklisting** in the Instant UI to specify the duration of the blacklisting on the Blacklisting tab of the PEF window. 8. **Internal server**— If you select this option, users who are required to authenticate with the internal RADIUS server must be added. Click the **Users** link to add the users. For information on adding a user, seeAdding a User on page 311. 9. Click **Upload Certificate** and browse to upload a certificate file for the internal server. See Certificates on page 170 for more information.

Figure 34 - *Employee Security Tab— Open*



Encryption: None

MAC authentication: Enabled

Authentication server 1: test

Authentication server 2: -- Select Server --

Reauth interval: 0 min.

Accounting: Enabled

Accounting interval: min.

Blacklisting: Disabled

10. Click **Next** to continue.
11. Use the **Access Rules** page to specify optional access rules for this network.
12. **Network-based—** Set the slider to **Network-based** if you want the same rules to apply to all users. The **Allow any to all destinations** access rule is enabled by default. This rule allows traffic to all destinations. Instant Firewall treats packets based on the first rule matched. For more information, see Instant Firewall on page 191.

    To edit the default rule:

    a. Select the rule and then click **Edit**.

    b. Select appropriate options in the **Edit Rule** window and click **OK.**

    To define an access rule:

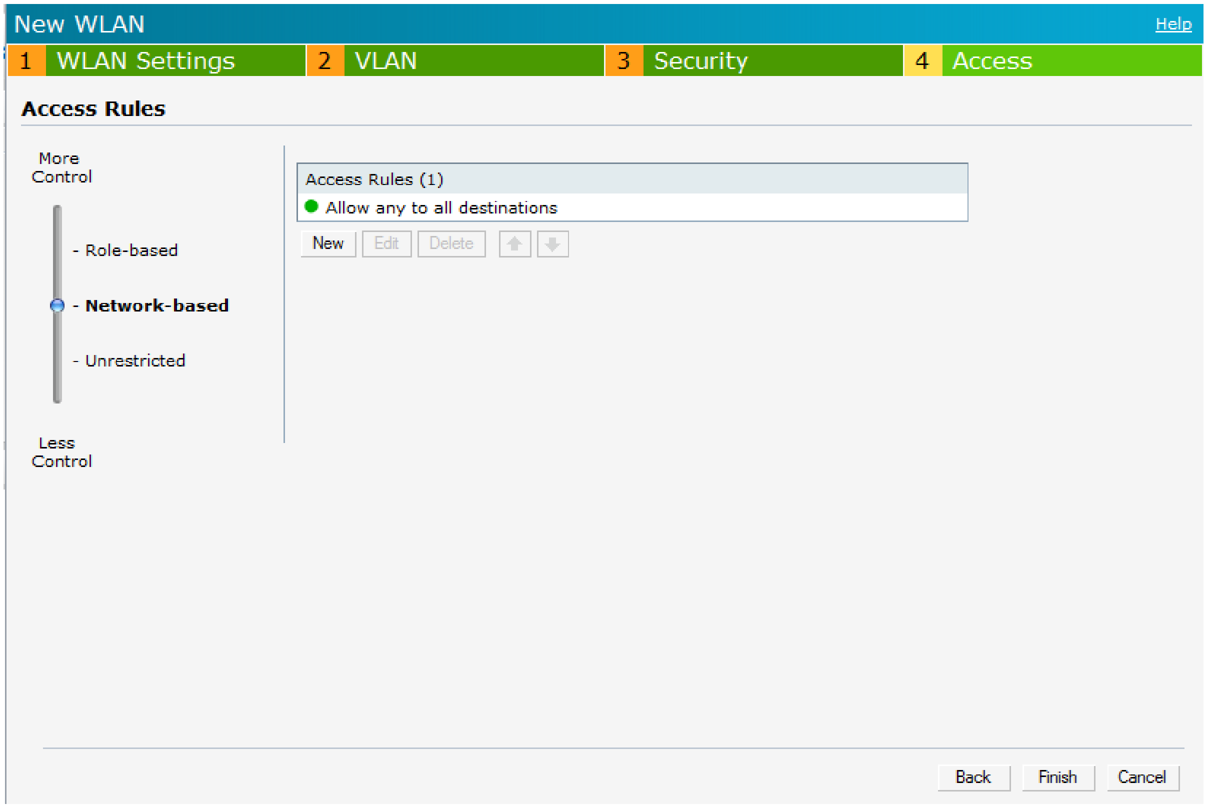
    a. Click **New**.

    b. Select appropriate options in the **New Rule** window.

    c. Click **OK.**

    1. **Role-based—** Select **Role-based** if you want to specify per-user access rules. See Creating a New User Role on page 177 for more information.
    2. **Unrestricted—** Select this to set no restrictions on access based on destination or type of traffic.
13. Click **Finish**. The network is added and listed in the **Networks** tab.

Figure 35 - *Adding an Employee Network— Access Rules Tab*



Access Rules (1)

● Allow any to all destinations

14. Click **Finish**. The network is added and listed in the **Networks** tab.

Voice Network

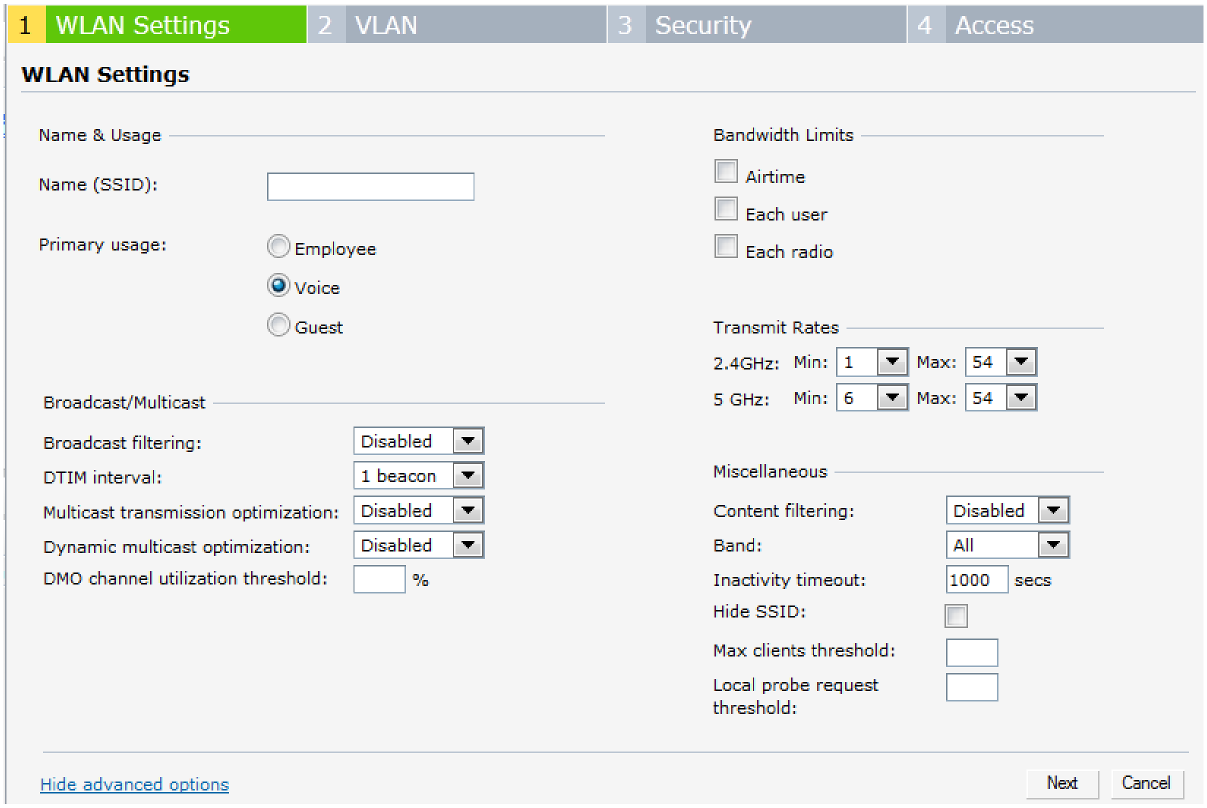
Use the Voice network type when you want devices that provide only voice services like handsets or only applications that require voice-like prioritization need connectivity.

Adding a Voice Network

This section provides the procedure to add a voice network.

1. In the **Networks** tab, click the **New** link. The **New WLAN** window appears.

Figure 36 - *Adding a Voice Network— WLAN Settings Tab*



WLAN Settings

Name & Usage

Name (SSID):

Primary usage: ○ Employee ● Voice ○ Guest

Broadcast/Multicast

Broadcast filtering: Disabled

DTIM interval: 1 beacon

Multicast transmission optimization: Disabled

Dynamic multicast optimization: Disabled

DMO channel utilization threshold: %

Bandwidth Limits

□ Airtime

□ Each user

□ Each radio

Transmit Rates

2.4GHz: Min: 1 Max: 54

5 GHz: Min: 6 Max: 54

Miscellaneous

Content filtering: Disabled

Band: All

Inactivity timeout: 1000 secs

Hide SSID: □

Max clients threshold:

Local probe request threshold:

2. In the **WLAN Settings** tab, perform the following steps:
   a. **Name (SSID)**— Enter a name that uniquely identifies a wireless network.
   b. **Primary usage—** Select **Voice** from the **Primary usage** options. This selection determines whether the network is primarily intended to be used for employee data, guest data, or voice traffic.
3. Click the **Show advanced options** link and perform the following steps.
   a. **Broadcast/Multicast**
      - **Broadcast filtering**— When set to **All**, the OAW-IAP drops all broadcast and multicast frames except for DHCP and ARP. When set to **ARP**, in addition to the above, the OAW-IAP converts ARP requests to unicast and send frames directly to the associated client. When **Disabled**, all broadcast and multicast traffic is forwarded.
      - **DTIM interval**— Indicates the DTIM (delivery traffic indication message) period in beacons. You can configure this option for every WLAN SSID profile. The default value is 1, which means the client checks for buffered data on the OAW-IAP at every beacon. You may choose to configure a larger DTIM value for power saving.
      - **Multicast transmission optimization—** When **Enabled**, the OAW-IAP chooses the optimal rate for sending broadcast and multicast frames based on the lowest of unicast rates across all associated clients. The default values are 1 Mbps for 2.4 GHz and 6 Mbps for 5.0 GHz bands. Multicast traffic can be sent at up to 24 Mbps when this option is enabled. This option is disabled by default.
      - **Dynamic multicast optimization—** When Enabled, the OAW-IAP converts multicast streams into unicast streams over the wireless link. DMO enhances the quality and

reliability of streaming video, while preserving the bandwidth available to non-video clients.

- **DMO channel utilization threshold**— When dynamic multicast optimization is enabled, the OAW-IAP converts multicast streams into multicast unicast streams as long as the channel utilization does not exceed this threshold. The default value is 90 and the maximum threshold value is 100%.

If the threshold value exceeds the maximum value, then the OAW-IAP sends multicast traffic over the wireless link.

b. **Bandwidth Limits—** You can specify three types of bandwidth limits.

- Airtime— Indicates the aggregate amount of airtime that all clients on this Network can use to send/receive data.
- Each user— Indicates the throughput for any single user on this Network. The throughput value is specified in kbps.
- Each radio— Indicates the aggregate amount of throughput each radio (some AP models have multiple radios) is allowed to provide for all clients connected to that radio

c. **Transmit Rates**— Indicates the ability to configure the basic and supported rates per SSID for Alcatel-Lucent Instant. Select to set the minimum and maximum legacy (non-802.11n) transmit rates for each band — 2.4 GHz and 5 GHz.

d. Miscellaneous

- Content filtering— When enabled, all DNS requests to non-corporate domains on this wireless network are sent to OpenDNS.
- Band**—** Set the band at which the network transmits radio signals. Available options are 2.4 GHz, 5 GHz and All. The All option is selected by default. It is also the recommended option.
- Inactivity timeout**—** Indicates the time in seconds after which an idle client ages out. The minimum value is 60 seconds and the default value is 1000 seconds.
- Hide SSID— Select this check box if you do not want the SSID (network name) to be visible to users.

NOTE

The Airtime Fairness and Bandwidth limits do not apply for voice traffic.

4. Click **Next** to continue.
5. Select the required Client IP assignment option— **Virtual Controller assigned** and **Network assigned**.

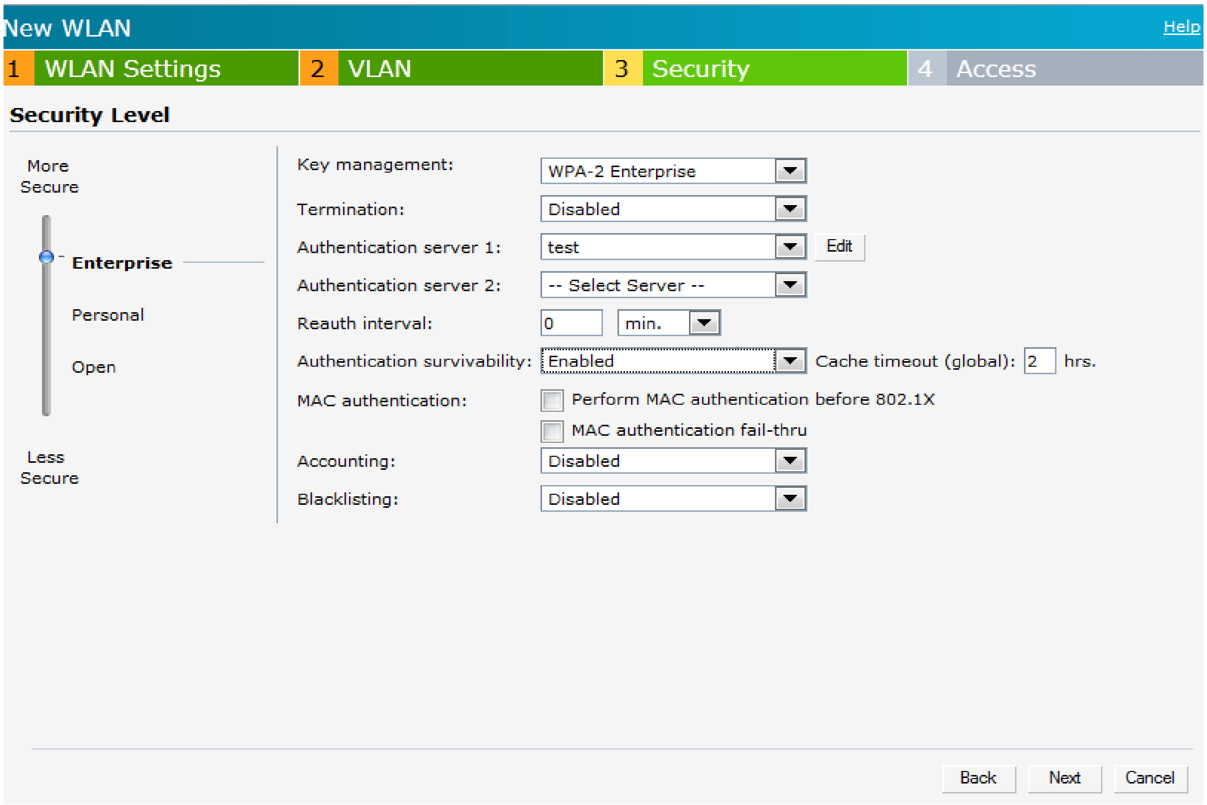
Table 8 - *Conditions for Client IP and VLAN Assignment*

If you select	then
Virtual Controller assigned	The client gets the IP address from the Virtual Controller. The Virtual Controller creates a private subnet and VLAN on the OAW-IAP for the wireless clients. The Virtual Controller NATs all traffic that passes out of this interface. This setup eliminates the need for complex VLAN and IP address management for a multi site wireless network. See Virtual

If you select	then
	Controller on page 139 for configuring the DHCP server.
Network assigned	By default, the client VLAN is assigned to the native VLAN on the wired network. • Default— The client gets the IP address in the same subnet as the OAW-IAPs. • Static— Select to specify a single VLAN, a comma separated list of VLANs, or a range of VLANs for all clients on this network. • Dynamic— Select to create rules for per-user VLAN assignment. See VLAN Derivation Rule on page 185 for more information. **NOTE:** Select the **Static** option in **Client VLAN assignment** section to configure VLAN pooling. See VLAN Pooling on page 92 for additional details.

6. Click **Next** to continue.
7. Slide and select the appropriate security levels in the **Security** tab. The default level is **Personal.** The available options are **Enterprise, Personal,** and **Open** which are described in the following tables**.**

Figure 37 - *Voice Security Tab— Enterprise*



Key management: WPA-2 Enterprise

Termination: Disabled

Authentication server 1: test

Authentication server 2: -- Select Server --

Reauth interval: 0 min.

Authentication survivability: Enabled Cache timeout (global): 2 hrs.

MAC authentication: □ Perform MAC authentication before 802.1X

□ MAC authentication fail-thru

Accounting: Disabled

Blacklisting: Disabled

Table 9 - *Conditions for Adding a Voice Network— Security Tab*

If	then,
You select the **Enterprise** security level	Perform the following steps: 1. Select the required key options from the **Key management** drop-down list. Available options are: - WPA-2 Enterprise - WPA Enterprise - Both (WPA-2 & WPA) - Dynamic WEP with 802.1X - **Use Session Key for LEAP:** Use the **Session Key for LEAP** instead of using Session Key from the RADIUS Server to derive pair wise unicast keys. This is required for old printers that use dynamic WEP via LEAP authentication. This is **Disabled** by default. For more information on encryption and recommended encryption type, see Encryption on page 175. 2. **Termination**— Enable this option to terminate the EAP portion of 802.1X authentication on the OAW-IAP instead of the RADIUS server. For more information, see External RADIUS Server on page 142. 3. **Authentication server 1 and 2—** Select the required Authentication server option from the drop-down list. Available options are: - **New**— If you select this option, then an external RADIUS server has to be configured to authenticate the users. For information on configuring an external RADIUS server, see Authentication on page 141. 4. **Reauth interval—** When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients. 5. **Blacklisting**— Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures. 6. **Max authentication failures**— Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10. **NOTE:** Navigate to **PEF > Blacklisting** in the Instant UI to specify the duration of the blacklisting on the Blacklisting tab of the PEF window.
You want to use the default security level, **Personal**	Perform the following steps: 1. Select the required key options from

If	then,
	the **Key management** drop-down list. Available options are: • WPA-2 Personal • WPA Personal • Both (WPA-2 & WPA) 2. **Static WEP**— If you have selected **Static WEP**, then do the following: • Select appropriate **WEP key size** from the WEP key size drop-down list. Available options are 64-bit and 128-bit. • Select appropriate Tx key from the **Tx Key** drop-down list. Available options are 1, 2, 3,and 4. • Enter an appropriate WEP key and reconfirm. For more information on encryption and recommended encryption type, see Encryption on page 175. 3. **WPA-2 Personal**— Select a passphrase format from the **Passphrase format** drop-down list. Available options are: • 8-63 alphanumeric chars • 64 hexadecimal chars 4. Enter a passphrase in the Passphrase text box and reconfirm. 5. Select the required option from the MAC authentication drop-down list. Available options are: Enabled and Disabled When **Enabled**, user must configure at least one RADIUS server for authentication server. See MAC Authentication on page 165 for further details. 6. **Authentication server 1—** Select the required Authentication server option from the drop-down list. Available options are: • **New**— If you select this option, then an external RADIUS server has to be configured to authenticate the users. For information on configuring an external RADIUS server, see Authentication on page 141. 7. **Reauth interval—** When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients. 8. **Accounting** — When enabled, the Access Points posts accounting information as RADIUS START and RADIUS STOP accounting records to the RADIUS server. 9. **Accounting interval** — When set to a value greater than zero, the Access Point periodically posts accounting

If	then,
	information as RADIUS INTERIM accounting records to the RADIUS server. 10.**Blacklisting**— Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures. 11.**Max authentication failures**— Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10. **NOTE:** Navigate to **PEF > Blacklisting** in the Instant UI to specify the duration of the blacklisting on the Blacklisting tab of the PEF window. 12.**InternalServer**— If you select this option, then users who are required to authenticate with the internal RADIUS server must be added. Click the **Users** link to add the users. For information on adding a user, see Adding a User on page 311. 13.Click **Upload Certificate** and browse to upload a certificate file for the internal server. See Certificates on page 170 for more information.
You select the **Open** security level	1. Select the required MAC authentication from the **MAC authentication** drop-down list. Available options are— Enabled and Disabled - When **Enabled**, user must configure at least one RADIUS server for authentication server. See MAC Authentication on page 165 for further details. 2. **Authentication server 1—** Select the required Authentication server option from the drop-down list. Available options are: - **New**— If you select this option, then an external RADIUS server has to be configured to authenticate the users. For information on configuring an external RADIUS server, see Authentication on page 141. 3. **Reauth interval—** When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients. 4. **Accounting** — When enabled, the Access Points posts accounting information as RADIUS START and RADIUS STOP accounting records to the RADIUS server. 5. **Accounting interval** — When set to a value greater than zero, the Access

If	then,
	Point periodically posts accounting information as RADIUS INTERIM accounting records to the RADIUS server. 6. **Blacklisting**— Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures. 7. **Max authentication failures**— Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10. **NOTE:** Navigate to **PEF > Blacklisting** in the Instant UI to specify the duration of the blacklisting on the Blacklisting tab of the PEF window. 8. **InternalServer**— If you select this option, then users who are required to authenticate with the internal RADIUS server must be added. Click the Users link to add the users. For information on adding a user, seeAdding a User on page 311. 9. Click **Upload Certificate** and browse to upload a certificate file for the internal server. See Certificates on page 170 for more information.

10. Click **Next** to continue.
11. Use the Access Rules page to specify optional access rules for this network.
    - **Network-based—** Set the slider to **Network-based** if you want the same rules to apply to all users. The **Allow any to all destinations** access rule is enabled by default. This rule allows traffic to all destinations. Instant Firewall treats packets based on the first rule matched. For more information, see Instant Firewall on page 191.

    To edit the default rule:

    a. Select the rule and then click **Edit**.

    b. Select appropriate options in the **Edit Rule** window and click **OK.**

    To define an access rule:

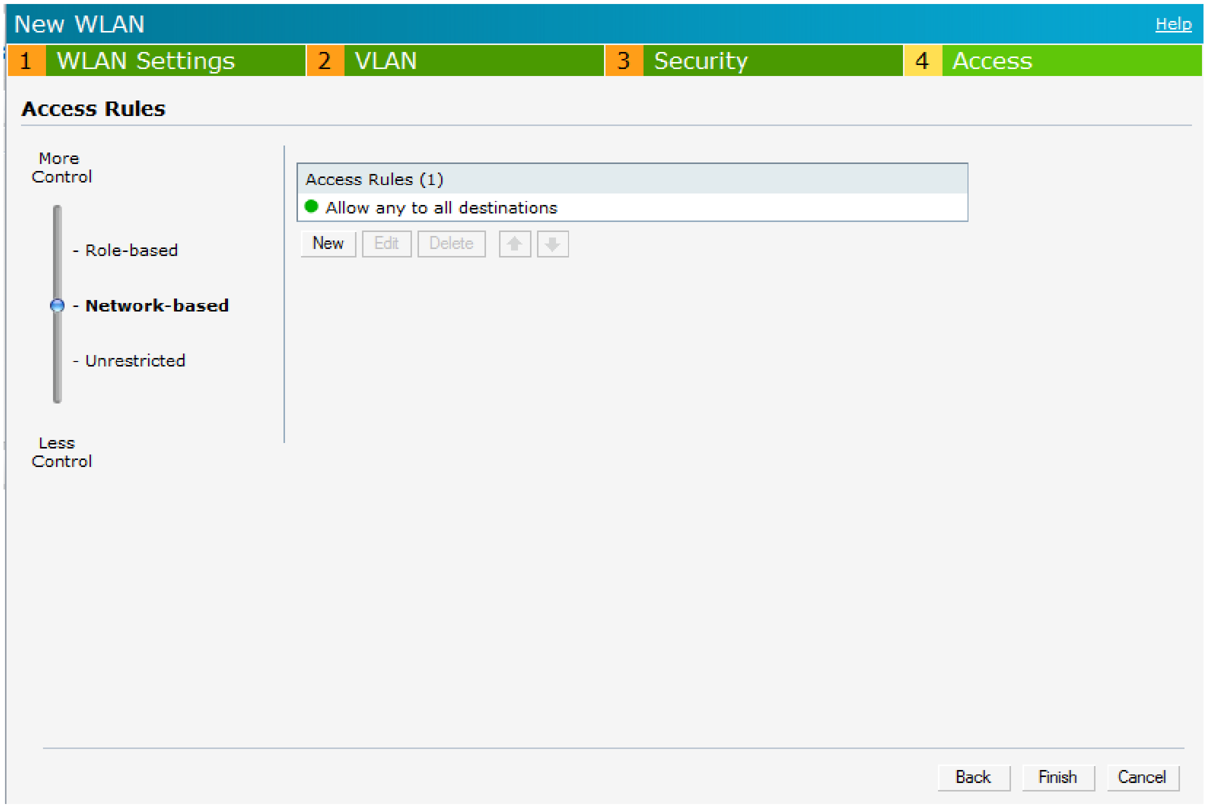
    a. Click **New**.

    b. Select appropriate options in the **New Rule** window.

    c. Click **OK.**

    - **Role-based—** Select **Role-based** if you want to specify per-user access rules. See Creating a New User Role on page 177 for more information.
    - **Unrestricted—** Select this to set no restrictions on access based on destination or type of traffic.

Figure 38 - *Adding a Voice Network— Access Rules Tab*



New WLAN

Access Rules

Access Rules (1)

● Allow any to all destinations

12. Click **Finish**. The network is added and listed in the **Networks** tab.

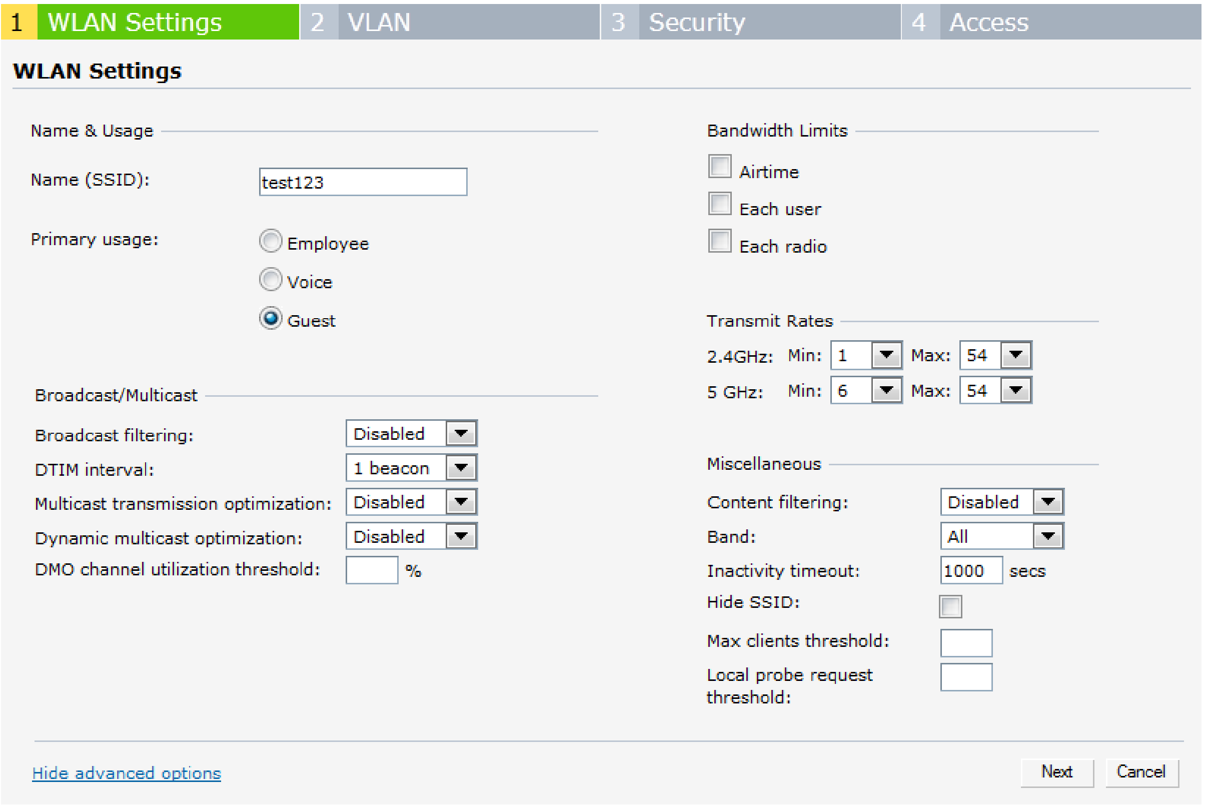
Guest Network

The Guest wireless network is created for guests, visitors, contractors, and any non-employee users who use the enterprise Wi-Fi network. The Virtual Controller assigns the IP address for the guest clients. Captive portal or passphrase based authentication methods can be set for this wireless network. Typically, a guest network is an un-encrypted network. However, you can specify encryption settings in the **Security** tab.

Adding a Guest Network

This section provides the procedure to add a guest network.

Figure 39 - *Adding a Guest Network— WLAN Settings Tab*



WLAN Settings

Name & Usage

Name (SSID): test123

Primary usage: ○ Employee ○ Voice ● Guest

Broadcast/Multicast

Broadcast filtering: Disabled

DTIM interval: 1 beacon

Multicast transmission optimization: Disabled

Dynamic multicast optimization: Disabled

DMO channel utilization threshold: %

Bandwidth Limits

□ Airtime

□ Each user

□ Each radio

Transmit Rates

2.4GHz: Min: 1 Max: 54

5 GHz: Min: 6 Max: 54

Miscellaneous

Content filtering: Disabled

Band: All

Inactivity timeout: 1000 secs

Hide SSID: □

Max clients threshold:

Local probe request threshold:

1. In the **Networks** tab, click the **New** link. The **WLAN Settings** window appears.
2. In the **WLAN Settings** tab, perform the following steps:
   a. **Name (SSID)**— Enter a name that uniquely identifies a wireless network.
   b. **Primary usage—** Select **Guest** from the **Primary usage** options. This selection determines whether the network is primarily intended to be used for employee data, guest data, or voice traffic.
3. Click the **Show advanced options** link and perform the following steps.
   a. **Broadcast/Multicast**
      - **Broadcast filtering**— When set to **All**, the OAW-IAP drops all broadcast and multicast frames except for DHCP and ARP. When set to **ARP**, in addition to the above, the OAW-IAP converts ARP requests to unicast and send frames directly to the associated client. When **Disabled**, all broadcast and multicast traffic is forwarded.
      - **DTIM interval**— Indicates the DTIM (delivery traffic indication message) period in beacons. You can configure this option for every WLAN SSID profile. The default value is 1, which means the client checks for buffered data on the OAW-IAP at every beacon. You may choose to configure a larger DTIM value for power saving.
      - **Multicast transmission optimization—** When **Enabled**, the OAW-IAP chooses the optimal rate for sending broadcast and multicast frames based on the lowest of unicast rates across all associated clients. The default values are 1 Mbps for 2.4 GHz and 6 Mbps for 5.0 GHz bands. Multicast traffic can be sent at up to 24 Mbps when this option is enabled. This option is disabled by default.
      - **Dynamic multicast optimization—** When **Enabled**, the OAW-IAP converts multicast streams into unicast streams over the wireless link. DMO enhances the

quality and reliability of streaming video, while preserving the bandwidth available to non-video clients.

- **DMO channel utilization threshold**— When dynamic multicast optimization is enabled, the OAW-IAP converts multicast streams into multicast unicast streams as long as the channel utilization does not exceed this threshold. The default value is 90 and the maximum threshold value is 100%.

If the threshold value exceeds the maximum value, then the OAW-IAP sends multicast traffic over the wireless link.

b. **Bandwidth Limits—** You can specify three types of bandwidth limits.

- Airtime— Indicates the aggregate amount of airtime that all clients on this Network can use to send/receive data.
- Each user— Indicates the throughput for any single user on this Network. The throughput value is specified in kbps.
- Each radio— Indicates the aggregate amount of throughput each radio (some AP models have multiple radios) is allowed to provide for all clients connected to that radio

c. Transmit Rates— Indicates the ability to configure the basic and supported rates per SSID for Alcatel-Lucent Instant. Select to set the minimum and maximum legacy (non-802.11n) transmit rates for each band — 2.4 GHz and 5 GHz.

d. Miscellaneous

- Content filtering— When enabled, all DNS requests to non-corporate domains on this wireless network are sent to OpenDNS.
- Band**—** Set the band at which the network transmits radio signals. Available options are 2.4 GHz, 5 GHz and All. The All option is selected by default. It is also the recommended option.
- Inactivity timeout**—** Indicates the time in seconds after which an idle client ages out. The minimum value is 60 seconds and the default value is 1000 seconds.
- Hide SSID— Select this check box to hide the SSID (network name).

4. Click **Next** to continue.
5. Select the required Client IP assignment option — **Virtual Controller assigned** or **Network assigned**.

Table 10 - *Conditions for Client IP and VLAN assignment*

If you select	then
Virtual Controller assigned	The client gets the IP address from the Virtual Controller. The Virtual Controller creates a private subnet and VLAN on the OAW-IAP for the wireless clients. The Virtual Controller NATs all traffic that passes out of this interface. This setup eliminates the need for complex VLAN and IP address management for a multi site wireless network. See Virtual Controller on page 139 for configuring the DHCP server.
Network assigned	By default, the client VLAN is assigned to the native VLAN on the wired network. • Default— The client gets the IP

If you select	then
	address in the same subnet as the OAW-IAPs. - Static— Select to specify a single VLAN, a comma separated list of VLANs, or a range of VLANs for all clients on this network. - Dynamic— Select to create rules for per-user VLAN assignment. See User VLAN Derivation on page 183 for more information. **NOTE:** Select the **Static** option in **Client VLAN assignment** section to configure VLAN pooling. See VLAN Pooling on page 92 for additional details.

6. Click **Next** to continue.
7. This tab allows you to configure the captive portal page and encryption for the Guest network. Select one of the following splash page type:

Table 11 - *Conditions for Adding a Guest Network— Security Tab*

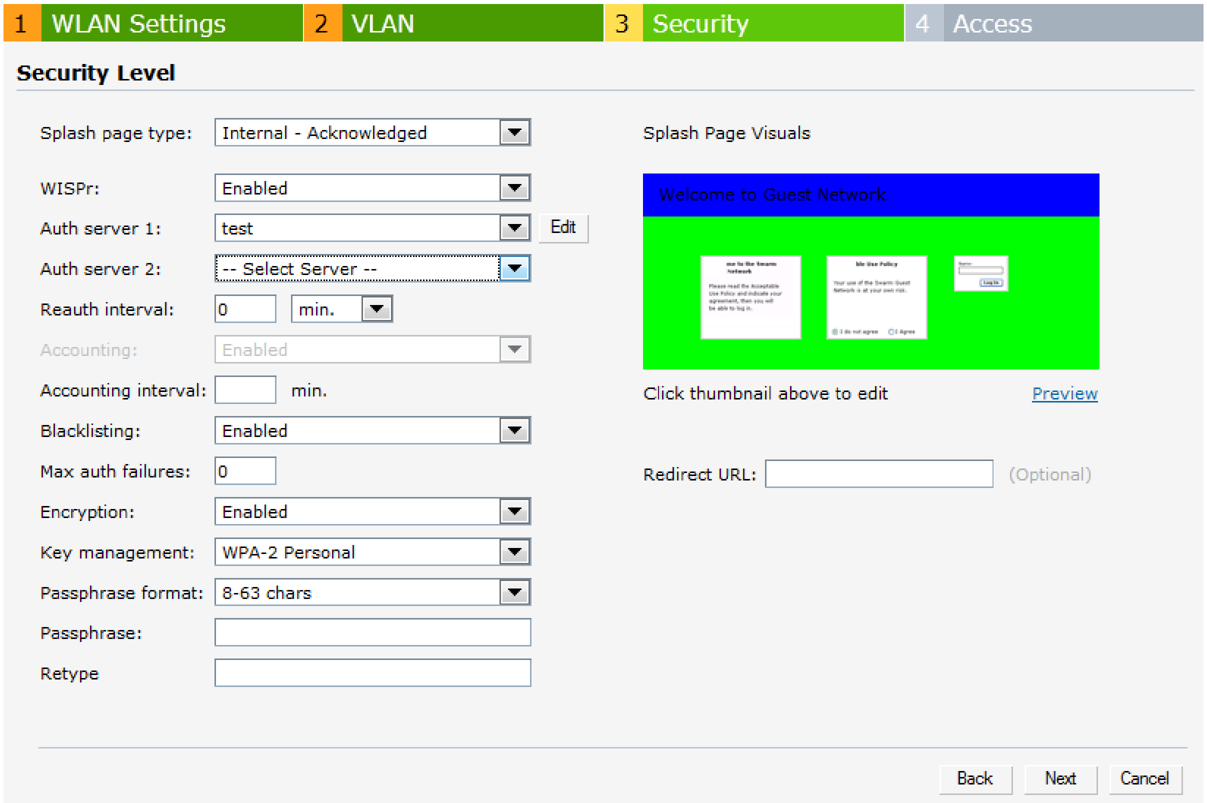
Splash Page Type	Description and steps to set up
Internal — Authenticated	The user has to accept the terms and conditions and enter a username and password on the captive portal page. If this option is selected, then add the users who are required to use the captive portal authentication to the user database. Click the Users link to add the users. For information about adding a user, see Adding a User on page 311. For information on customizing the splash page, see Customizing a Splash Page on page 155. 1. Select the required Authentication server 1 option from the drop-down list. Available options are: - **New** — If you select this option, then an external RADIUS server has to be configured to authenticate the users. For information on configuring an external RADIUS server, see Configuring an External RADIUS Server on page 143. - **Internal Server** — If you select this option, then users who are required to authenticate with the internal RADIUS server must be added. Click the **Users** link to add the users. For information on adding a user, see Adding a User on page 311. 2. **Reauth interval** — When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients. 3. **Blacklisting** — Select **Enabled** to enable blacklisting of the clients with a

Splash Page Type	Description and steps to set up
	specific number of authentication failures. 4. **Max authentication failures** — Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10. 5. **For Internal users** —Click **Users** to populate the system's internal authentication server with users. For information about adding a user, see Adding a User on page 311. 6. Click **Upload Certificate** and browse to upload a certificate file for the internal server. See Certificates on page 170 for more information. 7. **Redirect URL**— Users can be redirected to a specific URL (instead of the original URL) after successful captive portal authentication. This entry is optional.
Internal — Acknowledged	The user has to accept the terms and conditions for this splash page type. For information on customizing the splash page, see Customizing a Splash Page on page 155. 1. **Encryption** —Select Enabled from the Encryption drop-down list and perform the following steps (these steps are optional): a. Select the required key management option from the Key management drop-down list. Available options are: - WPA-2 Personal - WPA Personal - Both (WPA-2 & WPA) 2. **Passphrase format**— Specify either an alphanumeric or a hexadecimal string. Ensure that the hexadecimal string must be exactly 64 digits in length. 3. **Passphrase**— Enter a pre-shared key (PSK) passphrase.
External - RADIUS Server	An external server is used to display the splash page to the user. If this option is selected, then do the following: **External splash page** - **IP or hostname**— Enter the IP or hostname of the external server in the IP or hostname text box. - **URL**— Enter the URL of the captive portal page in the URL text box. - **Port**— Enter the number of the port to be used for communicating with the external server in the Port text box. 4. **Redirect URL**— By default, after

Splash Page Type	Description and steps to set up
	entering the requested info at the splash page, the user is redirected to the URL that was originally requested. Specify a redirect URL if you want to override the user's original request and redirect them to another URL. 5. **Auth server 1**— Select the required Authentication server 1 option from the drop-down list. Available options are: - **New**— If you select this option, then an external RADIUS server has to be configured to authenticate the users. For information on configuring an external RADIUS server, see Configuring an External RADIUS Server on page 143. 6. **Reauth interval**— When set to a value greater than zero, the Access Points periodically reauthenticates all associated and authenticated clients. 7. **Accounting** — When enabled, the Access Points posts accounting information as RADIUS START and RADIUS STOP accounting records to the RADIUS server. 8. **Accounting interval** — When set to a value greater than zero, the Access Point periodically posts accounting information as RADIUS INTERIM accounting records to the RADIUS server. 9. **Blacklisting**— Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures. 10.**Max authentication failures**— Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10. 11.**Walled Garden**— The walled garden directs the user’s navigation within particular areas to allow access to a selection of websites or prevent access to other websites. For more information, see Walled Garden Access on page 166.
External - Authentication Text	An external splash page returns a specified string to indicate successful authentication. - **IP or hostname**— Enter the IP or hostname of the external server in the IP or hostname text box. - **URL**— Enter the URL of the captive portal page in the URL text box. - **Port**— Enter the number of the port to be used for communicating with the external server in the Port text box.

Splash Page Type	Description and steps to set up
	- **Auth text** — Indicates the text string returned by the external server after a successful authentication. - **Redirect URL**— By default, after entering the requested info at the splash page, the user is redirected to the URL that was originally requested. Specify a redirect URL if you want to override the user's original request and redirect them to another URL. 1. **Reauth interval**— When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients. 2. **Blacklisting**— Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures. 3. **Max authentication failures**— Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10. 4. **Walled Garden**— The walled garden directs the user’s navigation within particular areas to allow access to a selection of websites or prevent access to other websites. For more information, see Walled Garden Access on page 166.
None	Select this option if you do not want to set the captive portal authentication.

Figure 40- *Adding a Guest Network — Splash Page Settings*



Security Level

Splash page type: Internal - Acknowledged

WISPr: Enabled

Auth server 1: test

Auth server 2: -- Select Server --

Reauth interval: 0 min.

Accounting: Enabled

Accounting interval: min.

Blacklisting: Enabled

Max auth failures: 0

Encryption: Enabled

Key management: WPA-2 Personal

Passphrase format: 8-63 chars

Passphrase:

Retype

Splash Page Visuals

Welcome to Guest Network

Click thumbnail above to edit Preview

Redirect URL: (Optional)

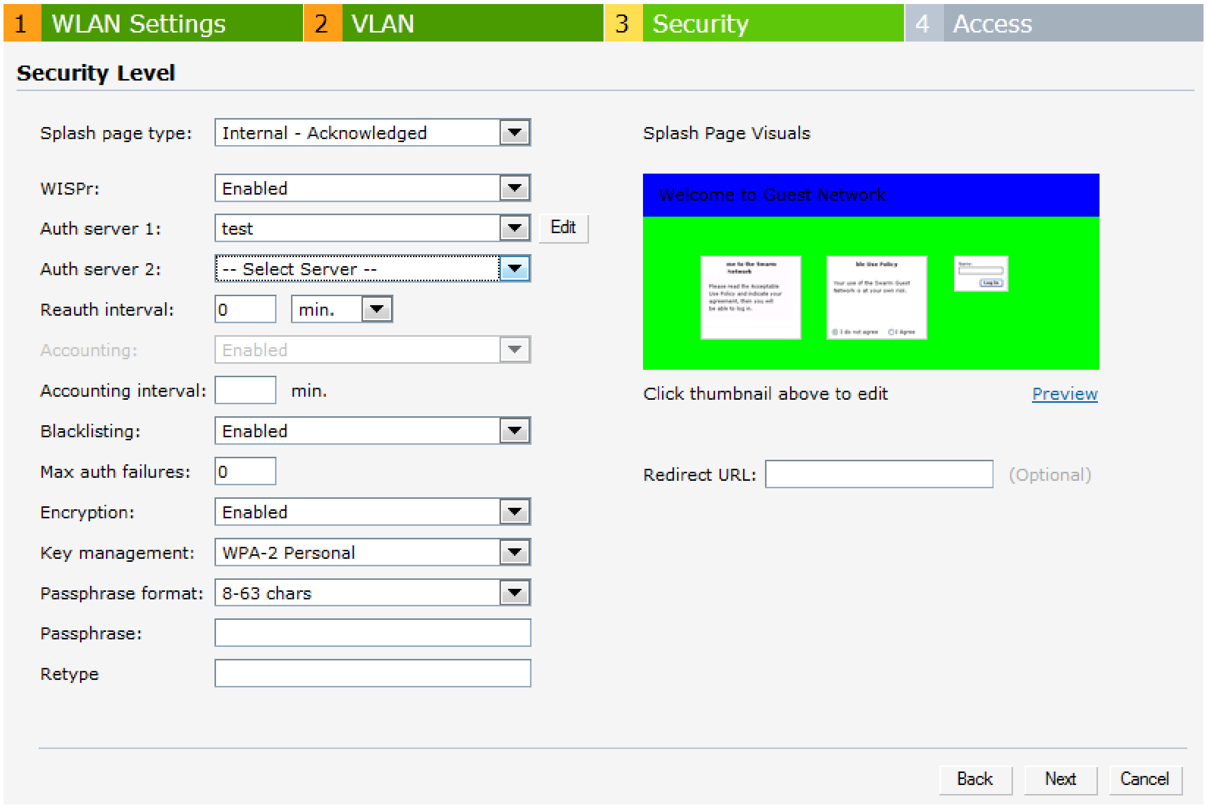
Select **Enabled** from the **Encryption** drop-down list and perform the following steps (these steps are optional):

a. Select the required key management option from the **Key management** drop-down list. Available options are:
   - WPA-2 Personal
   - WPA Personal
   - Both (WPA-2 & WPA)

b. **Passphrase format** — Specify either an alphanumeric or a hexadecimal string. Ensure that the hexadecimal string must be exactly 64 digits in length.

c. **Passphrase** — Enter a pre-shared key (PSK) passphrase.

Figure 41 - *Configuring a Splash Page — Encryption Settings*



Security Level

Splash page type: Internal - Acknowledged

WISPr: Enabled

Auth server 1: test

Auth server 2: -- Select Server --

Reauth interval: 0 min.

Accounting: Enabled

Accounting interval: min.

Blacklisting: Enabled

Max auth failures: 0

Encryption: Enabled

Key management: WPA-2 Personal

Passphrase format: 8-63 chars

Passphrase:

Retype

Splash Page Visuals

Welcome to Guest Network

Click thumbnail above to edit

Preview

Redirect URL: (Optional)

NOTE

You can customize the captive portal page using double-byte characters. Traditional Chinese, Simplified Chinese, and Korean are a few languages that use double-byte characters. Click on the banner, term, or policy in the **Splash Page Visuals** to modify the text in the red box. These fields accept double-byte characters or a combination of English and double-byte characters.

5. Use the Access Rules page to specify optional access rules for this network.

- **Network-based—** Set the slider **Network-based** if you want the same rules to apply to all users. The **Allow any to all destinations** access rule is enabled by default. This rule allows traffic to all destinations. Instant Firewall treats packets based on the first rule matched. For more information, see Instant Firewall on page 191.

To edit the default rule:

a. Select the rule and then click **Edit**.

b. Select appropriate options in the **Edit Rule** window and click **OK.**

To define an access rule:

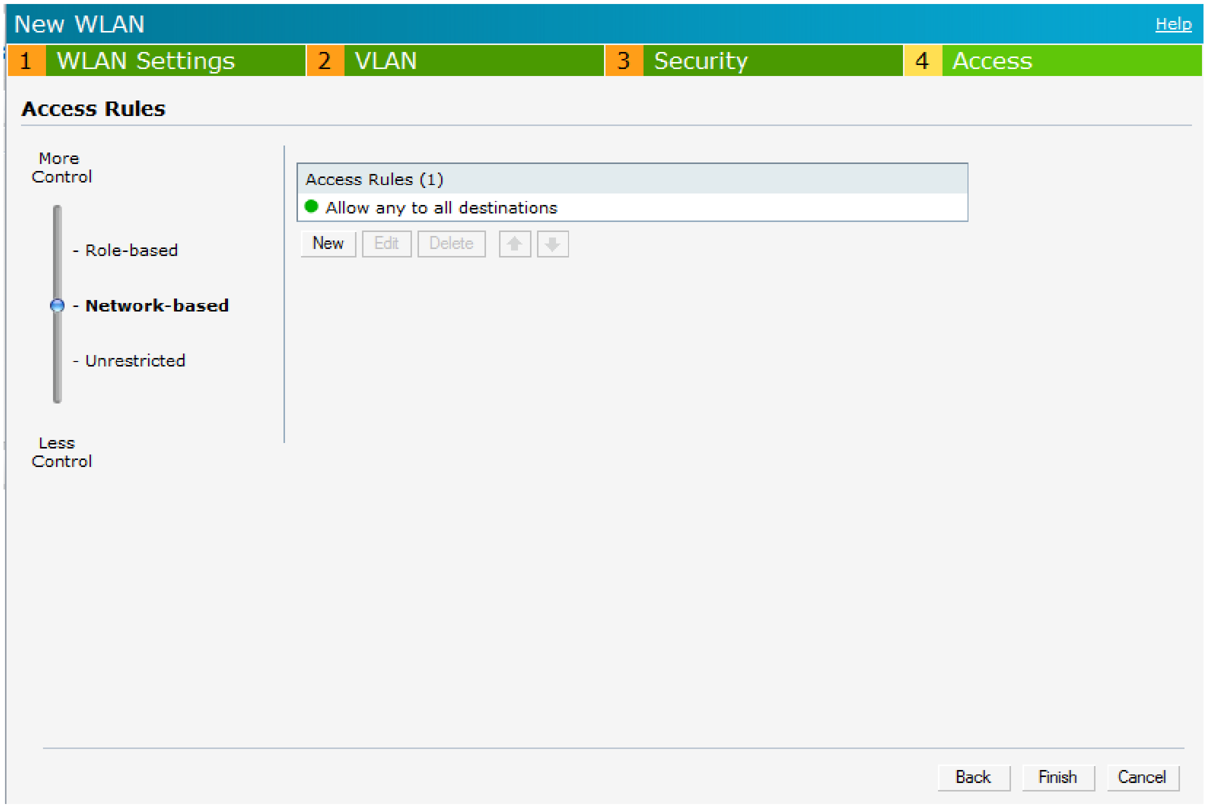
a. Click **New**.

b. Select appropriate options in the **New Rule** window.

c. Click **OK.**

- **Role-based—** Select **Role-based** if you want to specify per-user access rules. See Creating a New User Role on page 177 for more information.
- **Unrestricted—** Select this to set no restrictions on access based on destination or type of traffic.

Figure 42 - *Adding a Guest Network — Access Rules Tab*



6. Click **Finish**. The network is added and listed in the **Networks** tab.

Editing a Network

To edit a network:

1. In the **Networks** tab, select the network that you want to edit. The edit link appears.
2. Click the **edit** link. The **Edit network** window appears.
3. Make the required changes in any of the tabs. Click **Next** or the tab name to move to the next tab.
4. Click **Finish**.

Deleting a Network

To delete a network:

1. In the **Networks** tab, click the network which you want to delete. A **x** link appears against the network to be deleted.
2. Click **x**. A delete confirmation window appears.
3. Click **Delete Now**.

Number of WLAN SSIDs Supported

By default, you can create up to six networks or WLANs. You can enable the Extended SSID option and create up to 16 WLANs. OAW-IAP-175, OAW-IAP-104, and OAW-IAP-105 devices support up to 8 SSIDs and RAP-3WN, OAW-IAP-92, OAW-IAP-93, OAW-IAP-134, and OAW-

IAP-135 devices support up to 16 SSIDs. After you enable this option, the number of SSIDs that become active on each OAW-IAP depends on the OAW-IAP platform.

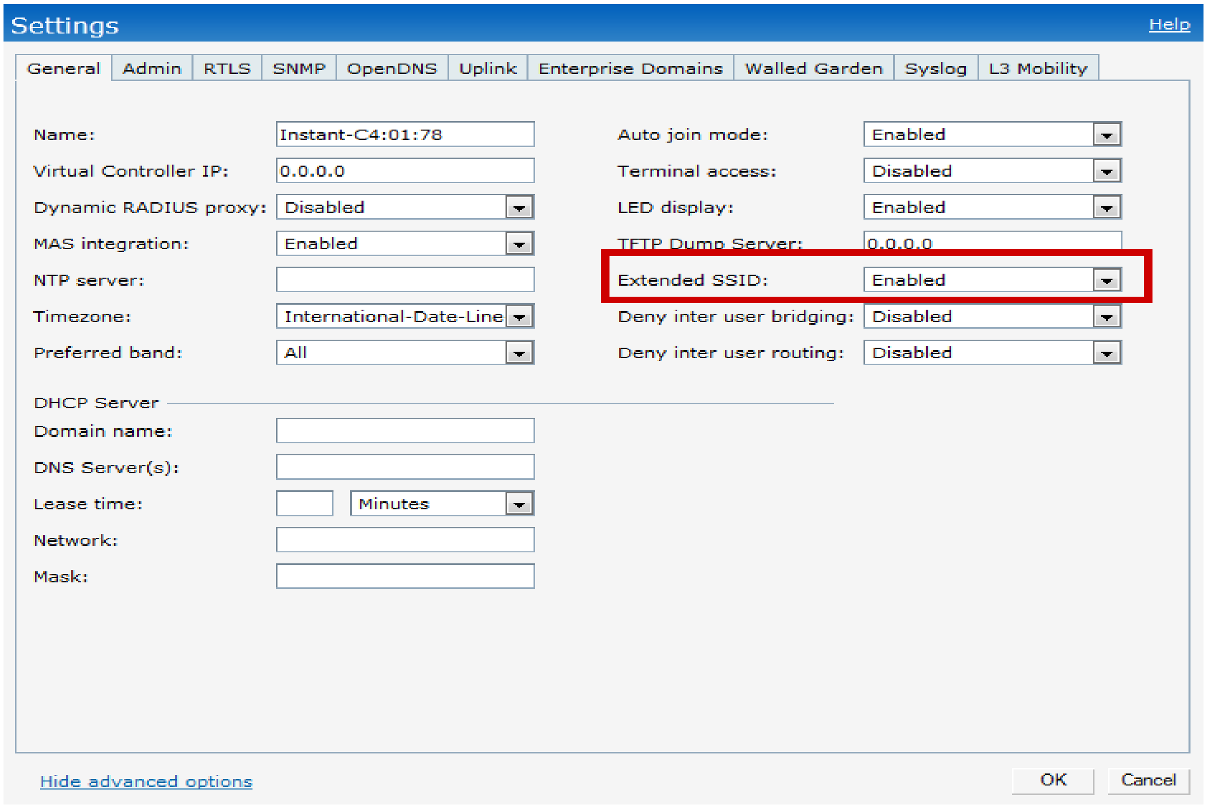
Enabling the Extended SSID option disables mesh.

Enabling the Extended SSID Option

To enable the extended SSID option:

1. Click the **Settings** link at the upper right corner of the Instant UI.
2. Click the **Show advanced options** link.
3. In the **General** tab, select **Enabled** from the **Extended SSID** drop-down list.
4. Click **OK**.
5. Reboot the AP for the changes to take effect.
   After you enable the option and reboot, the Wi-Fi link and mesh are disabled automatically.

Figure 43 - *Enabling Extended SSID.*



Name: Instant-C4:01:78

Virtual Controller IP: 0.0.0.0

Dynamic RADIUS proxy: Disabled

MAS integration: Enabled

NTP server:

Timezone: International-Date-Line

Preferred band: All

Auto join mode: Enabled

Terminal access: Disabled

LED display: Enabled

TFTP Dump Server: 0.0.0.0

Extended SSID: Enabled

Deny inter user bridging: Disabled

Deny inter user routing: Disabled

DHCP Server

Domain name:

DNS Server(s):

Lease time: Minutes

Network:

Mask:

VLAN Pooling

In a single OAW-IAP cluster, there can be a large number of clients in the same VLAN. This leads to a high level of broadcasts in the same subnet. The solution to this is to partition the network into reasonably-sized subnets and use L3-mobility between those subnets, when clients roam. However, there are various situations, like simple network design considerations, where a large number of clients need to be in the same subnet. VLAN pooling provides a solution in such scenarios. Each client is randomly assigned a VLAN from a pool of VLANs on the same SSID, thereby automatically partitioning a single broadcast domain of clients into multiple VLANs.

The Alcatel-Lucent Instant secure enterprise mesh solution is an effective way to expand network coverage for outdoor and indoor enterprise environments without any wires. As traffic traverses across mesh OAW-IAPs, the mesh network automatically reconfigures around broken or blocked paths. This self-healing feature provides increased reliability and redundancy— the network continues to operate if an OAW-IAP stops functioning or a connection fails.

This section describes the Alcatel-Lucent Instant secure enterprise mesh architecture.

Mesh Instant Access Points

An Alcatel-Lucent Instant mesh network requires at least one valid uplink (wired or 3G) connection. The OAW-IAP with the valid uplink connection is the mesh portal. The mesh portal may also act as a Virtual Controller. The un-wired OAW-IAPs are mesh points.

If two OAW-IAPs have valid uplink connections, there is redundancy in the mesh network, and most mesh points try to mesh directly with one of the two portals. However, depending on actual deployment and RF environment some mesh points may mesh through other intermediate mesh points.

In an Instant mesh network, the maximum hop count is two nodes (point >point >portal) and the maximum number of mesh points per mesh portal is eight.

Mesh OAW-IAPs learn about their environment when they boot up. Mesh OAW-IAPs can act as a mesh portal (MPP), an OAW-IAP that uses its uplink connection to reach the switch, a mesh point (MP), or an OAW-IAP that establishes an all wireless path to the mesh portal. Mesh OAW-IAPs locate and associate with their nearest neighbor, which provides the best path to the mesh portal. Mesh portals and mesh points are also known as mesh nodes, a generic term used to describe OAW-IAPs configured for mesh.

Instant mesh functionality is supported only on dual radio OAW-IAPs and not on single radio OAW-IAPs. On dual-radio OAW-IAPs, the 5 GHz radio is always used for both mesh-backhaul and client traffic, while the 2.4 GHz radio is always used for client traffic only.

NOTE

Mesh service is automatically enabled on 802.11a band for dual-radio IAP only, and this is not configurable.

The only limitation is that it has to be provisioned for the first time by plugging into the wired network. After that, mesh works on ROW OAW-IAP like any other regulatory domain.

Mesh Portals

The mesh portal (MPP) is the gateway between the wireless mesh network and the enterprise wired LAN. The mesh roles are automatically assigned based on the OAW-IAP configuration. A mesh network could have multiple mesh portals to support redundant mesh paths (mesh links between neighboring mesh points that establish the best path to the mesh portal) from the wireless mesh network to the wired LAN.

The mesh portal broadcasts a mesh services set identifier (MSSID/ mesh cluster name) to advertise the mesh network service to other OAW-IAP mesh points in that instant network. This is not configurable and is transparent to the user. The mesh points authenticate to the mesh portal and establish a link that is secured using Advanced Encryption Standard (AES) encryption.

NOTE

The mesh portal reboots after 5 minutes when it loses its uplink connectivity to a wired network.

Mesh Points

The mesh point (MP), is an OAW-IAP that establishes an all-wireless path to the mesh portal. The mesh point provides traditional WLAN services (such as client connectivity, intrusion detection system (IDS) capabilities, user role association, and Quality of Service (QoS) for LAN-to-mesh communication) to clients and performs mesh backhaul/network connectivity.

NOTE

Any provisioned OAW-IAP that has a valid uplink (wired or 3G) is a mesh portal, and the OAW-IAP without an Ethernet link is a mesh point.

.

NOTE

Mesh point also supports LAN bridging. You can connect any wired device to the downlink port of the mesh point. In the case of single Ethernet port platforms like AP-93 and AP-105, you can convert the Eth0 uplink port to a downlink port by enabling **Eth0 Bridging**. For additional information refer to Configuring Wired Bridging on Ethernet 0 on page 106.

Instant Mesh Setup

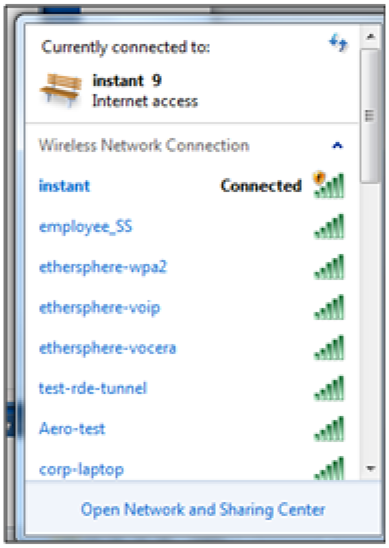
Instant mesh can be provisioned in two ways — Over-the-air provisioning and over-the-wire provisioning. Over-the-air provisioning is available when only one Alcatel-Lucent Instant mesh network is being advertised and it does not work for ROW version of OAW-IAPs.

The ROW OAW-IAP must have a the country code set in order to transmit/receive. Hence over-the-air provisioning is not supported on ROW OAW-IAPs at this time.

This section provides instructions on how to create a simple mesh network on Instant. To setup a mesh network:

1. Connect all the OAW-IAPs to a DHCP server so that the OAW-IAPs get their IP addresses in the same subnet.
2. For over-the-air provisioning— Connect one OAW-IAP to the switch to form the mesh portal. All the other OAW-IAPs are provisioned over-the-air. Ensure that only one Virtual Controller (one subnet) is available over-the-air and all the OAW-IAPs are connected to a DHCP server and get their IP addresses in the same subnet.
3. An open SSID, **instant** is listed. Connect a laptop to the default and open the **instant** SSID.

Figure 44 - *Open Instant SSID*



Currently connected to:

instant 9
Internet access

Wireless Network Connection

instant Connected

employee_SS

ethersphere-wpa2

ethersphere-voip

ethersphere-vocera

test-rde-tunnel

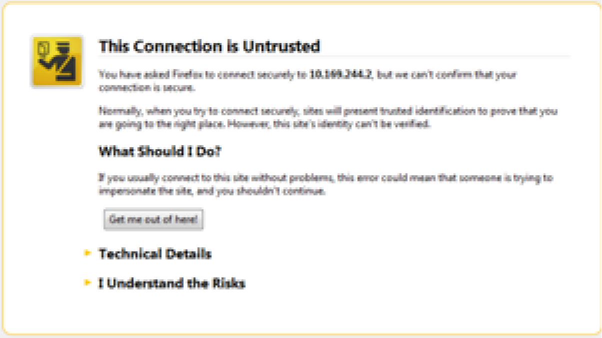
Aero-test

corp-laptop

Open Network and Sharing Center

4. Type instant.alcatel-lucentnetworks.com in the browser.
5. Click **I understand the risks** and **Add exception** to ignore the certificate warnings that the client does not recognize the certificate authority.

Figure 45 - *Untrusted Connection Window*



This Connection is Untrusted

You have asked Firefox to connect securely to **10.169.244.2**, but we can't confirm that your connection is secure.

Normally, when you try to connect securely, sites will present trusted identification to prove that you are going to the right place. However, this site's identity can't be verified.

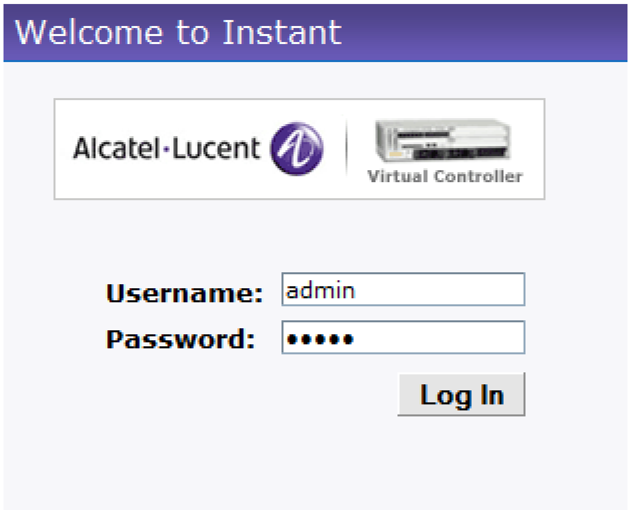
What Should I Do?

If you usually connect to this site without problems, this error could mean that someone is trying to impersonate the site, and you shouldn't continue.

6. In the login screen as shown in Figure 46 , enter the following credentials:

- Username— admin
- Password— admin

Figure 46 - *Login Window*



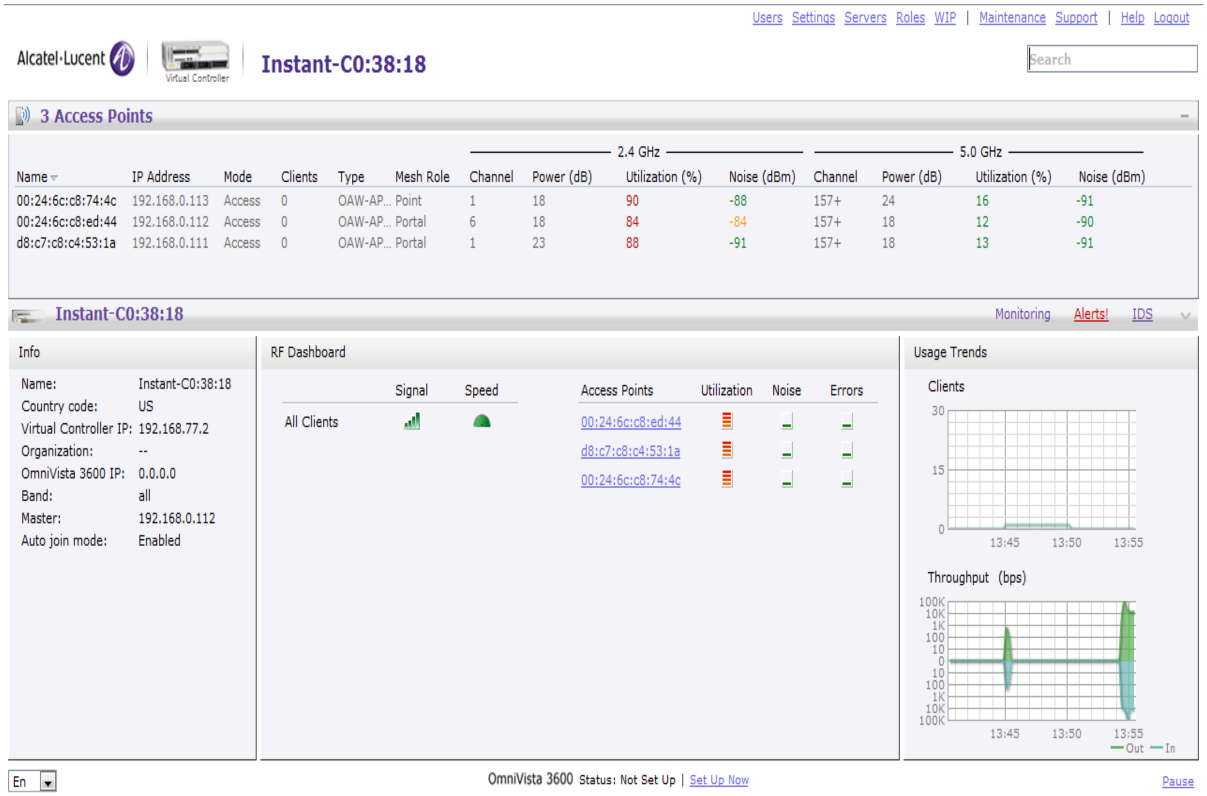
Welcome to Instant

Username: admin

Password: •••••

7. Create a new SSID and wpa-2 personal keys with **unrestricted** or **network based** access rules. Select **any permit** for basic connectivity.
8. Connect a client to the new SSID and disconnect from the **instant** SSID.
9. All the OAW-IAPs shows up on the Virtual Controller as shown in Figure 47. Disconnect the OAW-IAPs that you want to deploy as Mesh Points from the switch and place the OAW-IAPs at the desired location. The OAW-IAPs with valid uplink connections are the mesh portal.

Figure 47 - *Mesh Portal*



Users Settings Servers Roles WIP | Maintenance Support | Help Logout
Alcatel·Lucent
Virtual Controller
Instant-C0:38:18
Search

3 Access Points

						2.4 GHz				5.0 GHz			
Name	IP Address	Mode	Clients	Type	Mesh Role	Channel	Power (dB)	Utilization (%)	Noise (dBm)	Channel	Power (dB)	Utilization (%)	Noise (dBm)
00:24:6c:c8:74:4c	192.168.0.113	Access	0	OAW-AP...	Point	1	18	90	-88	157+	24	16	-91
00:24:6c:c8:ed:44	192.168.0.112	Access	0	OAW-AP...	Portal	6	18	84	-84	157+	18	12	-90
d8:c7:c8:c4:53:1a	192.168.0.111	Access	0	OAW-AP...	Portal	1	23	88	-91	157+	18	13	-91

Instant-C0:38:18

Info

Name:	Instant-C0:38:18
Country code:	US
Virtual Controller IP:	192.168.77.2
Organization:	--
OmniVista 3600 IP:	0.0.0.0
Band:	all
Master:	192.168.0.112
Auto join mode:	Enabled

RF Dashboard

	Signal	Speed
All Clients		

Access Points	Utilization	Noise	Errors
00:24:6c:c8:ed:44			
d8:c7:c8:c4:53:1a			
00:24:6c:c8:74:4c			

Usage Trends

OmniVista 3600 Status: Not Set Up | Set Up Now

NOTE

The OAW-IAPs in US, JP, or IL regulatory domain which are in factory default state scan for several minutes after booting. An OAW-IAP mesh point in factory default state automatically joins the portal only if a single Instant mesh network is found. In addition, the auto-join feature must be enabled in the existing network.

NOTE

The OAW-IAP mesh point gets an IP address from the same DHCP pool as the portal, and this DHCP request goes through the portal.

This section describes the Preferred band, Auto join mode, Terminal Access, LED display, and Syslog server features in Alcatel-Lucent Instant. In addition, this section provides procedures for adding and removing OAW-IAPs, editing the OAW-IAP settings, and upgrading the firmware on the OAW-IAP using the Instant UI.

Preferred Band

At the top right corner of Instant UI, click the **Settings** link. The **Settings** window appears.

1. In the **Settings** window, click the **General** tab.
2. Select the **Preferred band** (2.4 GHz, 5 GHz, All) from the drop-down list for single-radio access points.

NOTE

Reboot the OAW-IAP after configuring the radio profile settings in order for the changes to take effect.

Auto Join Mode

The Auto Join Mode feature allows OAW-IAPs to automatically,

1. Discover the Virtual Controller.
2. Join the network.
3. Begin functioning.

The **Auto Join Mode** feature is enabled by default. When the Auto Join Mode feature is disabled, a **New** link appears in the **Access Points** tab. Click this link to add OAW-IAPs to the network. For more information, see Adding an OAW-IAP to the Network on page 102. In addition, when this feature is disabled, OAW-IAPs that are configured but not active appear in red.

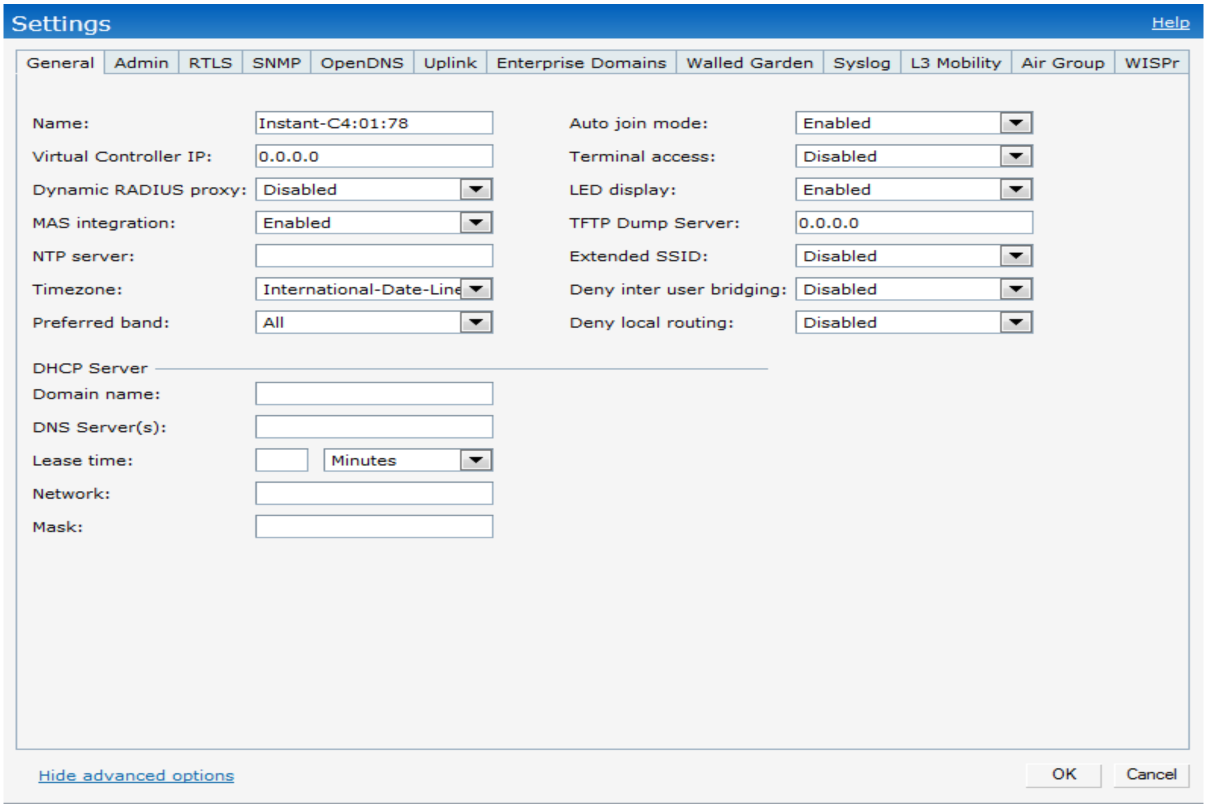
Disabling Auto Join Mode

To disable Auto Join Mode:

At the top right corner of Instant UI, click the **Settings** link. The **Settings** window appears.

1. In the **Settings** window, click the **General** tab.
2. Select **Disabled** from the **Auto join mode** drop-down list.

Figure 48 - *Disabling Auto Join Mode*



Name:	Instant-C4:01:78	Auto join mode:	Enabled
Virtual Controller IP:	0.0.0.0	Terminal access:	Disabled
Dynamic RADIUS proxy:	Disabled	LED display:	Enabled
MAS integration:	Enabled	TFTP Dump Server:	0.0.0.0
NTP server:		Extended SSID:	Disabled
Timezone:	International-Date-Line	Deny inter user bridging:	Disabled
Preferred band:	All	Deny local routing:	Disabled

DHCP Server

Domain name:	
DNS Server(s):	
Lease time:	Minutes
Network:	
Mask:	

3. Click **OK.**

Terminal Access

Instant supports terminal access for diagnostic purpose only. To enable or disable the SSH access to the IAP's CLI, navigate to **Settings > Advanced > Terminal access**.

NOTE

Telnet access to the CLI has been deprecated as of the 6.2.0.0-3.2.0.0 release. As of that release, when the Terminal Access option is enabled, only SSH access to the CLI will be possible.

NOTE

Instant does not support configuration using CLI.

LED Display

Administrators have the ability to turn off LED for all OAW-IAPs in an Instant network. Navigate to **Settings > Advanced > LED Display** to enable or disable the LEDs. When **Disabled**, all the LEDs are turned off. Use this option in environments where LEDs can be a distraction.

NOTE

The LED display is always in **Enabled** mode while rebooting the OAW-IAP.

TFTP Dump Server

Enter the IP address of a TFTP server to store core dump files.

Extended SSID

You can increase the number of SSIDs or networks that can be created by enabling the extended SSID option. To enable this feature, navigate to **Settings > General** and click **Show advanced options** in the Instant UI.

Deny Inter User Bridging and Deny Local Routing

To enable or disable these features, navigate to **Settings > General** in the Instant UI.

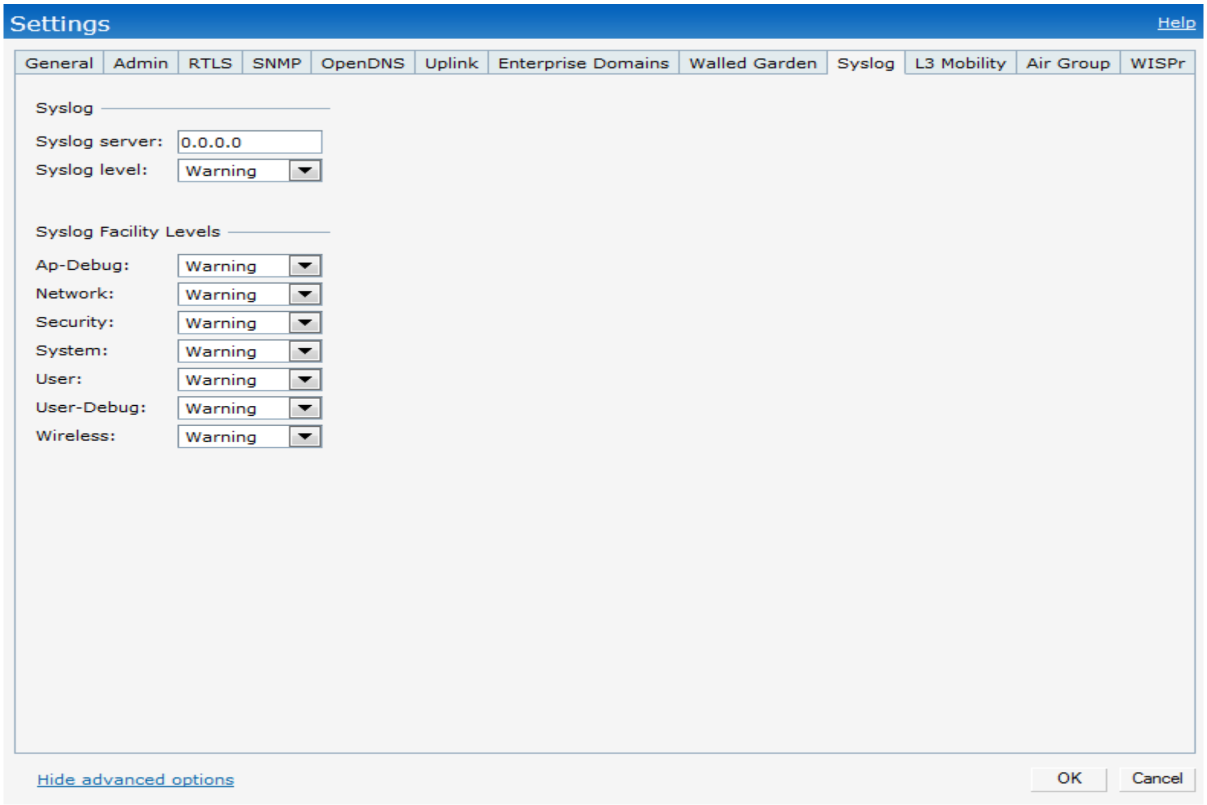
- **Deny inter user bridging**— This feature allows you to deny traffic between two clients which are directly connected to the same IAP or are on the same Instant network.
- **Deny local routing**— This feature allows you to deny local routing traffic between clients which are connected to the same IAP or are on the same Instant network.

Syslog Server

To specify a Syslog Server for sending syslog messages to the external servers, navigate to **Settings >** click **Show advanced options > Syslog Server** in the UI and update the following fields.

- **Syslog server—** Enter the IP address of the server to send system logs to.
- **Syslog level—** For a global level configuration, select one of the logging levels from the standard list of syslog levels. The default value is **Notice**.

Figure 49 - *Syslog Server*



Syslog

Syslog server: 0.0.0.0

Syslog level: Warning

Syslog Facility Levels

Ap-Debug: Warning

Network: Warning

Security: Warning

System: Warning

User: Warning

User-Debug: Warning

Wireless: Warning

Syslog Facility Levels

Alcatel-Lucent Instant supports facility-based logging levels. Syslog Facility is an information field associated with a syslog message. It is an application or operating system component that generates a log message. The following seven facilities are supported by Syslog:

- **AP-Debug—** Detailed log about AP device.
- **Network—** Log about change of network, for example, when a new OAW-IAP is added to a network.
- **Security—** Log about network security, for example, when a client connects using wrong password.
- **System—** Log about configuration and system status.
- **User—** Important logs about client.
- **User-Debug—** Detailed log about client.
- **Wireless—** Log about radio.

Table 12 describes the logging levels in order of severity, from most to least severe.

Table 12 - *Logging Levels*

Logging Level	Description
Emergency	Panic conditions that occur when the system becomes unusable.
Alert	Any condition requiring immediate attention and correction.
Critical	Any critical conditions such as a hard drive error.
Errors	Error conditions.
Warning	Warning messages.
Notice	Significant events of a non-critical and normal nature.
Informational	Messages of general interest to system users.
Debug	Messages containing information useful for debugging.

Adding an OAW-IAP to the Network

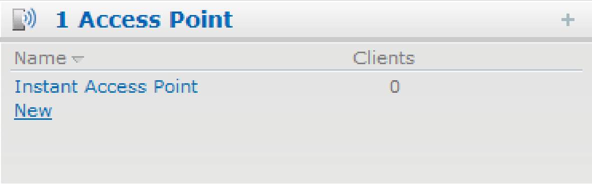
To add an OAW-IAP to the Alcatel-Lucent Instant network, assign an IP address. For more information, see Assigning an IP Address to the OAW-IAP on page 34.

After an OAW-IAP is connected to the network, if the Auto Join Mode feature is enabled, it is listed in the **Access Points** tab in the Instant UI. The OAW-IAP inherits the configuration and image from the Virtual Controller.

If the Auto Join Mode is not enabled, then perform the following steps to add an OAW-IAP to the network:

1. In the **Access Points** tab, click the **New** link.

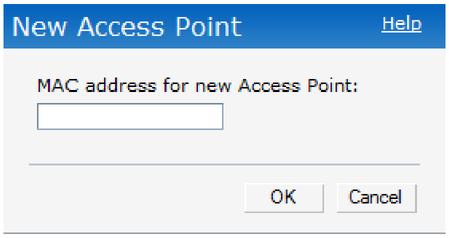
Figure 50 - *Adding an OAW-IAP to the Instant Network*



Name	Clients
Instant Access Point	0
New	

2. In the **New Access Point** window, enter the MAC address for the new OAW-IAP.

Figure 51 - *Entering the MAC Address for the New OAW-IAP*



MAC address for new Access Point:

3. Click **OK.**

Removing an OAW-IAP from the Network

An OAW-IAP can be manually removed from the network only if the Auto Join Mode on page 99 feature is disabled.

To manually remove an OAW-IAP from the network:

1. In the **Access Points** tab, click the OAW-IAP which you want to delete. An **x** appears against the OAW-IAP.
2. Click **x** to confirm the deletion.

> The deleted OAW-IAP(s) cannot join the Instant network anymore and no longer appear in the Instant UI. However, the master OAW-IAP cannot be deleted from the Virtual Controller.

Editing OAW-IAP Settings

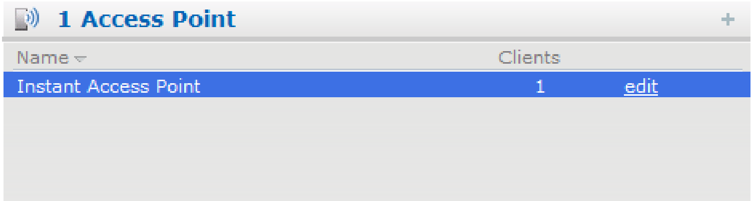
This section explains how to change the OAW-IAP settings such as Name, IP Address and steps for configuring Adaptive Radio Management (ARM), Wired Bridging on Ethernet 0 Port, Uplink Management VLAN, and migrating from a Virtual Controller Managed Network to Mobility Controller Managed Network.

Changing OAW-IAP Name

To change the OAW-IAP name:

1. In the Access Points tab, click on the OAW-IAP that you want to rename.

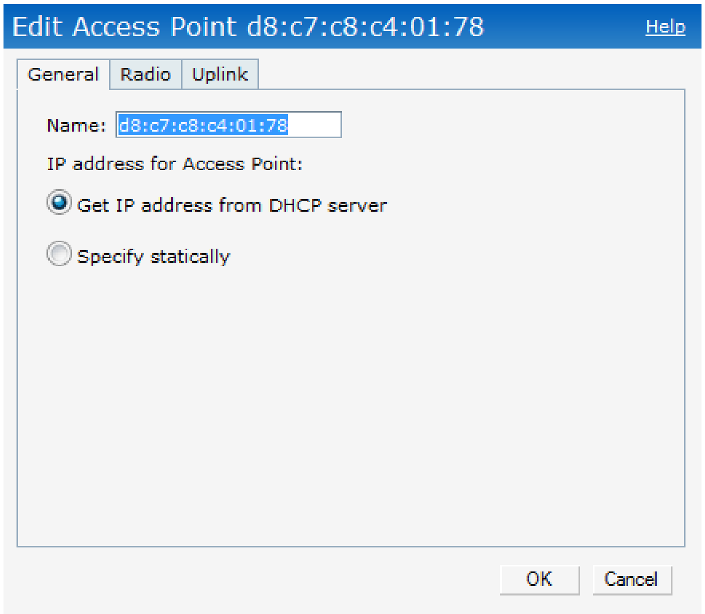
Figure 52 - *Editing OAW-IAP Settings*



Name	Clients	
Instant Access Point	1	edit

2. Click the edit link.

Figure 53 - *Changing OAW-IAP Name*



Edit Access Point d8:c7:c8:c4:01:78

Name: d8:c7:c8:c4:01:78

IP address for Access Point:

● Get IP address from DHCP server

○ Specify statically

3. Edit the OAW-IAP name in the **Name** text box.
4. Click **OK**.

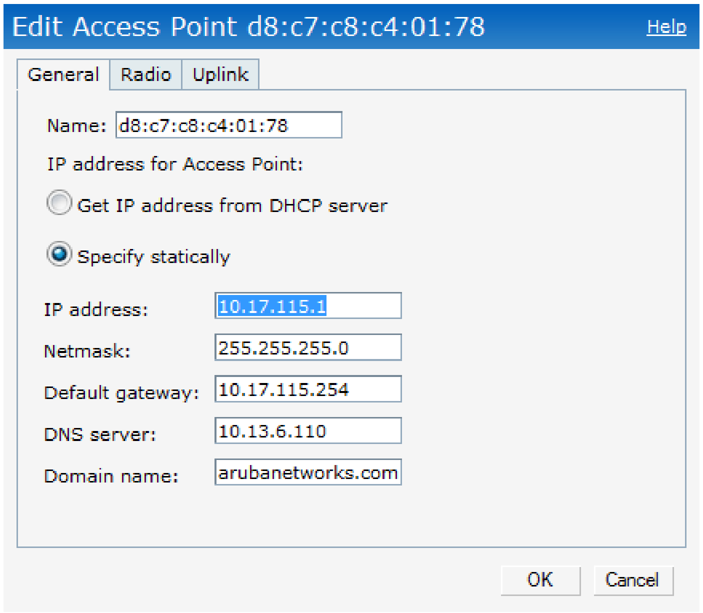
Changing IP Address of the OAW-IAP

The Instant UI allows you to change the IP address of the OAW-IAP connected to the network.

To change the IP address of the OAW-IAP:

1. In the **Access Points** tab, click the OAW-IAP for which you want to change the IP address. The **edit** link appears.
2. Click the **edit** link. The **Edit AP** window appears.

Figure 54 - *Configuring OAW-IAP Settings — Connectivity Tab*



Edit Access Point d8:c7:c8:c4:01:78

Name: d8:c7:c8:c4:01:78

IP address for Access Point:

○ Get IP address from DHCP server

● Specify statically

IP address: 10.17.115.1

Netmask: 255.255.255.0

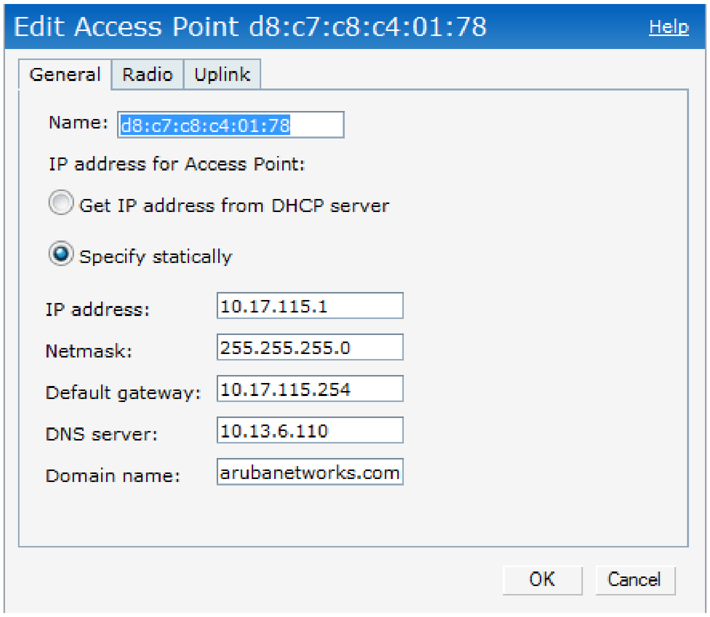
Default gateway: 10.17.115.254

DNS server: 10.13.6.110

Domain name: arubanetworks.com

3. Select either the **Get IP address from DHCP server or Specify statically** option. If you have selected the Specify statically option, then perform the following steps:
   a. Enter the new IP address for the OAW-IAP in the **IP address** text box.
   b. Enter the netmask of the network in the **Netmask** text box.
   c. Enter the IP address of the default gateway in the **Default gateway** text box.
   d. Enter the IP address of the DNS server in the **DNS server** text box.
   e. Enter the domain name in the **Domain name** text box.

Figure 55 - *Configuring OAW-IAP Connectivity Settings — Specifying Static Settings*



Name: d8:c7:c8:c4:01:78

IP address for Access Point:

○ Get IP address from DHCP server

● Specify statically

IP address: 10.17.115.1

Netmask: 255.255.255.0

Default gateway: 10.17.115.254

DNS server: 10.13.6.110

Domain name: arubanetworks.com

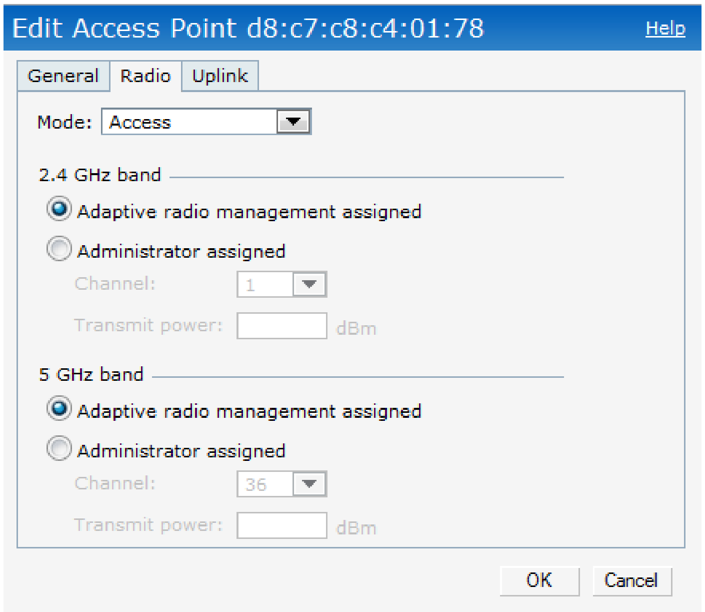
4. Click **OK** and reboot the OAW-IAP.

Configuring Adaptive Radio Management

Adaptive Radio Management (ARM) is enabled in Alcatel-Lucent Instant by default. However, if ARM is disabled, perform the following steps to enable it.

1. In the **Access Points** tab, click the OAW-IAP for which you want to configure ARM.
2. Click the **edit** link. An **Edit AP** window appears.
3. In the **Edit AP** window, select the **Radio** tab.
4. Select **Adaptive radio management assigned**.

Figure 56 - *Configuring OAW-IAP Radio Settings Mode — Access*



Edit Access Point d8:c7:c8:c4:01:78

Mode: Access

2.4 GHz band

● Adaptive radio management assigned

○ Administrator assigned

Channel: 1

Transmit power: dBm

5 GHz band

● Adaptive radio management assigned

○ Administrator assigned

Channel: 36

Transmit power: dBm

5. Click **OK**.

For more information about ARM, see Adaptive Radio Management on page 205.

Configuring Uplink Management VLAN

Instant supports a management VLAN for the uplink traffic on an OAW-IAP. After an OAW-IAP is provisioned with this parameter, all management traffic sent from the OAW-IAP is tagged with the management VLAN. Perform the following steps to configure a uplink management VLAN on an OAW-IAP:

1. In the **Access Points** tab, click the OAW-IAP.
2. Click the **edit** link. An **Edit AP** window appears.
3. In the **Edit AP** window, select the **Uplink** tab.
4. Specify the VLAN in the **Uplink Management VLAN** field.
5. Click **OK**.

NOTE

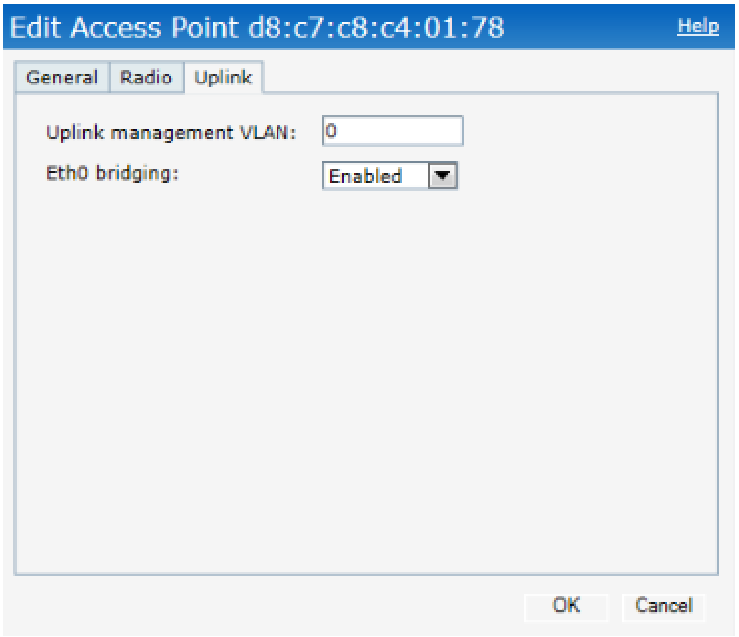
This configuration requires an OAW-IAP reboot to take effect.

Configuring Wired Bridging on Ethernet 0

Instant supports wired bridging on the Ethernet 0 port of an Instant AP. Perform the following steps to enable wired bridging on the Ethernet 0 port:

1. In the **Access Points** tab, click the OAW-IAP.
2. Click the **edit** link. An **Edit AP** window appears.
3. In the **Edit AP** window, select the **Uplink** tab.
4. Select **Enable** from the **Eth0 Bridging** drop box.

Figure 57 - *Configuring Wired Bridging on Ethernet 0 of an OAW-IAP*


Edit Access Point d8:c7:c8:c4:01:78

Uplink management VLAN: 0

Eth0 bridging: Enabled

5. Click **OK**.

Enabling wired bridging on this port of the OAW-IAP makes the port available as a downlink wired bridge and allows client access via the port. You can also use the port to connect a wired device when a 3G uplink is used.

NOTE

Reboot the OAW-IAP after the bridging is set for the configuration to take effect.

Migrating to a Mobility Controller Managed Network

An OAW-IAP can be provisioned as a Campus AP (CAP) or Remote AP (RAP) in a controller-based network. Before converting the OAW-IAP, ensure that both the OAW-IAP and controller are configured to operate in the same regulatory domain.

Converting an OAW-IAP to RAP Mode

For RAP conversion, the Virtual Controller sends the RAP convert command to all the other OAW-IAPs. The Virtual Controller along with the other slave OAW-IAPs then setup a VPN tunnel to the remote controller, and download the firmware by FTP. The Virtual Controller uses IPsec to communicate to the Mobility Controller over the internet.

- If the OAW-IAP gets AirWave information via DHCP (Option 43 and Option 60), it establishes an HTTPS connection to the AirWave server and downloads the configuration and operates in OAW-IAP mode.
- If the OAW-IAP does not get AirWave information via DHCP provisioning, it tries provisioning via a firmware image server in the cloud (sends serial number MAC address). If an entry for the OAW-IAP is present in the firmware image cloud server and is provisioned as an OAW-IAP > RAP entry, the firmware image cloud server responds with controller IP address, AP group, and AP type. The OAW-IAP then contacts the controller, establishes certificate-based secure communication, and gets configuration and image from the controller. The OAW-IAP then reboots and comes up as a RAP. The OAW-IAP then establishes an IPSEC connection with the controller and begins operating in RAP mode.

- If an OAW-IAP entry for the AP is present in the firmware image cloud server, the OAW-IAP gets AirWave server information from the cloud server and downloads configuration from OmniVista to operate in OAW-IAP mode.
- If there is no response from the cloud server or OmniVista, the OAW-IAP comes up in Alcatel-Lucent Instant mode.

NOTE

A description of the firmware image cloud server can be found in the section named Firmware Image Server in Cloud Network, within this chapter.

NOTE

A mesh point cannot be converted to RAP because mesh does not support VPN connection.

An OAW-IAP can be converted to an Instant Campus AP and Instant Remote AP only if the controller is running Instant 6.1.4 or later.

The following table describes the supported OAW-IAP platforms and minimal AOS version for OAW-IAP to CAP/RAP conversion.

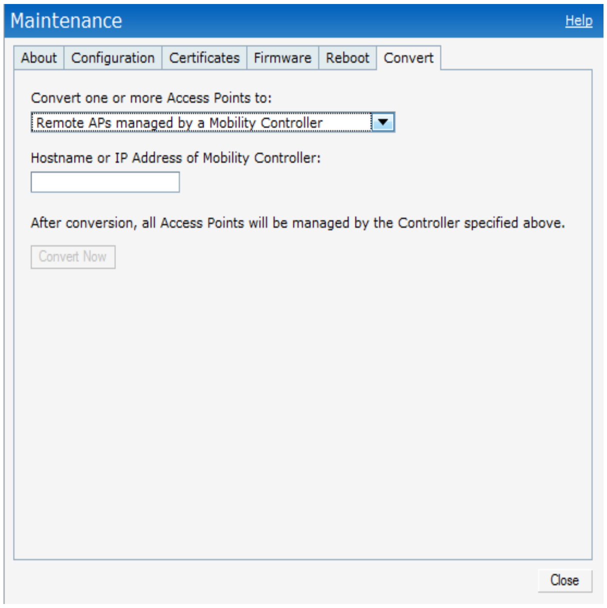
Table 13 - *OAW-IAP Platforms and Minimal AOS and OAW-IAP Versions for OAW-IAP to RAP Conversion*

OAW-IAP Platform	AOS Version	Instant Version
OAW-IAP-92	6.1.4 or later	1.0 or later
OAW-IAP-93	6.1.4 or later	1.0 or later
OAW-IAP-104	6.1.4 or later	3.0 or later
OAW-IAP-105	6.1.4 or later	1.0 or later
OAW-IAP-134	6.1.4 or later	2.0 or later
OAW-IAP-135	6.1.4 or later	2.0 or later
OAW-IAP-175AC	6.1.4 or later	3.0 or later
OAW-IAP-175P	6.1.4 or later	3.0 or later
RAP-3WN	6.1.4 or later	3.0 or later
RAP-3WNP	6.1.4 or later	3.0 or later
RAP-108	6.2.0.0 or later	3.2 or later
RAP-109	6.2.0.0 or later	3.2 or later

To convert an OAW-IAP to RAP, follow the instructions below:

1. Navigate to the **Maintenance** tab in the top right corner of the Instant UI.
2. Click the **Convert** tab.

Figure 58 - *Maintenance — Convert Tab*

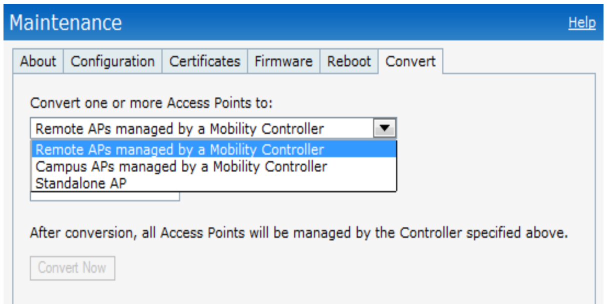


Convert one or more Access Points to: Remote APs managed by a Mobility Controller

Hostname or IP Address of Mobility Controller:

After conversion, all Access Points will be managed by the Controller specified above.

Figure 59 - *Convert options*



Convert one or more Access Points to: Remote APs managed by a Mobility Controller

After conversion, all Access Points will be managed by the Controller specified above.

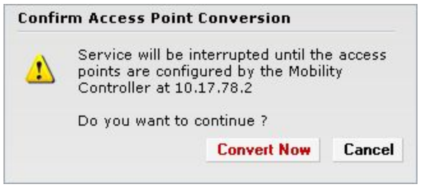
3. Select **Remote APs managed by a Mobility Controller** from the drop-down list.
4. Enter the hostname (fully qualified domain name) or the IP address of the controller in the **Hostname or IP Address of Mobility Controller** text box. This information is provided by your network administrator.

NOTE

Ensure the Mobility Controller IP Address is reachable by the OAW-IAPs.

5. Click **Convert Now** to complete the conversion.

Figure 60 - *Confirm Access Point Conversion*



Confirm Access Point Conversion

Service will be interrupted until the access points are configured by the Mobility Controller at 10.17.78.2

Do you want to continue ?

6. The OAW-IAP reboots and begins operating in RAP mode.
7. After conversion, the OAW-IAP is managed by the Alcatel-Lucent Mobility Controller which has been specified in the Instant UI.

NOTE

In order for the RAP conversion to work, ensure that you configure the Instant AP in the RAP white-list and enable the FTP service on the controller.

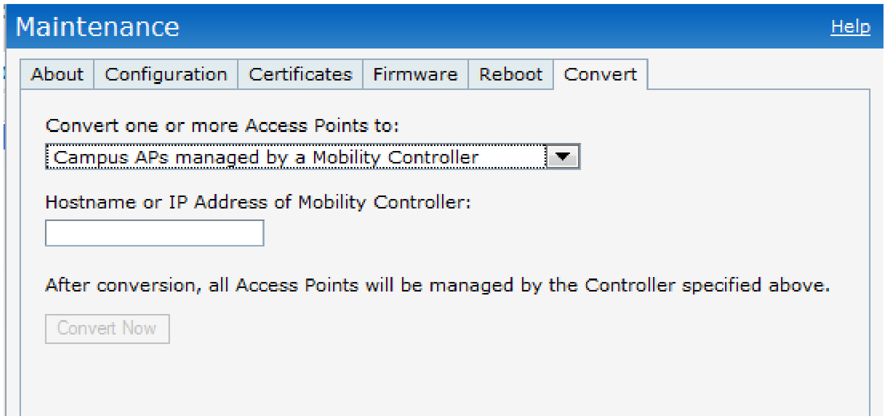
> If the VPN setup fails and an error message pops up, please click **OK**, copy the error logs and share them with your Alcatel-Lucent support engineer.

Converting an OAW-IAP to CAP

To convert an OAW-IAP to Campus AP, do the following:

1. Navigate to the **Maintenance** tab in the top right corner of the Instant UI.
2. Click the **Convert** tab.

Figure 61 - *Converting an OAW-IAP to CAP*



Convert one or more Access Points to: Campus APs managed by a Mobility Controller

Hostname or IP Address of Mobility Controller:

After conversion, all Access Points will be managed by the Controller specified above.

3. Select **Campus APs managed by a Mobility Controller** from the drop-down list.
4. Enter the hostname (fully qualified domain name) or the IP address of the controller in the **Hostname or IP Address of Mobility Controller** text box. This is provided by your network administrator.

> Ensure the Mobility Controller IP Address is reachable by the IAPs.

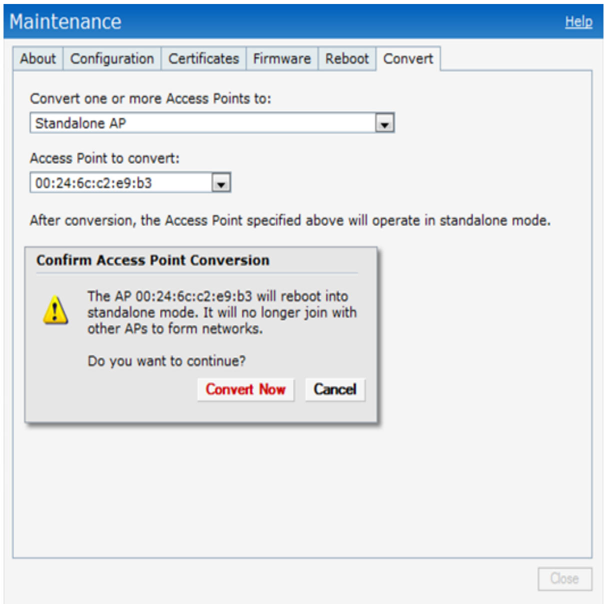
5. Click **Convert Now** to complete the conversion.

Converting an OAW-IAP to Standalone Mode

This feature allows you to deploy an Instant AP as an autonomous AP which is a separate entity from the existing Virtual Controller cluster in the same Layer 2 domain.

1. Navigate to the **Maintenance** tab in the top right corner of the Instant UI.
2. Click the **Convert** tab.

Figure 62 - *Standalone AP Conversion*



Convert one or more Access Points to: Standalone AP

Access Point to convert: 00:24:6c:c2:e9:b3

After conversion, the Access Point specified above will operate in standalone mode.

Confirm Access Point Conversion

The AP 00:24:6c:c2:e9:b3 will reboot into standalone mode. It will no longer join with other APs to form networks.

Do you want to continue?

3. Select **Standalone AP** from the drop-down list.
4. Select the Access Point from the drop-down list.
5. Click **Convert Now** to complete the conversion.
6. After the conversion the Access Point specified in the Instant UI operates in standalone mode.

Converting Back to an IAP

The reset button located on the rear of an OAW-IAP can be used to reset the OAW-IAP to factory default settings. If you have converted your OAW-IAP to a campus AP or a Remote AP, pressing the reset button converts it back to an OAW-IAP.

To reset an OAW-IAP, follow the instructions below:

1. Power off the OAW-IAP.
2. Press and hold the reset button using a small, narrow object, such as a paperclip.
3. Power on the OAW-IAP without releasing the reset button. The power LED flashes within 5 seconds indicating that the reset is completed.
4. Release the reset button.

The OAW-IAP then boots with the factory default settings.

NOTE

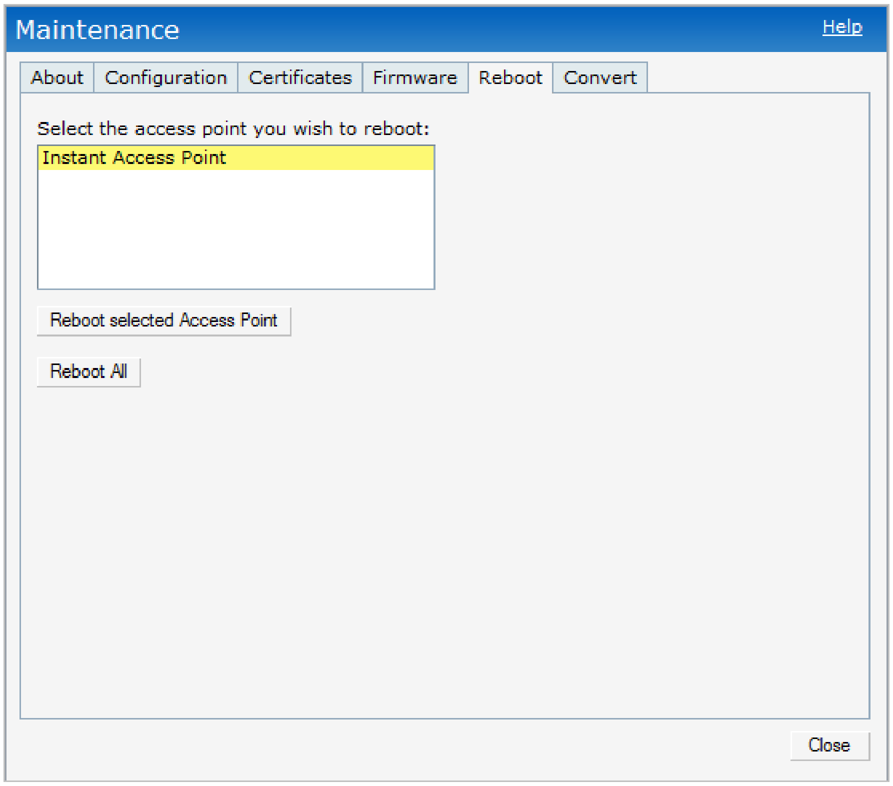
All APs have a reset button, except OAW-IAP-175P and OAW-IAP-175AC. Contact Alcatel-Lucent support for the backward conversion process on these OAW-IAPs.

Rebooting the OAW-IAP

If you encounter any problem with the OAW-IAPs, you can reboot all OAW-IAPs or selected OAW-IAPs in a network using the Instant UI. To reboot an OAW-IAP:

1. Click the **Maintenance** link. The **Maintenance** window appears.
2. Click the **Reboot** tab.

Figure 63 - *Rebooting the OAW-IAP*

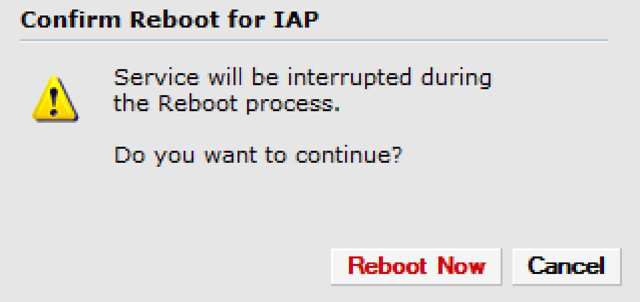


Select the access point you wish to reboot:

Instant Access Point

3. In the OAW-IAP list, select the OAW-IAP that you want to reboot and click **Reboot selected Access Point**. To reboot all the OAW-IAPs in the network, click **Reboot All.**
4. The **Confirm Reboot for OAW-IAP window** appears. Click **Reboot Now** to proceed.

Figure 64 - *Confirm Reboot message*

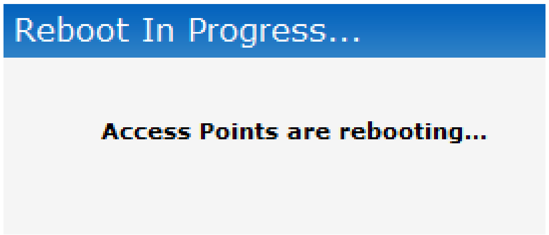

Confirm Reboot for IAP

Service will be interrupted during the Reboot process.

Do you want to continue?

5. The **Reboot in Progress** message appears indicating that the reboot is in progress.

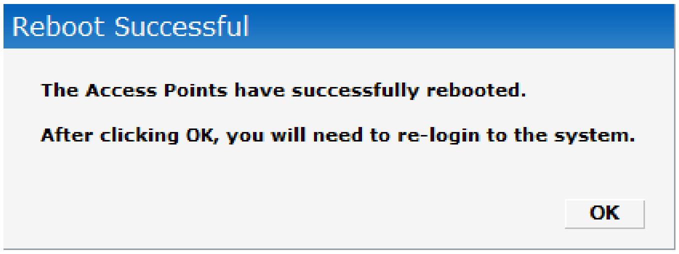
Figure 65 - *Reboot In Progress*


Reboot In Progress...

Access Points are rebooting...

6. The **Reboot Successful** message appears once the process is complete. If the system fails to boot, then the **Unable to contact Access Points after reboot was initiated message** appears**.**

Figure 66 - *Reboot Successful*



Reboot Successful

The Access Points have successfully rebooted.

After clicking OK, you will need to re-login to the system.

7. Click **OK** to close the window and re-login to the system.

Firmware Image Server in Cloud Network

The image check feature allows the OAW-IAP to discover new software image versions on a cloud-based image server hosted by Alcatel-Lucent Networks. The location of the image server is fixed and cannot be changed by the user. Alcatel-Lucent takes care of managing the image server, and ensures that the image server is loaded with latest versions of Instant software for its products.

Upgrade Using OmniVista and Image Server

Alcatel-Lucent Instant supports mixed AP-class instant deployment with all APs as part of the same Virtual Controller cluster.

Image management using Cloud Server

If the multi-class OAW-IAP network is not managed by OmniVista, image upgrades can be done through the cloud-based image check feature. When new OAW-IAPs joining the network need to synchronize its software with that of the Virtual Controller, and the new OAW-IAP is of a different class, the image file for the new OAW-IAP is provided by the cloud server.

Image management using OmniVista

If the multi-class OAW-IAP network is managed by OmniVista, image upgrades can only be done through the OmniVista UI. Users must upload OAW-IAP images for both classes on the AMP server. When new OAW-IAPs joining the network need to synchronize its software with that of the Virtual Controller, and the new OAW-IAP is of a different class, the image file for the new OAW-IAP is provided by OmniVista. If the AMP does not have the proper image file, the new AP is not be able to join the network.

NOTE

The Virtual Controller in Instant AP communicates with the OmniVista server or Image server, depending on the user's configuration. If OmniVista is not configured on the OAW-IAP, then the image is requested from the Image server. See Configuring OmniVista on page 243 for steps on how to configure OmniVista.

Automatic Firmware Image Check and Upgrade

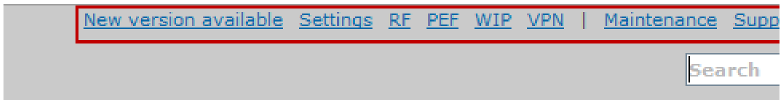
Automatic image check is enabled by default. If OmniVista is configured, then the automatic image check is automatically disabled, use the manual image check option to check for the latest image. For more information, see Upgrading to New Version on page 115 and Configuring OmniVista on page 243 for steps on how to configure OmniVista.

If the Automatic image check is enabled, then the following actions take place:

- once after every time the AP boots up
- once every week thereafter

If the image check locates a new version of the Instant software on the image server, then a **New version available** link appears at the top right corner of the Instant UI.

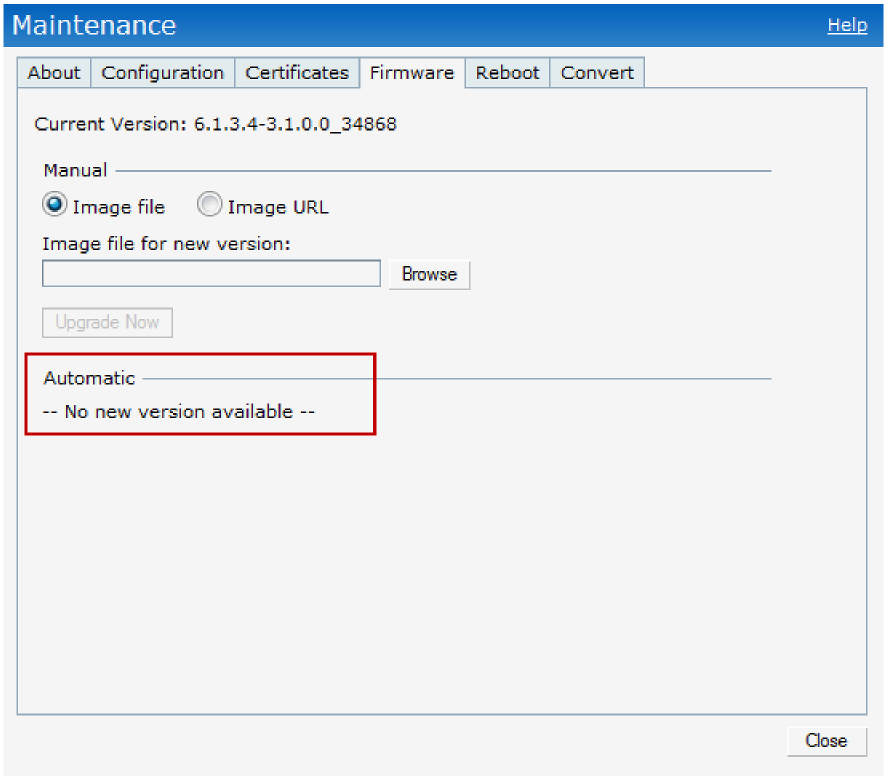
Figure 67 - *Automatic Image Check — New Version Available Link*



After the Automatic image check feature identifies a new version, perform the following steps to upgrade to the new version:

1. The **Maintenance** window appears. Click **Upgrade Now** to upgrade the OAW-IAP to the newer version.

Figure 68 - *New Version Available*



Current Version: 6.1.3.4-3.1.0.0_34868

Manual

● Image file ○ Image URL

Image file for new version:

Automatic

-- No new version available --

After you confirm, the AP downloads the new software image from the server, saves it to flash, and reboots. Depending on the progress and success of the upgrade, one of the following messages is displayed:

- Upgrading — While image upgrading is in progress.
- Upgrade successful —When the upgrading is successful.
- Upgrade fail —When the upgrading fails.

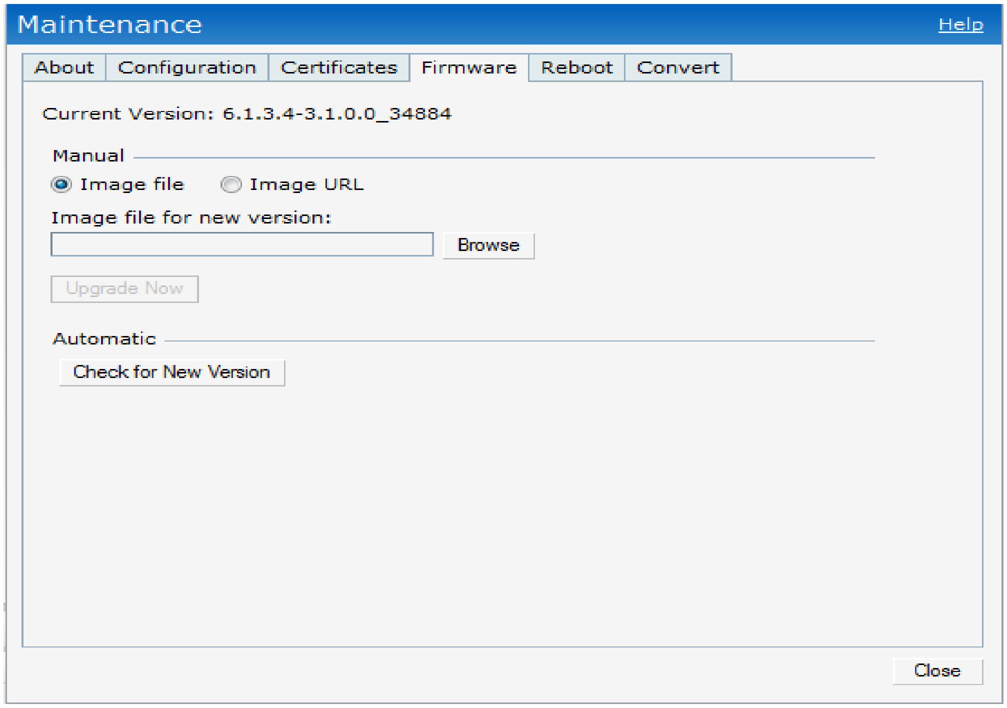
Upgrading to New Version

To manually check for a new firmware image version:

Manual

1. Navigate to **Maintenance > Firmware** to select and manually upgrade the image file.

Figure 69 - *Single class or Multi-class OAW-IAPNetworks Firmware Upgrade*



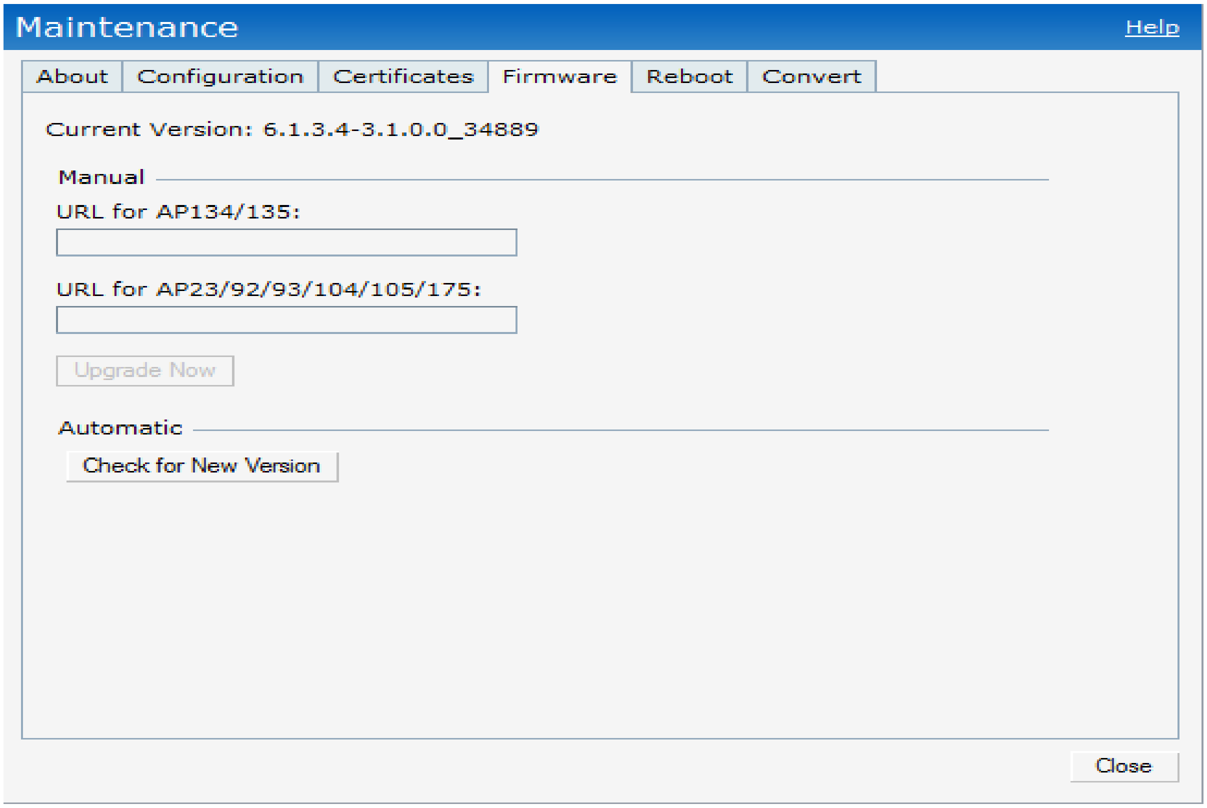
Current Version: 6.1.3.4-3.1.0.0_34884

Manual

● Image file ○ Image URL

Image file for new version:

Figure 70 - *Mixed OAW-IAP Network Firmware Upgrade*



Current Version: 6.1.3.4-3.1.0.0_34889

Manual

URL for AP134/135:

URL for AP23/92/93/104/105/175:

- **Image file—** Select to directly upload an image file. This method is only available for single-class OAW-IAPs.
  - Example: Alcatel-LucentInstant_Orion_6.2.0.0-3.2.0.0_xxxx
  - Example: Alcatel-LucentInstant_Cassiopeia_6.2.0.0-3.2.0.0_xxxx
  - Example: Alcatel-LucentInstant_Pegasus_6.2.0.0-3.2.0.0_xxxx
- **Image URL—** Select obtain the image file from a TFTP, FTP and HTTP URL

The following examples describe the image file format for two different classes of OAW-IAPs:

TFTP:

- URL for IAP-135/134: tftp://<IP-address>/Alcatel-LucentInstant_Cassiopeia_6.2.0.0-3.2.0.0_xxxx
- URL for IAP-105/92/93: tftp://<IP-address>/Alcatel-LucentInstant_Orion_6.2.0.0-3.2.0.0_xxxx
- URL for RAP-108/109: tftp://<IP-address>/Alcatel-LucentInstant_Pegasus_6.2.0.0-3.2.0.0_xxxx

FTP:

- ftp://<IP-address>/Alcatel-LucentInstant_Cassiopeia_6.2.0.0-3.2.0.0_xxxx
- ftp://<IP-address>/Alcatel-LucentInstant_Orion_6.2.0.0-3.2.0.0_xxxx
- ftp://<IP-address>/Alcatel-LucentInstant_Pegasus_6.2.0.0-3.2.0.0_xxxx

HTTP:

- http://<IP-address>/Alcatel-LucentInstant_Cassiopeia_6.2.0.0-3.2.0.0_xxxx
- http://<IP-address>/Alcatel-LucentInstant_Orion_6.2.0.0-3.2.0.0_xxxx
- http://<IP-address>/Alcatel-LucentInstant_Pegasus_6.2.0.0-3.2.0.0_xxxx

2. Click **Upgrade Now** to upgrade the OAW-IAP to the newer version.

Automatic

1. Click **Check for New Version** to automatically check for images on the Alcatel-Lucent image server in the cloud.

The field is replaced with the **Image Check in Progress** message. After the image check is completed, one of the following messages appears:

- No new version available— If there is no new version available.
- Image server timed out— Connection or session between the image server and the OAW-IAP is timed out.
- Image server failure— If the image server does not respond.
- A new image version found— If a new image version is found.

2. If a new version is found, the **Upgrade Now** button becomes available and displays the version number.
3. Click **Upgrade Now**.

   The OAW-IAP downloads the image from the server, saves it to flash and reboots. Depending on the progress and success of the upgrade, one of the following messages is displayed:

   - Upgrading— While image upgrading is in progress.
   - Upgrade successful— When the upgrading is successful.
   - Upgrade fail— When the upgrading fails.

Mobility Access Switch (MAS) Overview

The Alcatel-LucentOS Mobility Access Switch enables secure, role-based network access for wired users and devices, independent of their location or application. Installed in wiring closets, the MAS delivers up to 384 wire-speed Gigabit Ethernet switch ports and operates as a wired access point when deployed with an Alcatel-Lucent Mobility Controller.

As a wired access point, users and their devices are authenticated and assigned a unique role by the Mobility Controller. These roles are consistently applied whether the user is a Wi-Fi client, or connects to a port on the Mobility Access Switch. The result is an enterprise workforce that has consistent, secure access to network resources based on who they are – no matter where they are, what device they're using or how they connect.

Two models of the Mobility Access Switch are available, the S3500 and S2500.

For more information on MAS, see the ***Alcatel-LucentOS 7.1.3 User Guide***.

MAS Integration with an OAW-IAP

The Instant AP can be integrated with a MAS by plugging the Instant AP directly to the MAS port.

This section describes two main Mobility Access Switch (MAS) integration features:

- Rogue AP containment
- PoE prioritization
- GVRP Integration

Rogue AP Containment

When a rogue AP is detected by Instant, it sends the MAC Address of the rogue AP to the MAS. The MAS blacklists the MAC address of the rogue AP and turns off the PoE on the port.

PoE Prioritization

When an Instant AP is plugged directly into the MAS port, the MAS should increase the PoE priority of the port. This is done only if the PoE priority is set by default in the MAS.

NOTE

The PoE Prioritization and Rogue AP Containment features is available for Alcatel-LucentOS 7.2 release on
Alcatel-Lucent's Mobility Access Switches.

GVRP Integration

Configuring GARP VLAN Registration Protocol (GVRP) in Alcatel-LucentOS MAS enables the switch to dynamically register or de-register VLAN information received from a GVRP applicant such as an OAW-IAP. GVRP support also enables the switch to propagate the registered VLAN information to the neighboring switches in the network.

NOTE

The associated static VLANs in used wired and wireless profiles are propagated to the upstream MAS using GVRP messages.

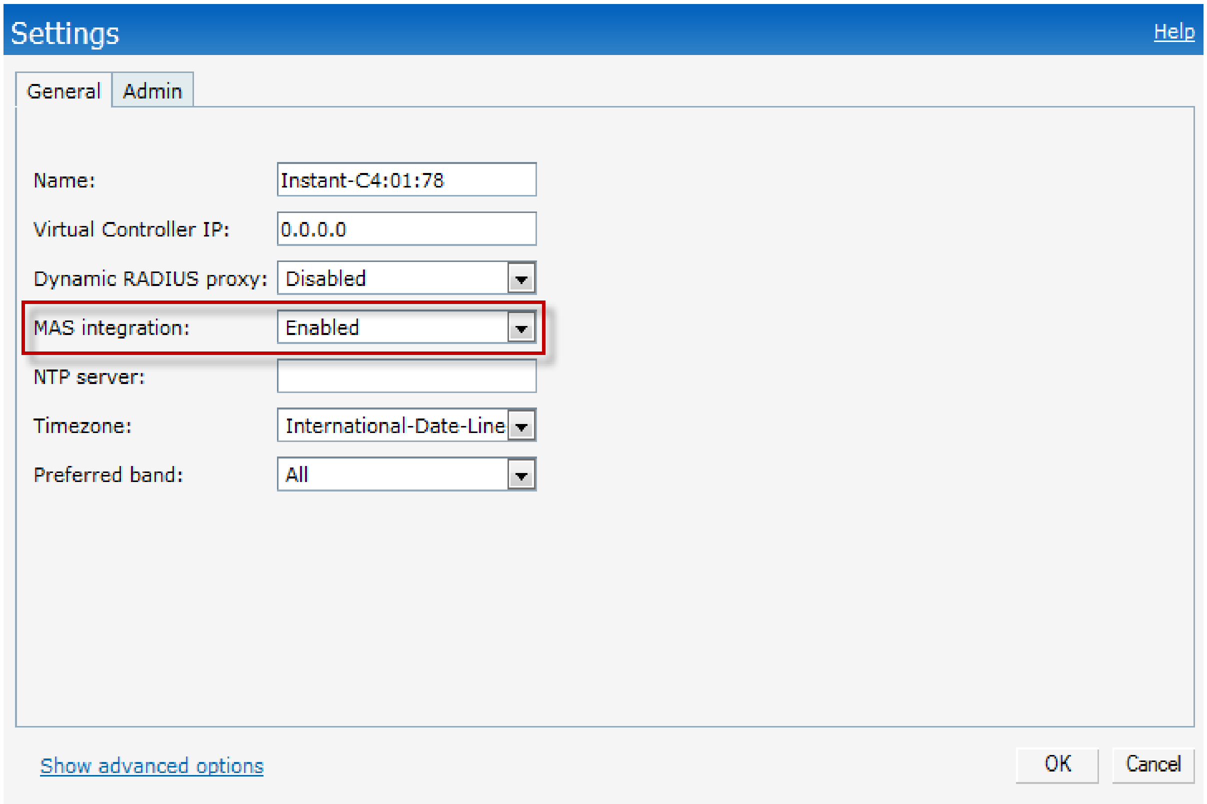
Enabling MAS Integration

This functionality enables the LLDP for the MAS integration. Using this protocol the OAW-IAPs instructs the MAS to turn off the ports where rogue APs are connected and to take actions such as increasing the PoE priority and to automatically configure the VLANs on the ports where the OAW-IAPs are connected.

To enable the MAS integration functionality, perform the following steps in the Instant UI:

1. Navigate to **Settings** at the top right corner of the Instant UI.
2. Navigate to **General** tab and select **Enabled** from the **MAS integration** drop-down list.

Figure 71 - *Enabling MAS Integration with an OAW-IAP*



Settings

Name: Instant-C4:01:78

Virtual Controller IP: 0.0.0.0

Dynamic RADIUS proxy: Disabled

MAS integration: Enabled

NTP server:

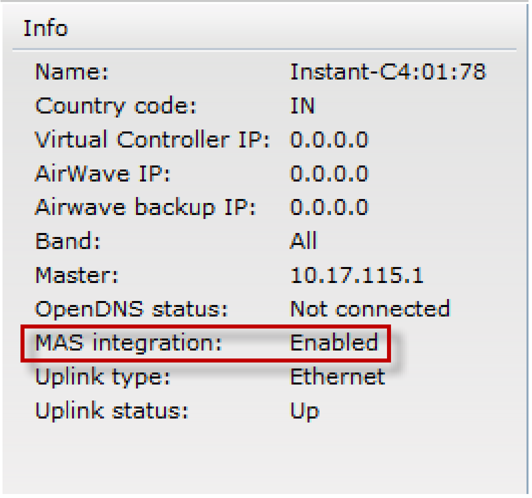
Timezone: International-Date-Line

Preferred band: All

Viewing the MAS Integration Status

The user can view the current status of the MAS integration in the Instant UI under **Info** tab.

Figure 72 - *MAS Integration Status*



Info

Name:	Instant-C4:01:78
Country code:	IN
Virtual Controller IP:	0.0.0.0
AirWave IP:	0.0.0.0
Airwave backup IP:	0.0.0.0
Band:	All
Master:	10.17.115.1
OpenDNS status:	Not connected
MAS integration:	Enabled
Uplink type:	Ethernet
Uplink status:	Up

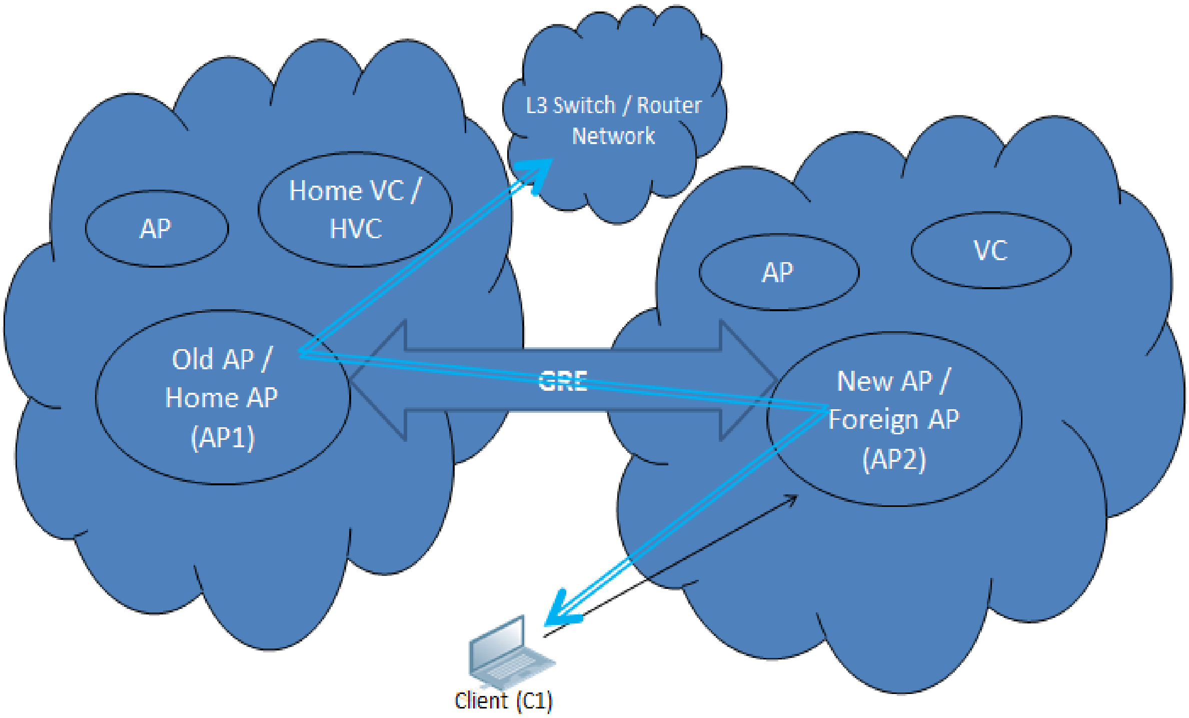
OAW-IAPs form a single Instant network when they are in the same L2 domain. As the number of clients increase, multiple subnets are required to avoid broadcast overhead. In such a scenario, a client should be allowed to roam away from the Instant network to which it first connected (home network) to another Instant network supporting the same WLAN access parameters (foreign network) and continue its existing sessions.

Layer-3 mobility allows a client to roam without losing its IP address and sessions. If WLAN access parameters are same across these networks, clients connected to APs in a given Instant network can roam to APs in a foreign Instant network and continue their existing sessions. Clients roaming across these networks are able to continue using their IP addresses after roaming. You can configure a list of Virtual Controller IP addresses across which L3 mobility is supported.

Overview

Alcatel-Lucent Instant Layer-3 mobility solution defines a Mobility Domain as a set of Instant networks, with same WLAN access parameters, across which client roaming is supported. The Instant network to which the client first connects is called its home network. When the client roams to a foreign network, an AP in the home network (home AP) anchors all traffic to or from this client. The AP to which the client is connected in the foreign network (foreign AP) tunnels all client traffic to or from the home AP through a GRE tunnel.

Figure 73 - Routing of traffic when the client is away from its home network



When a client first connects to an Instant network, a message is sent to all configured Virtual Controller IP addresses to see if this is an L3 roamed client. On receiving an acknowledgement from any of the configured Virtual Controller IP addresses, the client is identified as an L3 roamed client. If the AP has no GRE tunnel to this home network, a new tunnel is formed to an AP (home AP) from the client's home network.

Each foreign AP has only one home AP per Instant network to avoid duplication of broadcast traffic. Separate GRE tunnels are created for each foreign AP / home AP pair. If a peer AP is a foreign AP for one client and a home AP for another, two separate GRE tunnels are used to handle L3 roaming traffic between these APs.

If client subnet discovery fails on association due to some reason, the foreign AP identifies its subnet when it sends out the first L3 packet. If the subnet is not a local subnet and belongs to another Instant network, the client is treated as an L3 roamed client and all its traffic is forwarded to the home network via a GRE tunnel.

Configuring a Mobility Domain

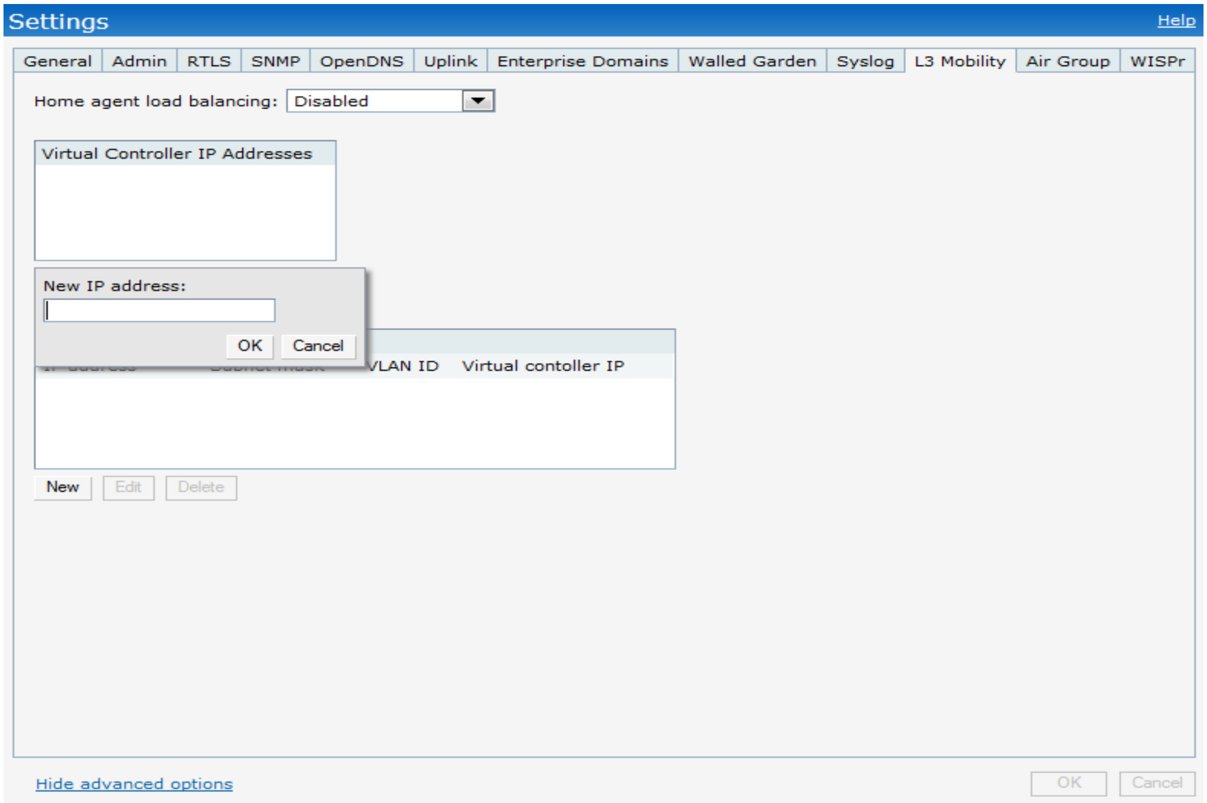
To configure a mobility domain, you have to specify the list of all Instant networks that form the mobility domain. In order to allow clients to roam seamlessly among all the APs, specify the Virtual Controller IP for each foreign subnet. You may include the local Instant/ VC IP address, so that the same configuration can be used across all Instant networks in the mobility domain. Best practice is to configure all client subnets in the mobility domain so that:

- If the client is from the local subnet, it is determined to be a local client as soon as it starts using the IP address and L3 roaming is aborted.
- If the client is from a foreign subnet, it is determined to be a foreign client as soon as it starts using the IP address and L3 roaming is immediately set up.

Perform the following steps to configure a mobility domain:

1. Click the **Settings** link at the upper right corner of the Instant UI.
2. Click the **Show advanced options** link and then click **L3 Mobility**.
3. Click **New** in the **Virtual Controller IP Addresses** section, add the IP address of a VC that is part of the mobility domain, and click **OK**.

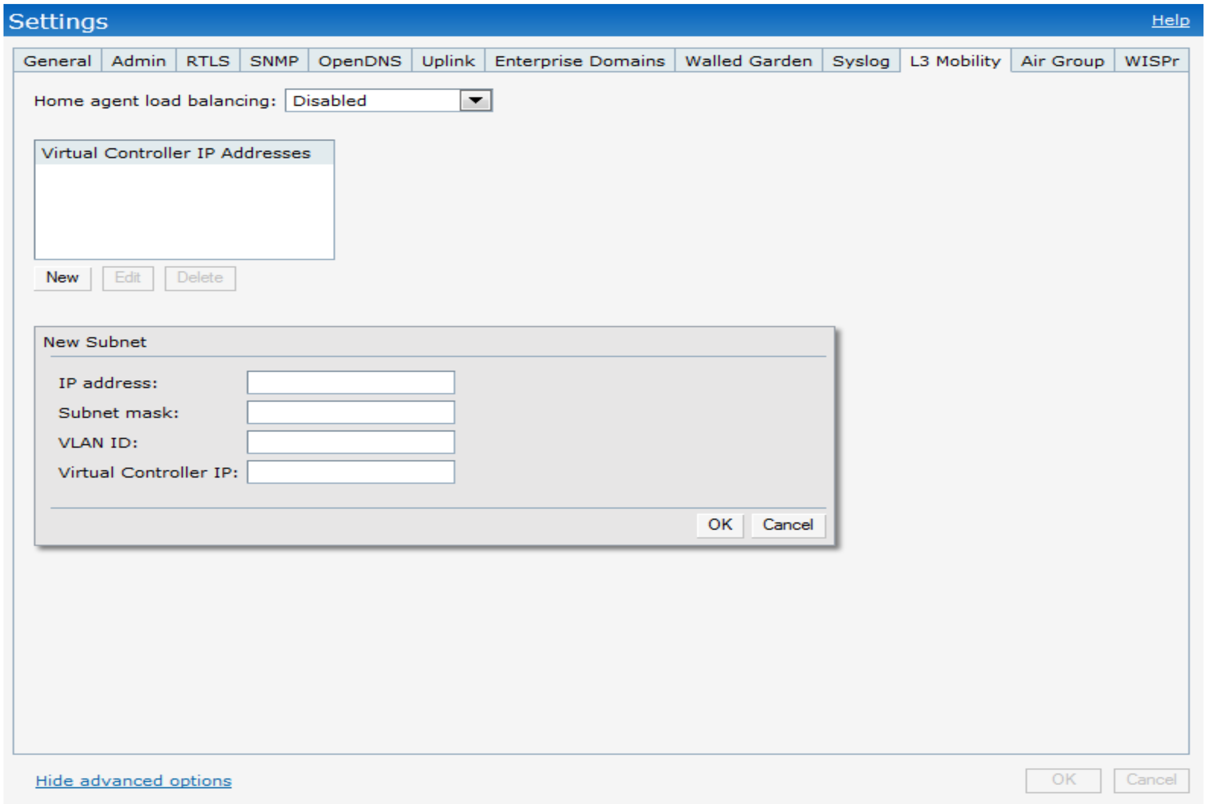
Figure 74 - *Add Virtual Controller IP Addresses*



Home agent load balancing: Disabled

4. Repeat Step 3 to add the IP addresses of all Virtual Controllers that form the L3 mobility domain.
5. Click **New** in the **Subnets** section and specify the following:
   a. Enter the client subnet in the **IP address** text box.
   b. Enter the mask in the **Subnet mask** text box.
   c. Enter the VLAN ID in the home network in the **VLAN ID** text box.
   d. Enter the home VC IP address for this subnet in the **Virtual Controller IP** text box.

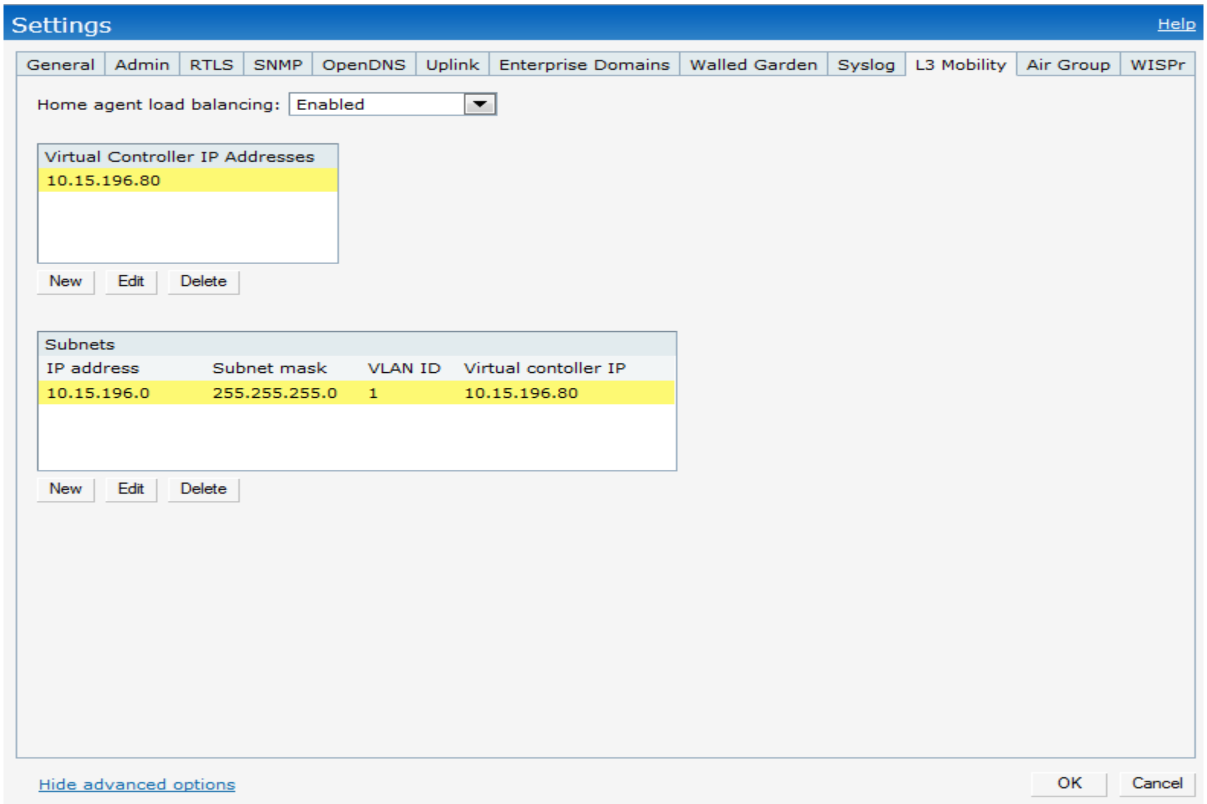
Figure 75 - *Add Subnets Information*



Home agent load balancing: Disabled

6. Click **OK**.

Figure 76 - *Example Layer-3 Configuration*



Home agent load balancing: Enabled

Virtual Controller IP Addresses
10.15.196.80

IP address	Subnet mask	VLAN ID	Virtual contoller IP
10.15.196.0	255.255.255.0	1	10.15.196.80

Home Agent Load Balancing

Home Agent Load Balancing is required in large networks where multiple tunnels might terminate on a single border or lobby AP and overload it. When load balancing is enabled, the VC assigns the home AP for roamed clients by using a *round robin* policy. With this policy, the load for the APs acting as Home Agents for roamed clients is uniformly distributed across the Instant cluster. By default, home agent load balancing is disabled.

To enable home agent load balancing by performing the following steps:

1. Click the **Settings** link at the upper right corner of the Instant UI.
2. Click the **Show advanced options** link and then click **L3 Mobility**.
3. Select **Enabled** from the **Home agent load balancing** drop-down list.

Wireless networks operate in environments with electrical and radio frequency devices that can interfere with network communications. Microwave ovens, cordless phones, and even adjacent Wi-Fi networks are all potential sources of continuous or intermittent interference. The spectrum monitor software modules on OAW-IAPs that support this feature are able to examine the radio frequency (RF) environment in which the Wi-Fi network is operating, identify interference and classify its sources. An analysis of the results can then be used to quickly isolate issues with packet transmission, channel quality, and traffic congestion caused by contention with other devices operating in the same band or channel.

Spectrum monitors (SMs*)* are OAW-IAP radios that gather spectrum data but do not service clients. Each SM scans and analyzes the spectrum band used by the SM's radio (2.4 GHz or 5 GHz). An AP radio in *hybrid AP* mode continues to serve clients as an access point while it analyzes spectrum analysis data for the channel the radio uses to serve clients. You can record data for both types of spectrum monitor devices. However, the recorded spectrum is not reported to the Virtual Controller. A spectrum alert is sent to the VC when a non-Wi-Fi interference device is detected.

The spectrum monitor is supported on OAW-IAP-104, OAW-IAP-105, OAW-IAP-134, and OAW-IAP-135 radios.

Creating Spectrum Monitors and Hybrid APs

An OAW-IAP can be provisioned to function as a spectrum monitor or as a hybrid OAW-IAP. The radios on groups of APs can be converted to dedicated spectrum monitors or hybrid APs via the AP group’s 802.11a and 802.11g radio profiles.

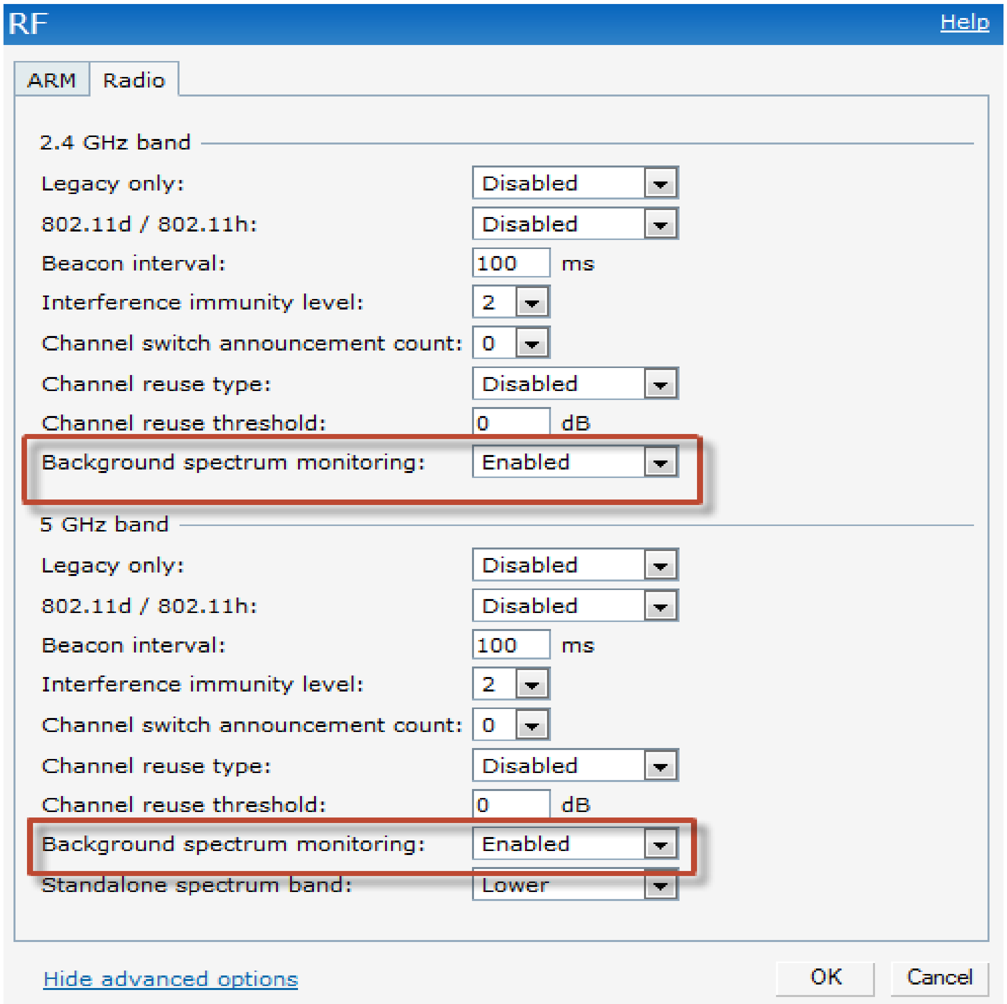
Converting OAW-IAPs into Hybrid OAW-IAPs

You can convert all OAW-IAPs in an Instant network into a hybrid OAW-IAPs by selecting the **Background spectrum monitoring** option in the Alcatel-Lucent Instant network’s 802.11a and 802.11g radio profiles. APs in Access Mode continue to provide normal access service to clients, while providing the additional function of monitoring RF interference. If any OAW-IAP in the Instant network does not support the spectrum monitoring feature, that AP continues to function as a standard OAW-IAP, rather than a hybrid OAW-IAP. By default, the background spectrum monitoring option is disabled. In the hybrid mode, spectrum monitoring is performed only on the home channel.

Follow the procedure below to convert OAW-IAPs in an Alcatel-Lucent Instant network to hybrid mode:

1. Click the **RF** link at the top right corner of the Instant UI.
2. Click **Show advanced options** to view the **Radio** tab.

Figure 77 - *Configuring a Hybrid OAW-IAP*



2.4 GHz band

Legacy only: Disabled

802.11d / 802.11h: Disabled

Beacon interval: 100 ms

Interference immunity level: 2

Channel switch announcement count: 0

Channel reuse type: Disabled

Channel reuse threshold: 0 dB

Background spectrum monitoring: Enabled

5 GHz band

Legacy only: Disabled

802.11d / 802.11h: Disabled

Beacon interval: 100 ms

Interference immunity level: 2

Channel switch announcement count: 0

Channel reuse type: Disabled

Channel reuse threshold: 0 dB

Background spectrum monitoring: Enabled

Standalone spectrum band: Lower

3. To enable a spectrum monitor on the 802.11g radio band, in the 2.4 GHz radio profile, select **Enabled** from the **Background Spectrum Monitoring** drop-down list.
4. To enable a spectrum monitor on the 802.11a radio band, in the 5 GHz radio profile, select **Enabled** from the **Background Spectrum Monitoring** drop-down list.
5. Click **OK**.

Converting an OAW-IAP to a Spectrum Monitor

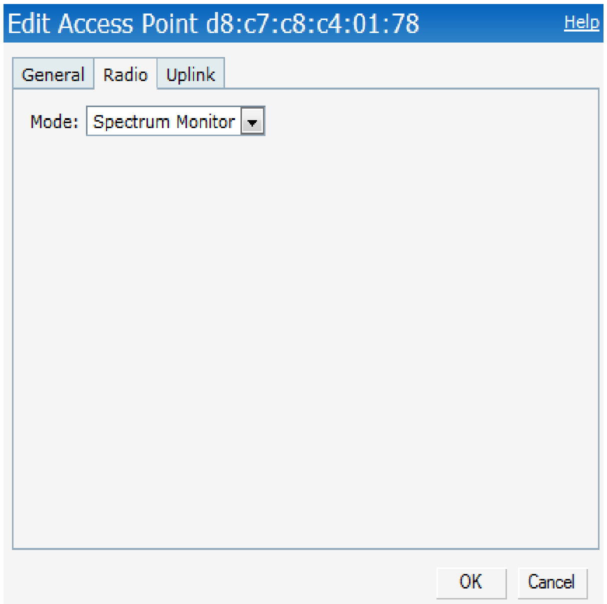
You can configure an OAW-IAP to function as a standalone spectrum monitor. In spectrum mode, spectrum monitoring is performed on entire bands. However for the 5 GHz radio, spectrum monitoring is performed on only one of the three bands: 5 GHz - lower, 5 GHz - middle, or 5 GHz - higher. By default, spectrum monitoring is performed on the 5 GHz - higher band.

Follow the procedure below to convert an OAW-IAP to a spectrum monitor.

1. In the **Access Points** tab, click the AP that you want to convert to a spectrum monitor. The **edit** link appears.
2. Click the **edit** link. The **Edit Access Point** window appears.
3. Click the **Radio** tab.
4. From the **Access Mode** drop-down list, select **Spectrum Monitor.**
5. Click **OK**.

6. Reboot the OAW-IAP for the changes to take effect.

Figure 78 - *Configuring a Spectrum Monitor*



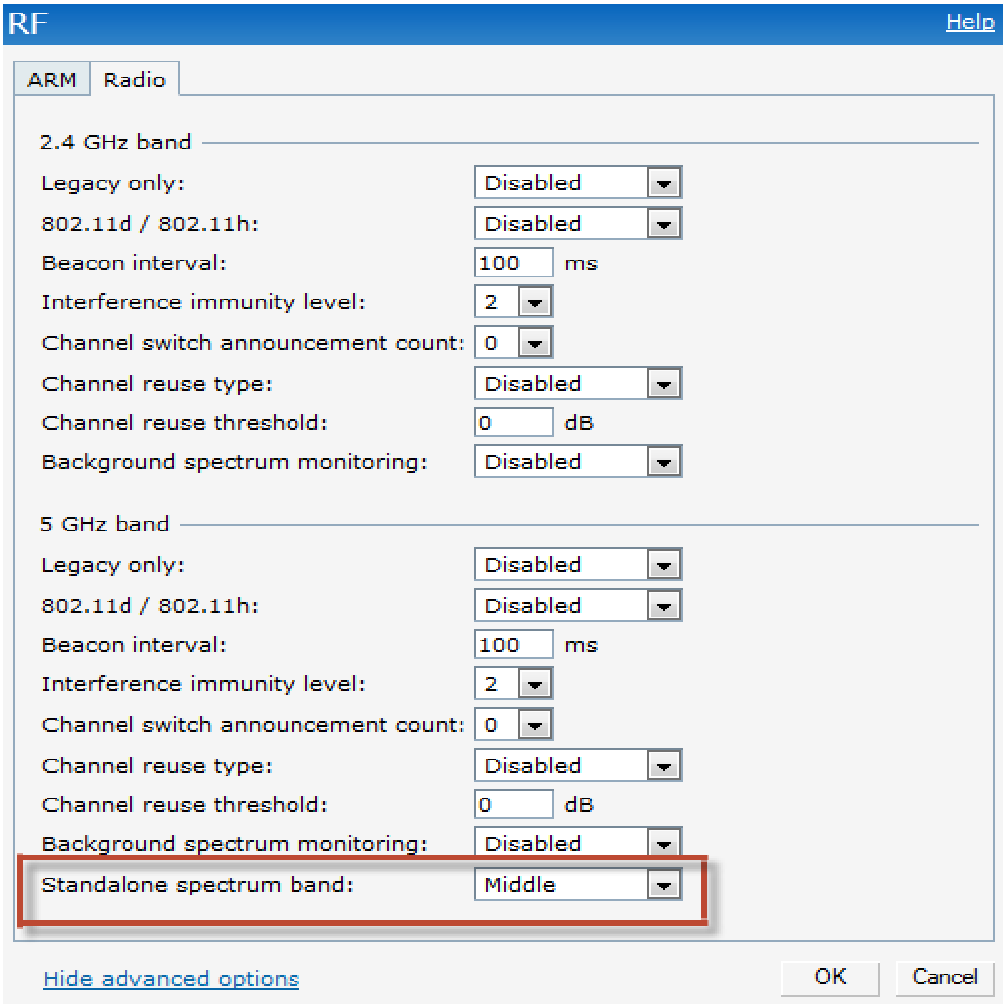
Edit Access Point d8:c7:c8:c4:01:78

Mode: Spectrum Monitor

By default, spectrum monitoring is performed on the 5 GHz - higher band.

7. To enable spectrum monitoring for any other band for the 5 GHz radio:
   a. Click the **RF** link at the upper right corner of the Instant UI.
   b. Click **Show advanced options** to view the **Radio** tab.
   c. For the 5 GHz radio, specify the spectrum band you want that radio to monitor by selecting **Lower, Middle,** or **Higher** from the **Standalone spectrum band** drop-down list.
   d. Click **OK.**

Figure 79 - *Monitor Middle Band for 5 GHz Radio.*



2.4 GHz band

Legacy only:	Disabled
802.11d / 802.11h:	Disabled
Beacon interval:	100 ms
Interference immunity level:	2
Channel switch announcement count:	0
Channel reuse type:	Disabled
Channel reuse threshold:	0 dB
Background spectrum monitoring:	Disabled

5 GHz band

Legacy only:	Disabled
802.11d / 802.11h:	Disabled
Beacon interval:	100 ms
Interference immunity level:	2
Channel switch announcement count:	0
Channel reuse type:	Disabled
Channel reuse threshold:	0 dB
Background spectrum monitoring:	Disabled
Standalone spectrum band:	Middle

Spectrum Data

The spectrum data is collected by each OAW-IAP spectrum monitor and hybrid AP. The spectrum data is not reported to the VC. The **Spectrum** link is visible in the Instant UI (Access Point view) only if you have enabled the spectrum monitoring feature. You can view the following spectrum data in the Instant UI:

- Overview - Device List on page 130
- Channel Metrics on page 133
- Channel Details on page 134

Overview - Device List

The device list consists of a device summary table and channel information for active non-Wi-Fi devices currently seen by a spectrum monitor or hybrid AP radio. To view the device list, click **Spectrum** in the dashboard.

To view the device list, click **Spectrum** in the dashboard.

Table 14 shows the details of the information that is displayed:

Table 14 - *Device Summary and Channel Information*

Column	Description
Type	Device type. This parameter can be any of the following: • audio FF (fixed frequency) • bluetooth • cordless base FH (frequency hopper) • cordless phone FF (fixed frequency) • cordless network FH (frequency hopper) • generic FF (fixed frequency) • generic FH (frequency hopper) • generic interferer • microwave • microwave inverter • video • xbox **NOTE:** For additional details about non-Wi-Fi device types shown in this table, see Table 15.
ID	ID number assigned to the device by the spectrum monitor or hybrid AP radio. Spectrum monitors and hybrid APs assign a unique spectrum ID per device type.
Cfreq	Center frequency of the signal sent from the device.
Bandwidth	Channel bandwidth used by the device.
Channels-affected	Radio channels affected by the wireless device.
Signal-strength	Strength of the signal sent from the device, in dBm.
Duty-cycle	Device duty cycle. This value represents the percent of time the device broadcasts a signal.
Add-time	Time at which the device was first detected.
Update-time	Time at which the device's status was updated.

Non WiFi Interferers

The following table describes each type of non Wi-Fi interferer detected by the spectrum monitor feature.

Table 15 - *Non Wi-Fi Interferer Types*

Non Wi-Fi Interferer	Description
Bluetooth	Any device that uses the Bluetooth protocol to communicate in the 2.4 GHz band is classified as a *Bluetooth* device. Bluetooth uses a frequency hopping protocol.
Fixed Frequency (Audio)	Some audio devices such as wireless speakers and microphones also use fixed frequency to continuously transmit audio. These devices are classified as *Fixed Frequency (Audio)*.
Fixed Frequency	Some cordless phones use a fixed frequency to transmit data (much like the fixed frequency video devices). These devices are classified as

Non Wi-Fi Interferer	Description
(Cordless Phones)	*Fixed Frequency (Cordless Phones)*.
Fixed Frequency (Video)	Video transmitters that continuously transmit video on a single frequency are classified as *Fixed Frequency (Video*). These devices typically have close to a 100% duty cycle. These types of devices may be used for video surveillance, TV or other video distribution, and similar applications.
Fixed Frequency (Other)	All other fixed frequency devices that do not fall into one of the above categories are classified as *Fixed Frequency (Other*). Note that the RF signatures of the fixed frequency audio, video and cordless phone devices are very similar and that some of these devices may be occasionally classified as Fixed Frequency (Other).
Frequency Hopper (Cordless Base)	Frequency hopping cordless phone base units transmit periodic beacon-like frames at all times. When the handsets are not transmitting (i.e., no active phone calls), the cordless base is classified as *Frequency Hopper (Cordless Base*).
Frequency Hopper (Cordless Network)	When there is an active phone call and one or more handsets are part of the phone conversation, the device is classified as *Frequency Hopper (Cordless Network*). Cordless phones may operate in 2.4 GHz or 5 GHz bands. Some phones use both 2.4 GHz and 5 GHz bands (for example, 5 GHz for Base-to-handset and 2.4 GHz for Handset-to-base). These phones may be classified as unique Frequency Hopper devices on both bands.
Frequency Hopper (Xbox)	The Microsoft Xbox device uses a frequency hopping protocol in the 2.4 GHz band. These devices are classified as *Frequency Hopper (Xbox*).
Frequency Hopper (Other)	When the classifier detects a frequency hopper that does not fall into one of the above categories, it is classified as *Frequency Hopper (Other)*. Some examples include IEEE 802.11 FHSS devices, game consoles and cordless/hands-free devices that do not use one of the known cordless phone protocols.
Microwave	Common residential microwave ovens with a single magnetron are classified as a *Microwave*. These types of microwave ovens may be used in cafeterias, break rooms, dormitories and similar environments. Some industrial, healthcare or manufacturing environments may also have other equipment that behave like a microwave and may also be classified as a Microwave device.
Microwave (Inverter)	Some newer-model microwave ovens have the inverter technology to control the power output and these microwave ovens may have a duty cycle close to 100%. These microwave ovens are classified as *Microwave (Inverter)*. Dual-magnetron industrial microwave ovens with higher duty cycle may also be classified as Microwave (Inverter). As in the Microwave category described above, there may be other equipment that behave like inverter microwaves in some industrial, healthcare or manufacturing environments. Those devices may also be classified as Microwave (Inverter).
Generic Interferer	Any non-frequency hopping device that does not fall into one of the other categories described in this table is classified as a *Generic Interferer*. For example a Microwave-like device that does not operate

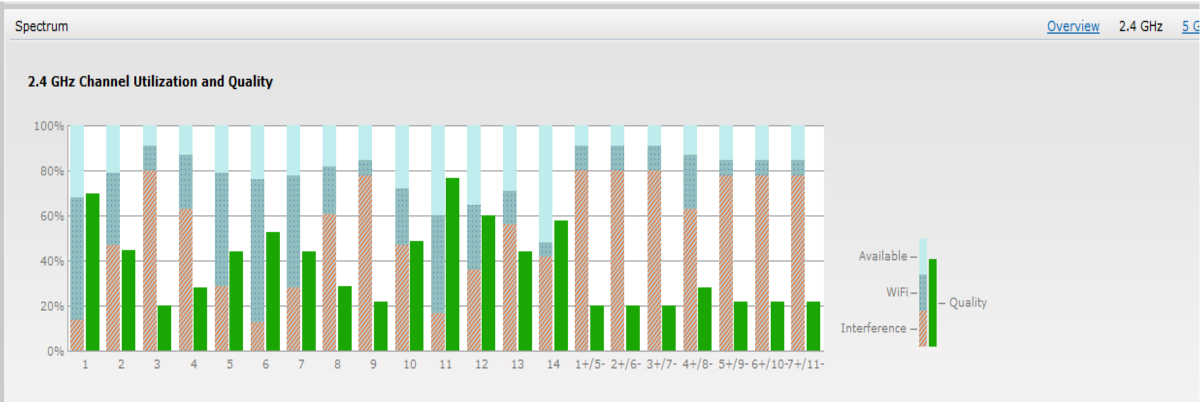
Non Wi-Fi Interferer	Description
	in the known operating frequencies used by the Microwave ovens may be classified as a Generic Interferer. Similarly wide-band interfering devices may be classified as Generic Interferers.

Channel Metrics

The channel metrics graph displays channel quality, availability and utilization metrics as seen by a spectrum monitor or hybrid AP. You can view the channel utilization data for the percentage of each channel that is currently being used by Wi-Fi devices, and the percentage of each channel being used by non-Wi-Fi devices and 802.11 adjacent channel interference (ACI). This chart shows the channel availability, the percentage of each channel that is available for use, or the current relative quality of selected channels in the 2.4 GHz or 5 GHz radio bands. While spectrum monitors can display data for all channels in their selected band, hybrid APs display data for their one monitored channel only.

To view this graph, click **2.4 GHz** in the **Spectrum** section of the dashboard.

Figure 80 - *Channel Metrics for the 2.4 GHz Radio Channel*



To view this graph, click **5 GHz** in the **Spectrum** section of the dashboard.

Figure 81 - *Channel Metrics for the 5 GHz Radio Channel*

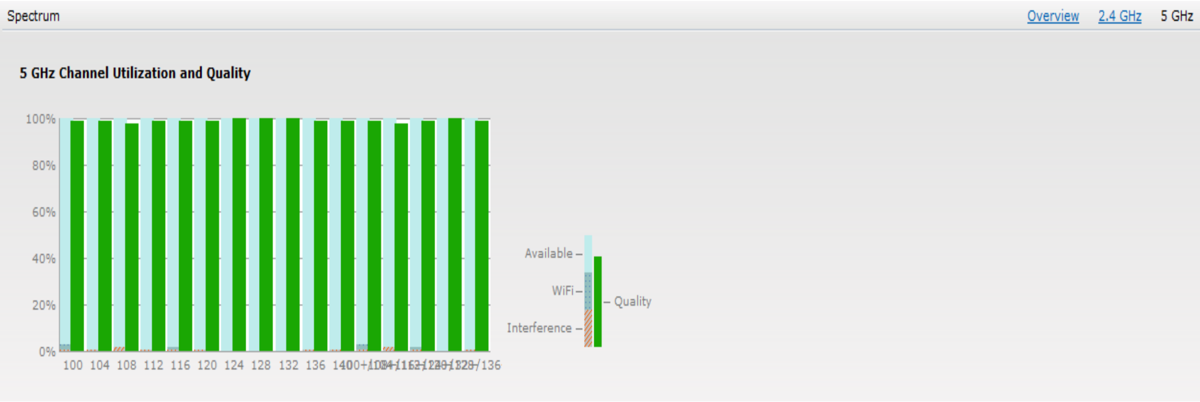


Table 16 shows the information displayed in the channel metrics graph.

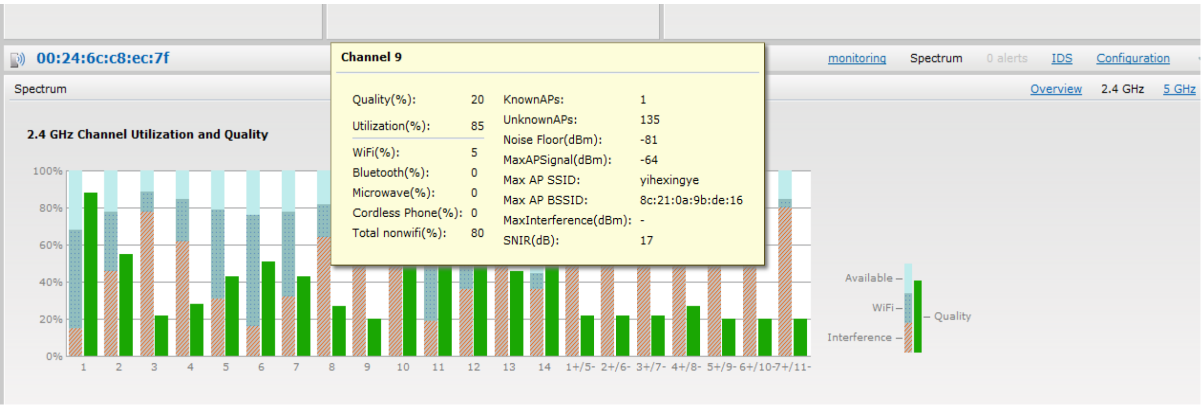
Table 16 - *Channel Metrics*

Column	Description
Channel	A 2.4 GHz or 5 GHz radio channel.
Quality(%)	Current relative quality of selected channels in the 2.4 GHz or 5 GHz radio bands, as determined by the percentage of packet retries, the current noise floor, and the duty cycle for non-Wi-Fi devices on that channel.
Availability(%)	The percentage of the channel currently available for use.
Utilization(%)	The percentage of the channel being used.
WiFi Util(%)	The percentage of the channel currently being used by Wi-Fi devices.
Interference Util(%)	The percentage of the channel currently being used by non-Wi-Fi interference + Wi-Fi ACI (Adjacent Channel Interference)

Channel Details

When you move your mouse over a channel, the channel details or the summary of the 5 GHz and 2.4 Ghz channels as detected by a spectrum monitor are displayed. You can view the aggregate data for each channel seen by the spectrum monitor radio, including the maximum AP power, interference and the signal-to-noise-and-interference Ratio (SNIR). SNIR is the ratio of signal strength to the combined levels of interference and noise on that channel. Spectrum monitors display spectrum data seen on all channels in the selected band, and hybrid APs display data from the one channel they are monitoring.

Figure 82 - *Channel Details*



Channel 9

```
Quality(%):          20    KnownAPs:              1
Utilization(%):      85    UnknownAPs:            135
WiFi(%):             5     Noise Floor(dBm):      -81
Bluetooth(%):        0     MaxAPSignal(dBm):      -64
Microwave(%):        0     Max AP SSID:           yihexingye
Cordless Phone(%):   0     Max AP BSSID:          8c:21:0a:9b:de:16
Total nonwifi(%):    80    MaxInterference(dBm):  -
                           SNIR(dB):              17
```

Table 17 shows the information that you can view in the channel details graph.

Table 17 - *Channel Details Information*

Column	Description
Channel	An 802.11a or 802.11g radio channel.
Quality(%)	Current relative quality of the channel.

Column	Description
Utilization(%)	The percentage of the channel being used.
Wi-Fi (%)	The percentage of the channel currently being used by Wi-Fi devices.
Type	Device type.
Total nonwifi (%)	The percentage of the channel currently being used by non Wi-Fi devices.
Known APs	Number of valid APs identified on the radio channel.
UnKnown APs	Number of invalid or rogue APs identified on the radio channel.
Channel Util (%)	Percentage of the channel currently in use.
Max AP Signal (dBm)	Signal strength of the AP that has the maximum signal strength on a channel.
Max Interference (dBm)	Signal strength of the non WI-FI device that has the highest signal strength.
SNIR (db)	The ratio of signal strength to the combined levels of interference and noise on that channel. This value is calculated by determining the maximum noise-floor and interference-signal levels, and then calculating how strong the desired signal is above this maximum.

Spectrum Alerts

When new non-Wi-Fi device is found, an alert is reported to the Virtual Controller. The spectrum alert messages include the device ID, device type, IP address of the spectrum monitor or hybrid AP, and the timestamp. Virtual Controller reports the detailed device information to AMP.

NTP Server

For successful and proper communication between various elements in a network, time synchronization between the elements and across the network is critical. Following are the uses of time synchronization:

- Trace and track security gaps, network usage, and troubleshoot network issues.
- Map event on one network element to a corresponding event on another.
- Maintain accurate time for billing services and similar.

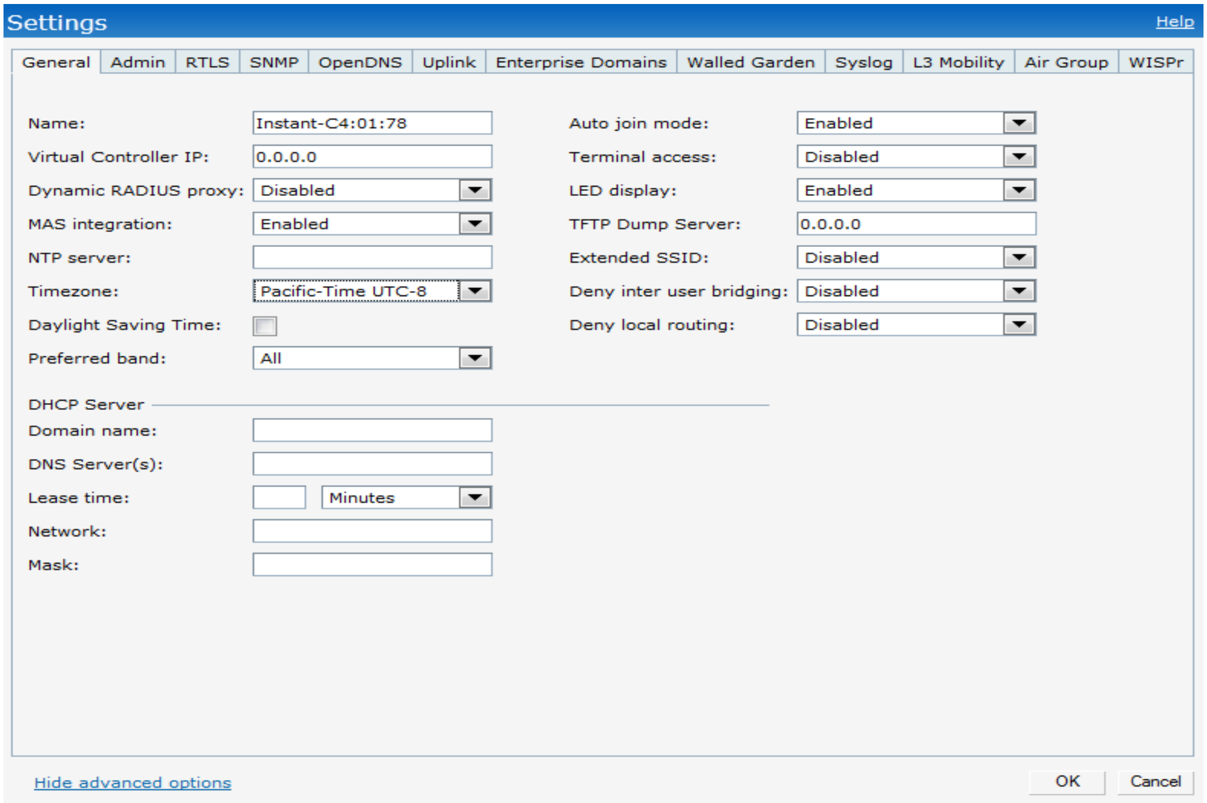
Network Time Protocol (NTP) is required to obtain the precise time from a server and to regulate the local time in each network element. If NTP server is not configured in the Alcatel-Lucent Instant network, an OAW-IAP reboot may lead to variation in time and data.

Configuring an NTP Server

The NTP server is set to **pool.ntp.org** by default. To configure the NTP server on Alcatel-Lucent Instant, perform the following steps.

1. Navigate to the **Settings** tab in the top right corner of the Instant UI.

Figure 83 - *Configuring NTP Server*



Name: Instant-C4:01:78
Virtual Controller IP: 0.0.0.0
Dynamic RADIUS proxy: Disabled
MAS integration: Enabled
NTP server:
Timezone: Pacific-Time UTC-8
Daylight Saving Time: □
Preferred band: All

Auto join mode: Enabled
Terminal access: Disabled
LED display: Enabled
TFTP Dump Server: 0.0.0.0
Extended SSID: Disabled
Deny inter user bridging: Disabled
Deny local routing: Disabled

DHCP Server
Domain name:
DNS Server(s):
Lease time: Minutes
Network:
Mask:

2. In the **General** tab, enter the IP address or the URL (domain name) of the NTP server in the **NTP Server** text box.

3. Select the timezone from the **Timezone** drop-down list. This indicates the time returned by the NTP server.

> You can enable daylight saving time on OAW-IAPs if the time zone you selected supports the daylight saving time. This feature ensures that the OAW-IAPs reflect the seasonal time changes in the region they serve.

4. Click **OK**.

Daylight Saving Time

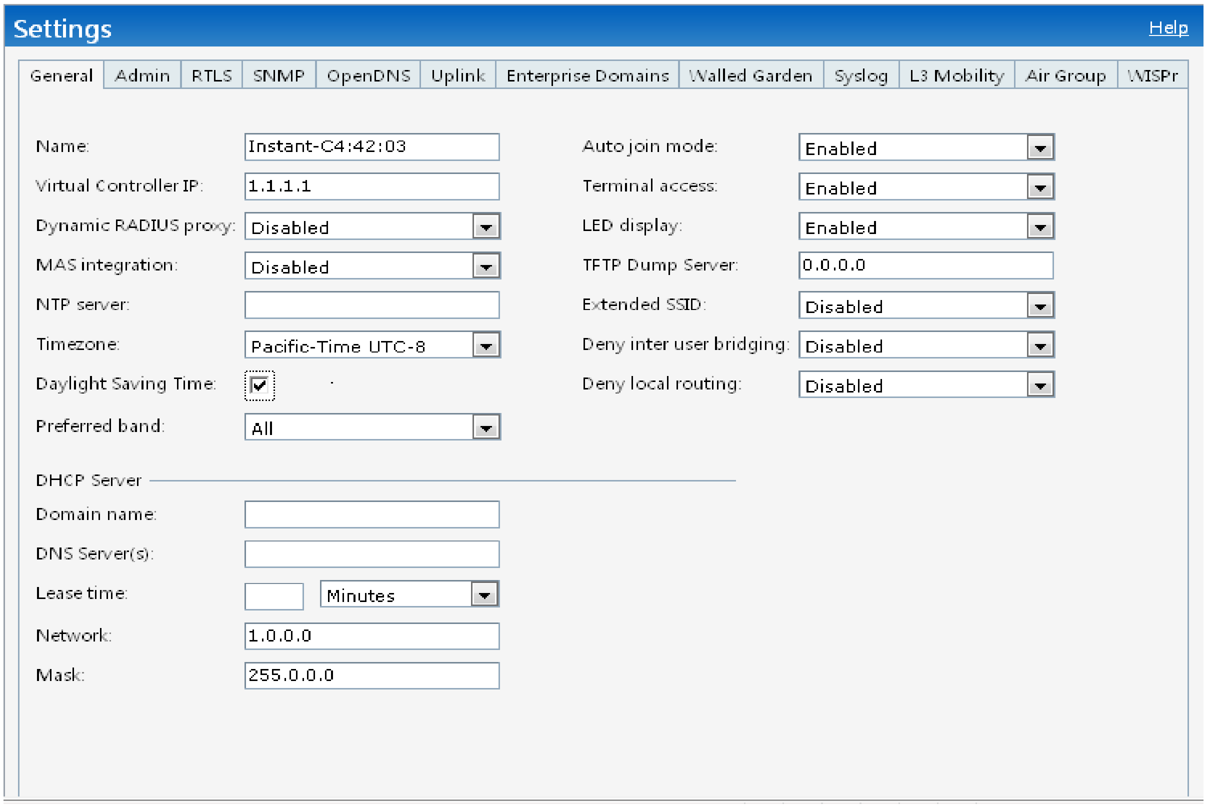
Daylight saving time (DST), also know as summer time, is the practice of advancing clocks so that evenings have more daylight and mornings have less. Typically clocks are adjusted forward one hour near the start of spring and are adjusted backward in autumn. Many countries observe DST, and many do not. If the time zone you selected for an OAW-IAP supports DST, you can enable daylight saving time feature on this OAW-IAP to ensure the OAW-IAP reflects the seasonal time changes.

Enabling Daylight Saving Time

To enable the Daylight Saving Time on Alcatel-Lucent Instant, perform the following steps.

1. Navigate to the **Settings** tab in the top right corner of the Instant UI.
2. In the **General** tab, select the check box besides the **Daylight Saving Time**. If the Time Zone selected does not support DST, the **Daylight Saving Time** option does not appear.

Figure 84 - *Enabling Daylight Saving Time*



Name:	Instant-C4:42:03	Auto join mode:	Enabled
Virtual Controller IP:	1.1.1.1	Terminal access:	Enabled
Dynamic RADIUS proxy:	Disabled	LED display:	Enabled
MAS integration:	Disabled	TFTP Dump Server:	0.0.0.0
NTP server:		Extended SSID:	Disabled
Timezone:	Pacific-Time UTC-8	Deny inter user bridging:	Disabled
Daylight Saving Time:	☑	Deny local routing:	Disabled
Preferred band:	All		

DHCP Server

Domain name:	
DNS Server(s):	
Lease time:	Minutes
Network:	1.0.0.0
Mask:	255.0.0.0

Alcatel-Lucent Instant does not require an external mobility switch to regulate and manage the Wi-Fi network. Instead, one OAW-IAP in every network assumes the role of virtual controller. It coordinates, stores, and distributes all the settings required to provide a centralized functionality to regulate and manage the Wi-Fi network. The Virtual Controller (VC) is the single point of configuration and firmware management. When configured, the virtual controller sets up and manages the VPN tunnel to a mobility controller in the data center.

The VC also functions like any other AP with full RF scalability. It also acts as a node, coordinating DHCP address allocation for network address translated clients ensuring mobility of the clients when they roam between different OAW-IAPs.

Master Election Protocol

The Master Election Protocol enables the Alcatel-Lucent Instant network to dynamically elect an OAW-IAP to take on a VC role, allow graceful failover to a new Virtual Controller when the existing VC is down, and avoid race conditions. This protocol ensures stability of the network during initial startup or when the VC goes down by allowing only one OAW-IAP to self-elect as a VC.

Preference to an IAP with 3G/4G Card

The Master Election Protocol prefers the Instant AP (OAW-IAP) with a 3G/4G card, when electing a VC for the Alcatel-Lucent Instant network during initial startup. The VC is selected as follows:

- If there are more than one OAW-IAP with 3G/4G cards, one of these OAW-IAPs is dynamically elected as the VC.
- When an OAW-IAP without 3G/4G card is elected as the VC but is up for less than 5 minutes, another OAW-IAP with 3G/4G card in the network will be elected as the VC to replace it and the previous VC reboots.
- When an OAW-IAP without 3G/4G card is already elected as the VC and is up for more than 5 minutes, the VC will not be replaced until it goes down.

NOTE

OAW-IAP-135 is preferred over OAW-IAP-105 when a VC is elected.

Preference to an OAW-IAP with Non-Default IP

The Master Election Protocol prefers the Instant AP (OAW-IAP) with non-default IP, when electing a VC for the Alcatel-Lucent Instant network during initial startup. If there are more than one OAW-IAPs with non-default IPs in the network, all OAW-IAPs with default IP will automatically reboot and the DHCP process is used to assign new IP addresses.

Virtual Controller IP Address

You can specify a single static IP address that can be used to manage a multi-AP Alcatel-Lucent Instant network. This IP address is automatically provisioned on a shadow interface on the OAW-IAP that takes the role of a Virtual Controller. When an OAW-IAP becomes a Virtual Controller, it sends three Address Resolution Protocol (ARP) messages with the static IP address and its own MAC address to update the network ARP cache.

Specifying Name and IP Address for the Virtual Controller

To specify name and IP address for the Virtual Controller:

1. At the top right corner of the Instant UI, click the **Settings** link. The **Settings** window appears.
2. Enter a name for the Virtual Controller in the **Name** text box.
3. Enter the appropriate IP address in the **Virtual Controller IP** text box.

Configuring the DHCP Server

The DHCP Server is the built-in server, used for networks which have **Client IP Assignment** set to **Virtual Controller** Assigned. The default size of the IP address pool has been increased to 512. You can customize the DHCP pool's subnet and address range if you need to provide simultaneous access to more number of clients. The largest address pool supported is 2048.

To configure the domain name, DNS server, and lease time for the DHCP server, network, and mask, perform the following steps:

1. At the top right corner of the Instant UI, click the **Settings** link.
2. In the **Settings** window, select the **General** tab.
3. Enter the domain name of the client in the **Domain name** text box.
4. Enter the IP addresses of the DNS servers seperated by comma(,) in the **DNS server** text box.
5. Enter the duration of the DHCP lease in the **Lease time** text box.
6. Select **Minutes**, **Hours**, or **Days** for the lease time from the drop-down list next to **Lease time**.
7. Enter the network in the **Network** text box.
8. Enter the mask in the **Mask** text box.

NOTE

To provide simultaneous access to more than 512 clients, use the Network and Mask fields to specify a larger range. While the network (or prefix) is the common part of the address range, the mask (suffix) specifies how long the variable part of the address range is.

9. Click **Ok** to apply the changes.

Authentication Methods in Alcatel-Lucent Instant

Authentication is a process of identifying a user by having them to provide a valid username and password. Clients can also be authenticated based on their MAC addresses. The following authentication methods are supported in Alcatel-Lucent Instant:

- 802.1X Authentication on page 141
- Captive Portal on page 151
- MAC Authentication on page 165
- MAC + 802.1X Authentication on page 167
- MAC + Captive Portal Authentication on page 168

802.1X Authentication

802.1X is a method for authenticating the identity of a user before providing network access to the user. Remote Authentication Dial In User Service (RADIUS) is a protocol that provides centralized authentication, authorization, and accounting management. For authentication purpose, the wireless client can associate to a network access server (NAS) or RADIUS client such as a wireless OAW-IAP. The wireless client can pass data traffic only after successful 802.1X authentication. The steps involved in 802.1X authentication are:

1. The NAS requests authentication credentials from the wireless client.
2. The wireless client sends the authentication credentials to the NAS.
3. The NAS sends these credentials to a RADIUS server.
4. The RADIUS server checks the user identity and begins authentication with the client if the user identity is present in its database. The RADIUS server sends an Access-Accept message to the NAS.

   If the RADIUS server cannot identify the user, it stops the authentication process and sends an Access-Reject message to the NAS. The NAS forwards this message to the client and the client must re-authenticate with correct credentials.
5. After the client is authenticated, the RADIUS server forwards the encryption key to the NAS. The encryption key is used to encrypt or decrypt traffic sent to and from the client.

NOTE

A NAS acts as a gateway to guard access to a protected resource. A client connecting to the wireless network first connects to the NAS.

The Alcatel-Lucent Instant network supports internal RADIUS server and external RADIUS server for 802.1X authentication.

Internal RADIUS Server

Each OAW-IAP has an instance of Free RADIUS server operating locally. When you enable the Internal RADIUS server option for the network, the authenticator on the OAW-IAP sends a RADIUS packet to the local IP address. The Internal RADIUS server listens and replies to the

RADIUS packet. The following authentication methods are supported in Alcatel-Lucent Instant network:

- EAP-TLS— The Extensible Authentication Protocol- Transport Layer Security method supports the termination of EAP-TLS security using the internal RADIUS server. The EAP-TLS requires both server and certification authority (CA) certificates installed onto the OAW-IAP.The client certificate is verified on the Virtual Controller (the client certificate must be signed by a known CA) before the user name is checked on the authentication server.
- EAP-TTLS (MSCHAPv2)— The Extensible Authentication Protocol-Tunneled Transport Layer Security (EAP-TTLS) method uses server-side certificates to set up authentication between clients and servers. However, the actual authentication is performed using passwords.
- EAP-PEAP (MSCHAPv2)— Protected Extensible Authentication Protocol (PEAP) is an 802.1X authentication method that uses server-side public key certificates to authenticate clients with server. The PEAP authentication creates an encrypted SSL / TLS tunnel between the client and the authentication server. Exchange of information is encrypted and stored in the tunnel ensuring the user credentials are kept secure.
- LEAP— Lightweight Extensible Authentication Protocol (LEAP) uses dynamic WEP keys for authentication between the client and authentication server.

NOTE

Alcatel-Lucent does not recommend to use the LEAP authentication method because it does not provide any resistance to network attacks.

External RADIUS Server

In the external RADIUS server, the IP address of the Virtual Controller is configured as the NAS IP address. Instant RADIUS is implemented on the Virtual Controller, and this feature eliminates the need to configure multiple NAS clients for every OAW-IAP on the RADIUS server for client authentication. Instant RADIUS dynamically forwards all the authentication requests from a NAS to a remote RADIUS server. The RADIUS server responds to the authentication request with an Access-Accept or Access-Reject message, and users are allowed or denied access to the network depending on the response from the RADIUS server.

When you enable the external RADIUS server option for the network, the authenticator on the OAW-IAP sends a RADIUS packet to the local IP address. The external RADIUS server then listens and responds to the RADIUS packet.

The following authentication methods are supported in Alcatel-Lucent Instant network:

Authentication Terminated on OAW-IAP

Alcatel-Lucent Instant allows EAP termination for PEAP-GTC and PEAP-MSCHAV2. PEAP-GTC termination allows authorization against an LDAP server and external RADIUS server while PEAP-MSCHAV2 allows authorization against an external RADIUS server. This allows users to run PEAP-GTC termination with their own username and password to a local Microsoft Active Directory server with LDAP authentication.

The following EAP-Type methods are described below:

EAP-Generic Token Card (GTC)— This EAP method permits the transfer of unencrypted usernames and passwords from client to server. The main uses for EAP-GTC are one-time token cards such as SecureID and the use of LDAP or RADIUS as the user authentication server. You can also enable caching of user credentials on the OAW-IAP as a backup to an external authentication server.

EAP-Microsoft Challenge Authentication Protocol version 2 (MS-CHAPv2)— This EAP method is widely supported by Microsoft clients. A RADIUS server must be used as the backend authentication server.

If you are using the OAW-IAP’s internal database for user authentication, you need to add the names and passwords of the users to be authenticated. If you are using an LDAP server for user authentication, you need to configure the LDAP server on the Virtual Controller, and configure user IDs and passwords. If you are using a RADIUS server for user authentication, you need to configure the RADIUS server on the Virtual Controller.

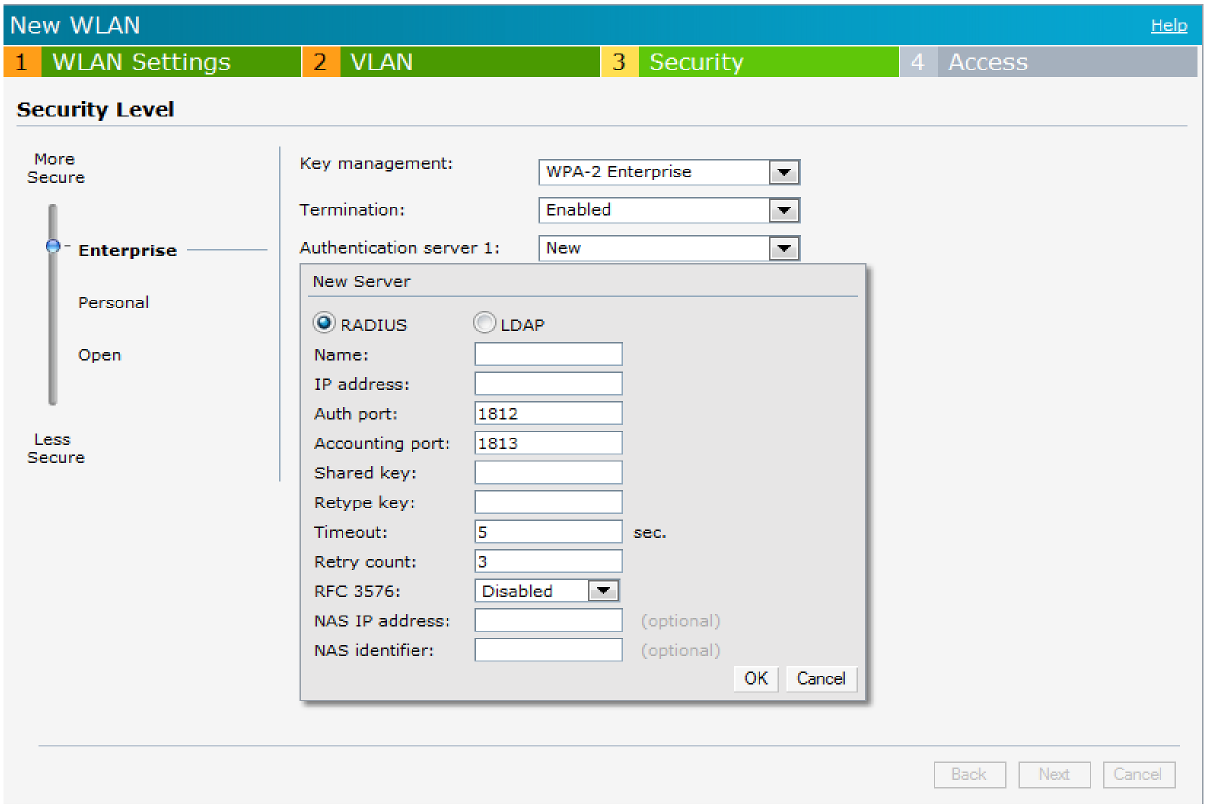
Configuring an External RADIUS Server

To configure an external RADIUS server for a wireless network:

1. Click **New** in the **Networks** tab and select the appropriate **Primary usage.**
2. Click **Next** to continue.
3. Use the **VLAN** tab to specify how the clients on this network get their IP address and VLAN.
4. Click **Next** to continue.
5. In the **Security** tab, slide the bar to **Enterprise** and update the following fields:
   a. **Key Management**— Select the type of key for encryption and authentication.
   b. **Termination**— Select Enabled to terminate the EAP portion of 802.1X authentication on the access point instead of RADIUS server.
   c. **Authentication server 1**— Select **New** from the drop-down list to authenticate user credentials for the RADIUS server at run time and update the following fields:
   - **RADIUS Server**
     - Name— Enter the name of the new external RADIUS server.
     - IP address— Enter the IP address of the external RADIUS server.
     - Auth port— Enter the authorization port number of the external RADIUS server. The port number is set to 1812 by default.
     - Accounting port— Enter the accounting port number. This port is used to send accounting records to the RADIUS server. The port number is set to 1813 by default
     - Shared key— Enter a shared key for communicating with the external RADIUS server.
     - Timeout— Indicates the timeout for one RADIUS request. The OAW-IAP retries to send the request several times (as configured in the "Retry count") before the user gets disconnected. e.g. If the "Timeout" is 5 sec, "Retry counter" is 3, user is disconnected after 20 sec ("Timeout" x "Retry counter + 1). The default value is 5 seconds.
     - Retry count— Specify a number between 1 and 5. Indicates the maximum number of authentication requests that are sent to server group, and the default value is 3 requests.
     - RFC 3576— When enabled, the Access Points process RFC 3576-compliant Change of Authorization (CoA) and Disconnect messages from the RADIUS server. Disconnect messages cause a user session to be terminated immediately, whereas CoA messages modify session authorization attributes such as data filters.
     - NAS IP address— Enter the Virtual Controller IP address. The NAS IP address is the Virtual Controller IP address that is sent in data packets. Note: If you do not enter the IP address, the Virtual Controller IP address is used by default when Dynamic RADIUS Proxy is enabled.

  - NAS identifier— Use this to configure strings for RADIUS attribute 32, NAS Identifier, to be sent with RADIUS requests to the RADIUS server.
- **LDAP Server**
  - Name— Enter the name of the new external RADIUS server.
  - IP address— Enter the IP address of the external RADIUS server.
  - Auth port— Enter the authorization port number of the external RADIUS server. The port number is set to 1812 by default.
  - Admin-DN— Enter a Distinguished Name for the admin user who has read/search privileges across all the entries in the LDAP database. The user may not have write privileges but is able to search the database, and read attributes of the other users in the database.
  - Admin password— Enter a admin password.
  - Base-DN— Enter a Distinguished Name of the node which contains the entire user database.
  - Filter— Indicates the filter that should be applied to search for the user in the LDAP database. The default filter string is (objectclass=*).
  - Key Attribute— Indicates the attribute that should be used as a key in search for the LDAP server. For Active Directory, the value is sAMAccountName.
  - Timeout— Enter a value between 1 and 30 seconds. The default value is 5.
  - Retry count— Enter a value between 1 and 5. The default value is 3.

Figure 85 - *Configuring an External RADIUS Server*



Key management: WPA-2 Enterprise

Termination: Enabled

Authentication server 1: New

● RADIUS ○ LDAP

Name:

IP address:

Auth port: 1812

Accounting port: 1813

Shared key:

Retype key:

Timeout: 5 sec.

Retry count: 3

RFC 3576: Disabled

NAS IP address: (optional)

NAS identifier: (optional)

6. Click **OK** after updating the fields.
7. **Reauth interval** — When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients.

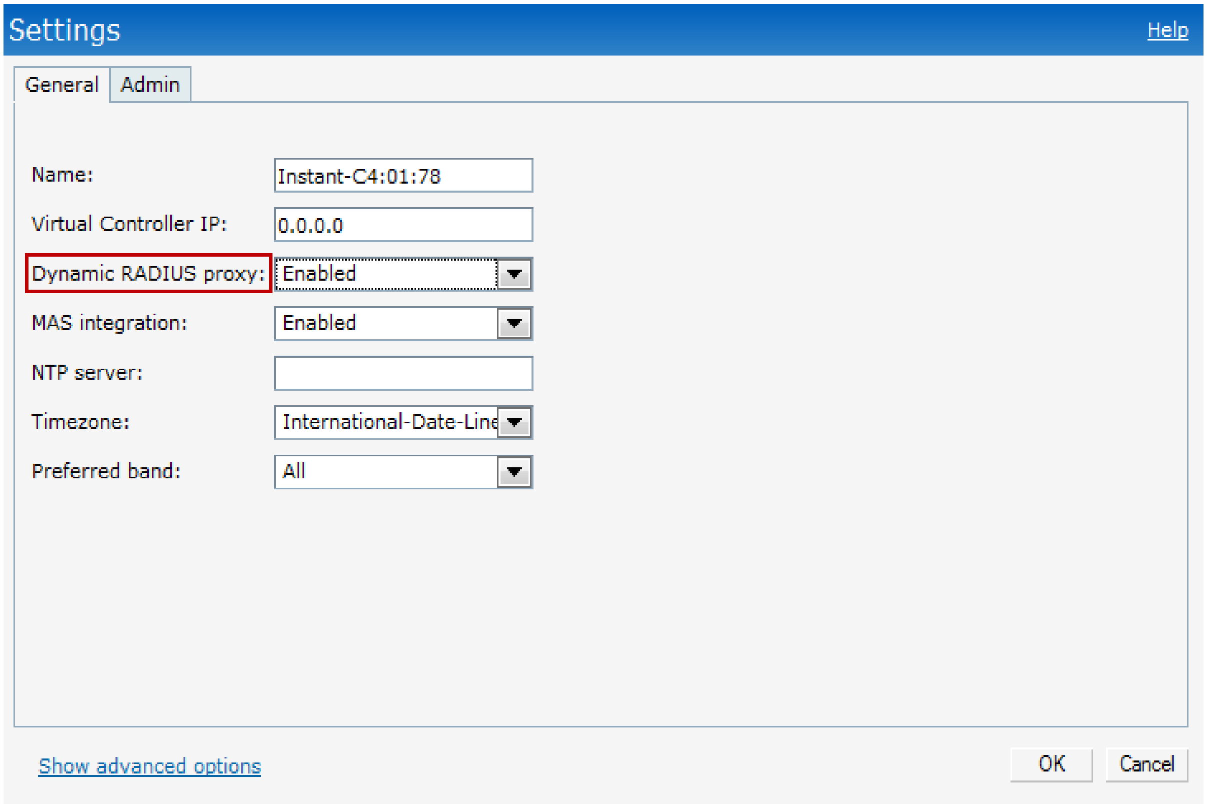
8. **Blacklisting**— Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures.
   - **Max authentication failures**— Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10.
9. Navigate to **PEF > Blacklisting** in the Instant UI to specify the duration of the blacklisting on the Blacklisting tab of the PEF window.
10. **For Internal users—** Click **Users** to populate the system's internal authentication server with users. For information about adding a user, see Adding a User on page 311.
11. Click **Next** to continue and then click **Finish.**

Enabling Instant RADIUS

To enable Instant RADIUS:

1. Click **Settings** at the top right corner of the Instant UI.
2. Select **Enabled** from the **Dynamic RADIUS Proxy** drop-down list. When enabled, the Virtual Controller network uses the IP Address of the Virtual Controller for communication with external RADIUS servers. You must set the Virtual Controller IP address as a NAS client in the RADIUS server if Dynamic RADIUS Proxy is enabled.

Figure 86 - *Enabling Instant RADIUS*



Name:	Instant-C4:01:78
Virtual Controller IP:	0.0.0.0
Dynamic RADIUS proxy:	Enabled
MAS integration:	Enabled
NTP server:	
Timezone:	International-Date-Line
Preferred band:	All

3. Click **OK**.

Authentication Survivability

This feature provides authentication and authorization survivability against remote link failure for Alcatel-Lucent Mobility Controllers when working with ClearPass Policy Manager.

When enabled, this feature allows Instant to authenticate the previously connected clients using EAP-PEAP authentication even when connectivity to ClearPass Policy Manager is temporarily lost.

The following flow diagrams depict the interaction between the ClearPass Policy Manager and the IAP for different network scenarios.

- 802.1X Authentication when ClearPass Policy Manager is available (refer to Figure 89)
- 802.1X Authentication using cached crendentials when ClearPass Policy Manager is not available (refer to Figure 88)
- 802.1X Authentication when ClearPass Policy Manager is available again (refer to Figure 89)

Figure 87 depicts a process wherein the OAW-IAP offloads EAP method authentication to ClearPass over a remote link connection. After authenticating the user against Active Directory and deriving enforcement attributes for the user, the ClearPass Policy Manager returns additional information in the RADIUS Access Accept message which the IAP caches to support authentication survivability.

As seen in the figure below, the information sent by the ClearPass Policy Manager varies depending on the authentication method used.

Figure 87 - *802.1X Authentication when ClearPass Policy Manager is reachable*

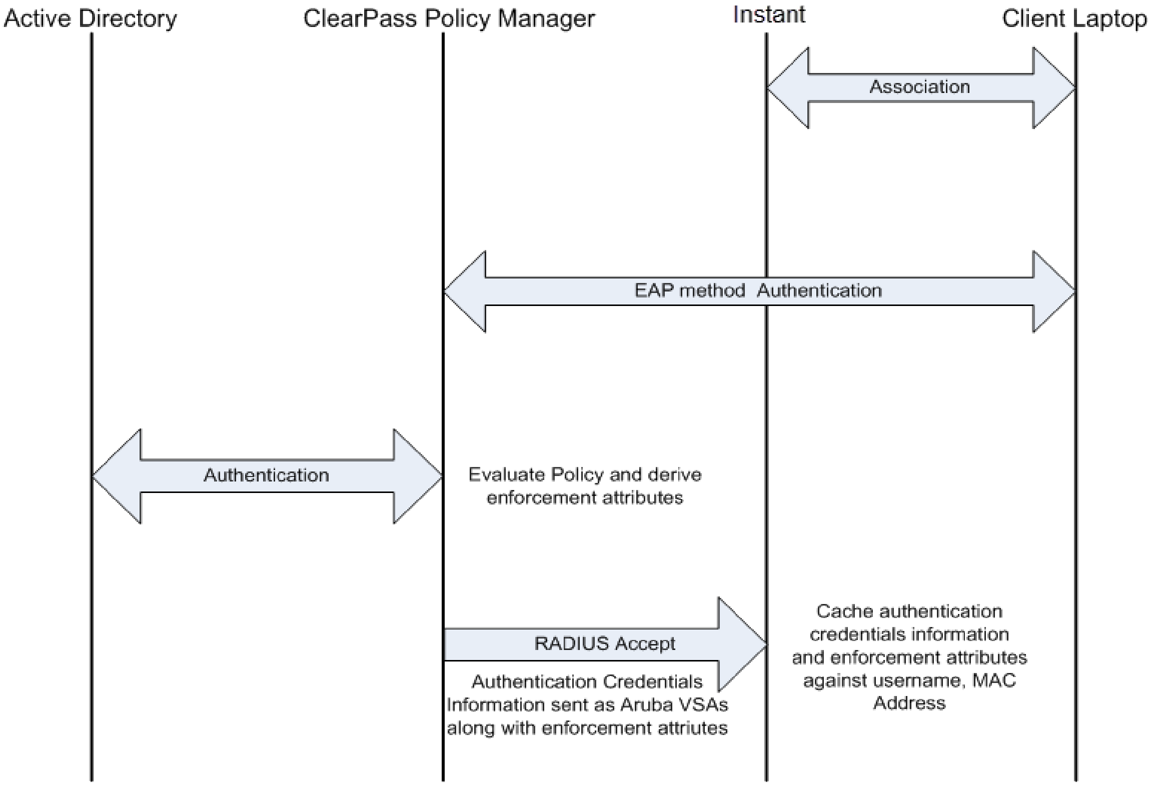

Active Directory
ClearPass Policy Manager
Instant
Client Laptop
Association
EAP method Authentication
Authentication
Evaluate Policy and derive enforcement attributes
RADIUS Accept
Authentication Credentials Information sent as Aruba VSAs along with enforcement attriutes
Cache authentication credentials information and enforcement attributes against username, MAC Address

Figure 88 depicts a situation when the remote link is not available and the OAW-IAP is no longer able to reach the ClearPass Policy Manager. Here, the OAW-IAP will terminate and complete the EAP authentication using the cached credentials information.

NOTE

If both the OAW-IAP to which the client was associated and the CPPM are not available, then the client will be not be able to reauthenticate until the CPPM server is available again.

Figure 88 - *802.1X Authentication using cached credentials*

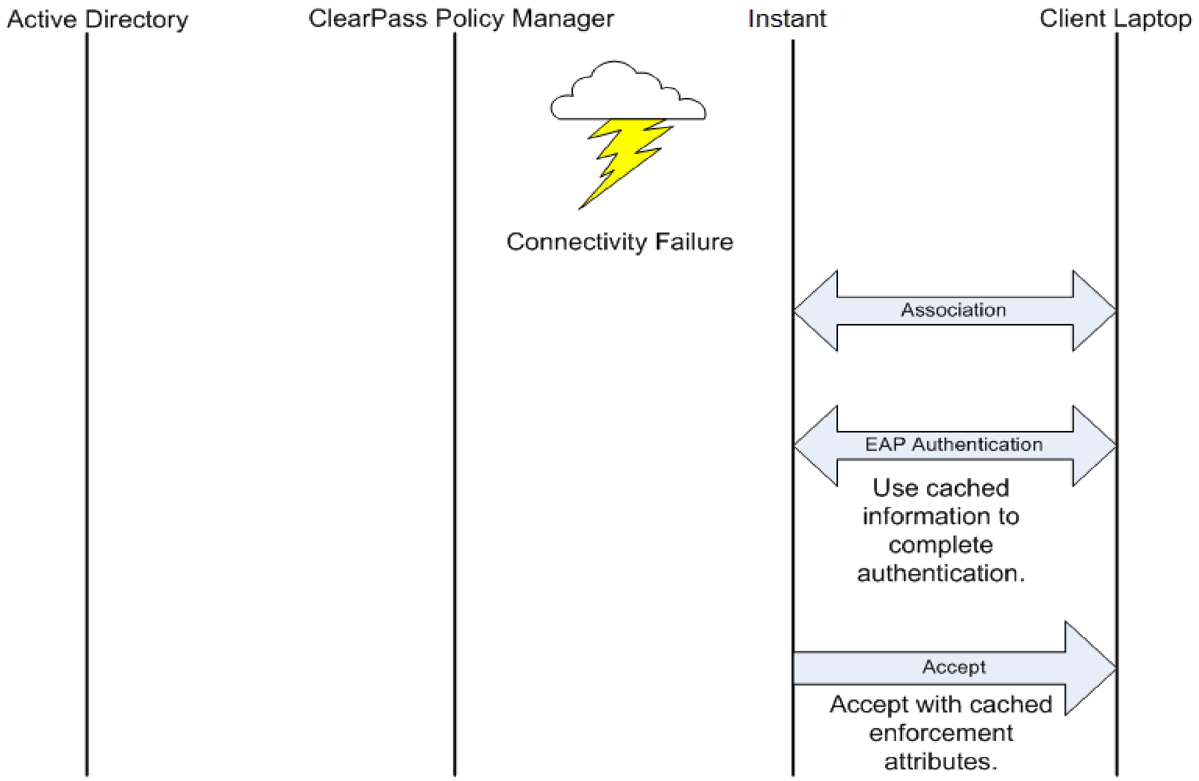
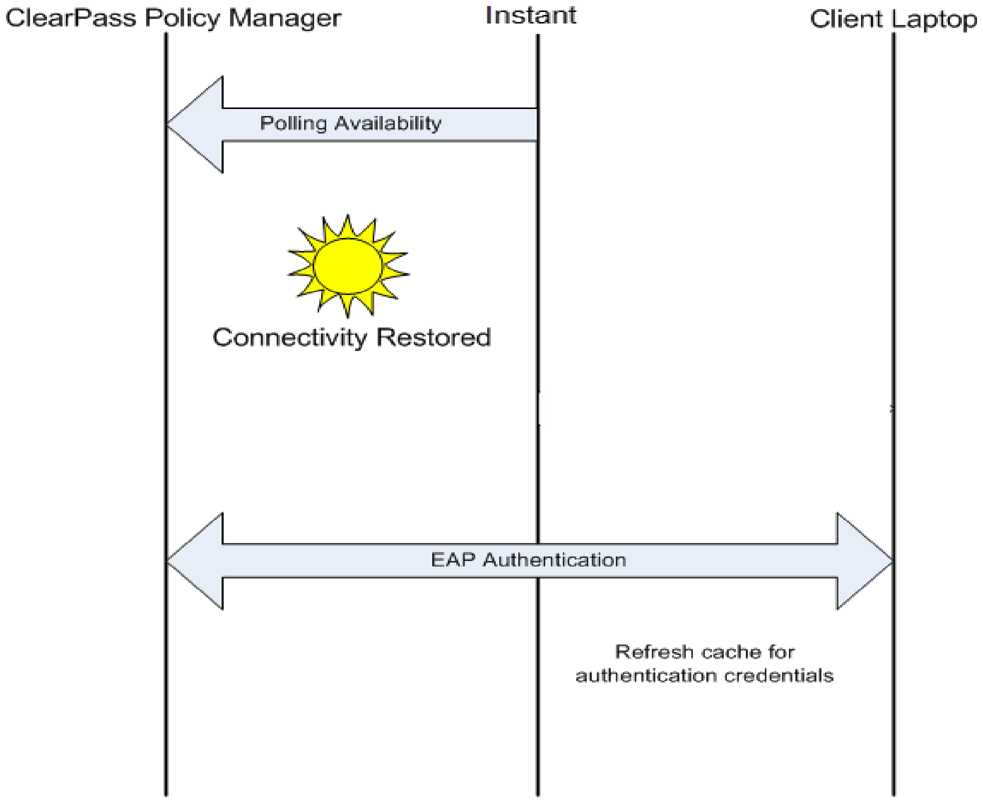


Figure 89 depicts a situation when the CPPM link is reachable again. The OAW-IAP will send the RADIUS-Request message to the CPPM server directly for client authentication.

Figure 89 - *802.1X Authentication when ClearPass Policy Manager is reachable again*



RADIUS Server Authentication with VSA

An external RADIUS server authenticates network users and returns to the OAW-IAP the vendor-specific attribute (VSA) that contains the name of the network role for the user. The authenticated user is placed into the management role specified by the VSA.

List of Supported VSA

Instant supports the following types of VSA’s:

- AP-Group
- AP-Name
- ARAP-Features
- ARAP-Security
- ARAP-Security-Data
- ARAP-Zone-Access
- Acct-Authentic
- Acct-Delay-Time
- Acct-Input-Gigawords
- Acct-Input-Octets
- Acct-Input-Packets
- Acct-Link-Count
- Acct-Multi-Session-Id
- Acct-Output-Gigawords
- Acct-Output-Octets
- Acct-Output-Packets
- Acct-Session-Id
- Acct-Session-Time
- Acct-Status-Type
- Acct-Terminate-Cause
- Acct-Tunnel-Packets-Lost
- Add-Port-To-IP-Address
- Alcatel-Lucent-AP-Group
- Alcatel-Lucent-Admin-Role
- Alcatel-Lucent-Essid-Name
- Alcatel-Lucent-Location-Id
- Alcatel-Lucent-Named-User-Vlan
- Alcatel-Lucent-Port-Id
- Alcatel-Lucent-Priv-Admin-User
- Alcatel-Lucent-Template-User
- Alcatel-Lucent-User-Role
- Alcatel-Lucent-User-Vlan
- Alcatel-Lucent-Auth-Survivability
- Alcatel-Lucent-AS-User-Name
- Alcatel-Lucent-AS-Credential-Hash
- CHAP-Challenge

- Callback-Id
- Callback-Number
- Class
- Connect-Info
- Connect-Rate
- Crypt-Password
- DB-Entry-State
- Digest-Response
- Domain-Name
- EAP-Message
- Error-Cause
- Event-Timestamp
- Exec-Program
- Exec-Program-Wait
- Expiration
- Fall-Through
- Filter-Id
- Framed-AppleTalk-Link
- Framed-AppleTalk-Network
- Framed-AppleTalk-Zone
- Framed-Compression
- Framed-IP-Address
- Framed-IP-Netmask
- Framed-IPX-Network
- Framed-MTU
- Framed-Protocol
- Framed-Route
- Framed-Routing
- Full-Name
- Group
- Group-Name
- Hint
- Huntgroup-Name
- Idle-Timeout
- Login-IP-Host
- Login-LAT-Node
- Login-LAT-Port
- Login-LAT-Service
- Login-Service
- Login-TCP-Port
- Menu
- Message-Auth
- NAS-Port-Type

- Password
- Password-Retry
- Port-Limit
- Prefix
- Prompt
- Rad-Authenticator
- Rad-Code
- Rad-Id
- Rad-Length
- Reply-Message
- Revoke-Text
- Server-Group
- Server-Name
- Service-Type
- Session-Timeout
- Simultaneous-Use
- State
- Strip-User-Name
- Suffix
- Termination-Action
- Termination-Menu
- Tunnel-Assignment-Id
- Tunnel-Client-Auth-Id
- Tunnel-Client-Endpoint
- Tunnel-Connection-Id
- Tunnel-Medium-Type
- Tunnel-Preference
- Tunnel-Private-Group-Id
- Tunnel-Server-Auth-Id
- Tunnel-Server-Endpoint
- Tunnel-Type
- User-Category
- User-Name
- User-Vlan
- Vendor-Specific

Management Authentication Settings

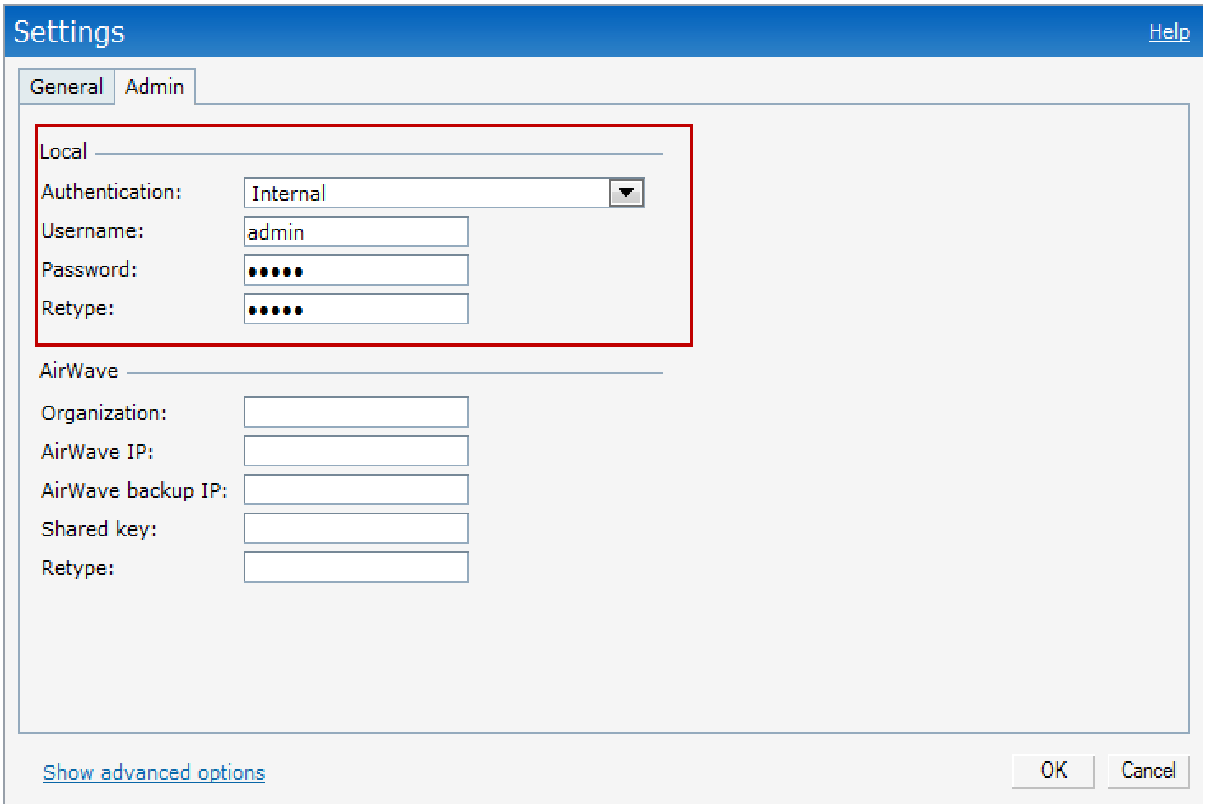
Use this page to specify authentication for access to the Virtual Controller Management user interface.

1. Navigate to the **Settings** link in the Instant UI.
2. Select the **Admin** tab.
3. In the **Authentication** drop-down list, select any one of the following:

- **Internal**— Select to specify a single set of user credentials. Enter the **Username** and **Password** for accessing the Virtual Controller Management User Interface.
- **RADIUS Server**— Specify one or two RADIUS servers to authenticate UI. If two servers are configured users can use them in primary/backup mode or load-balancing mode, this is identical to the RADIUS server configuration for SSIDs. For information on configuring external RADIUS server, see External RADIUS Server on page 142.
- **RADIUS server w/ fallback to internal**— Specify the RADIUS servers as well as a Username and Password. If there is no response from the RADIUS server (RADIUS server timeout), the authentication switches to **Internal**.

4. Click **OK**.

Figure 90 - *Management Authentication Settings*



Local

Authentication: Internal

Username: admin

Password: •••••

Retype: •••••

AirWave

Organization:

AirWave IP:

AirWave backup IP:

Shared key:

Retype:

Captive Portal

Alcatel-Lucent Instant network supports captive portal authentication method for a Guest network type. In this method, a web page is displayed to a guest user who tries to access the internet. The user has to authenticate or accept company's network usage policy in the web page. Two types of captive portal authentication are supported on Alcatel-Lucent Instant.

- Internal Captive Portal on page 151
- External Captive Portal on page 157

Internal Captive Portal

In the Internal Captive Portal type, an internal server is used to host the captive portal service. Internal captive portal authentication is classified as follows:

- Internal Authenticated— To gain access to the wireless network, a user must authenticate in the captive portal page. If this option is selected, then users who are required to authenticate have to be added to the user database. Click the **Users** link to add the users. For information about adding users, see Adding a User on page 311.
- Internal Acknowledged— To gain access to the wireless network, a user must accept the terms and conditions.

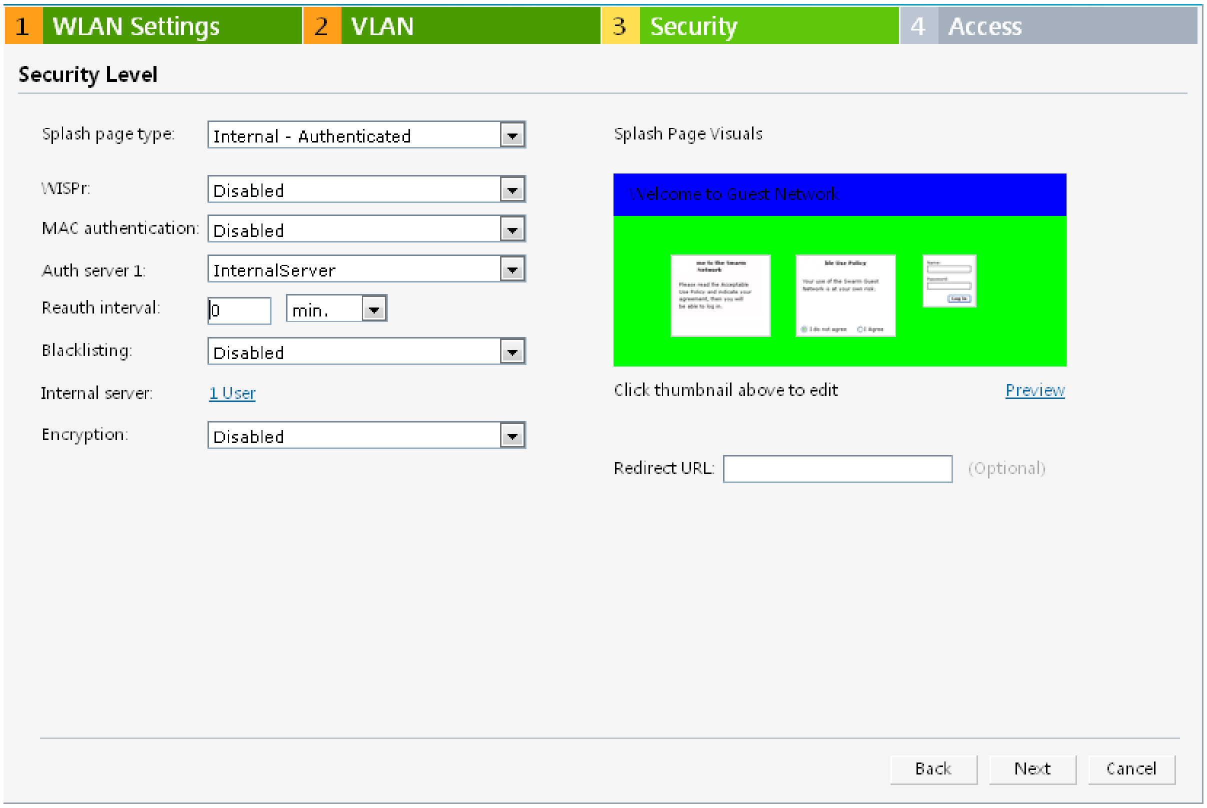
Configuring Internal Captive Portal Authentication when Adding a Guest Network

To configure internal captive portal authentication when adding a guest network, perform the following steps:

1. In the **Network** tab, click the **New** link. The **New WLAN** window opens.
2. In the **WLAN Settings** tab, update the following information:
    1. Enter a name for the network in the **Name (SSID)** text box.
    2. Click **Guest** and then click **Next.**
3. Use the **VLAN** tab, to specify how the clients on this network get their IP address and VLAN.
4. Click **Next** to continue.
5. In the **Security** tab, select one of the following options for the splash page type:
    a. **Internal - Authenticated**
    b. **Internal - Acknowledged**
    c. **External - RADIUS Server**
    d. **External - Authentication text**
    e. None

See Guest Network on page 82 for more information on the splash page type options.

Figure 91 - *Configuring Captive Portal when Adding A Guest Network*



Security Level

Splash page type: Internal - Authenticated

WISPr: Disabled

MAC authentication: Disabled

Auth server 1: InternalServer

Reauth interval: 0 min.

Blacklisting: Disabled

Internal server: 1 User

Encryption: Disabled

Splash Page Visuals

Redirect URL: (Optional)

The appearance of a splash page can be customized as required. For information on customizing a splash page, see Customizing a Splash Page on page 155.

6. Select **Disabled** or **Enabled** from the **WISPr** drop-down list to disable or enable the WISPr authentication. For information on WISPr authentication, see WISPr Authentication on page 163.
7. Select **Disabled** or **Enabled** from the **MAC authentication** drop-down list to disable or enable the MAC authentication. For information on MAC authentication, see MAC Authentication on page 165.
8. Select **InternalServer** from the **Auth server** 1 drop-down list to authenticate user credentials at run time.
9. **Reauth interval** — When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients.
10. **Blacklisting** — Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures.
11. **Max authentication failures** — Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10.
12. **Internal server** —
    - Click **User** to populate the system's internal authentication server with users. For information about adding a user, see Adding a User on page 311.
    - Click **Upload Certificate** and browse to upload a certificate file for the internal server.
13. **Encryption**— Select **Enabled** from the drop-down list and perform the following steps (these steps are optional):
    a. Select the required key management option from the **Key management** drop-down list. Available options are:
        - WPA-2 Personal
        - WPA Personal
        - Both (WPA-2 & WPA)

    b. **Passphrase format** — Specify either an alphanumeric or a hexadecimal string. Ensure that the hexadecimal string must be exactly 64 digits in length.

    c. **Passphrase** — Enter a pre-shared key (PSK) passphrase.
14. Click **Next** and click **Finish.**

Configuring Internal Captive Portal Authentication when Editing a Guest Network

To configure internal captive portal authentication when editing a guest network, perform the following steps:

1. In the **Network** tab, click the network for which you want to configure internal captive portal authentication. The **edit** link for the network appears.
2. Click the **edit** link. The **Edit** window for the network appears.
3. Navigate to the **Security** tab and select one of the following options for the splash page type:
    a. **Internal — Authenticated**

    b. **Internal — Acknowledged**

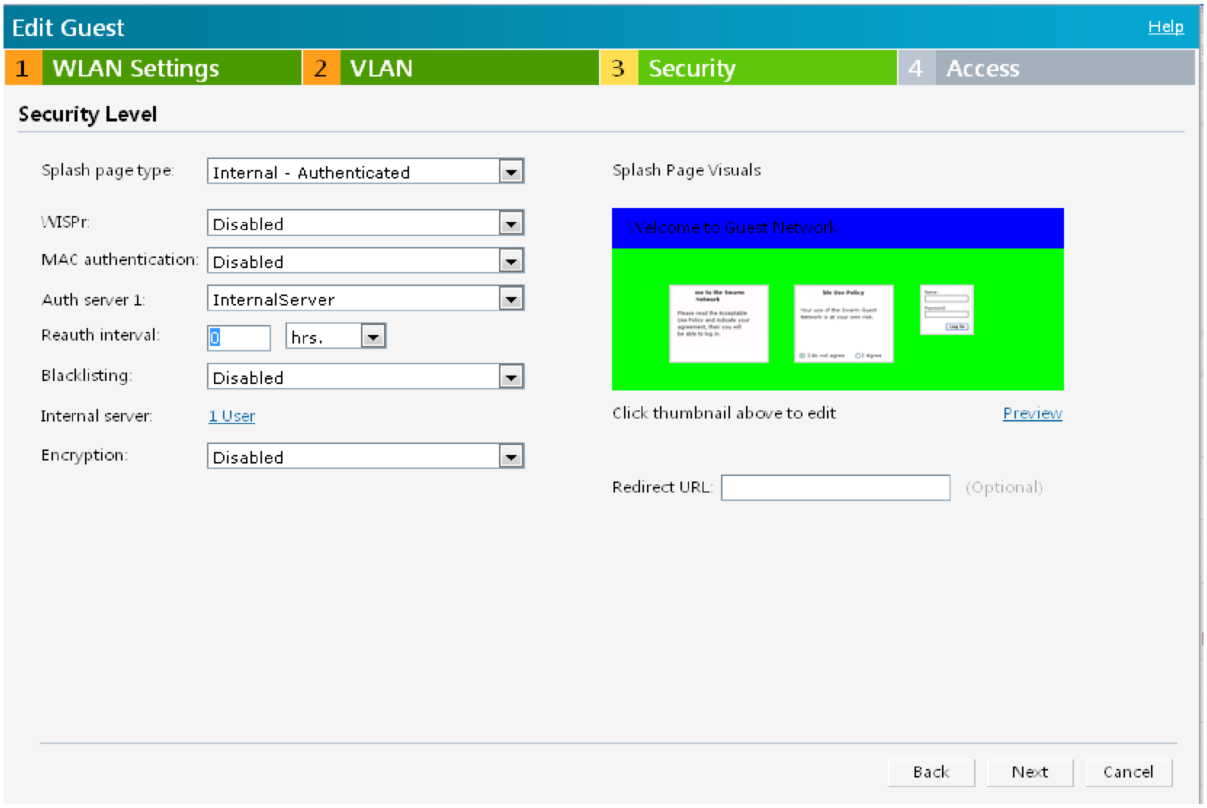
    c. **External — RADIUS Server**

    d. **External — Authentication Text**

    e. **None**

    See Guest Network on page 82 for more information.

Figure 92 - *Configuring Captive Portal when Editing a Guest Network*



Security Level

Splash page type: Internal - Authenticated

WISPr: Disabled

MAC authentication: Disabled

Auth server 1: InternalServer

Reauth interval: 0 hrs.

Blacklisting: Disabled

Internal server: 1 User

Encryption: Disabled

Splash Page Visuals

Welcome to Guest Network

Click thumbnail above to edit

Preview

Redirect URL: (Optional)

The appearance of a splash page can be customized as required. For information on customizing a splash page, see Customizing a Splash Page on page 155.

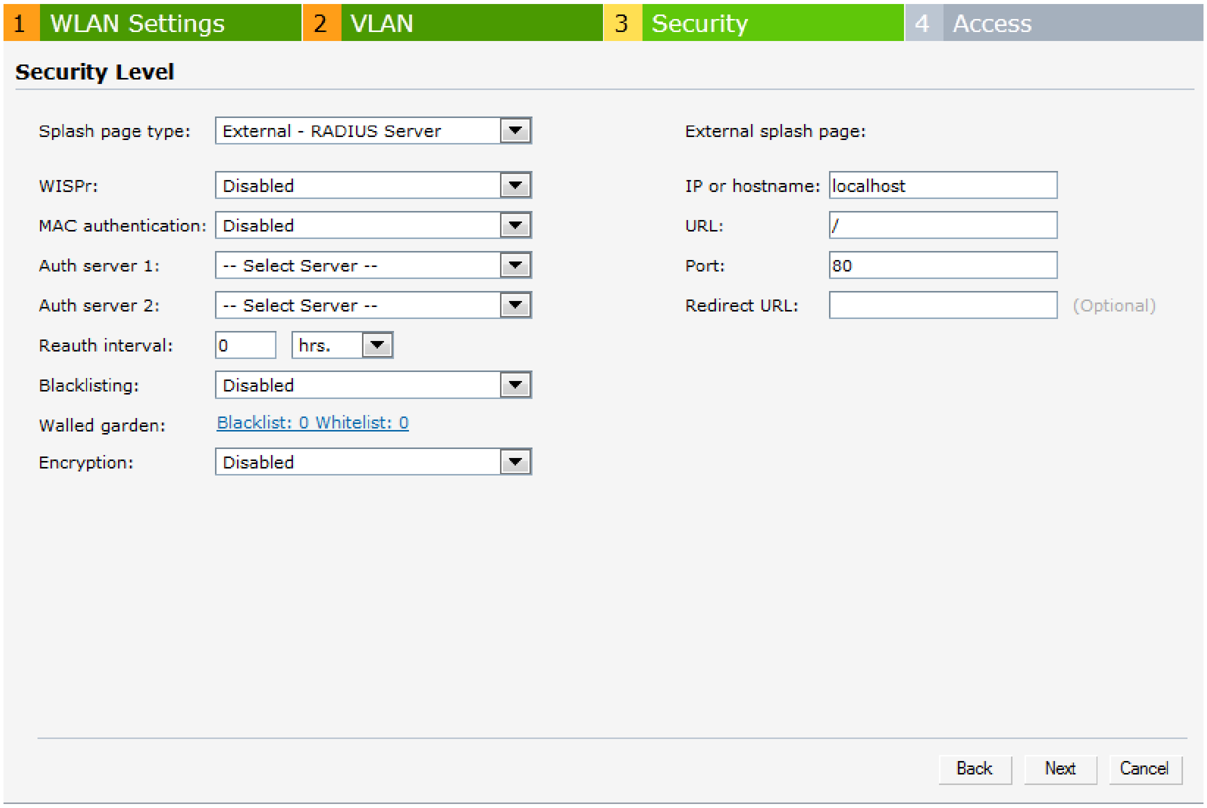
4. Click **Next** and click **Finish.**

Configuring Internal Captive Portal with External RADIUS Server Authentication when Adding a Guest Network

To configure internal captive portal with external RADIUS server authentication, perform the following steps:

1. In the **Network** tab, click the **New** link. The **New WLAN** window opens.
2. In the **WLAN Settings** tab, perform the following:
   a. Enter a name for the network in the **Name (SSID)** text box.
   b. Select **Guest** and then click **Next.**
3. Use the **VLAN** tab, to specify how the clients on this network get their IP address and VLAN.
4. Click **Next** to continue.
5. In the **Security** tab, select **Internal — Authenticated** under the splash page type.
6. Select an external RADIUS server from the Authentication server drop-down list to authenticate user credentials at run time. If there is no external RADIUS server in the drop-down list, click **New** to add a RADIUS server. For information on configuring external RADIUS server, see External RADIUS Server on page 142.
7. Click **Next** and then click **Finish**.

Figure 93 - *Configuring Internal Captive Portal with External RADIUS Server Authentication*



Security Level

Splash page type: External - RADIUS Server

WISPr: Disabled

MAC authentication: Disabled

Auth server 1: -- Select Server --

Auth server 2: -- Select Server --

Reauth interval: 0 hrs.

Blacklisting: Disabled

Walled garden: Blacklist: 0 Whitelist: 0

Encryption: Disabled

External splash page:

IP or hostname: localhost

URL: /

Port: 80

Redirect URL: (Optional)

Customizing a Splash Page

A splash page is a web page that is displayed to a guest user when they are trying to access the internet. The appearance of a splash page can be customized as required. To customize a splash page, perform the following steps:

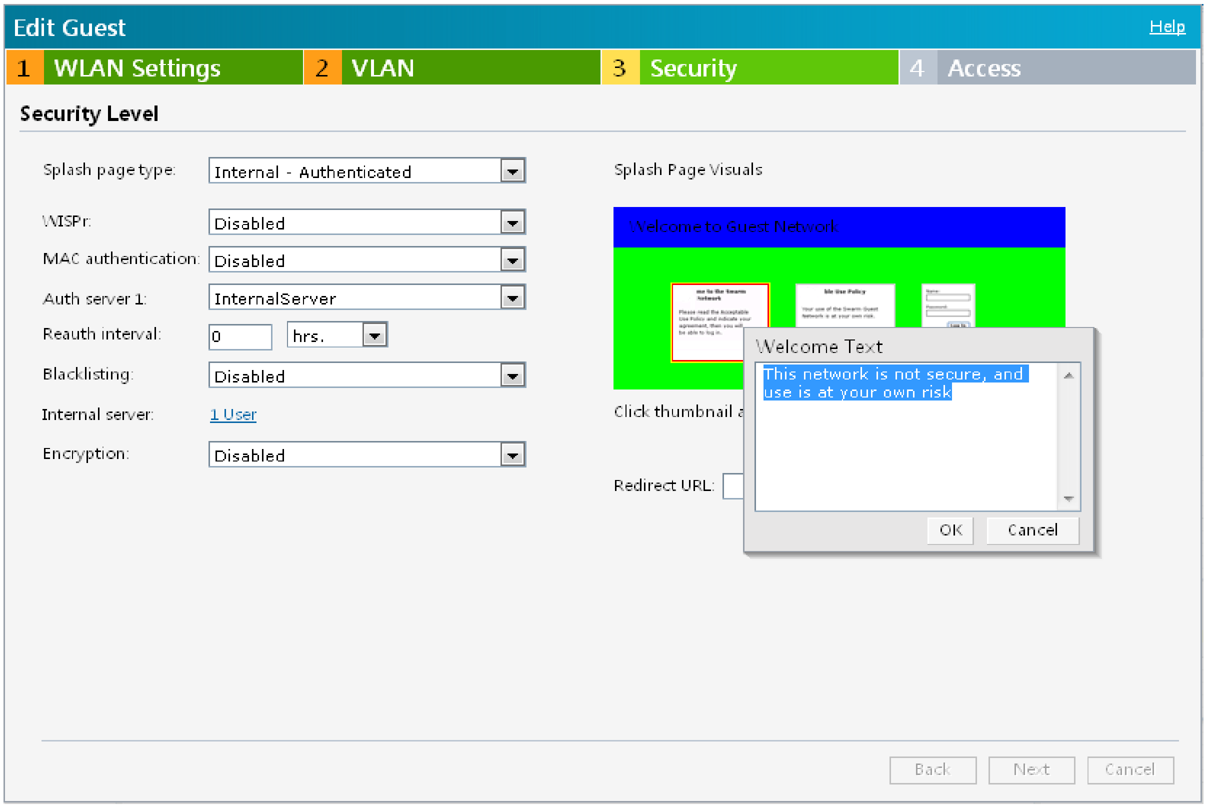
> NOTE
>
> The current release does not support per SSID splash page. When multiple SSIDs are configured to use customized splash page, changes to the page are reflected on all SSIDs.

1. In the **Network** tab, click the network for which you want to customize the splash page. The **edit** link for the network appears.
2. Click the **edit** link. The **Edit** window for the network appears.
3. Navigate to the **Security** tab and perform the following steps:

   Splash Page Visuals — Use the in-place editor below to specify text and colors for the initial page that users connecting to the network see. This page asks for user credentials or email, depending on the splash page type (Internal - Authenticated or Internal - Acknowledged) you set.

   a. To change the color of the splash page, click the Splash page rectangle and select the required color from the **Background Color** palette.
   b. To change the welcome text, click the first square in the splash page, type the required text in the **Welcome** text box, and click **OK**. The welcome text should not exceed 127 characters.
   c. To change the policy text, click the second square in the splash page, type the required text in the **Policy** text box, and click **OK**. The policy text should not exceed 255 characters.

Figure 94 - *Customizing a Splash Page*



Edit Guest

Help

1 WLAN Settings | 2 VLAN | 3 Security | 4 Access

Security Level

Splash page type: Internal - Authenticated

WISPr: Disabled

MAC authentication: Disabled

Auth server 1: InternalServer

Reauth interval: 0 hrs.

Blacklisting: Disabled

Internal server: 1 User

Encryption: Disabled

Splash Page Visuals

Welcome to Guest Network

Click thumbnail a

Redirect URL:

Welcome Text

This network is not secure, and use is at your own risk

4. Click **Next** and then click **Finish.**

NOTE

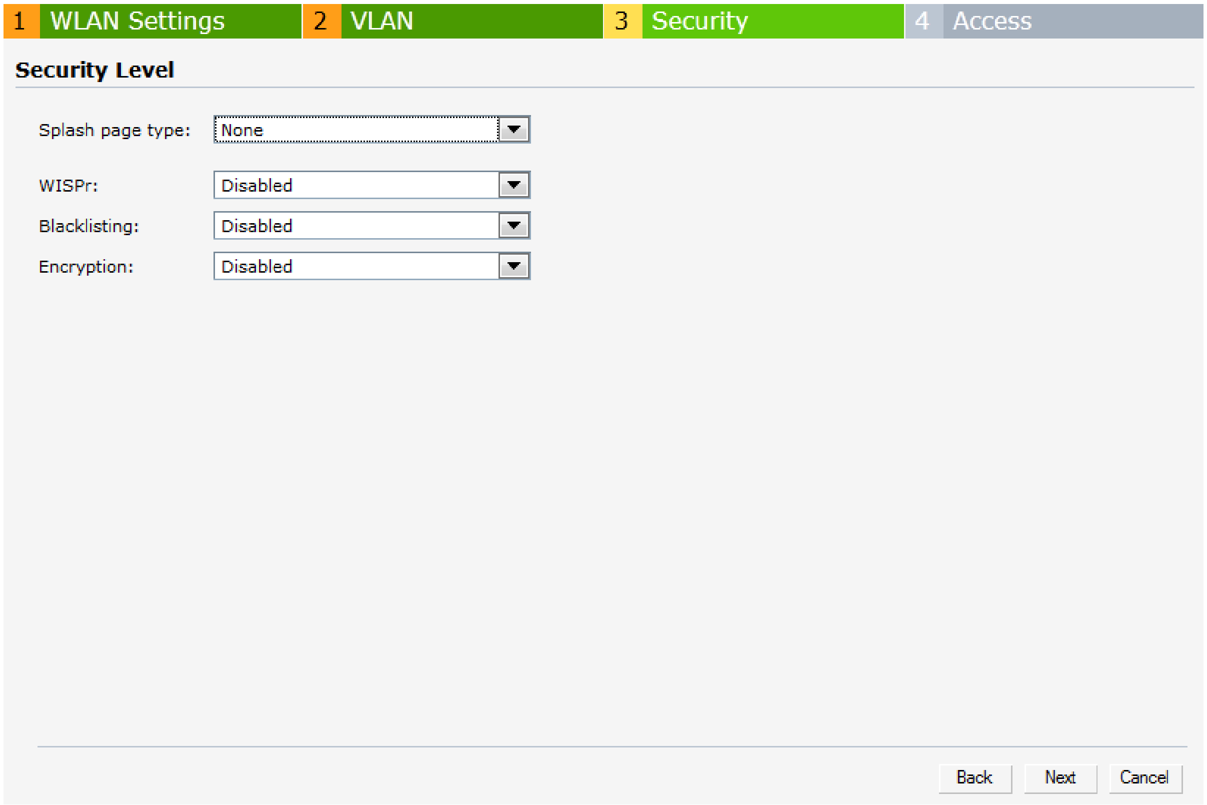
You can customize the captive portal page using double-byte characters. Traditional Chinese, Simplified Chinese, and Korean are a few languages that use double-byte characters. Click on the banner, term, or policy in the **Splash Page Visuals** to modify the text in the red box. These fields accept double-byte characters or a combination of English and double-byte characters.

Disabling Captive Portal Authentication

To disable captive portal authentication, perform the following steps:

1. In the **Network** tab, click the guest network for which you want to disable captive portal authentication. The **edit** link for the network appears.
2. Click the **edit** link. The **Edit** window for the network appears.
3. Navigate to **Security** tab and select **None** from the **Splash page type** drop-down list.

Figure 95 - *Disabling Captive Portal Authentication*



Security Level

Splash page type: None

WISPr: Disabled

Blacklisting: Disabled

Encryption: Disabled

4. Click **Next** and then click **Finish.**

External Captive Portal

Alcatel-Lucent Instant supports external captive portal authentication. The external portal can be on the cloud or on a server outside the enterprise network.

Configuring External Captive Portal Authentication when Adding a Guest Network

To configure external captive portal authentication when adding a guest network, perform the following steps:

1. In the **Network** tab, click the **New** link. The **New WLAN** window appears.
2. In the **WLAN Settings** tab, perform the following:
   1. Enter a name for the network in the **Name (SSID)** text box.
   2. Select **Guest** and click **Next** to continue**.**
3. Use the **VLAN** tab to specify how the clients on this network get their IP address and VLAN.
4. Click **Next** to continue.
5. In the **Security** tab, select **External - Authentication Text** from the **Splash page type** drop-down list and enter the **Auth text**. This entry is not mandatory. The Authentication text indicates the text string returned by the external server after a successful authentication.

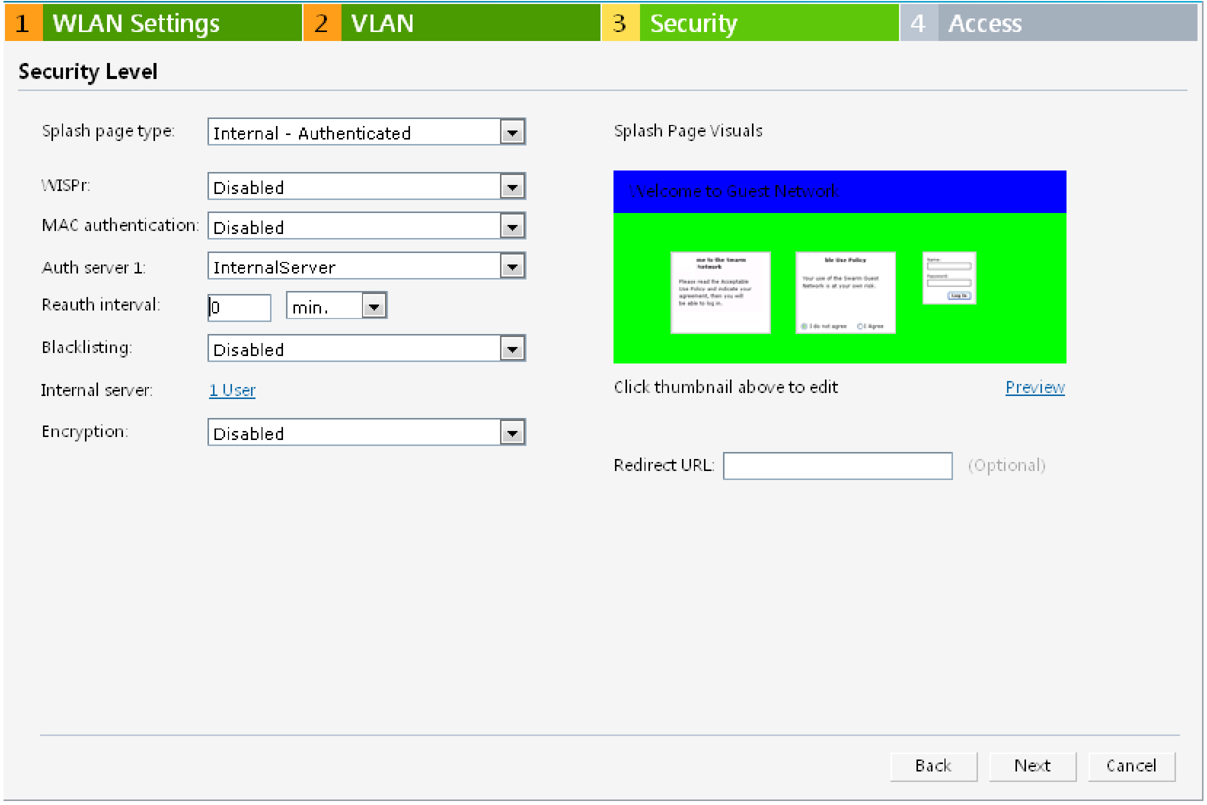
Or

Select **External - RADIUS Server** from the **Splash page type** drop-down list and select **New** from the **Auth server 1** and **Auth server 2** to add a RADIUS server.

1. **IP or hostname —** Enter the IP address or the hostname of the external splash page server.

2. **URL —** Enter the URL for the external splash page server.
3. **Port —** Enter the number of the port to be used for communicating with the external splash page server.
4. **Redirect URL —** Specify a redirect URL if you want to override the user's original request and redirect them to another URL.

Figure 96 - *External Captive Portal when Adding a Guest Network - External RADIUS Server*



Security Level

Splash page type: Internal - Authenticated

WISPr: Disabled

MAC authentication: Disabled

Auth server 1: InternalServer

Reauth interval: 0 min.

Blacklisting: Disabled

Internal server: 1 User

Encryption: Disabled

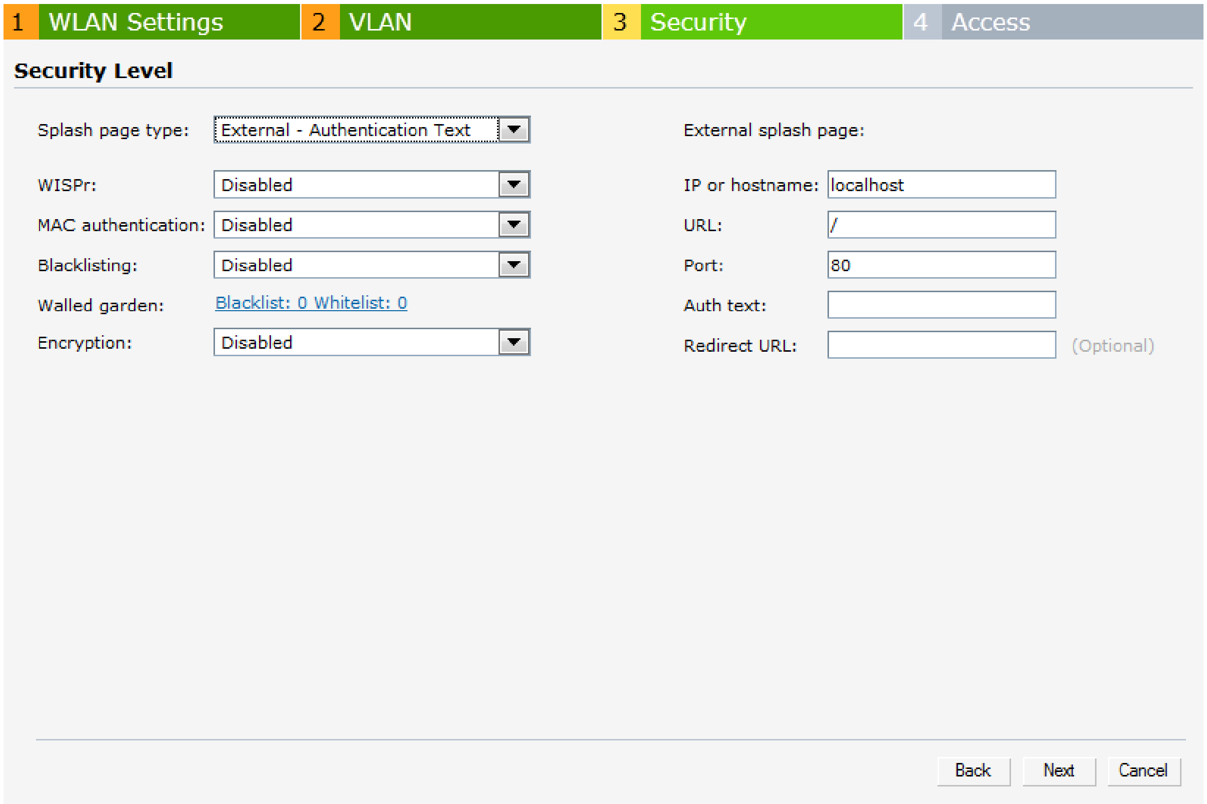
Splash Page Visuals

Click thumbnail above to edit   Preview

Redirect URL: (Optional)

6. Select **Disabled** or **Enabled** from the **WISPr** drop-down list to disable or enable the WISPr authentication. For information on WISPr authentication, see WISPr Authentication on page 163.
7. Select **Disabled** or **Enabled** from the **MAC authentication** drop-down list to disable or enable the MAC authentication. For information on MAC authentication, see MAC Authentication on page 165.

Figure 97 - *External Captive Portal when Adding a Guest Network - External Authentication text*



Security Level

Splash page type: External - Authentication Text

WISPr: Disabled

MAC authentication: Disabled

Blacklisting: Disabled

Walled garden: Blacklist: 0 Whitelist: 0

Encryption: Disabled

External splash page:

IP or hostname: localhost

URL: /

Port: 80

Auth text:

Redirect URL: (Optional)

8. **Authentication server 1**: Select New and update the fields for the external RADIUS server to authenticate user credentials at runtime. Refer to Configuring an External RADIUS Server on page 143 for more details on server settings.
9. **Reauth interval** — When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients.
10. **Blacklisting**— Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures.
11. **Max authentication failures**— Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10.

    Navigate to **PEF > Blacklisting** in the Instant UI to specify the duration of the blacklisting on the Blacklisting tab of the PEF window.
12. **Walled garden —** Click on the link to open the **Walled Garden** window. The walled garden directs the user’s navigation within particular areas to allow access to a selection of websites or prevent access to other websites. For more information, see Walled Garden Access on page 166.
13. Click **Next** to continue and then click **Finish.**

Configuring External Captive Portal Authentication when Editing a Guest Network

To configure external captive portal authentication when editing a guest network, perform the following steps:

1. In the **Network** tab, click the network for which you want to configure the external captive portal authentication. The **edit** link for the network appears.
2. Click the **edit** link. The **Edit** window for the network appears.
3. Navigate to the **Security** tab and perform the following steps:

4. Select **External - RADIUS Server** or **External - Authentication Text** from the **Splash page type** drop down list.
5. Use the fields below to specify/edit the server for this guest network's splash page.

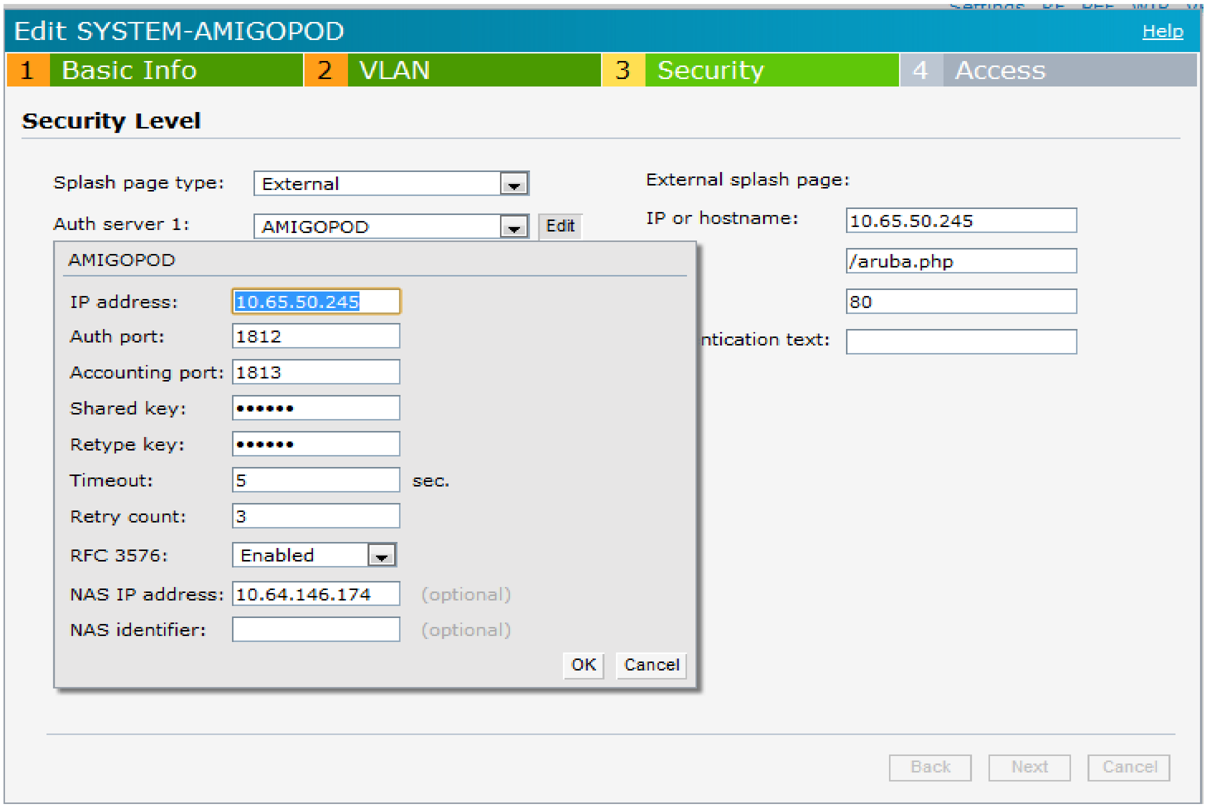
   Splash page type — External - Authentication Text

   a. **Reauth interval** — When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients.
   b. **Blacklisting**—Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures.
   c. **Max authentication failures**— Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10. Navigate to **PEF > Blacklisting** in the Instant UI to specify the duration of the blacklisting on the Blacklisting tab of the PEF window.
   d. **Walled Garden**— Click on the link to open the **Walled Garden** window. The walled garden directs the user's navigation within particular areas to allow access to a selection of websites or prevent access to other websites. For more information, see Walled Garden Access on page 166.
   e. **Encryption**— Select **Enabled** from the drop-down list and perform the following steps (these steps are optional). Select the required key management option from the Key management drop-down list. Available options are:
      - WPA-2 Personal
      - WPA Personal
      - Both (WPA-2 & WPA)
      - Passphrase format — Specify either an alphanumeric or a hexadecimal string. Ensure that the hexadecimal string must be exactly 64 digits in length.
      - Passphrase — Enter a pre-shared key (PSK) passphrase.

   External splash page

   a. **IP or hostname—** Enter the IP address or the hostname of the external splash page server.
   b. **URL—** Enter the URL for the external splash page server.
   c. **Port—** Enter the number of the port to be used for communicating with the external splash page server.
   d. **Auth text—** Enter the authentication text. This indicates the text string returned by the external server after a successful authentication.

Figure 98 - *Configuring External Captive Portal Authentication for a Guest Network*



Splash page type: External

Auth server 1: AMIGOPOD

IP address: 10.65.50.245

Auth port: 1812

Accounting port: 1813

Shared key: ••••••

Retype key: ••••••

Timeout: 5 sec.

Retry count: 3

RFC 3576: Enabled

NAS IP address: 10.64.146.174 (optional)

NAS identifier: (optional)

External splash page:

IP or hostname: 10.65.50.245

/aruba.php

80

ntication text:

e. **Redirect URL**— Specify a redirect URL if you want to override the user's original request and redirect them to another URL.

Splash page type — External- RADIUS Server

a. **Authentication server 1**: Click **Edit** to modify the external RADIUS servers settings. Refer to Configuring an External RADIUS Server on page 143 for more details on server settings.

b. **Reauth interval**— When set to a value greater than zero, the Access Points periodically reauthenticate all associated and authenticated clients.

c. **Blacklisting**— Select **Enabled** to enable blacklisting of the clients with a specific number of authentication failures.

d. **Max authentication failures**— Users who fail to authenticate the number of times specified here are dynamically blacklisted. The maximum value for this entry is 10. Navigate to **PEF > Blacklisting** in the Instant UI to specify the duration of the blacklisting on the Blacklisting tab of the PEF window.

e. **Walled Garden**— Click on the link to open the Walled Garden window. The walled garden directs the user’s navigation within particular areas to allow access to a selection of websites or prevent access to other websites. For more information, see Walled Garden Access on page 166.

f. **Encryption**— Select Enabled from the drop-down list and perform the following steps (these steps are optional). Select the required key management option from the Key management drop-down list. Available options are:

- WPA-2 Personal
- WPA Personal
- Both (WPA-2 & WPA)

- Passphrase format — Specify either an alphanumeric or a hexadecimal string. Ensure that the hexadecimal string must be exactly 64 digits in length.
- Passphrase — Enter a pre-shared key (PSK) passphrase.

External splash page

a. **IP or hostname—** Enter the IP address or the hostname of the external splash page server.

b. **URL—** Enter the URL for the external splash page server.

c. **Port—** Enter the number of the port to be used for communicating with the external splash page server.

d. **Redirect URL**— Specify a redirect URL if you want to override the user's original request and redirect them to another URL.

6. Click **Next** and click **Finish.**

External Captive Portal Authentication using ClearPass Guest

You can configure Instant to point to ClearPass Guest (formerly known as Amigopod) as an external Captive Portal server. User authentication is performed by:

- Matching a string in the server response
- RADIUS server (either ClearPass Guest or a different RADIUS server)

Creating a Web Login page in the ClearPass Guest

The ClearPass Guest Visitor Management Appliance provides a simple and personalized user interface through which operational staff can quickly and securely manage visitor network access. With ClearPass Guest, your non-technical staff have controlled access to a dedicated visitor management user database. Through a customizable web portal, your staff can easily create an account, reset a password or set an expiry time for visitors. Visitors can be registered at reception and provisioned with an individual guest account that defines their visitor profile and the duration of their visit. By defining a web login page on the ClearPass Guest Visitor Management Appliance, you are able to provide a customized graphical login page for visitors accessing the network.

Refer to the *RADIUS Services* section in the **ClearPass Guest Deployment Guide** for information on setting up the RADIUS Web Login feature.

Configuring the RADIUS Server in Instant

To configure Instant to point to ClearPass Guest as an external Captive Portal server, perform the following steps:

1. Navigate to the **Networks** tab in the Instant UI, click the **New** link. The **New WLAN** window appears.
2. In the **WLAN Settings** tab:

   a. Enter a name for the network in the **Name (SSID)** text box. Example: ECP

   b. Select **Guest** from the **Primary usage** options.
3. Click **Next** to continue.
4. Use the **VLAN** tab to specify how the clients on this network get their IP address and VLAN.
5. Click **Next** to continue.
6. In the **Security** tab, select **External- RADIUS Server** and update the following fields**.**

   a. Enter the IP address of the ClearPass Guest server in the **IP or hostname** field. The IP address is **10.65.77.245**.

b. Enter **/page_name.php** in the **URL** field. This URL must correspond to the **Page Name** configured in the ClearPass Guest RADIUS Web Login page.
   For example, if the Page Name is **Alcatel-Lucent**, then the URL should be **/Alcatel-Lucent.php** in the Instant UI.

c. Enter the **Port** number (generally should be **80**). The ClearPass Guest server uses this port for HTTP services.

d. To create an external RADIUS server, select **New** from the **Authentication server 1** drop-down list. Refer to Configuring an External RADIUS Server on page 143 for information on the new RADIUS server parameters.

7. The new network appears in the **Networks** tab. Click the wireless network icon on your desktop and select the new network.
8. Open any browser and type any URL. Instant redirects the URL to ClearPass Guest login page.
9. Log in to the network with the username and password specified used while configuring the RADIUS server in Step d.

WISPr Authentication

Wireless Internet Service Provider roaming (WISPr) authentication allows a smart client to authenticate on the network when they roam between wireless Internet service providers, even if the wireless hotspot uses an Internet Service Provider (ISP) with whom the client may not have an account.

If you are a hotspot operator using WISPr authentication and a client that has an account with your ISP attempts to access the Internet at your hotspot, then your ISP's WISPr AAA server authenticates that client directly and allows the client access on the network. If the client only has an account with a *partner* ISP, then your ISP's WISPr AAA server forwards that client's credentials to the partner ISP's WISPr AAA server for authentication. When the client is authenticated on the partner ISP, it is also authenticated on your hotspot's own ISP as per their service agreements. The OAW-IAP assigns the default WISPr user role to the client when your ISP sends an authentication message to the OAW-IAP.

Instant supports the following smart clients:

- iPass
- Boingo

These smart clients enable client authentication and roaming between hotspots by embedding iPass Generic Interface Specification (GIS) *redirect*, *authentication*, and *logoff* messages within HTML messages that are sent to the OAW-IAP.

Configuring WISPr Authentication

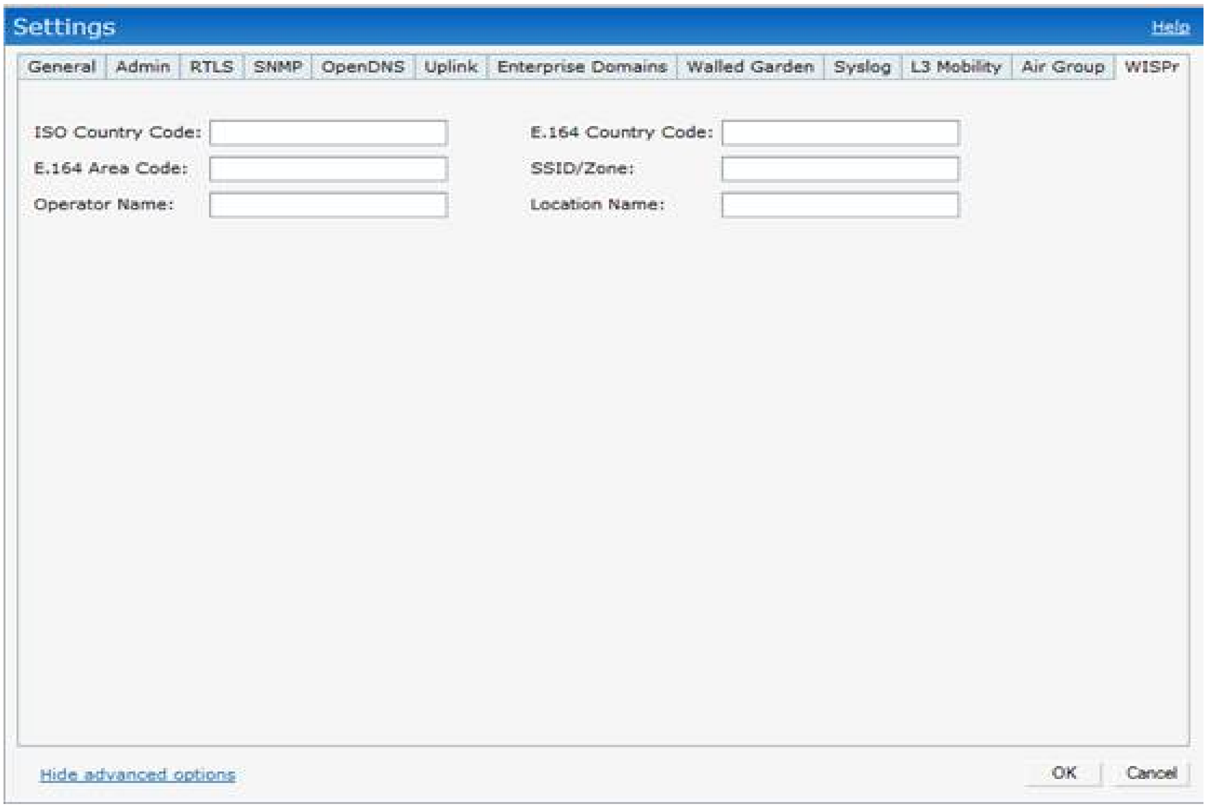
To configure WISPr authentication:

NOTE

The following two types of WISPr authentication are supported:
- Internal – Authenticated
- External - RADIUS Server
Select the **Internal – Authenticated** or the **External - RADIUS Server** option from the **Splash page type** drop down before you configure WISPr authentication.

1. In the Instant UI, click **Settings** in the top-right corner, then select the **WISPr** tab.
2. Enter the ISO Country Code section of the WISPr Location ID in the **ISO Country Code** text box.
3. Enter the E.164 Area Code section of the WISPr Location ID in the **E.164 Area Code** text box.
4. Enter the operator name of the Hotspot in the **Operator Name** text box.
5. Enter the E.164 Country Code section of the WISPr Location ID in the **E.164 Country Code** text box.
6. Enter the SSID/Zone section of the WISPr Location ID in the **SSID/Zone** text box.
7. Enter the name of the Hotspot location in the **Location Name** text box. If no name is defined, the parameter will use the name of the OAW-IAP to which the user has associated.
8. Click **OK** to apply the changes.

Figure 99 - *Configuring WISPr Authentication*



The parameters described above, to define WISPr RADIUS attributes, are specific to the RADIUS server your ISP uses for WISPr authentication. Contact your ISP to determine these values. You can find a list of ISO and ITU country and area codes at the ISO and ITU websites (www.iso.org and http://www.itu.int.).

NOTE

A Boingo smart client uses a NAS identifier in the format <CarrierID>_<VenueID> for location identification. To support Boingo clients, you must also configure the NAS identifier parameter in the Radius server profile for the WISPr server.

MAC Authentication

Media Access Control (MAC) authentication is used to authenticate devices based on their physical MAC addresses. It is an early form of filtering. MAC authentication requires that the MAC address of a machine must match a manually defined list of addresses. This form of authentication does not scale past a handful of devices, because it is difficult to maintain the list of MAC addresses. Additionally, it is easy to change the MAC address of a station to match one on the accepted list. This spoofing is trivial to perform with built-in driver tools, and it should not be relied upon to provide security.

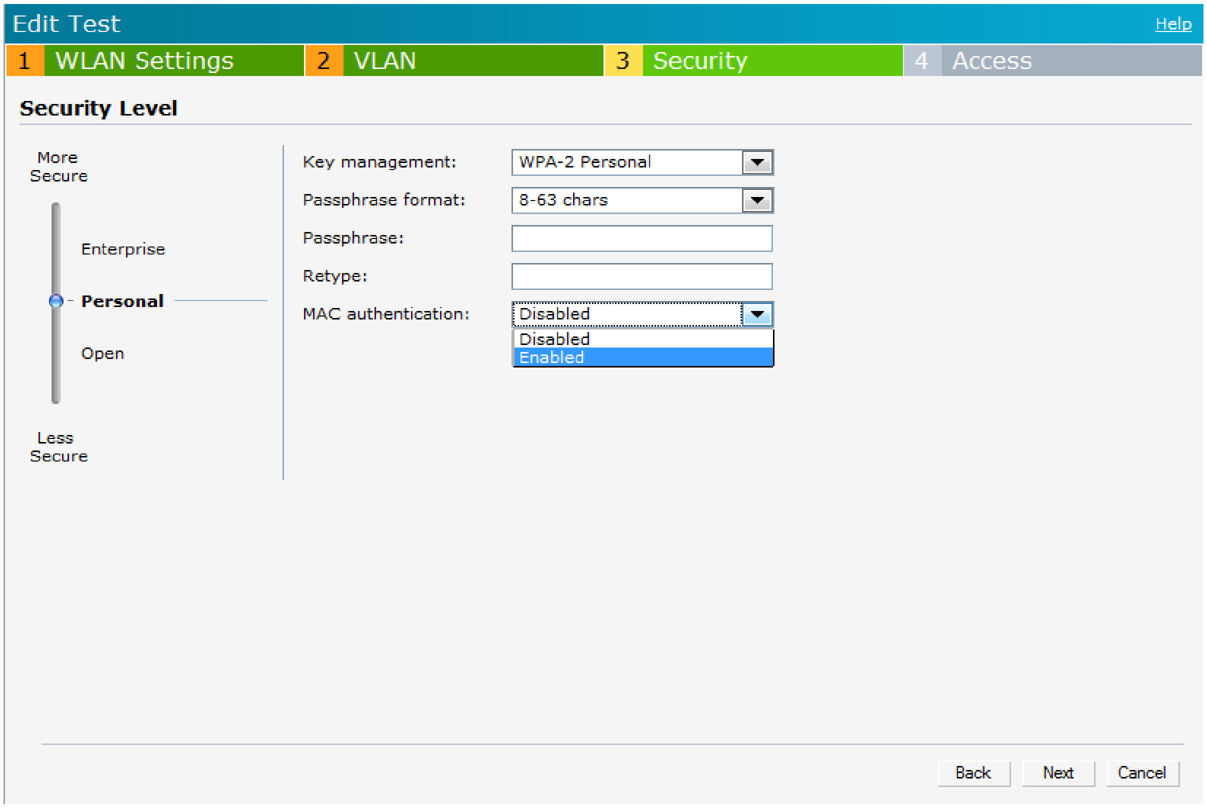
MAC authentication can be used alone, but typically it is combined with other forms of authentication, such as WEP authentication. Because MAC addresses are easily observed during transmission and easily changed on the client, this form of authentication should be considered nothing more than a minor hurdle. Alcatel-Lucent recommends against the use of MAC-based authentication.

Configuring MAC Authentication

To enable MAC Authentication for a wireless network:

1. In the **Network** tab, click the network for which you want to enable MAC authentication. The **edit** link for the network appears.
2. Click the **edit** link and navigate to the **Security** tab.
3. For a network with **Personal** or **Open** security level, select **Enabled** from the **MAC authentication** drop-down list.
4. Click **OK** to continue.

Figure 100 - *Configuring MAC Authentication*



Edit Test

Security Level

Key management: WPA-2 Personal

Passphrase format: 8-63 chars

Passphrase:

Retype:

MAC authentication: Disabled

5. Click **Next** and then click **Finish** to apply the changes.

Walled Garden Access

On the internet, a walled garden typically controls a user's access to web content and services. The walled garden directs the user's navigation within particular areas to allow access to a selection of websites or prevent access to other websites.

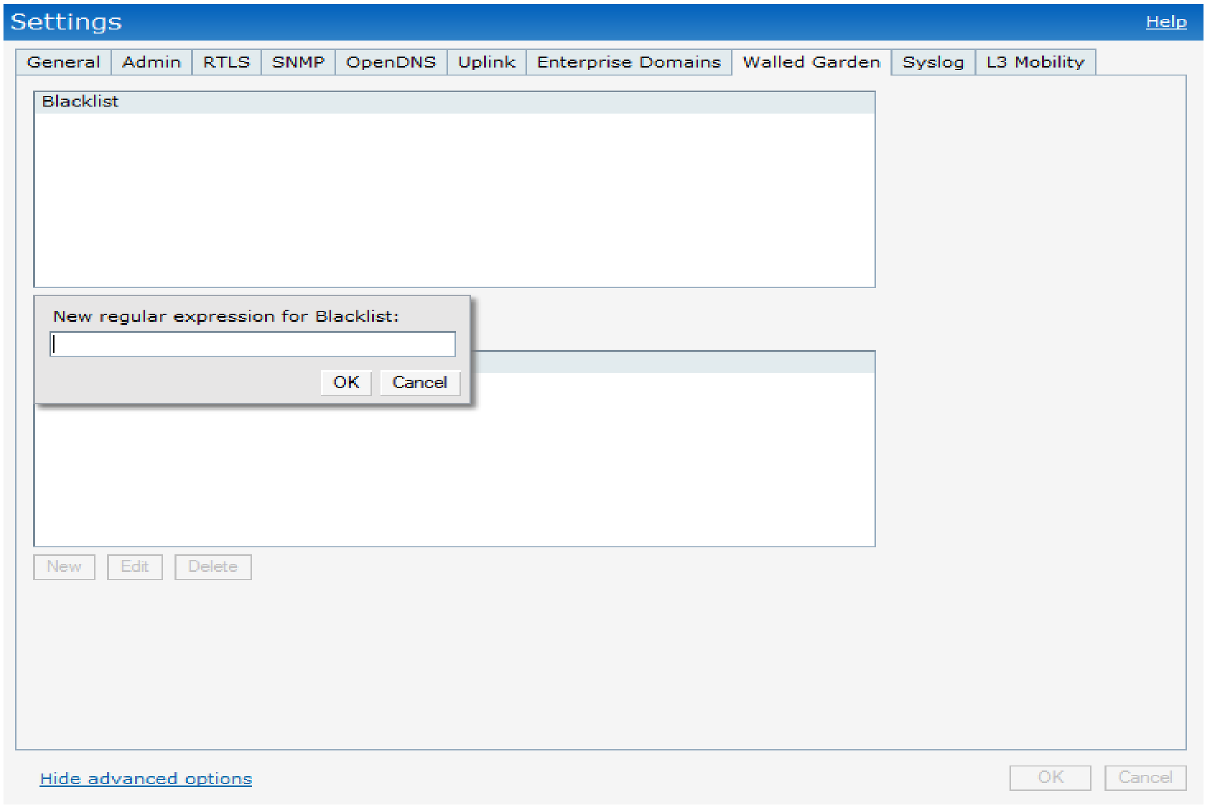
Creating a Walled Garden Access

Walled garden access is needed when an external captive portal is used. A common example could be a hotel environment where unauthenticated users are allowed to navigate to a designated login page (for example, a hotel website) and all its contents.

Users who do not sign up for internet service can view "allowed" websites (typically hotel property websites). The website names must be DNS-based (not IP address based) and support the option to define wildcards. This works for client devices with or without HTTP proxy settings.

When a user attempts to navigate to other websites not configured in the white list walled garden profile, the user is redirected back to the login page. In addition, the black listed walled garden profile is configured to explicitly block navigation to websites from unauthenticated users.

Figure 101 - *Walled Garden*



To create a Walled Garden access:

1. Click the **Settings** at the top right corner of the Instant UI and select **Walled Garden**.
2. To allow users access to a domain, click **New** and enter the domain name or URL in the **Whitelist** section of the window. This allows access to a domain while the user remains unauthenticated. Specify a POSIX regular expression (regex(7)), for example:

- yahoo.com matches various domains such as news.yahoo.com, travel.yahoo.com and finance.yahoo.com
- www.apple.com/library/test is only allow a subset of www.apple.com site corresponding to path /library/test/*
- favicon.ico allows access to /favicon.ico from all domains.

3. To deny users access to a domain, click **New** and enter the domain name or URL in the **Blacklist** section of the window. This prevents unauthenticated users from viewing specific websites. When a URL specified in blacklist is accessed by an unauthenticated user, Instant AP sends an HTTP 403 response to the client with a simple error message.

   If the requested URL neither appears on the blacklist or whitelist list then the request is redirected to the external captive portal.
4. Select the domain name/URL and click **Edit** to modify or **Delete** to remove the entry from the list.
5. Click **OK** to apply the changes.

MAC + 802.1X Authentication

This authentication method has the following features:

- MAC authentication must succeed before 802.1X authentication

  The administrator is allowed to enable MAC authentication for 802.1X authentication. MAC authentication shares all the authentication server configurations with 802.1X authentication. If a wireless or wired client connects to the network, MAC authentication is done first. If MAC authentication fails, 802.1X authentication will not begin. If MAC authentication succeeds, 802.1X authentication is carried out. If 802.1X authentication succeeds, the client is assigned an 802.1X authentication role. If 802.1X authentication fails, the client is assigned a **deny-all** role or **mac-auth-only** role.
- MAC authentication only role

  Allows an administrator to create a **mac-auth-only** role (similar to **machine-auth-only** role concept) for role-based access rules when MAC authentication is enabled for 802.1X authentication. The **macauth-only** role is assigned to a client if MAC authentication succeeds and 802.1X authentication fails. If 802.1X authentication succeeds, it will be overwritten by the final role. The **mac-auth-only** role is primarily used for wired clients.
- L2 authentication fall-through

  Allows an administrator to enable the **l2-authentication-fallthrough** mode. If this option is enabled and MAC authentication fails, 802.1X authentication is still allowed. If this option is disabled, 802.1X authentication is not allowed. The **l2-authentication-fallthrough** mode is disabled by default.

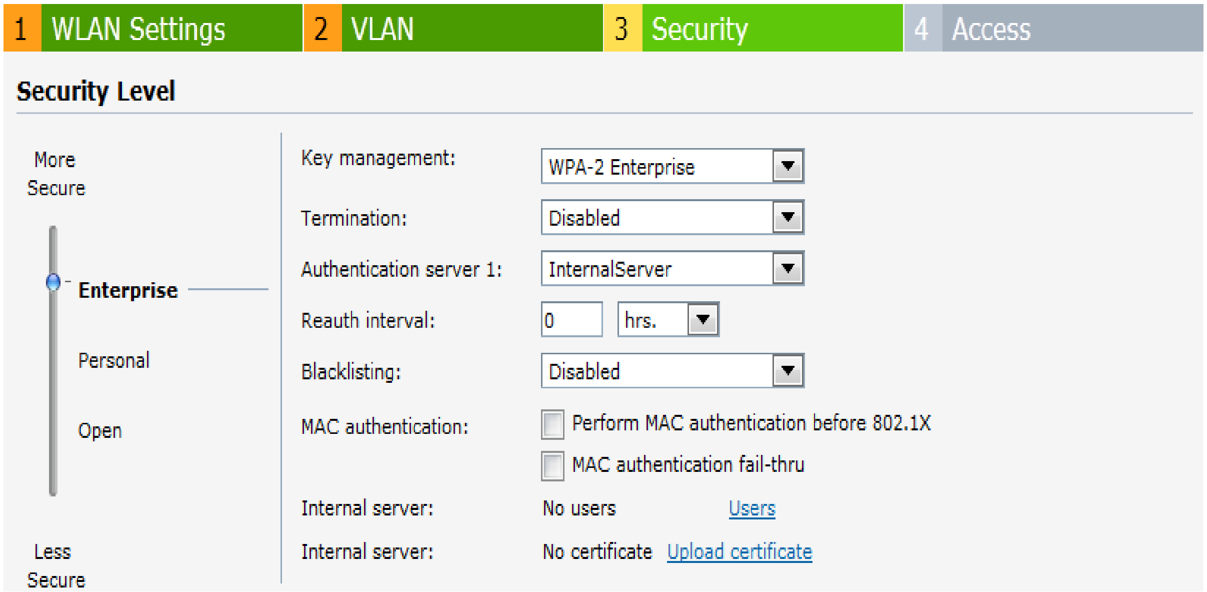
Configuring MAC + 802.1X Authentication

To configure the MAC+802.1X authentication for a wireless network:

1. In the **Network** tab, click the network for which you want to enable MAC+802.1X authentication. The **edit** link for the network appears.
2. Click the **edit** link and navigate to the **Security** tab.
3. For a network with **Enterprise** level:
   a. Select the check box **Perform MAC authentication before 802.1X** if you want to use 802.1X authentication only when MAC authentication is successful.

b. Select the check box **MAC authentication fail-thru** if you want to use 802.1X authentication even when the MAC authentication fails.

Figure 102 - *Configuring MAC+802.1X Authentication*



Key management: WPA-2 Enterprise

Termination: Disabled

Authentication server 1: InternalServer

Reauth interval: 0 hrs.

Blacklisting: Disabled

MAC authentication: □ Perform MAC authentication before 802.1X

□ MAC authentication fail-thru

Internal server: No users Users

Internal server: No certificate Upload certificate

4. Click **Next** and then click **Finish** to apply the changes.

MAC + Captive Portal Authentication

This authentication method has the following features:

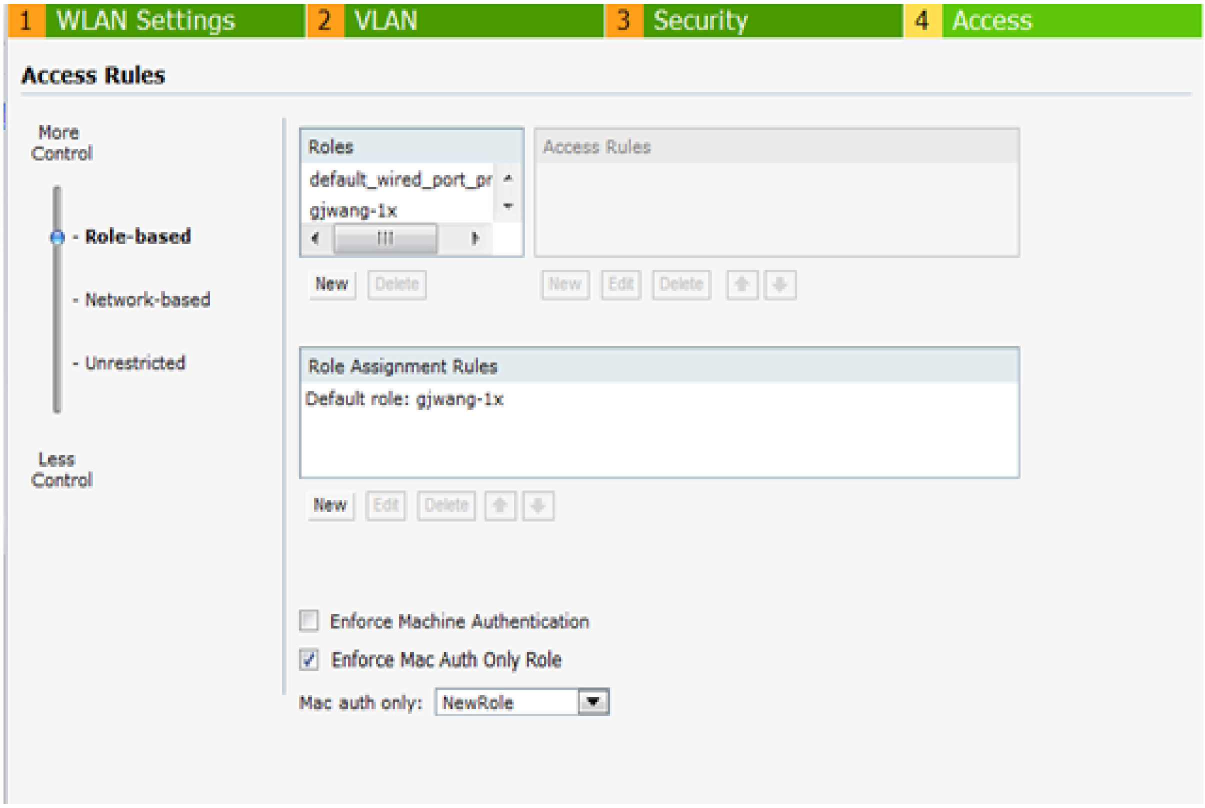
- If the captive portal splash page type is **Internal-Authenticated** or **External-RADIUS Server**, MAC authentication reuses the server configurations.
- If the captive portal splash page type is **Internal-Acknowledged** or **External-Authentication Text** and MAC authentication is enabled, a server configuration page is displayed.
- If the captive portal splash page type is **none**, MAC authentication cannot be enabled.
- MAC authentication only role— You can use the WLAN wizard to configure the **mac-auth-only** role in the role-based access rule configuration section when MAC authentication is enabled with captive portal authentication.

Configuring MAC + Captive Portal Authentication

To configure the MAC + Captive Portal authentication for a wireless network:

1. In the **Network** tab, click the network for which you want to enable MAC+Captive Portal authentication. The **edit** link for the network appears.
2. Click the **edit** link and navigate to the **Security** tab.
3. For a network with **Role-Based** rules:
   a. Select the check box **Enforce Machine Authentication** when MAC authentication is enabled for Captive Portal. If the MAC authentication fails, Captive Portal auth role is assigned to the client.
   b. Select the check box **Enforce MAC Auth Only Role** when MAC authentication is enabled for Captive Portal. After successful MAC authentication, MAC auth only role is assigned to the client.

Figure 103 - *Configuring MAC + Captive Portal Authentication*



Default role: gjwang-1x

□ Enforce Machine Authentication

☑ Enforce Mac Auth Only Role

Mac auth only: NewRole

4. Click **Next** and then click **Finish** to apply the changes.

Wired Authentication on an OAW-IAP

Instant supports wired authentication on the Ethernet uplink (Ethernet 0) and downlink (Ethernet 1/Ethernet 2) ports of an Instant AP.

The following wired authentication methods are supported:

- MAC Authentication
- Captive Portal Authentication
- 802.1X Wired Authentication

To configure wired authentication on an OAW-IAP:

1. Click the **Wired** link on the upper right corner of the Instant UI
2. Click on the **Network assignments** drop-down lists to apply an existing Ethernet downlink profile to the Ethernet ports.

NOTE

Configure bridging on the Ethernet port before you apply a profile.

The devices (for example, IP phone / printer) connected to the wired ports are now authenticated using the profile that is applied to the port. A list of all the wired users is available in the **Wired** window.

Certificates

A certificate is a digital file that certifies the identity of the organization or products of the organization. It is also used to establish your credentials for any web transactions. It contains the organization name, a serial number, expiration date, a copy of the certificate-holder's public key, and the digital signature of the certificate-issuing authority so that a recipient can ensure that the certificate is real.

Alcatel-Lucent Instant supports the following certificate files:

- Server certificate: PEM or PKCS#12 format with passphrase (PSK)
- CA certificate: PEM or DER format

There are two ways to upload the certificates.

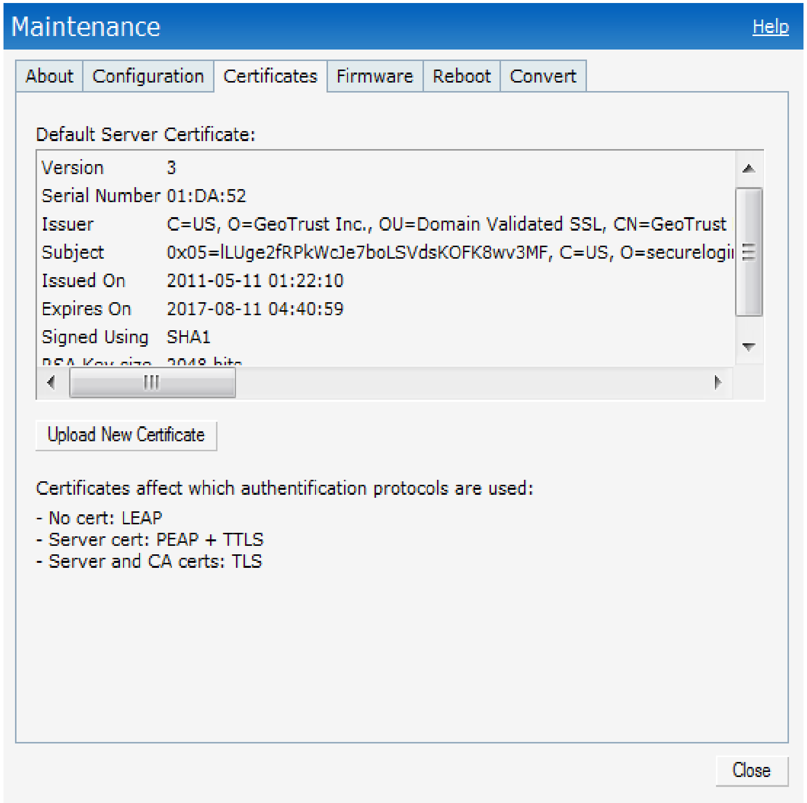
1. **Instant UI:** Navigate to **Maintenance > Certificates** and then click **Upload New Certificate** to directly upload the certificate. Refer to Loading Certificates using Instant UI on page 170 for further instructions.
2. **OmniVista:** Navigate to **Device Setup > Certificate** and then click **Add New Certificate**. Refer to Loading Certificates using OmniVista on page 171 for further instructions.

Loading Certificates using Instant UI

To load a certificate in the Instant UI:

1. Navigate to the **Maintenance > Certificates** page.

Figure 104 - *Loading Certificates*



Default Server Certificate:

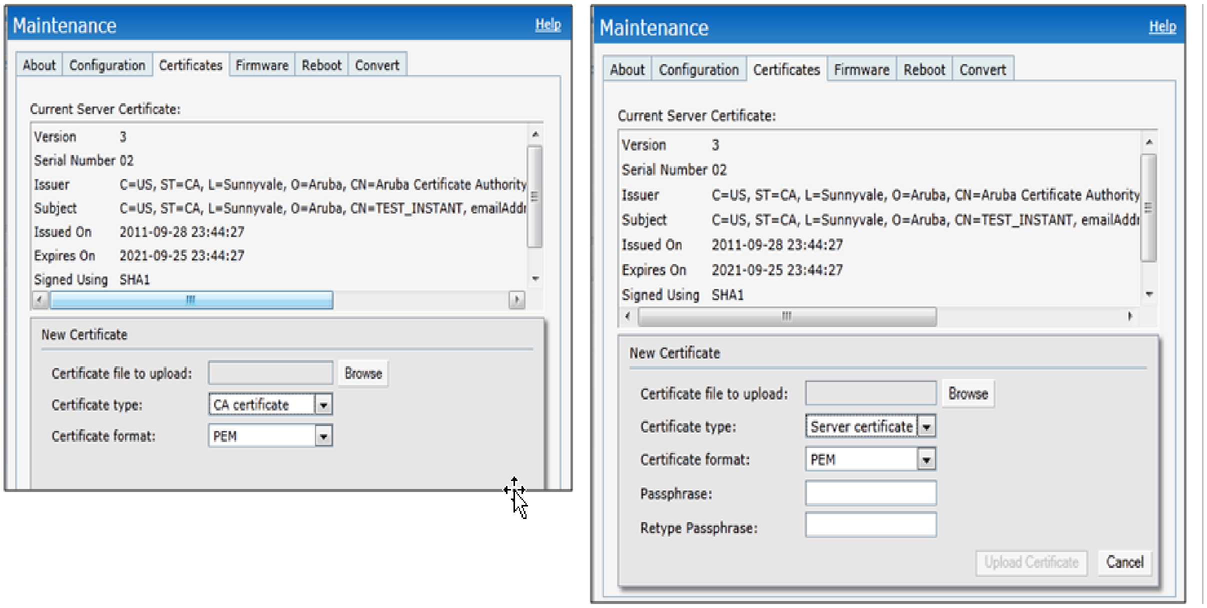
```
Version        3
Serial Number 01:DA:52
Issuer         C=US, O=GeoTrust Inc., OU=Domain Validated SSL, CN=GeoTrust
Subject        0x05=lLUge2fRPkWcJe7boLSVdsKOFK8wv3MF, C=US, O=securelogi
Issued On      2011-05-11 01:22:10
Expires On     2017-08-11 04:40:59
Signed Using   SHA1
RSA Key size   2048 bits
```

Certificates affect which authentification protocols are used:

- No cert: LEAP
- Server cert: PEAP + TTLS
- Server and CA certs: TLS

2. Click **Upload New Certificate** and the **New Certificate** window appears.

Figure 105 - *New Certificate*



Current Server Certificate:

Version	3
Serial Number	02
Issuer	C=US, ST=CA, L=Sunnyvale, O=Aruba, CN=Aruba Certificate Authority
Subject	C=US, ST=CA, L=Sunnyvale, O=Aruba, CN=TEST_INSTANT, emailAddr
Issued On	2011-09-28 23:44:27
Expires On	2021-09-25 23:44:27
Signed Using	SHA1

New Certificate

Certificate file to upload:

Certificate type: CA certificate

Certificate format: PEM

New Certificate

Certificate file to upload:

Certificate type: Server certificate

Certificate format: PEM

Passphrase:

Retype Passphrase:

3. Select the **Certificate type— CA certificate and Server certificate** from the drop-down list. The CA certificate is required to validate the client's certificate and the server certificate verifies the server's identity to the client.
4. Select the certificate format from the **Certificate format** drop-down list.
5. If you have selected **Server certificate** type, then enter a passphrase in **Passphrase** and reconfirm. The default password is **whatever**.
6. Click **Browse** and select the appropriate certificate file, and click **Upload Certificate**. The **Certificate Successfully Installed** window appears.

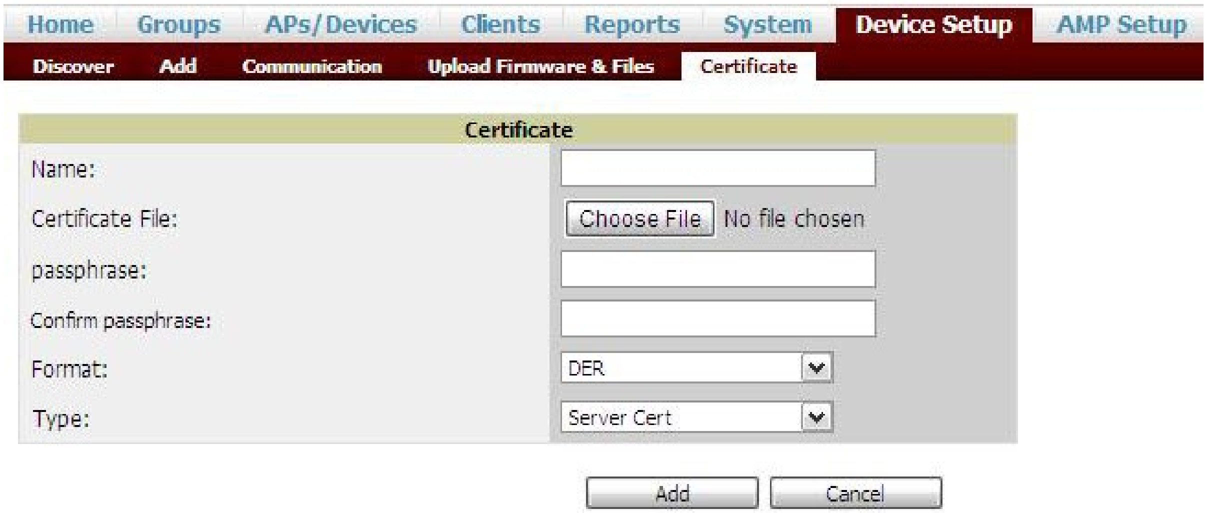
Loading Certificates using OmniVista

You can now manage Instant AP certificates using the OmniVista Management server (AMP). The AMP directly provision the certificates for basic certificate verification (i.e certificate type, format, version, serial number etc) before accepting the certificate and uploading to an OAW-IAP network. The AMP packages the text of the certificate into an HTTPS message and sends it to the Virtual Controller of the OAW-IAP network. Once the Virtual Controller receives this message, it draws the certificate content from the message, converts it to the right format and saves it on the RADIUS server.

To load a certificate in OmniVista:

1. Navigate to **Device Setup > Certificate** and then click **Add** to add a new certificate. The **Certificate** window appears.
2. Enter the certificate **Name**, and click **Choose File** to browse and upload the certificate.

Figure 106 - *Loading Certificate via OmniVista*

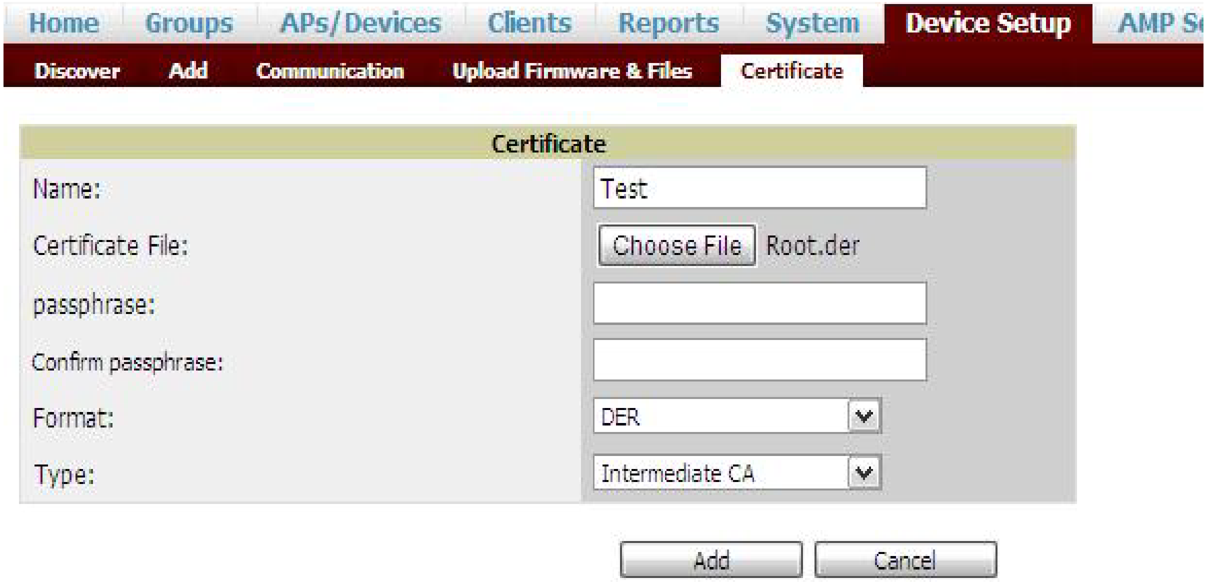


Certificate

Name:	
Certificate File:	Choose File No file chosen
passphrase:	
Confirm passphrase:	
Format:	DER
Type:	Server Cert

3. Select the appropriate **Format** that matches the certificate file name. Select **Server Cert** certificate **Type**, and provide the passphrase if you want to upload a Server certificate. Select either **Intermediate CA** or **Trusted CA** certificate **Type**, if you want to upload a CA certificate.

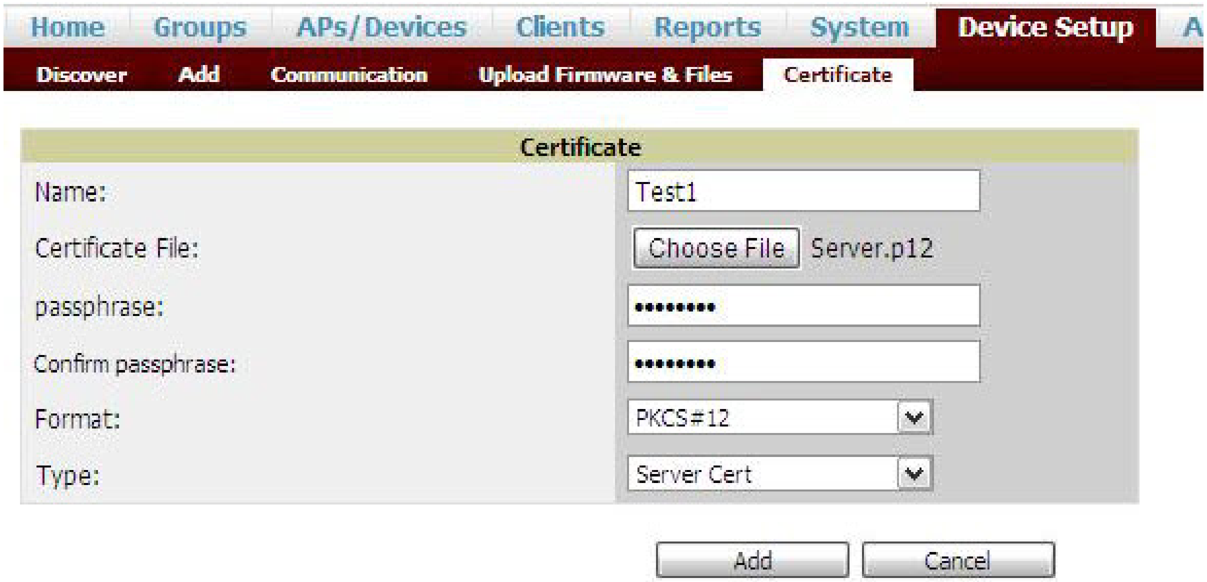
Figure 107 - *CA Certificate*



Certificate

Name:	Test
Certificate File:	Choose File Root.der
passphrase:	
Confirm passphrase:	
Format:	DER
Type:	Intermediate CA

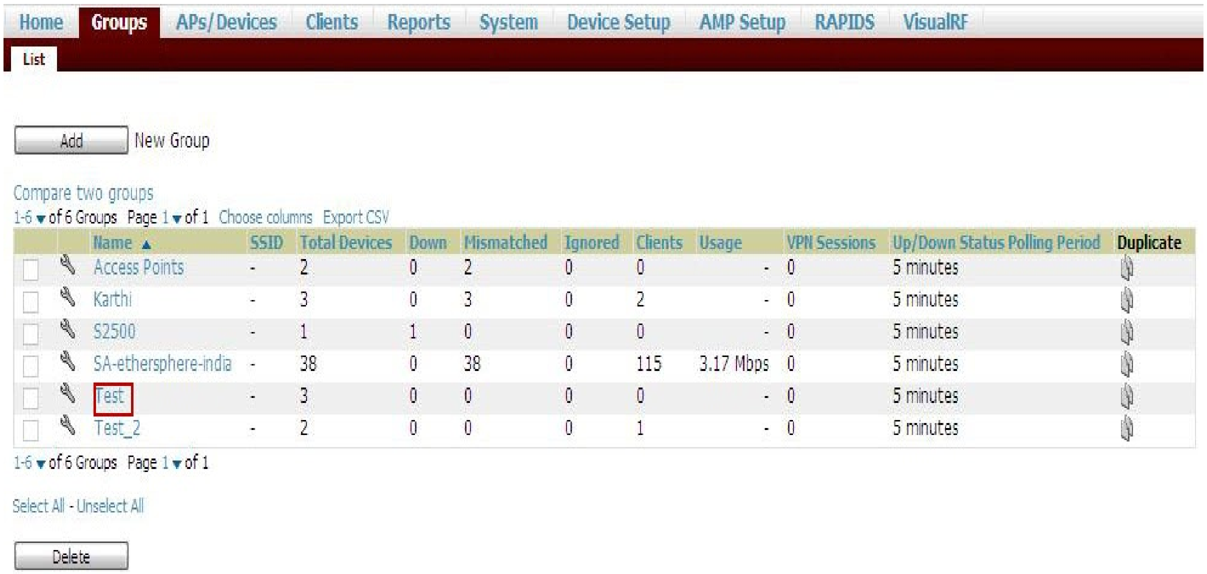
Figure 108 - *Server Certificate*



Certificate	
Name:	Test1
Certificate File:	Choose File Server.p12
passphrase:	••••••••
Confirm passphrase:	••••••••
Format:	PKCS#12
Type:	Server Cert

4. After you upload the certificate, navigate to **Groups,** click on the Instant **Group** and then select **Basic**. The Group name appears only if you have entered the **Organization** name in the Instant UI. Refer to Creating your Organization String on page 243 for further information.

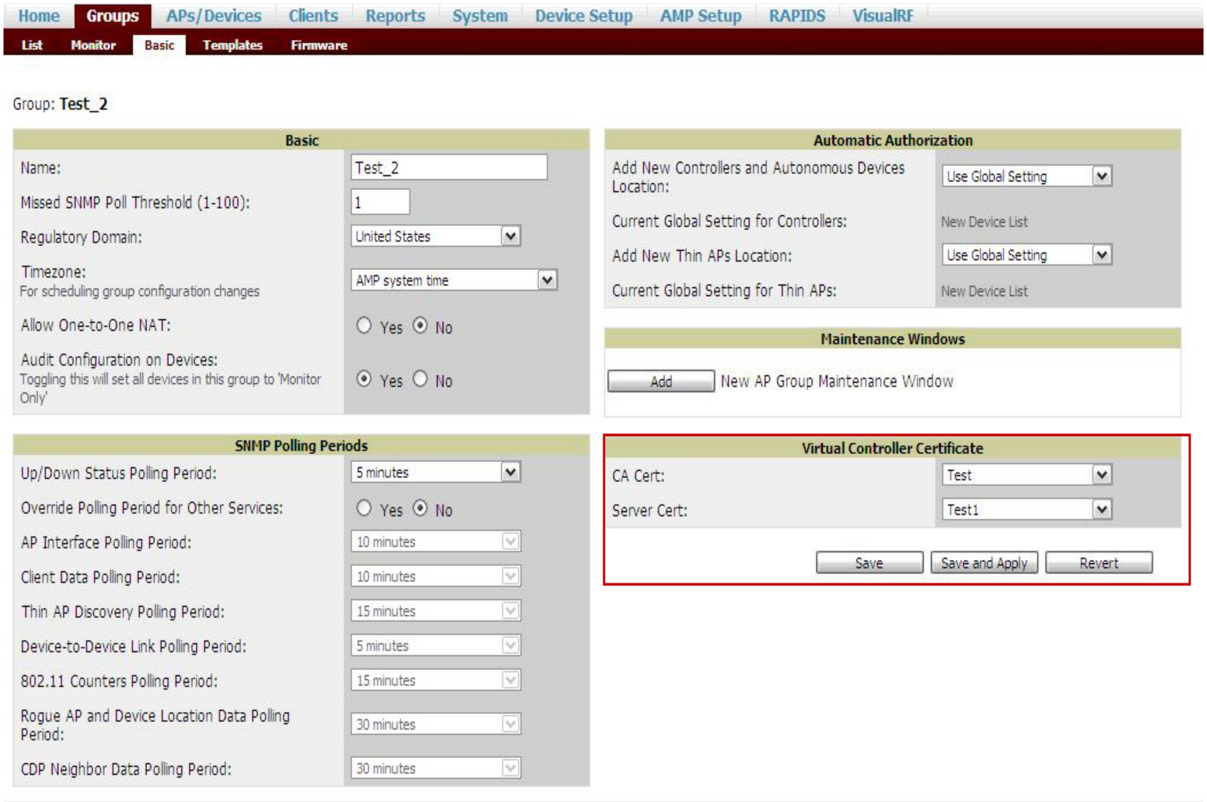
Figure 109 - *Selecting the Group*



		Name ▲	SSID	Total Devices	Down	Mismatched	Ignored	Clients	Usage	VPN Sessions	Up/Down Status Polling Period	Duplicate
□		Access Points	-	2	0	2	0	0	-	0	5 minutes	
□		Karthi	-	3	0	3	0	2	-	0	5 minutes	
□		S2500	-	1	1	0	0	0	-	0	5 minutes	
□		SA-ethersphere-india	-	38	0	38	0	115	3.17 Mbps	0	5 minutes	
□		Test	-	3	0	0	0	0	-	0	5 minutes	
□		Test_2	-	2	0	0	0	1	-	0	5 minutes	

5. The **Virtual Controller Certificate** section displays the certificates (CA cert and Server) as highlighted in the figure below.

Figure 110 - *Virtual Controller Certificate*



Group: **Test_2**

Basic

Name:	Test_2
Missed SNMP Poll Threshold (1-100):	1
Regulatory Domain:	United States
Timezone: For scheduling group configuration changes	AMP system time
Allow One-to-One NAT:	○ Yes ● No
Audit Configuration on Devices: Toggling this will set all devices in this group to 'Monitor Only'	● Yes ○ No

SNMP Polling Periods

Up/Down Status Polling Period:	5 minutes
Override Polling Period for Other Services:	○ Yes ● No
AP Interface Polling Period:	10 minutes
Client Data Polling Period:	10 minutes
Thin AP Discovery Polling Period:	15 minutes
Device-to-Device Link Polling Period:	5 minutes
802.11 Counters Polling Period:	15 minutes
Rogue AP and Device Location Data Polling Period:	30 minutes
CDP Neighbor Data Polling Period:	30 minutes

Automatic Authorization

Add New Controllers and Autonomous Devices Location:	Use Global Setting
Current Global Setting for Controllers:	New Device List
Add New Thin APs Location:	Use Global Setting
Current Global Setting for Thin APs:	New Device List

Maintenance Windows

Add New AP Group Maintenance Window

Virtual Controller Certificate

CA Cert:	Test
Server Cert:	Test1

Save | Save and Apply | Revert

6. Click **Save** to apply the changes only to OmniVista. Click **Save and Apply** to apply the changes to the Instant AP.

NOTE

To unselect the certificate options, click **Revert**.

Encryption Types Supported in Alcatel-Lucent Instant

Encryption is the process of converting data into an undecipherable format or code when it is transmitted on a network. Encryption prevents unauthorized use of the data. The following encryption types are supported in Alcatel-Lucent Instant:

WEP

Though WEP is an authentication method, it is also an encryption algorithm where all users typically share the same key. WEP is easily broken with automated tools, and should be considered no more secure than an open network. Alcatel-Lucent recommends against deploying WEP encryption. Organizations that use WEP are strongly encouraged to move to Advanced Encryption Standard (AES) encryption.

TKIP

TKIP uses the same encryption algorithm as WEP, but TKIP is much more secure and has an additional message integrity check (MIC). Recently some cracks have begun to appear in the TKIP encryption methods. Alcatel-Lucent recommends that all users migrate from TKIP to AES as soon as possible.

AES

The Advanced Encryption Standard (AES) encryption algorithm is now widely supported and is the recommended encryption type for all wireless networks that contain any confidential data. AES in Wi-Fi leverages 802.1X or PSKs to generate per station keys for all devices. AES provides a high level of security, similar to what is used by IP Security (IPsec) clients. Alcatel-Lucent recommends that all devices that cannot support AES be upgraded or replaced so that they are capable of AES encryption.

NOTE

WEP and TKIP are limited to WLAN connection speed of 54 Mbps. For 802.11n connection only AES encryption is supported.

Encryption Recommendations

Alcatel-Lucent recommendations for encryption on Wi-Fi networks are as follows:

- WEP —Not recommended
- TKIP— Not recommended
- AES— Recommended for all deployments

Understanding WPA and WPA2

The Wi-Fi Alliance created the Wi-Fi Protected Access (WPA) and WPA2 certifications to describe the 802.11i standard. The standard was written to replace WEP, which was found to have numerous security flaws. It took longer than expected to complete the standard, so WPA was created based on a draft of 802.11i, which allowed people to move forward quickly to create more secure WLANs. WPA2 encompasses the full implementation of the 802.11i standard. Table 18 summarizes the differences between the two certifications. WPA2 is a superset that encompasses the full WPA feature set. WPA and WPA2 can be further classified as follows:

- **Personal** — Personal is also called Pre-Shared Key (PSK). In this type, a unique key is shared with each client in the network. Users have to use this key to securely log in to the network. The key remains the same until it is changed by authorized personnel. Key change intervals can also be configured.
- **Enterprise** — Enterprise is more secure than WPA Personal. In this type, every client automatically receives a unique encryption key after securely logging on to the network. This key is long and automatically updated regularly. While WPA uses TKIP, WPA2 uses AES algorithm.

Table 18 - *WPA and WPA2 Features*

Certification	Authentication	Encryption
WPA	• PSK • IEEE 802.1X with Extensible Authentication Protocol (EAP)	Temporal Key Integrity Protocol (TKIP) with message integrity check (MIC)
WPA2	• PSK • IEEE 802.1X with EAP	Advanced Encryption Standard -- Counter Mode with Cipher Block Chaining Message Authentication Code (AESCCMP)

Recommended Authentication and Encryption Combinations

Table 19 summarizes the recommendations for authentication and encryption combinations that should be used in Wi-Fi networks.

Table 19 - *Recommended Authentication and Encryption Combinations*

Network Type	Authentication	Encryption
Employee	802.1X	AES
Guest Network	Captive Portal	None
Voice Network or Handheld devices	802.1X or PSK as supported by the device	AES if possible, TKIP or WEP if necessary (combine with restricted policy enforcement firewall (PEF) user role).

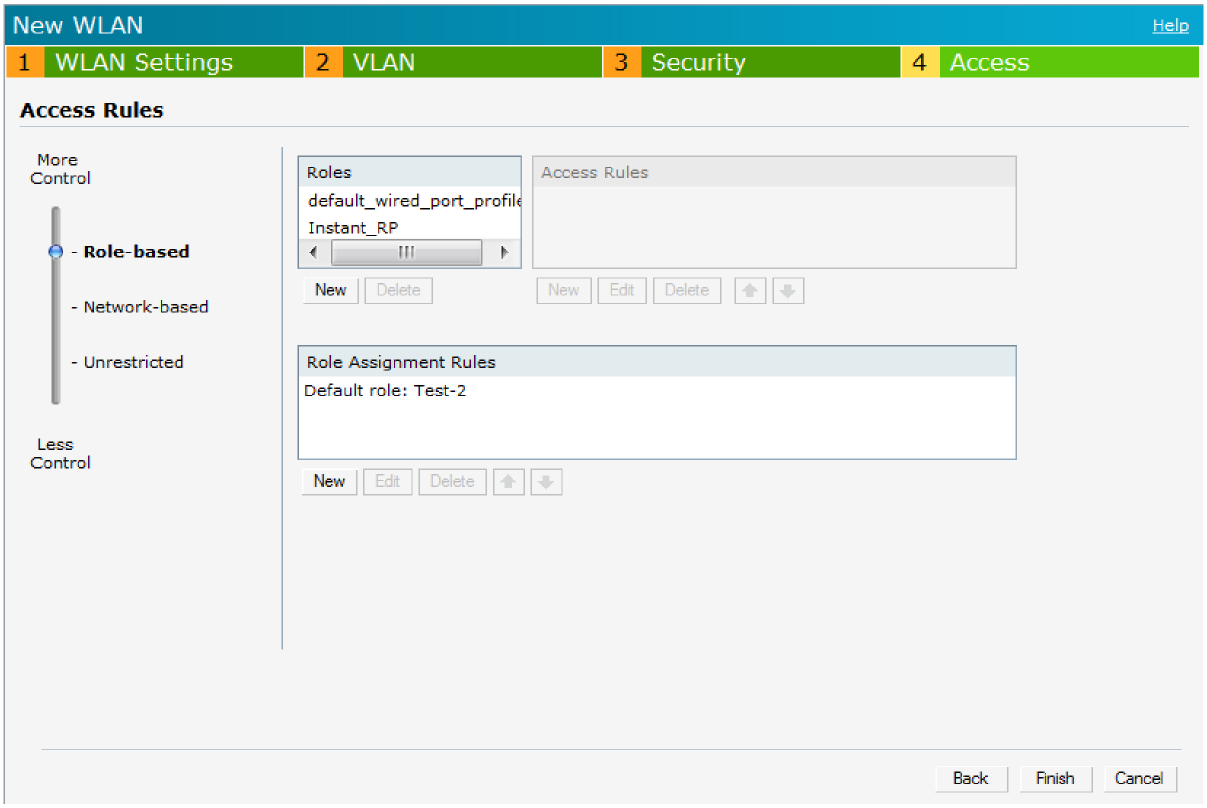
Every client in an Alcatel-Lucent Instant network is associated with a user role, which determines the client's network privileges, how often it must re-authenticate, and which bandwidth contracts are applicable.

This section describes creating and assigning roles using the Instant UI.

User Roles

This section describes how to create a new user role.

Figure 111 - *Access Tab - Instant User Role Settings*



Roles: default_wired_port_profile, Instant_RP

Role Assignment Rules: Default role: Test-2

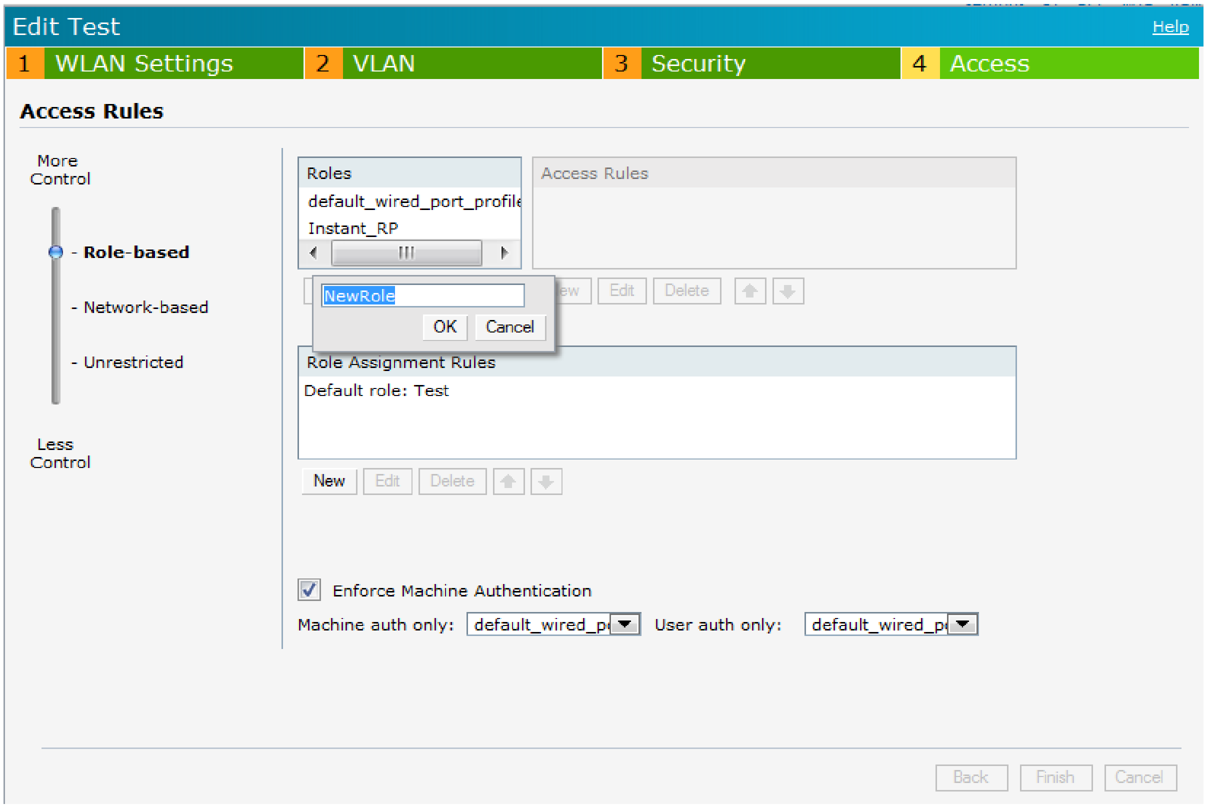
Creating a New User Role

To create a new user role:

1. Click the **New** link in the **Networks** tab.
   To define the access rule to an existing network, click the network. The **edit** link appears. Click the **edit** link and navigate to the **Access** tab.
2. In the **WLAN Settings** tab, enter the appropriate information and click **Next** to continue.
3. Use the **VLAN** tab, to specify how the clients on this network get their IP address and VLAN. Click **Next** to continue.
4. Click **Next** and set appropriate values in the **Security** tab.
5. Click **Next**. The **Access** tab appears.

6. Slide to **Role-based** using the scroll bar on the left.
7. Click **New**. The **New Rule** window appears. Enter the name of the new user role. To delete a user role, select the user role and click **Delete**.

Figure 112 - *Creating a New User Role*



Default role: Test

☑ Enforce Machine Authentication

Machine auth only: default_wired_p User auth only: default_wired_p

8. Click **OK**. The **Allow any to all destinations** access rule is enabled by default. This rule allows traffic to all destinations. To create new access rules, see Examples for Access Rules on page 194.
9. **Assign pre-authentication role—** Use this option if you want to allow some access to users even before they are authenticated.
10. **Enforce Machine Authentication—** You can assign different rights to clients based on whether their hardware device supports machine authentication. Machine Authentication is only supported on Windows devices, so this can be used to distinguish between Windows devices and other devices such as iPads.

    - Machine Auth only role - This indicates a Windows machine with no user logged in. The device supports machine authentication and has a valid RADIUS account, but a user has not yet logged in and authenticated.
    - User Auth only role - This indicates a known user or a non-Windows device. The device does not support machine auth or does not have a RADIUS account, but the user is logged in and authenticates.

    When a device does both Machine and User authentication, the user gets the default role or the derived role based on the RADIUS attribute.

    To configure Machine Authentication, do the following:

    1. In the **Roles** window, create a role for **Machine auth only** and **User auth only**.
    2. Configure Access Rules for these roles by selecting the role, and applying the rule. Refer to Examples for Access Rules on page 194 for procedures to create access rules.
    3. Select **Enforce Machine Authentication** and specify these two roles.

4. Click **Finish** to apply these changes.

Creating Role Assignment Rules

This section describes the rules for determining the role that is assigned for each authenticated client.

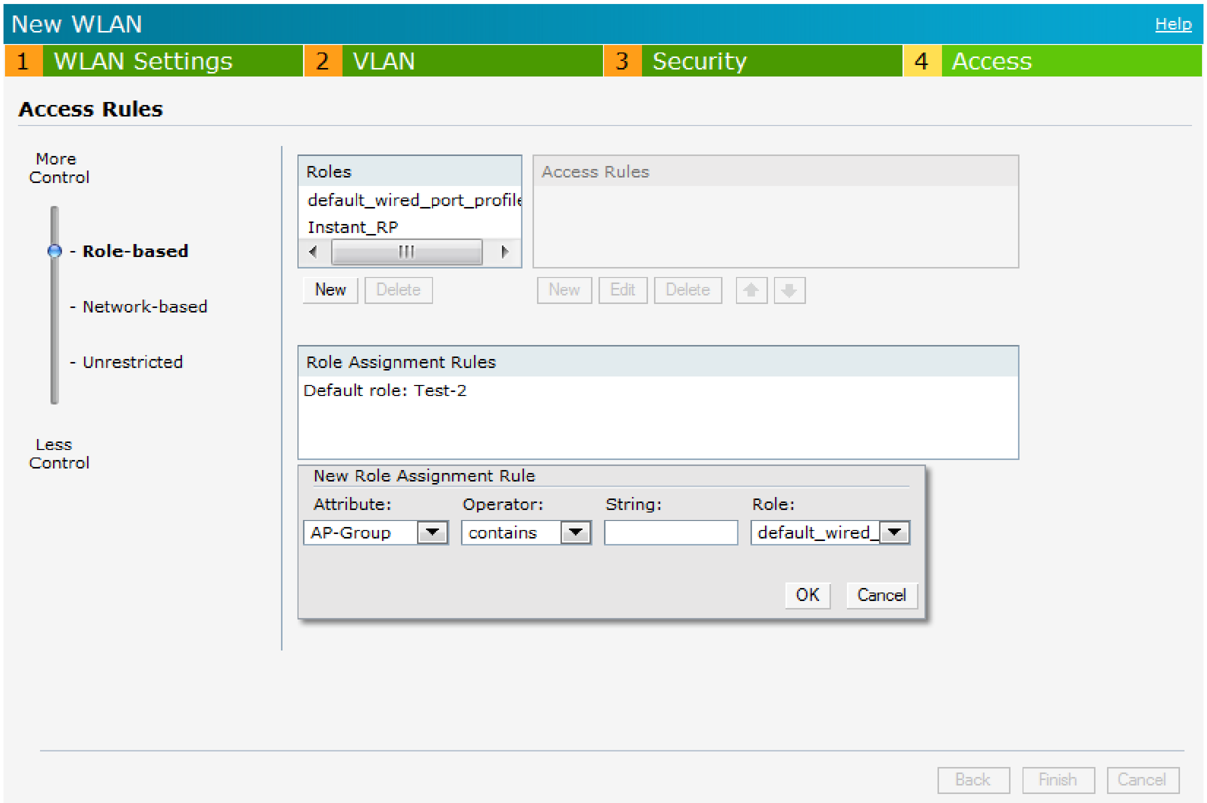
NOTE

When Enforce Machine Authentication is enabled, both the device and the user must be authenticated for the role assignment rule to apply.

To create role assignment rules for the user role:

1. Click **New** in the **Role Assignment Rules** section of the window. The default user role is the newly created user role.
2. Select the attribute from the **Attribute** drop-down list that the rule it matches against. The list of supported attributes includes RADIUS attributes (see List of Supported VSA on page 148), DHCP-Option, 802.1X-Authentication-Type, and MAC-Address.
3. Select the operator from the **Operator** drop-down list. The following types of operators are supported:
   - **contains**— To check if the attribute contains the operand value.
   - **Is the role**— To check if the role is same as the operand value.
   - **equals**— To check if the attribute is equal to the operand value.
   - **not-equals**— To check if the attribute is not equal to the operand value.
   - **starts-with**— To check if the attribute the starts with the operand value.
   - **ends-with**— To check if the attribute ends with the operand value.
4. Enter the string to match in the **String** text box.
5. Select the appropriate role from the **Role** drop-down list.
6. Click **OK**.

Figure 113 - *Creating Role Assignment Rules*



Roles: default_wired_port_profile, Instant_RP

Role Assignment Rules

Default role: Test-2

New Role Assignment Rule

Attribute:	Operator:	String:	Role:
AP-Group	contains		default_wired_

MAC-Address Attribute

The first three octets in a MAC address are known as Organizationally Unique Identifier (OUI), and are purchased from the Institute of Electrical and Electronics Engineers, Incorporated (IEEE) Registration Authority. This identifier uniquely identifies a vendor, manufacturer, or other organization (referred to by the IEEE as the “assignee”) globally and effectively reserves a block of each possible type of derivative identifier (such as MAC addresses) for the exclusive use of the assignee. IAP uses the OUI part of a MAC address to identify the device manufacturer and assigns a desired role for users who have completed 802.1X authentication and MAC authentication.

DHCP Option and DHCP Fingerprinting

The DHCP fingerprinting feature allows you to identify the operating system of a device by looking at the options in the DHCP frame. Based on the operating system type, a role can be assigned to the device.

For example, in order to create a role assignment rule with DHCP option, select **equals** from the **Operator** drop-down list and enter 370103060F77FC in the **String** text box. Since 370103060F77FC is the fingerprint for Apple iOS devices such as iPad and iPhone, OAW-IAP assigns Apple iOS devices to the role that you choose.

Table 20 - *Validated DHCP Fingerprint*

Device	DHCP Option	DHCP Fingerprint
Apple iOS	Option 55	370103060F77FC

Device	DHCP Option	DHCP Fingerprint
Android	Option 60	3C64686370636420342E302E3135
Blackberry	Option 60	3C426C61636B4265727279
Windows 7/Vista Desktop	Option 55	37010f03062c2e2f1f2179f92b
Windows XP(SP3, Home, Professional)	Option 55	37010f03062c2e2f1f21f92b
Windows Mobile	Option 60	3c4d6963726f736f66742057696e646f777320-434500
Windows 7 Phone	Option 55	370103060f2c2e2f
Apple Mac OSX	Option 55	370103060f775ffc2c2e2f

802.1X-Authentication-Type

OAW-IAP allows you to use client 802.1X authentication to assign a desired role for users who have completed 802.1X authentication.

NOTE

When creating more than one role assignment rule based on RADIUS attributes, a DHCP option, and 802.1X-authentication-type, the first matching rule in the rule list is applied.

User VLAN Derivation

Instant allows you to assign a user VLAN based on user attributes. When an external RADIUS authentication server is used for authentication, the user VLAN can be derived from Vendor Specific Attributes (VSAs).

The user VLAN can be derived in 802.1X authentication or MAC authentication using the following rules:

- Vendor Specific Attributes (VSA)
- VLAN derivation rule
- User role
- SSID Profile

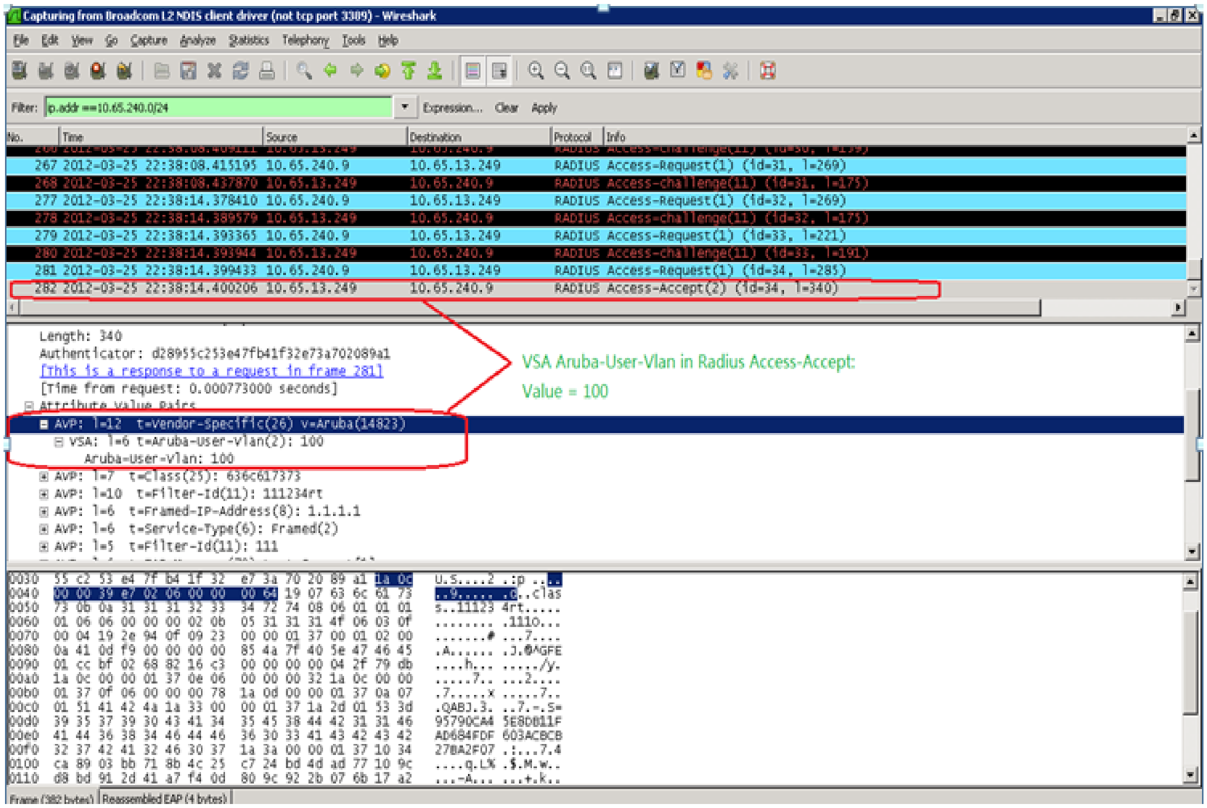
The user VLAN cannot be derived in the following scenarios:

- Captive Portal authentication
- Guest SSID network

Vendor Specific Attributes (VSA)

When an external RADIUS server is used, the user VLAN can be derived from the **Alcatel-Lucent-User-Vlan** VSA. The VSA is then carried in an Access-Accept packet from the RADIUS server. The OAW-IAP can analyze the return message and derive the value of the VLAN which it assigns to the user.

Figure 114 - *RADIUS Access—Accept packets with VSA*



Capturing from Broadcom L2 NDIS client driver (not tcp port 3389) - Wireshark

Filter: ip.addr ==10.65.240.0/24

```
No.  Time                        Source          Destination     Protocol Info
267 2012-03-25 22:38:08.415195 10.65.240.9     10.65.13.249    RADIUS  Access-Request(1) (id=31, l=269)
268 2012-03-25 22:38:08.437870 10.65.13.249    10.65.240.9     RADIUS  Access-challenge(11) (id=31, l=175)
277 2012-03-25 22:38:14.378410 10.65.240.9     10.65.13.249    RADIUS  Access-Request(1) (id=32, l=269)
278 2012-03-25 22:38:14.389579 10.65.13.249    10.65.240.9     RADIUS  Access-challenge(11) (id=32, l=175)
279 2012-03-25 22:38:14.393365 10.65.240.9     10.65.13.249    RADIUS  Access-Request(1) (id=33, l=221)
280 2012-03-25 22:38:14.393944 10.65.13.249    10.65.240.9     RADIUS  Access-challenge(11) (id=33, l=191)
281 2012-03-25 22:38:14.399433 10.65.240.9     10.65.13.249    RADIUS  Access-Request(1) (id=34, l=285)
282 2012-03-25 22:38:14.400206 10.65.13.249    10.65.240.9     RADIUS  Access-Accept(2) (id=34, l=340)
```

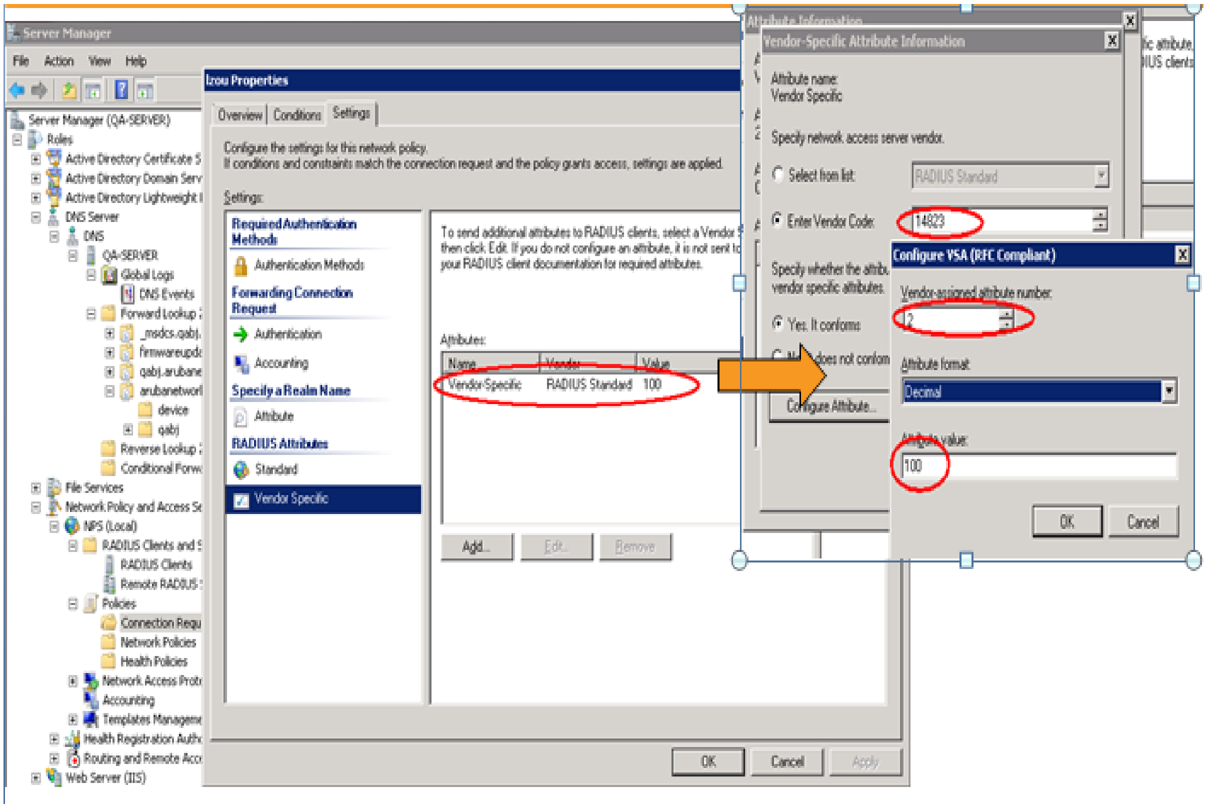
```
    Length: 340
    Authenticator: d28955c253e47fb41f32e73a702089a1
    [This is a response to a request in frame 281]
    [Time from request: 0.000773000 seconds]
  ⊟ Attribute Value Pairs
    ⊟ AVP: l=12  t=Vendor-Specific(26) v=Aruba(14823)
      ⊟ VSA: l=6 t=Aruba-User-Vlan(2): 100
          Aruba-User-Vlan: 100
    ⊞ AVP: l=7  t=Class(25): 636c617373
    ⊞ AVP: l=10  t=Filter-Id(11): 111234rt
    ⊞ AVP: l=6  t=Framed-IP-Address(8): 1.1.1.1
    ⊞ AVP: l=6  t=Service-Type(6): Framed(2)
    ⊞ AVP: l=5  t=Filter-Id(11): 111
```

VSA Aruba-User-Vlan in Radius Access-Accept:
Value = 100

```
0030  55 c2 53 e4 7f b4 1f 32  e7 3a 70 20 89 a1 1a 0c   U.S....2 .:p ....
0040  00 00 39 e7 02 06 00 00  00 64 19 07 63 6c 61 73   ..9..... .d..clas
0050  73 0b 0a 31 31 31 32 33  34 72 74 08 06 01 01 01   s..11123 4rt.....
0060  01 06 06 00 00 00 02 0b  05 31 31 31 4f 06 03 0f   ........ .111O...
0070  00 04 19 2e 94 0f 09 23  00 00 01 37 00 01 02 00   .......# ...7....
0080  0a 41 0d f9 00 00 00 00  85 4a 7f 40 5e 47 46 45   .A...... .J.@^GFE
0090  01 cc bf 02 68 82 16 c3  00 00 00 00 04 2f 79 db   ....h... ...../y.
00a0  1a 0c 00 00 01 37 0e 06  00 00 00 32 1a 0c 00 00   .....7.. ...2....
00b0  01 37 0f 06 00 00 00 78  1a 0d 00 00 01 37 0a 07   .7.....x .....7..
00c0  01 51 41 42 4a 1a 33 00  00 01 37 1a 2d 01 53 3d   .QABJ.3. ..7.-.S=
00d0  39 35 37 39 30 43 41 34  35 45 38 44 42 31 31 46   95790CA4 5E8DB11F
00e0  41 44 36 38 34 46 44 46  36 30 33 41 43 42 43 42   AD684FDF 603ACBCB
00f0  32 37 42 41 32 46 30 37  1a 3a 00 00 01 37 10 34   27BA2F07 .:...7.4
0100  ca 89 03 bb 71 8b 4c 25  c7 24 bd 4d ad 77 10 9c   ....q.L% .$.M.w..
0110  d8 bd 91 2d 41 a7 f4 0d  80 9c 92 2b 07 6b 17 a2   ...-A... ...+.k..
```

File Edit View Go Capture Analyze Statistics Telephony Tools Help
Expression... Clear Apply
Frame (382 bytes)
Reassembled EAP (4 bytes)

Figure 115 - *Configure VSA on a RADIUS Server*



Izou Properties

Overview | Conditions | Settings

Configure the settings for this network policy.
If conditions and constraints match the connection request and the policy grants access, settings are applied.

Settings:

- Required Authentication Methods
  - Authentication Methods
- Forwarding Connection Request
  - Authentication
  - Accounting
- Specify a Realm Name
  - Attribute
- RADIUS Attributes
  - Standard
  - Vendor Specific

To send additional attributes to RADIUS clients, select a Vendor S then click Edit. If you do not configure an attribute, it is not sent to your RADIUS client documentation for required attributes.

Attributes:

Name	Vendor	Value
Vendor-Specific	RADIUS Standard	100

Attribute Information

Vendor-Specific Attribute Information

Attribute name:
Vendor Specific

Specify network access server vendor.

○ Select from list: RADIUS Standard

● Enter Vendor Code: 14823

Specify whether the attrib vendor specific attributes.

● Yes. It conforms

○ No. It does not conform

Configure VSA (RFC Compliant)

Vendor-assigned attribute number:
2

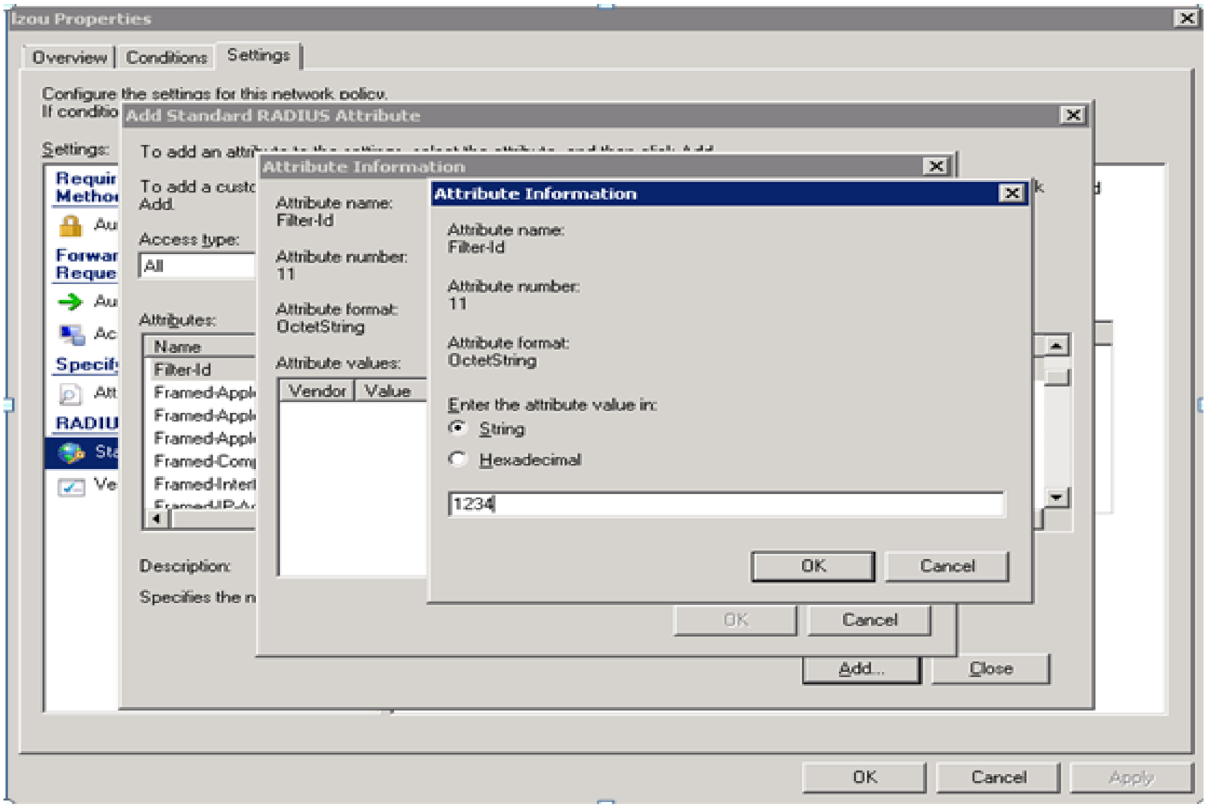
Attribute format:
Decimal

Attribute value:
100

VLAN Derivation Rule

When an external RADIUS server is used for authentication, the RADIUS server may return a reply message for authentication. If the RADIUS server supports return attributes, and sets an attribute value to the reply message, OAW-IAP can analyze the return message and match attributes with a user pre-defined VLAN derivation rule. If the rule is matched, the VLAN value defined by the rule is assigned to the user.

Figure 116 - *Configuring RADIUS Attributes on the RADIUS Server*



Attribute Information

Attribute name:
Filter-Id

Attribute number:
11

Attribute format:
OctetString

Enter the attribute value in:

● String

○ Hexadecimal

1234

Configuring VLAN Derivation Rules on an OAW-IAP

The rule assigns the user to a VLAN based on the attributes returned by the RADIUS server when the user is authenticated and the MAC address of the user.

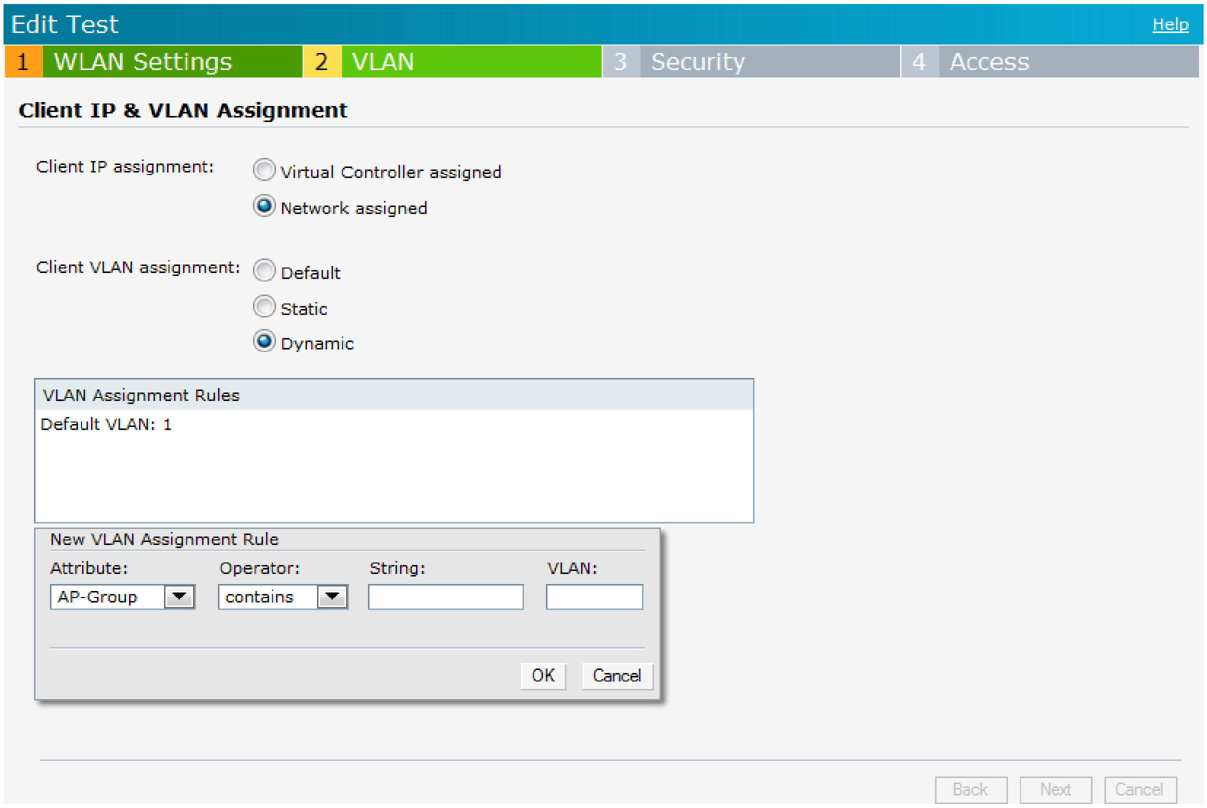
To configure VLAN derivation rules on an OAW-IAP:

1. Select a network on the Instant UI and click on the **edit** link.
2. Select the **VLAN** tab and check the Dynamic radio button under the **client VLAN assignment.**
3. Click **New** to assign the user to a VLAN. The **New VLAN Assignment Rule** window appears.

   Enter the following information:

   - **Attribute**— Select the attribute returned by the RADIUS server during authentication or the MAC-Address.
   - **Operator**— Select an operator for matching the string.
   - **String**— Enter the string to match.
   - **VLAN**— Enter the VLAN to be assigned.
4. Click **OK**.

Figure 117 - *Configuring VLAN Derivation Rules on an OAW-IAP*



Edit Test

Client IP & VLAN Assignment

Client IP assignment: ○ Virtual Controller assigned ● Network assigned

Client VLAN assignment: ○ Default ○ Static ● Dynamic

VLAN Assignment Rules

Default VLAN: 1

New VLAN Assignment Rule

Attribute: AP-Group

Operator: contains

String:

VLAN:

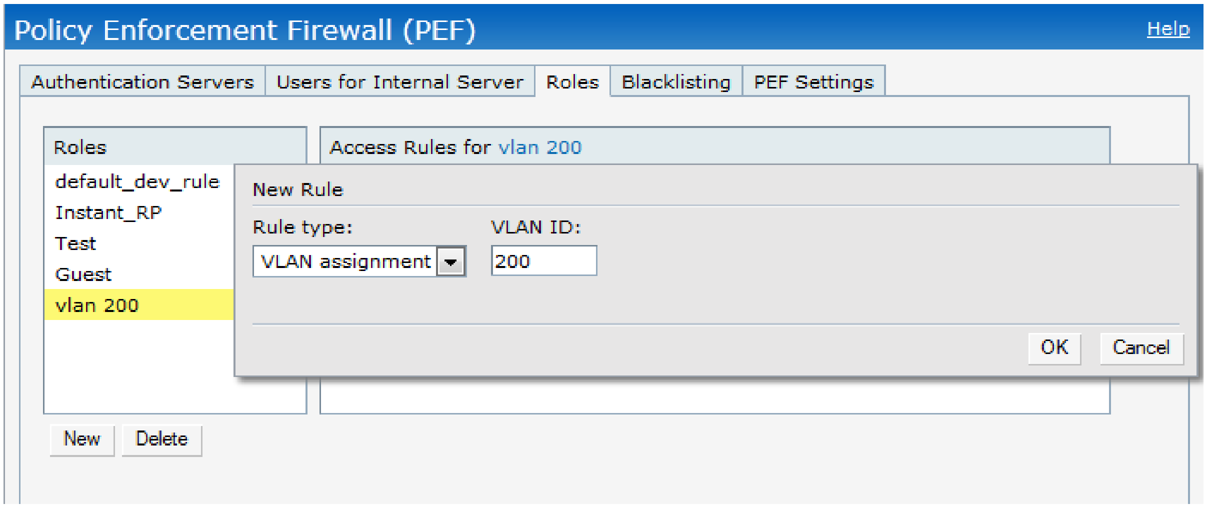
User Role

If the VSA and VLAN derivation rules are not matching, then the user VLAN can be derived by a user role.

Configuring a User Role

1. Click the **PEF link** at the top right corner of Instant UI.
2. Select **Roles** tab.
3. Click the **New** button under roles.
4. Enter the new role in the text box and click **OK**.
5. Click the **New** button under the **Access rules**.
6. Select the **Rule type** as **VLAN assignment**.
7. Enter the ID of the VLAN in the **VLAN id** text box.
8. Click **OK**.

Figure 118 - *Configuring VLAN Derivation using the User Role*



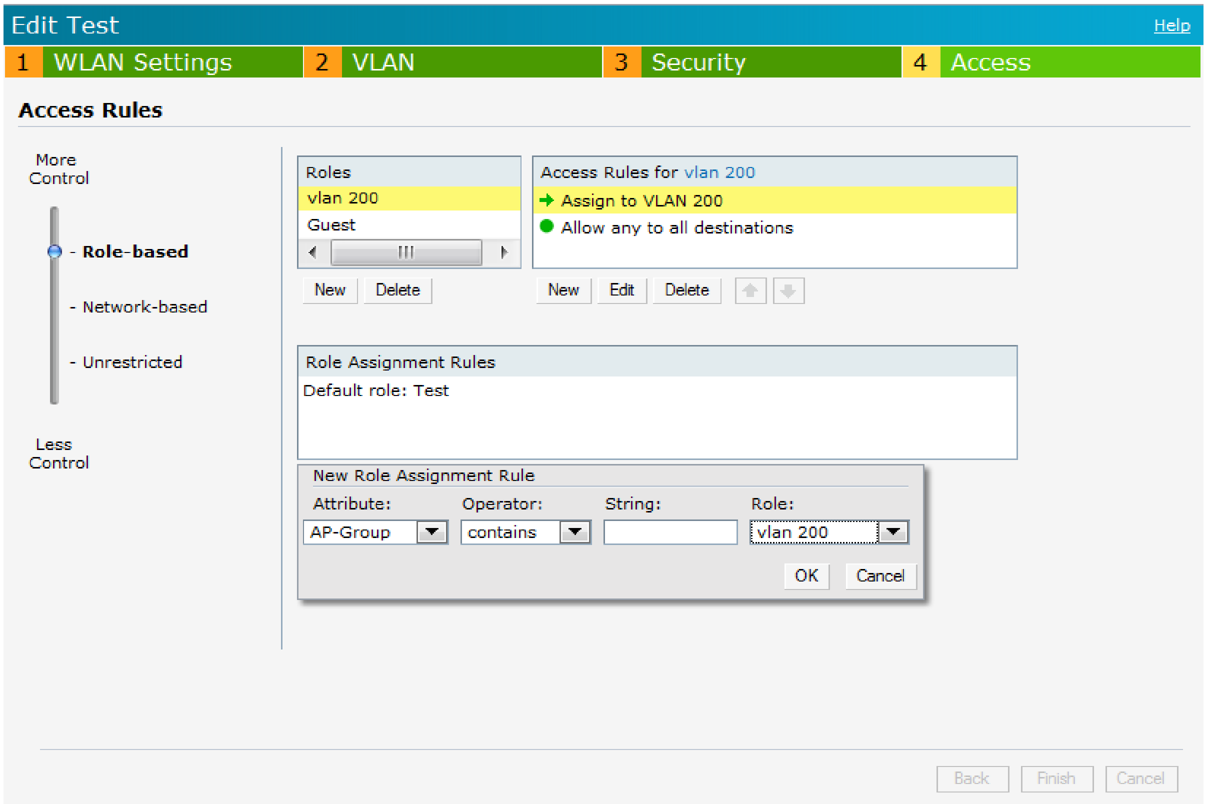
Rule type: VLAN assignment

VLAN ID: 200

To use a defined user VLAN role:

1. Select a network on the Instant UI and click on the **edit** link.
2. Select the **Access** tab
3. Under **role-based**, select the defined role.
4. Select the access rule for the defined role from the list of Access rules.
5. Click the **New** button under the **New Role Assignment** window.
6. Select the attribute from the **Attribute** drop-down list.
7. Select the operator to match from the **Operator** drop-down list.
8. Enter the string to match in the **String** text box.
9. Select the role to be assigned from the **Role** text box.
10. Click **OK**.

Figure 119 - *To use a Defined User VLAN Role*



Access Rules

Roles: vlan 200, Guest

Access Rules for vlan 200
- Assign to VLAN 200
- Allow any to all destinations

Role Assignment Rules
Default role: Test

New Role Assignment Rule
Attribute: AP-Group
Operator: contains
String:
Role: vlan 200

SSID Profile

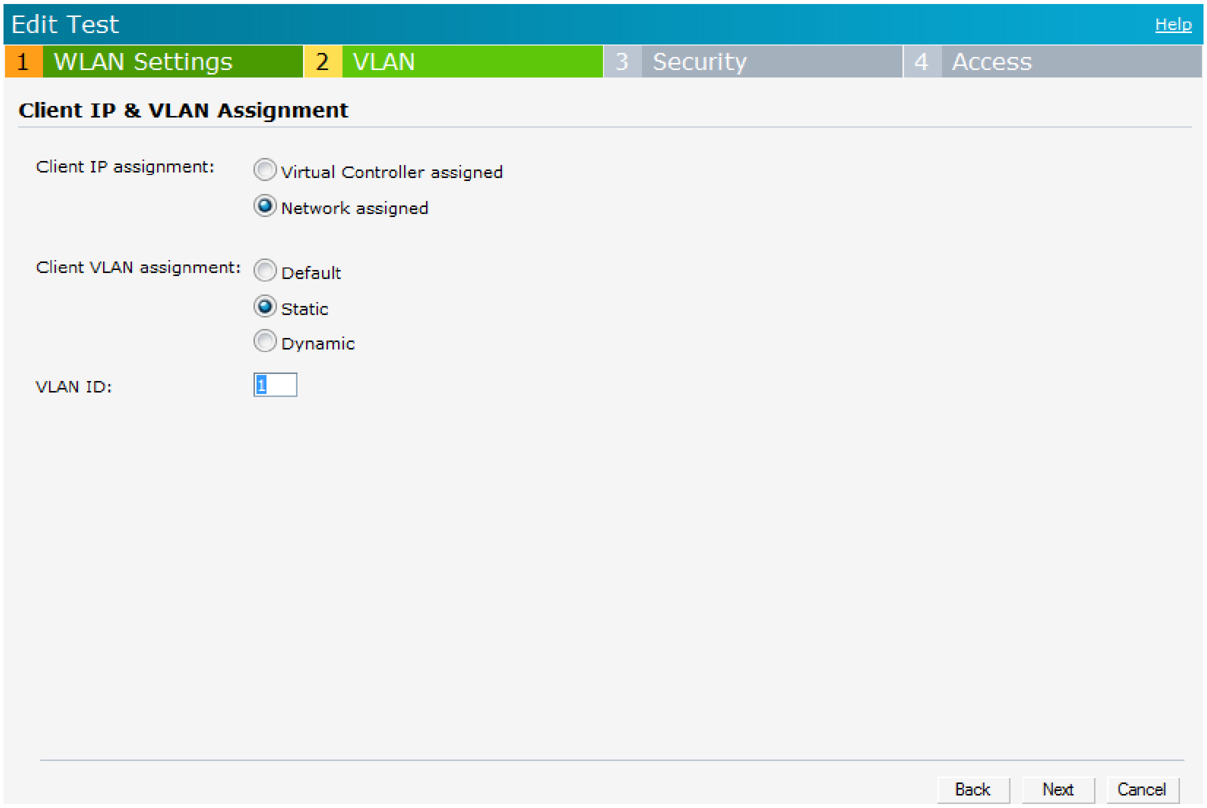
If the VSA, VLAN derivation rules are not matching, and the User Role does not contain a VLAN, then the user VLAN can be derived by the SSID profile.

Configuring VLAN Derivation Rules Using an SSID Profile

To configure VLAN derivation rules on an OAW-IAP:

1. Select a network on the Instant UI and click on the **edit** link.
2. Select the **VLAN** tab and check the static radio button under the **client VLAN assignment.**
3. Enter the ID of the VLAN in the **VLAN ID** text box.
4. Click **OK**.

Figure 120 - *Configuring VLAN Derivation Rules Using an SSID Profile*



Client IP & VLAN Assignment

Client IP assignment: ○ Virtual Controller assigned ● Network assigned

Client VLAN assignment: ○ Default ● Static ○ Dynamic

VLAN ID: 1

A firewall is a system designed to prevent unauthorized internet users from accessing a private network connected to the internet. It defines access rules and monitors all data entering or leaving the network and blocks data that does not satisfy the specified security policies.

Alcatel-Lucent Instant implements a Instant Firewall feature that uses a simplified firewall policy language. An administrator can define the firewall policies on an SSID or wireless LAN such as the Guest network or an Employee network. At the end of the authentication process, these policies are uniformly applied to users connected to that network. The Instant Firewall gives you the flexibility to limit packets or bandwidth available to a particular class of users. Instant Firewall manages packets according to the first rule the packet matches.

1. In the **Networks** tab, click the **New** link. The **New WLAN** window appears.
2. Navigate to **Access** tab to specify the access rules for the network.
3. Slide to **Network-based** using the scroll bar and click **New** to add a new rule.

The New Rule window consists of the following options:

- **Rule type—** Select the rule type (Access control, VLAN assignment) from the drop-down list.

NOTE

This release of Instant supports configuration of up to 64 access control rules.

- **Action—** Select **Allow**, **Deny**, or **Destination-NAT** from the drop-down list to allow or deny traffic with the specified service type and destination.
- **Log—** Select this check box if you want a log entry to be created when this rule is triggered. Instant firewall supports firewall based logging function. Firewall logs on OAW-IAP are generated as syslog messages.
- **Blacklist—** Select this check box if you want the client to be blacklisted when this rule is triggered. The blacklisting lasts for the duration specified as **Auth failure blacklist** time on the Blacklisting tab of the **PEF** window. See Client Blacklisting on page 298 for more information.
- **Classify media**— Select this check box if you want to prioritize video and voice traffic. When enabled, deep packet inspection is performed on all non-NATed traffic, and the traffic is marked as follows:
  - Video: Priority 5 (Critical)
  - Voice: Priority 6 (Internetwork Control)
- **Disable scanning**— Select this check box if you want ARM scanning to be paused when this rule is triggered, to optimize performance.

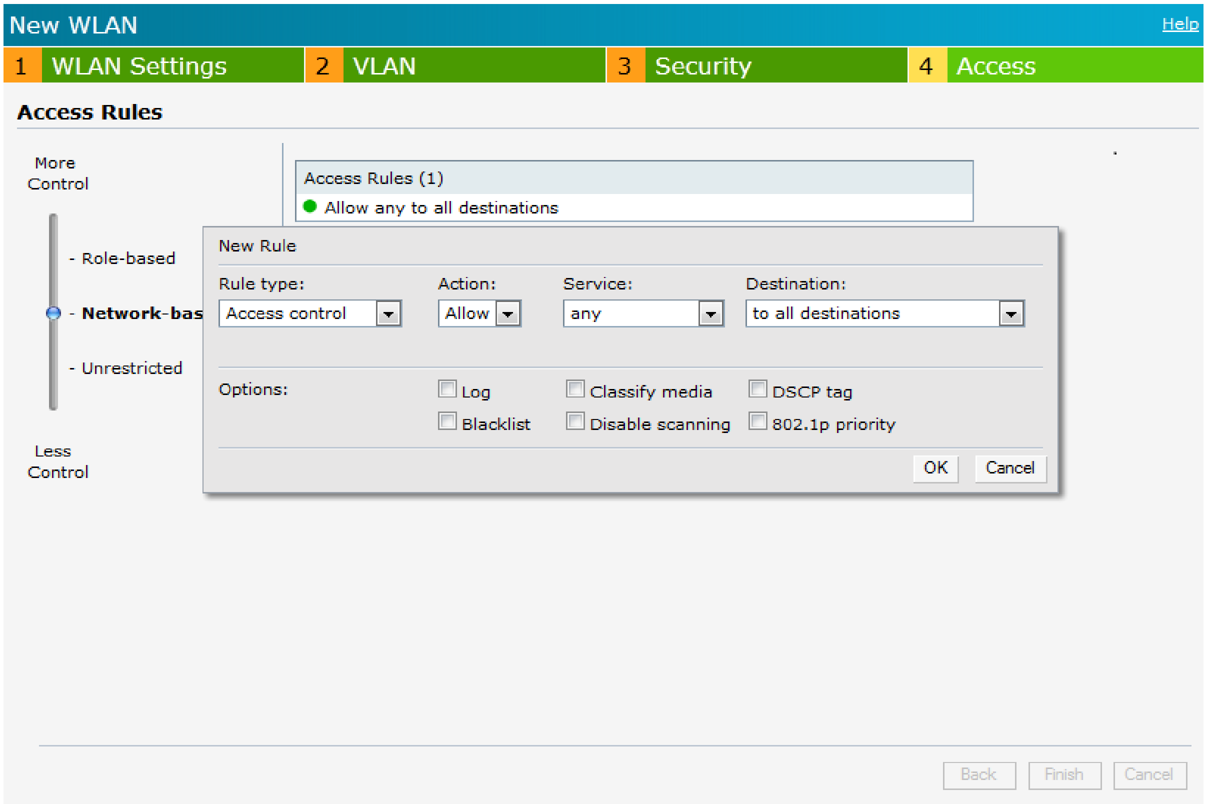
NOTE

This feature only takes effect if ARM scanning is enabled, from the ARM tab of the RF dialog.

- **DSCP tag**— Select this check box if you want to specify a DSCP value to prioritize traffic when this rule is triggered. Specify a value between 0 and 63. The higher the value, the higher the priority.

- **802.1p priority**— Select this check box if you want to specify an 802.1p priority. Specify a value between 0 and 7. The higher the value, the higher the priority.

Figure 121 - *Access Tab - Instant Firewall Settings*



Rule type: Access control
Action: Allow
Service: any
Destination: to all destinations

Service Options

Table 21 lists the set of service options available in the Instant UI. You can allow or deny access to any or all of these services depending on your requirements.

Table 21 - *Network Service Options*

Service	Description
any	Access is allowed or denied to all services.
custom	Available options are TCP, UDP, and Other. If you select the TCP or UDP options, enter appropriate port numbers. If you select the **Other** option, enter the appropriate ID.
adp	Application Distribution Protocol
bootp	Bootstrap Protocol
dhcp	Dynamic Host Configuration Protocol
dns	Domain Name Server
esp	Encapsulating Security Payload

Service	Description
ftp	File Transfer Protocol
gre	Generic Routing Encapsulation
h323-tcp	H.323-Transmission Control Protocol
h323-udp	H.323-User Datagram Protocol
http-proxy2	Hypertext Transfer Protocol-proxy2
http-proxy3	Hypertext Transfer Protocol-proxy3
http	Hypertext Transfer Protocol
https	Hypertext Transfer Protocol Secure
icmp	Internet Control Message Protocol
ike	Internet Key Exchange
kerberos	Computer network authentication protocol
l2tp	Layer 2 Tunneling Protocol
lpd-tcp	Line Printer Daemon protocol-Transmission Control Protocol
lpd-udp	Line Printer Daemon protocol-User Datagram Protocol
msrpc-tcp	Microsoft Remote Procedure Call-Transmission Control Protocol
msrpc-udp	Microsoft Remote Procedure Call-User Datagram Protocol
netbios-dgm	Network Basic Input/Output System-Datagram Service
netbios-ns	Network Basic Input/Output System-Name Service
netbios-ssn	Network Basic Input/Output System-Session Service
ntp	Network Time Protocol
papi	Point of Access for Providers of Information
pop3	Post Office Protocol 3
pptp	Point-to-Point Tunneling Protocol
rtsp	Real Time Streaming Protocol
sccp	Skinny Call Control Protocol
sip	Session Initiation Protocol
sip-tcp	Session Initiation Protocol-Transmission Control Protocol

Service	Description
sip-udp	Session Initiation Protocol-User Datagram Protocol
smb-tcp	Server Message Block-Transmission Control Protocol
smb-udp	Server Message Block-User Datagram Protocol
smtp	Simple mail transfer protocol
snmp	Simple network management protocol
snmp-trap	Simple network management protocol-trap
svp	Software Validation Protocol
tftp	Trivial file transfer protocol

Destination Options

Table 22 lists the destination options available in the Instant UI. You can allow or deny access to any or all of these destinations depending on your requirements.

Table 22 - *Destination Options*

Destination	Description
To all destinations	Access is allowed or denied to all destinations.
To a particular server	Access is allowed or denied to a particular server. You have to specify the IP address of the server.
Except to a particular server	Access is allowed or denied to servers other than the specified server. You have to specify the IP address of the server.
To a network	Access is allowed or denied to a network. You have to specify the IP address and netmask for the network.
Except to a network	Access is allowed or denied to networks other than the specified network. You have to specify the IP address and netmask for the network.

Examples for Access Rules

This section provides procedures to create the following access rules.

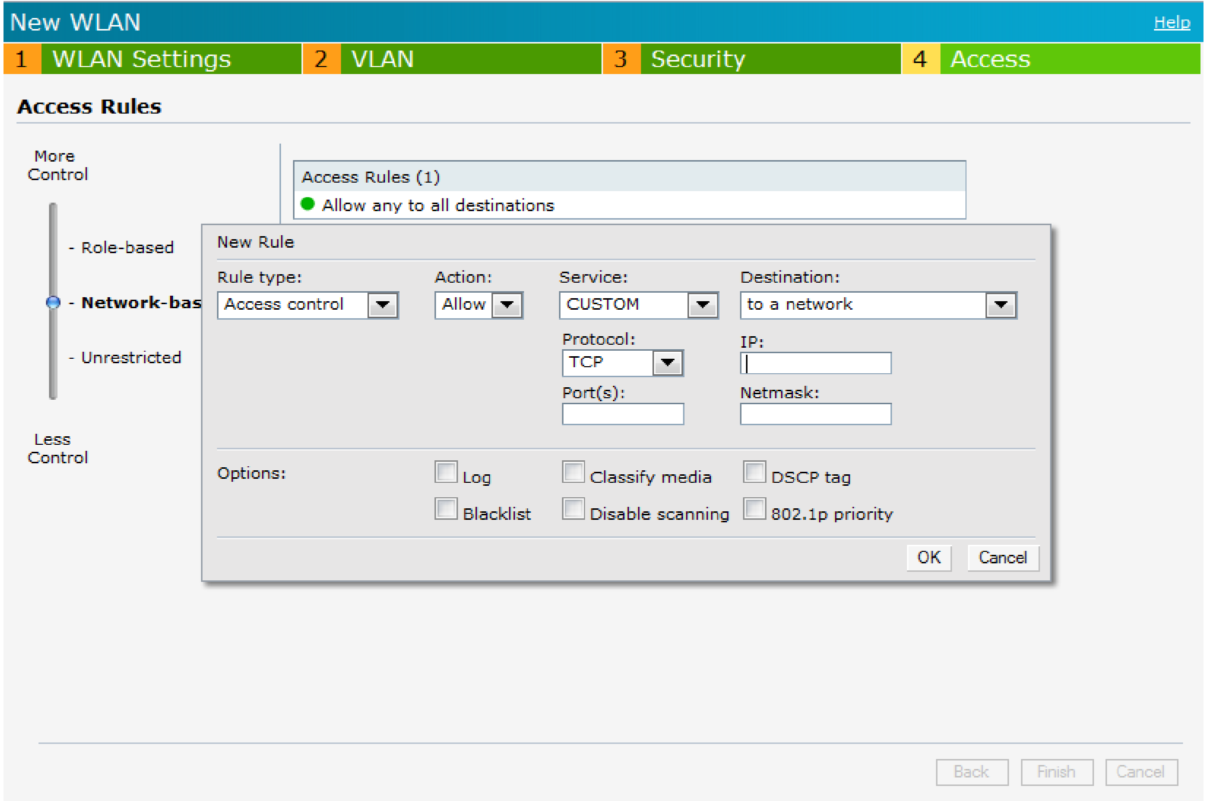
- Allow TCP Service to a Particular Network on page 195
- Allow POP3 Service to a Particular Server on page 196
- Deny FTP Service except to a Particular Server on page 196
- Deny bootp Service except to a Particular Network on page 197

Allow TCP Service to a Particular Network

1. Click the **New** link in the **Networks** tab.

   To define the access rule to an existing network, click the network. The **edit** link appears. Click the **edit** link and navigate to the **Access** tab.
2. In the **WLAN Settings** tab, enter the appropriate information. and click **Next** to continue.
3. Use the **VLAN** tab, to specify how the clients on this network get their IP address and VLAN. Click **Next** to continue.
4. Click **Next** and set appropriate values in the **Security** tab.
5. Click **Next**. The **Access** tab appears. The **Allow any to all destinations** access rule is enabled by default. This rule allows traffic to all destinations. To define allow TCP service access rule to a particular network:
   a. Click **New**, the **New Rule** window appears.
   b. Select **Allow** from the **Action** drop-down list.
   c. Select **custom** from the **Service** drop-down list.
      - Select TCP from the Protocol drop-down list.
      - Enter appropriate port number in the Port(s) text box.
   d. Select **to a network** from the **Destination** drop-down list.
      - Enter appropriate IP address in the IP text box.
      - Enter appropriate netmask in the Netmask text box.

Figure 122 - *Defining Rule — Allow TCP Service to a Particular Network*

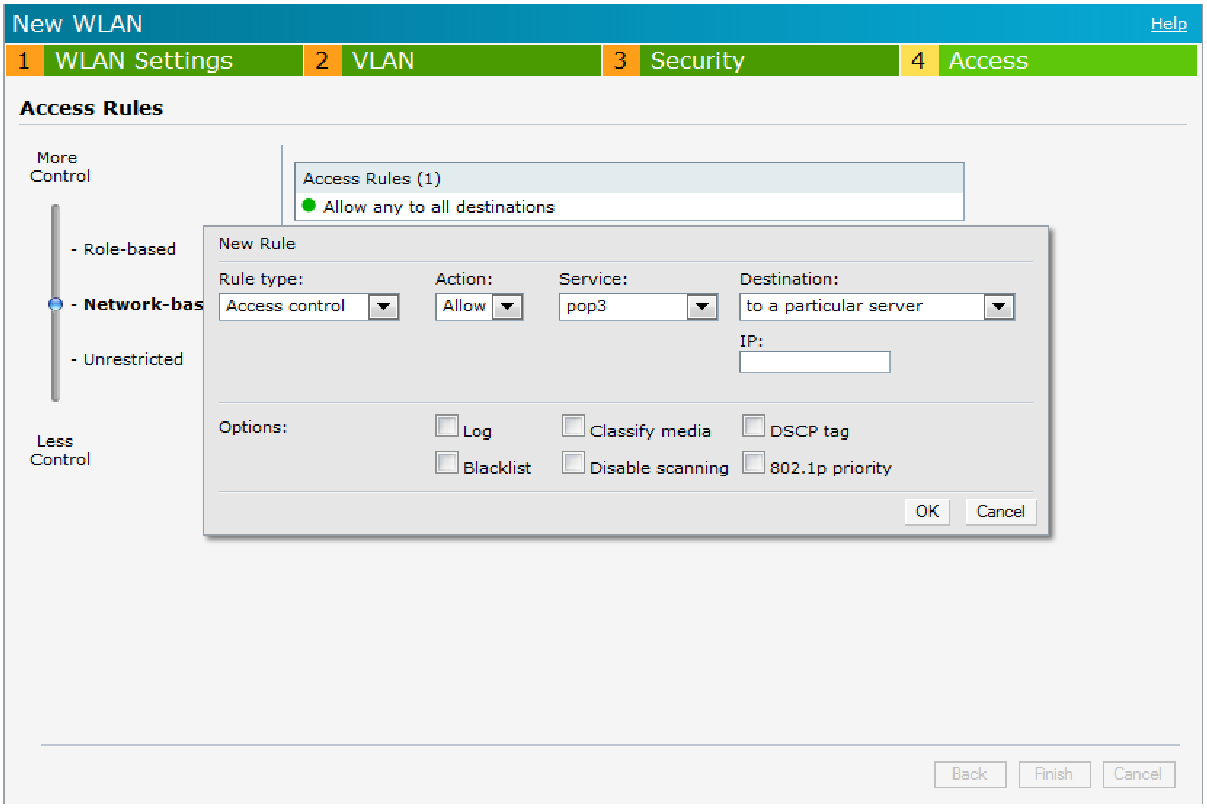


   e. Click **OK.**
6. Click **Finish**.

Allow POP3 Service to a Particular Server

1. Click the **New** link in the **Networks** tab.
   To define the access rule to an existing network, click the network. The **edit** link appears. Click the **edit** link and navigate to the **Access** tab.
2. In the **WLAN Settings** tab, enter the appropriate information and click **Next** to continue.
3. Use the **VLAN** tab, to specify how the clients on this network get their IP address and VLAN.Click **Next** to continue.
4. Click **Next** and slide to set the appropriate security levels in the **Security** tab.
5. Click **Next**. The **Access** tab appears. The **Allow any to all destinations** access rule is enabled by default. This rule allows traffic to all destinations. To define allow POP3 service access rule to a particular server:
   a. Click **New**, the **New Rule** window appears.
   b. Select **Allow** from the **Action** drop-down list.
   c. Select **pop3** from the **Service** drop-down list.
   d. Select **to a particular server** from the **Destination** drop-down list and enter appropriate IP address in the IP text box.
   e. Click **OK**.
6. Click **Finish**.

Figure 123 - *Defining Rule — Allow POP3 Service to a Particular Server*



Access Rules (1)

● Allow any to all destinations

Rule type: Access control

Action: Allow

Service: pop3

Destination: to a particular server

IP:

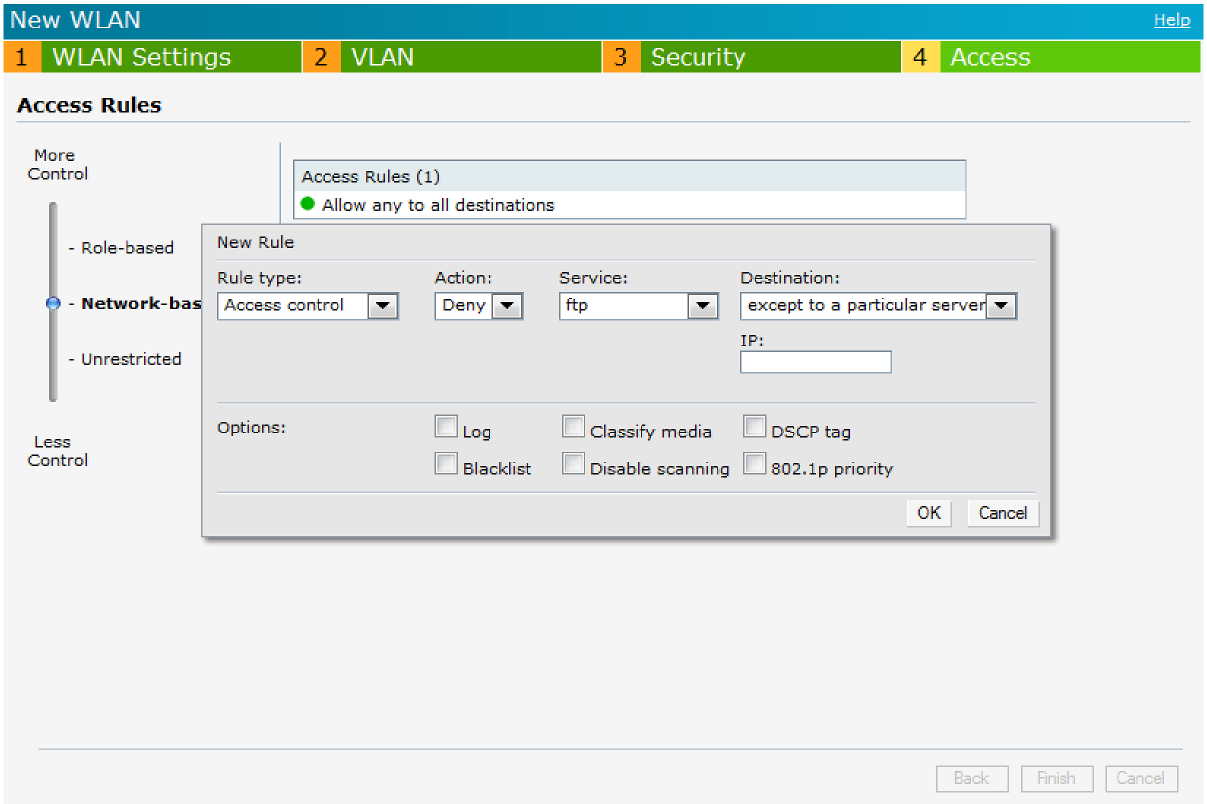
Options: □ Log □ Classify media □ DSCP tag □ Blacklist □ Disable scanning □ 802.1p priority

Deny FTP Service except to a Particular Server

1. Click the **New** link in the **Networks** tab.
   To define the access rule to an existing network, click the network. The **edit** link appears. Click the **edit** link and navigate to the **Access** tab.
2. In the **WLAN Settings** tab, enter the appropriate information and click **Next** to continue.

3. Use the **VLAN** tab, to specify how the clients on this network get their IP address and VLAN. Click **Next** to continue.
4. Click **Next** and set appropriate security levels using the slider bar in the **Security** tab.
5. Click **Next**. The **Access** tab appears. The **Allow any to all destinations** access rule is enabled by default. This rule allows traffic to all destinations. To define deny FTP service access rule except to a particular server:
   a. Click **New**, the **New Rule** window appears.
   b. Select **Deny** from the **Action** drop-down list.
   c. Select **ftp** from the **Service** drop-down list.
   d. Select **except to a particular server** from the **Destination** drop-down list and enter appropriate IP address in the **IP** text box.
   e. Click **OK**
6. Click **Finish**

Figure 124 - *Defining Rule — Deny FTP Service Except to a Particular Server*



Access Rules (1)
● Allow any to all destinations

New Rule

Rule type: Access control

Action: Deny

Service: ftp

Destination: except to a particular server

IP:

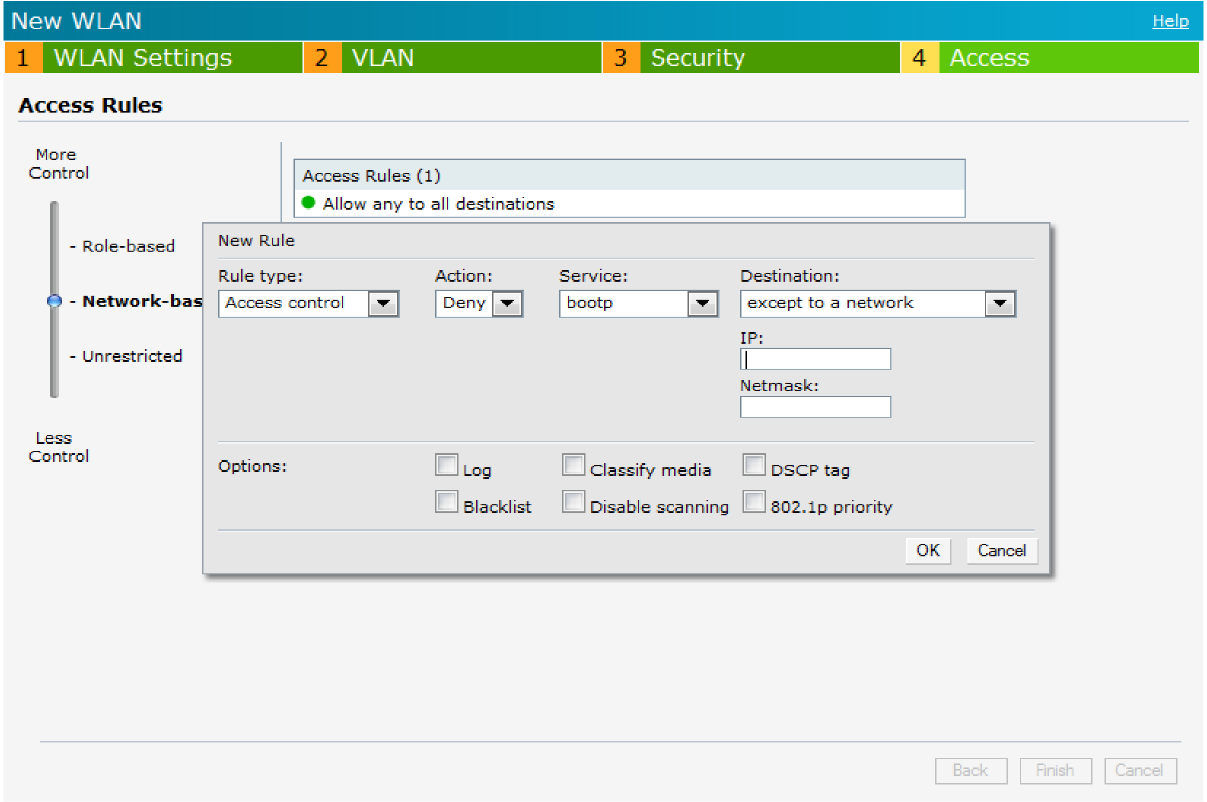
Options: □ Log □ Classify media □ DSCP tag □ Blacklist □ Disable scanning □ 802.1p priority

Deny bootp Service except to a Particular Network

1. Click the **New** link in the **Networks** tab.
   To define the access rule to an existing network, click the network. The **edit** link appears. Click the **edit** link and navigate to the **Access** tab.
2. In the **WLAN Settings** tab, enter the appropriate information. and click **Next** to continue.
3. Use the **VLAN** tab, to specify how the clients on this network get their IP address and VLAN.Click **Next** to continue.
4. Click **Next** and set appropriate security levels using the slider bar in the **Security** tab.

5. Click **Next**. The **Access** tab appears. The **Allow any to all destinations** access rule is enabled by default. This rule allows traffic to all destinations. To define deny bootp service access rule except to a network:
    a. Click **New,** the **New Rule** window appears.
    b. Select **Deny** from the **Action** drop-down list.
    c. Select **bootp** from the **Service** drop-down list.
    d. Select **except to a network** from the **Destination** drop-down list.
        - Enter the appropriate IP address in the IP text box.
        - Enter the appropriate netmask in the Netmask text box.
    e. Click **OK**.
6. Click **Finish**.

Figure 125 - *Defining Rule — Deny bootp Service Except to a Network*



Access Rules

Access Rules (1)

● Allow any to all destinations

New Rule

Rule type: Access control

Action: Deny

Service: bootp

Destination: except to a network

IP:

Netmask:

Options: □ Log □ Classify media □ DSCP tag □ Blacklist □ Disable scanning □ 802.1p priority

The Content Filtering feature allows you to create internet access policies that allow or deny user access to websites based on website categories and security ratings. This feature is useful to:

- Prevent known malware hosts from accessing your wireless network.
- Improve employee productivity by limiting access to certain websites.
- Reduce bandwidth consumption significantly.

Content Filtering is based on per SSID, and up to four domain names can be configured manually. When enabled, all DNS requests to non-corporate domains on this wireless network are sent to the open DNS server.

NOTE

Regardless of whether content filtering is disabled or enabled, instant.alcatel-lucentnetworks.com is always resolved internally on Instant.

Enabling Content Filtering

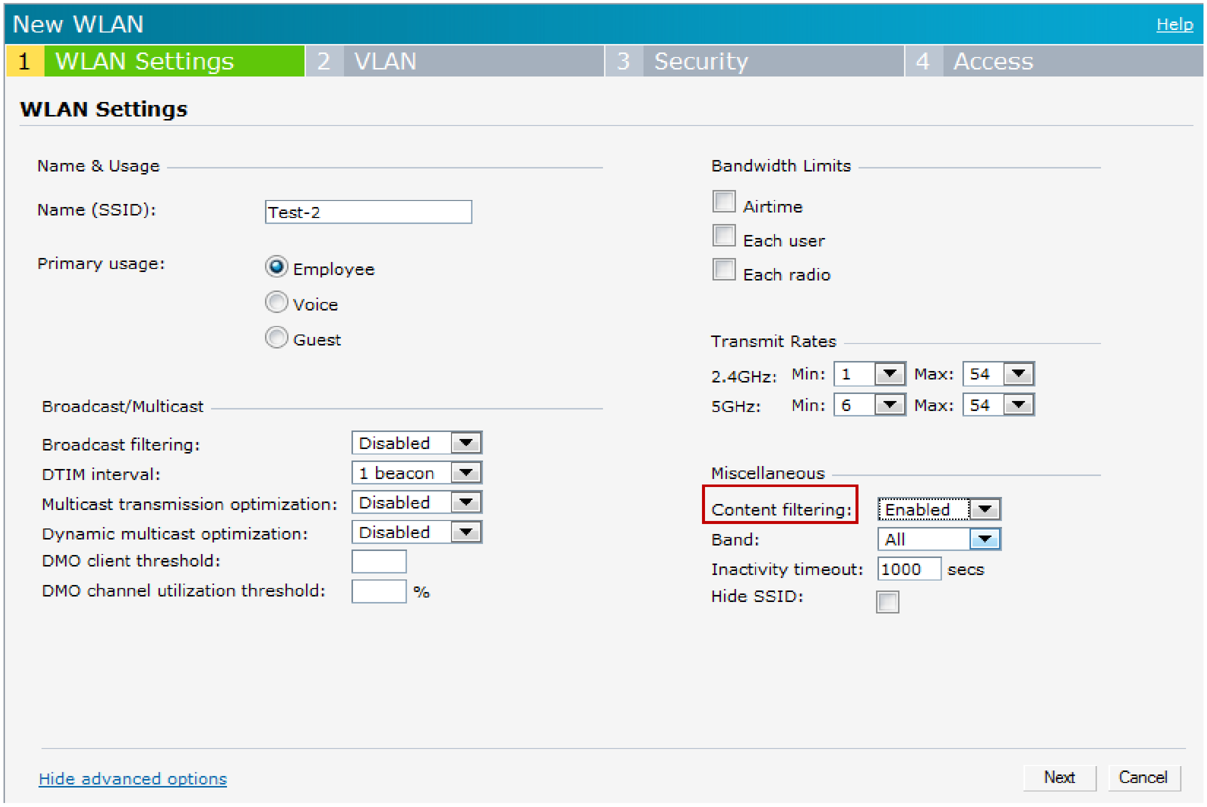
To enable content filtering per SSID:

1. Click **New** in the **Networks** tab and then click **Show advanced options**.
2. Select **Enabled** from the **Content Filtering** drop-down list and click **Next** to continue**.**

When Content Filtering is enabled, the internal domains check the DNS request of the clients. There are two ways to configure the internal domain.

1. Navigate to **Settings > General >** click **Show advanced options > DHCP Server > Domain name** to configure a domain name for a Virtual Controller assigned network. This domain name applies for Content Filtering.
2. Navigate to **Settings > General >** click **Show advanced options > Enterprise Domains** to configure a domain name for Content Filtering.

Figure 126 - *Enabling Content Filtering*



WLAN Settings

Name & Usage

Name (SSID): Test-2

Primary usage: ● Employee ○ Voice ○ Guest

Broadcast/Multicast

Broadcast filtering: Disabled

DTIM interval: 1 beacon

Multicast transmission optimization: Disabled

Dynamic multicast optimization: Disabled

DMO client threshold:

DMO channel utilization threshold: %

Bandwidth Limits

□ Airtime

□ Each user

□ Each radio

Transmit Rates

2.4GHz: Min: 1 Max: 54

5GHz: Min: 6 Max: 54

Miscellaneous

Content filtering: Enabled

Band: All

Inactivity timeout: 1000 secs

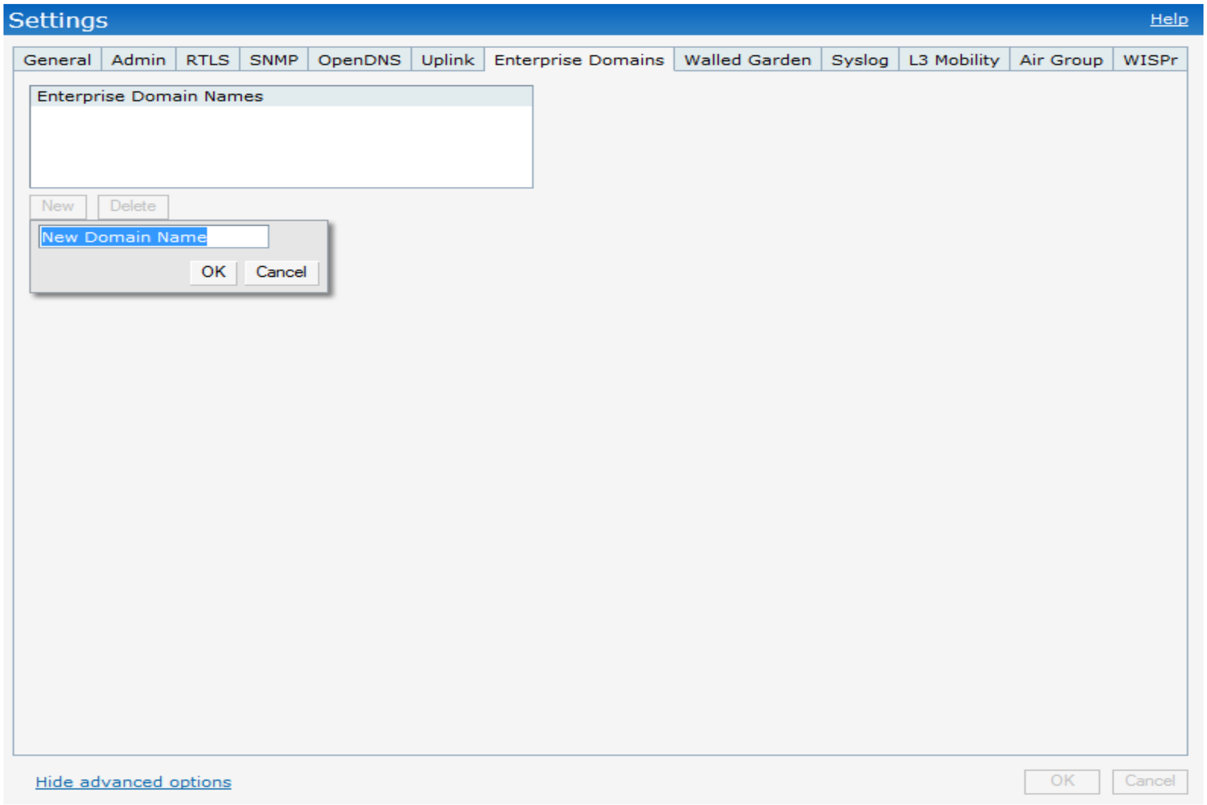
Hide SSID: □

The content filtering configuration applies to all the OAW-IAPs in the Alcatel-Lucent Instant network and the service is enabled or disabled globally across all the wireless networks that are configured in the Alcatel-Lucent Instant UI.

Enterprise Domains

The Enterprise Domain Names list displays all the DNS domain names that are valid on the enterprise network. This list is used to determine how client DNS requests should be routed. When **Content Filtering** is enabled for the wireless network, everything that does not match this list is sent to the open DNS server.

Figure 127 - *Enterprise Domains*



To manually add or delete a domain, perform the following steps.

1. Navigate to **Settings** at the top right corner of the Instant UI and then select **Enterprise Domains** in the UI.
2. Click **New** and enter a **New Domain Name** or select the domain and click **Delete** to remove the domain name from the list.
3. Click **OK** to apply the changes.

OS Fingerprinting

The OS Fingerprinting feature gathers information about the client that is connected to the Alcatel-Lucent Instant network to find the operating system that the client is running on. The following is a list of advantages of this feature:

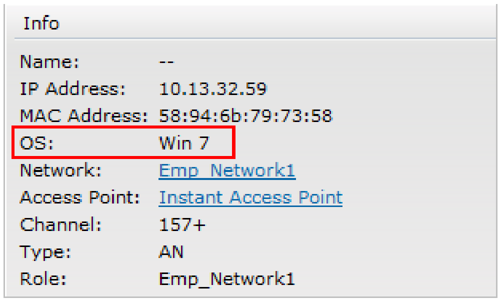
- Identifying rogue clients— Helps to identify clients that are running on forbidden operating systems.
- Identifying outdated operating systems— Helps to locate outdated and unexpected OS in the company network.
- Locating and patching vulnerable operating systems— Assists in locating and patching specific operating system versions on the network that have known vulnerabilities, thereby securing the company network.

OS Fingerprinting is enabled in the Alcatel-Lucent Instant network by default. The following operating systems are identified by Alcatel-Lucent Instant:

- Windows 7
- Windows Vista
- Windows Server
- Windows XP
- Windows ME
- OS-X
- iPhone
- iOS
- Android
- Blackberry
- Linux

In the following image, the OS of the client is Windows 7.

Figure 128 - *OS Fingerprinting*



Name:	--
IP Address:	10.13.32.59
MAC Address:	58:94:6b:79:73:58
OS:	Win 7
Network:	Emp_Network1
Access Point:	Instant Access Point
Channel:	157+
Type:	AN
Role:	Emp_Network1

Adaptive Radio Management (ARM) is a radio frequency management technology that optimizes WLAN performance even in the networks with highest traffic by dynamically and intelligently choosing the best 802.11 channel and transmitting power for each OAW-IAP in its current RF environment. ARM works with all standard clients, across all operating systems, while remaining in compliance with the IEEE 802.11 standards. It does not require any proprietary client software to achieve its performance goals. ARM ensures low-latency roaming, consistently high performance, and maximum client compatibility in a multi-channel environment. By ensuring the fair distribution of available Wi-Fi bandwidth to mobile devices, ARM ensures that data, voice, and video applications have sufficient network resources at all times. ARM allows mixed 802.11a, b, g, and n client types to inter operate at the highest performance levels.

ARM Features

This section describes ARM features that are available in Alcatel-Lucent Instant.

Channel or Power Assignment

This feature automatically assigns channel and power settings for all the OAW-IAPs in the network according to changes in the RF environment. This feature automates many setup tasks during network installation and during ongoing operations when RF conditions change.

Voice Aware Scanning

This feature stops an OAW-IAP supporting an active voice call from scanning for other channels in the RF spectrum. The OAW-IAP resumes scanning when no more active voice calls are present on that OAW-IAP. This significantly improves the voice quality when a call is in progress while simultaneously delivering automated RF management functions.

Load Aware Scanning

This feature dynamically adjusts scanning behavior to maintain uninterrupted data transfer on resource intensive systems when the network traffic exceeds a predefined threshold. The OAW-IAPs resume complete monitoring scans when the traffic drops to the normal levels.

Band Steering Mode

This feature moves dual-band capable clients to stay on the 5 GHz band on dual-band OAW-IAPs. This feature reduces co-channel interference and increases available bandwidth for dual-band clients because there are more channels on the 5 GHz band than on the 2.4 GHz band.

Band steering supports the following three different band steering modes:

- **Prefer 5 GHz**— If you configure the OAW-IAP to use prefer-5 GHz band steering mode, the OAW-IAP steers the client to 5 GHz band (if the client is 5 GHz capable) but lets the client connect on the 2.4 GHz band if the client persists in 2.4 GHz association attempts.
- **Force 5 GHz**— When the OAW-IAP is configured in force-5 GHz band steering mode, the OAW-IAP forces 5 GHz-capable OAW-IAPs to use that radio band.

- **Balance Bands**— In this band steering mode, the OAW-IAP tries to balance the clients across the two radios in order to best utilize the available 2.4 GHz bandwidth. This feature takes into account the fact that the 5 GHz band has more channels than the 2.4 GHz band, and that the 5 GHz channels operate in 40MHz while the 2.5 Ghz band operates in 20MHz.
- **Disabled— Disabled means that the clients selects which band to use.**

Airtime Fairness Mode

This feature provides equal access to all clients on the wireless medium, regardless of client type, capability, or operating system, thus delivering uniform performance to all clients. This feature prevents some clients from monopolizing resources at the expense of other clients.

NOTE

Reboot the OAW-IAP after configuring the radio profile settings in order for the changes to take effect.

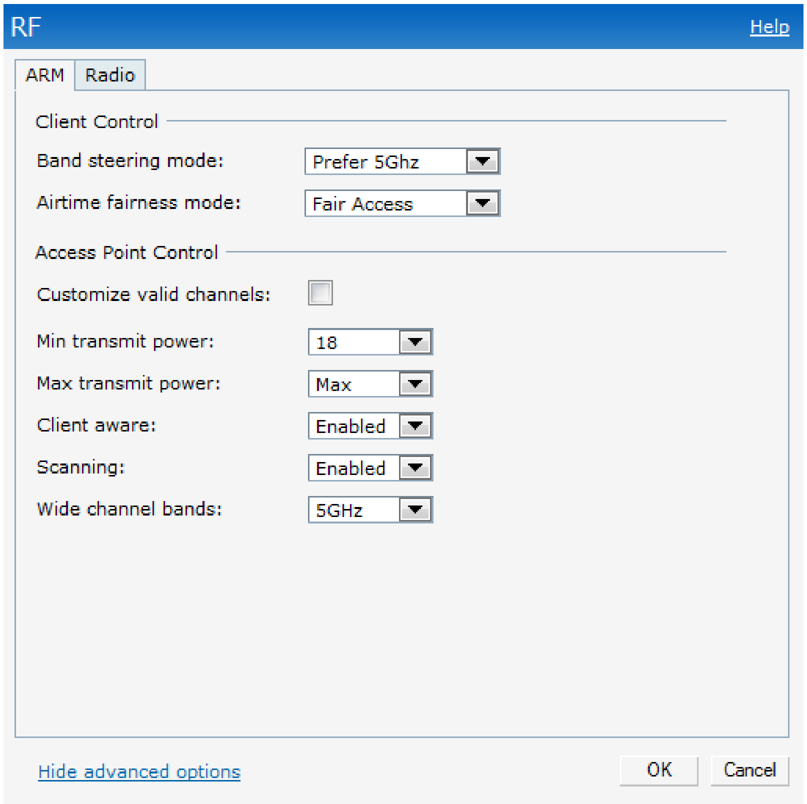
Airtime Fairness Modes

Navigate to **RF** which is at the top right corner of the Instant UI and click **ARM**.

The Airtime fairness consists of the following modes:

- **Default Access**— Provides access based on the client request. When **Air Time Fairness** is set to default access, per user and per SSID bandwidth limits are not enforced
- **Fair Access**— Allocates Airtime evenly across all the clients
- **Preferred Access**— 11n clients get more airtime than 11a/11g, which get more airtime than 11b. The ratio is 16:4:1.

Figure 129 - *Airtime Fairness Mode*



Client Control

Band steering mode: Prefer 5Ghz

Airtime fairness mode: Fair Access

Access Point Control

Customize valid channels: □

Min transmit power: 18

Max transmit power: Max

Client aware: Enabled

Scanning: Enabled

Wide channel bands: 5GHz

Access Point Control

Customize Valid Channels

You can customize **Valid 5 GHz channels** and **Valid 2.4 GHz channels** for 20MHz and 40MHz channels in the OAW-IAP. Here, the administrator can configure the ARM channels in the channel width window. The valid channels automatically show in the static channel assignment window.

Min Transmit Power

This indicates the minimum effective isotropic radiated power (EIRP) from 3 to 33 dBm in 3 dBm increments. You may also specify a special value of 127 dBm for regulatory maximum to disable power adjustments for environments such as outdoor mesh links. Higher power level settings may be constrained by local regulatory requirements and AP capabilities. In the event that an AP is configured for a Min Tx EIRP setting it cannot support, this value is reduced to the highest supported power setting.

The default value is18 dBm.

Max Transmit Power

This indicates the maximum effective isotropic radiated power (EIRP) from 3 to 33 dBm in 3 dBm increments. Higher power level settings may be constrained by local regulatory requirements and AP capabilities. In the event that an AP is configured for a Max Tx EIRP setting it cannot support, this value is reduced to the highest supported power setting.

Default value: 127 dBm

Client Aware

When **Enabled**, Adaptive Radio Management (ARM) does not change channels for the Access points when the clients are active, except for high priority events such as radar or excessive noise. This should be enabled in most deployments for a stable WLAN.

If the Client Aware mode is **Disabled**, the OAW-IAP may change to a more optimal channel, but this change may also disrupt current client traffic.

The Client Aware option is **Enabled** by default

NOTE

When the Client Aware ARM is disabled, channels can be changed even when the clients are active on BSSID.

Scanning

When ARM is enabled, the OAW-IAP dynamically scans all 802.11 channels within its 802.11 regulatory domain at regular intervals and reports everything it sees to the OAW-IAP on each channel it scans. This includes, but is not limited to, data regarding WLAN coverage, interference, and intrusion detection.

Wide Channel Bands

This feature allows administrators to configure 40 MHz channels in the 2.4 GHz and 5.0 GHz bands. 40 MHz channels are essentially two 20 MHz adjacent channels that are bonded together. 40 MHz channel effectively doubles the frequency bandwidth available for data transmission.

Monitoring the Network with ARM

When ARM is enabled, an OAW-IAP dynamically scans all 802.11 channels within its 802.11 regulatory domain at regular intervals and provides reports for network (WLAN) coverage, interference, and intrusion detection, to a Virtual Controller.

ARM Metrics

ARM computes coverage and interference metrics for each valid channel and chooses the best performing channel and transmit power settings for each OAW-IAP RF environment. Each OAW-IAP gathers other metrics on its ARM-assigned channel to provide a snapshot of the current RF health state.

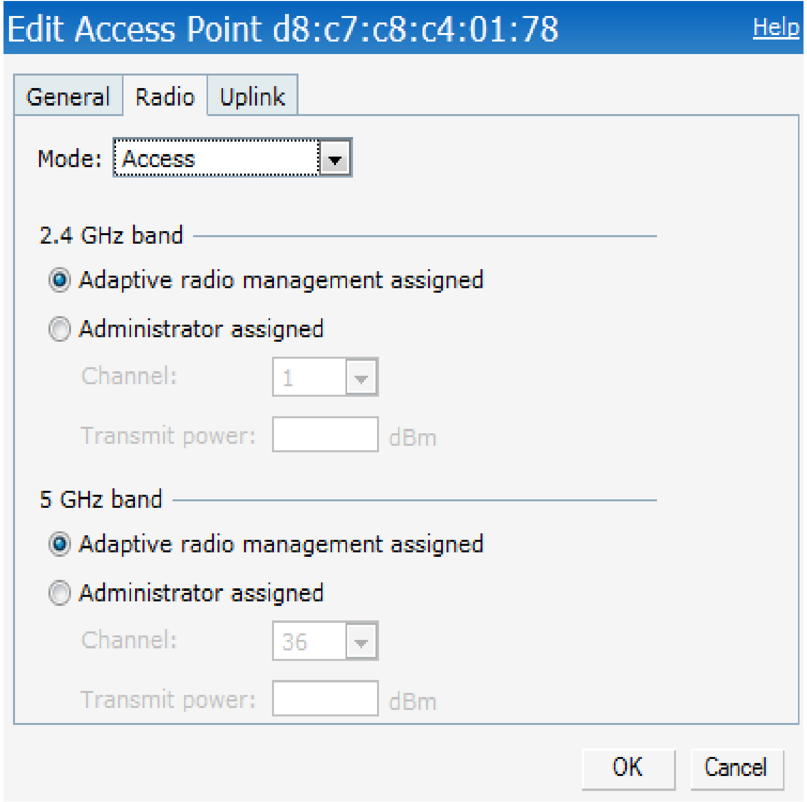
Configuring Administrator Assigned Radio Settings for OAW-IAP

Adaptive Radio Management (ARM) is enabled on Alcatel-Lucent Instant by default. It automatically assigns appropriate channel and power settings for the OAW-IAPs.

To manually configure radio settings:

1. In the **Access Points** tab, click the AP for which you want to enable ARM. The **edit** link appears.
2. Click the **edit** link. The **Edit AP** window appears.
3. Click the **Radio** tab.

Figure 130 - *Configuring Administrator Assigned Radio Settings for OAW-IAP*



Edit Access Point d8:c7:c8:c4:01:78

Mode: Access

2.4 GHz band

● Adaptive radio management assigned

○ Administrator assigned

Channel: 1

Transmit power: dBm

5 GHz band

● Adaptive radio management assigned

○ Administrator assigned

Channel: 36

Transmit power: dBm

4. Select the **Mode** from the drop-down list.
   - Access Mode— In Access mode the AP serves clients, while also monitoring for rogue APs in the background.
   - Monitor Mode— In Monitor mode the AP acts as a dedicated monitor scanning all channels for rogue APs and clients.

- Spectrum Monitor— In the Spectrum Monitor mode the AP functions as a dedicated full-spectrum RF monitor, scanning all channels to detect interference, whether from neighboring APs or from non-WiFi devices such as microwaves and cordless phones.

By default the access point's channel and power are optimized dynamically using Adaptive Radio Management (ARM). You can override ARM on the 2.4 GHz and 5 GHz bands and set the channel and power manually if desired.

Table 23 - *Mode, Spectrum and AP Operation*

Mode	Spectrum	AP Operation
Access	Disabled	AP serves clients, while also monitoring for rogue APs in the background.
Access	Enabled	AP monitors all RF interference on its current channel, while simultaneously providing normal access services to clients.
Monitor	Disabled	AP functions as a dedicated full-spectrum RF monitor, scanning all channels to detect interference, whether from neighboring APs or from non-WiFi devices such as microwaves and cordless phones.
Monitor	Enabled	AP does not provide access service to clients.

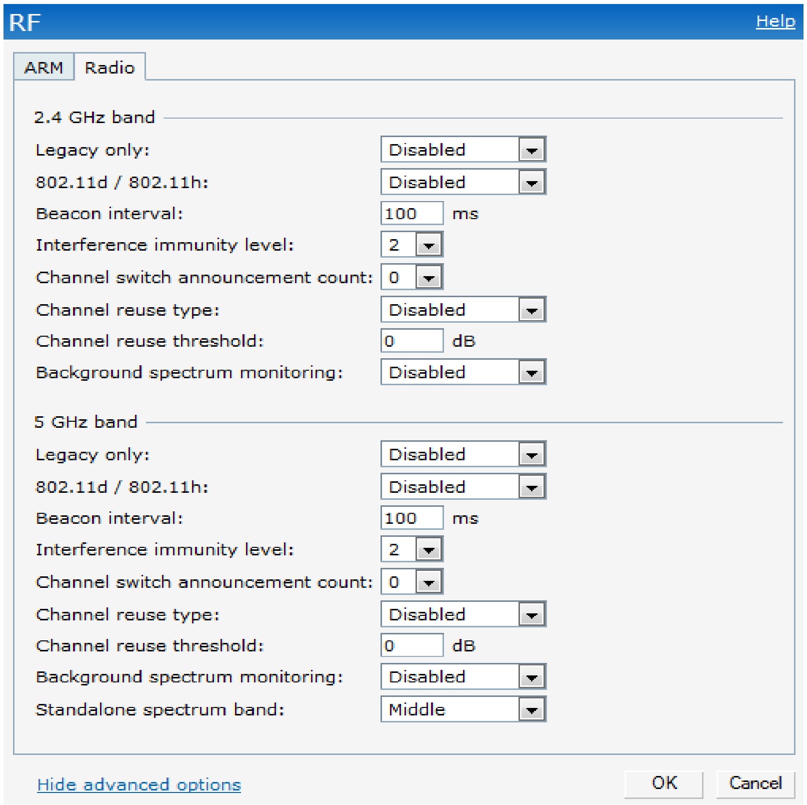
5. Select **Administrator assigned** in **2.4 GHz** and **5 GHz** band sections.
6. Select appropriate channel number from the **Channel** drop-down list for both **2.4 GHz** and **5 GHz** band sections.
7. Enter appropriate transmit power value in the **Transmit power** text box in **2.4 GHz** and **5 GHz** band sections.
8. Click **OK.**

Configuring Radio Profiles in Instant

Alcatel-Lucent Instant supports radio profile configuration. The radio settings are available for both the 2.4-GHz and the 5-GHz radio profiles. You can configure the radios separately, using the parameters described in table on each radio.

Use the following procedure to configure Instant's radio attributes for the 2.4 GHz and 5 GHz frequency bands.

Figure 131 - *Radio Profile*



2.4 GHz band

Legacy only: Disabled

802.11d / 802.11h: Disabled

Beacon interval: 100 ms

Interference immunity level: 2

Channel switch announcement count: 0

Channel reuse type: Disabled

Channel reuse threshold: 0 dB

Background spectrum monitoring: Disabled

5 GHz band

Legacy only: Disabled

802.11d / 802.11h: Disabled

Beacon interval: 100 ms

Interference immunity level: 2

Channel switch announcement count: 0

Channel reuse type: Disabled

Channel reuse threshold: 0 dB

Background spectrum monitoring: Disabled

Standalone spectrum band: Middle

1. Navigate to **RF** which is at the top right corner of the Instant UI.
2. Click **Show advanced options** to view the **Radio** tab.
3. Refer to the table below to configure the radio settings for bands 2.4 GHz and 5 GHz.

Table 24 - *Radio Profile Configuration Parameters*

Parameter	Description
Legacy only	Enable to run the radio in non-802.11n mode. This is disabled by default.
802.11d / 802.11h	Enable the radio to advertise its 802.11d (Country Information) and 802.11h (Transmit Power Control) capabilities. This is disabled by default.
Beacon interval	Enter the Beacon period (60ms to 500ms) for the OAW-IAP in msec. This indicates how often the 802.11 beacon management frames are transmitted by the access point. The default value is 100 msec.
Interference immunity level	Select to increase the immunity level to improve performance in high-interference environments. The default immunity level is 2. **NOTE:** Increasing the immunity level makes the AP slightly “deaf” to its surroundings, causing the AP to lose a small amount of range. • Level 0— no ANI adaptation.

Parameter	Description
	- Level 1— Noise immunity only. This level enables power-based packet detection by controlling the - amount of power increase that makes a radio aware that it has received a packet. - Level 2— Noise and spur immunity. This level also controls the detection of OFDM packets, and is the - default setting for the Noise Immunity feature. - Level 3— Level 2 settings and weak OFDM immunity. This level minimizes false detects on the radio due to interference, but may also reduce radio sensitivity. This level is recommended for environments with a high-level of interference related to 2.4 GHz appliances such as cordless phones. - Level 4— Level 3 settings, and FIR immunity. At this level, the AP adjusts its sensitivity to in-band power, which can improve performance in environments with high and constant levels of noise interference. - Level 5— The AP completely disables PHY error reporting, improving performance by eliminating the time the OAW-IAP would spend on PHY processing.
Channel switch announcement count	Indicates the number of channel switching announcements that must be sent prior to switching to a new channel. This allows associated clients to recover gracefully from a channel change.
Channel reuse type	When set to **Dynamic**, the access point, when busy, automatically adjust its Clear Channel Assessment (CCA) threshold to accommodate transmissions to the most distant associated client. When set to **Static**, the access point sets its CCA threshold to the value specified in **Channel reuse threshold**.
Channel reuse threshold	When set to **Static,** this value specifies the tolerable interference that must be maintained.
Background spectrum monitoring	When background spectrum monitoring is enabled, the APs in access mode continue to provide normal access service to clients, while performing additional function of monitoring RF interference (from both neigh bo uri ng APs and non-WiFi sources such as, microwaves and cordless phones) on the channel they are currently serving clients on.
Standalone spectrum band	For background spectrum monitoring on the 5 GHz band, it is necessary to specify which portion of the channel to monitor: upper, middle, or lower.

NOTE

Reboot the OAW-IAP after configuring the radio profile settings in order for the changes to take effect.

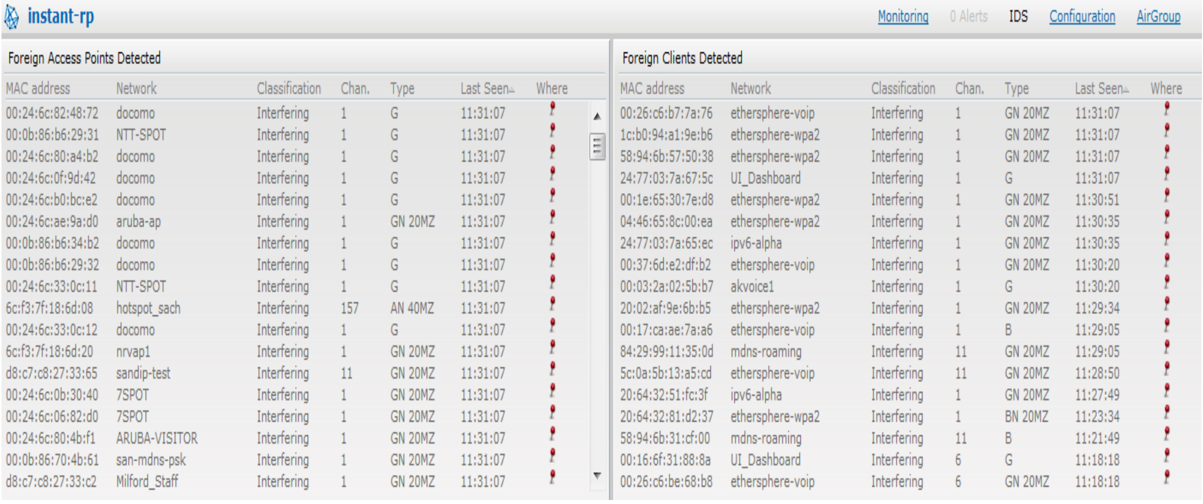
Intrusion Detection System (IDS) is a feature that monitors the network for the presence of unauthorized OAW-IAPs and clients. It also logs information about the unauthorized OAW-IAPs and clients, and generates reports based on the logged information.

Rogue AP Detection and Classification

The most important IDS functionality offered in the Alcatel-Lucent Instant network is the ability to detect rogue APs, interfering APs, and other devices that can potentially disrupt network operations. An AP is considered to be a rogue AP if it is both unauthorized and plugged into the wired side of the network. An AP is considered to be an interfering AP if it is seen in the RF environment but is not connected to the wired network. While the interfering AP can potentially cause RF interference, it is not considered a direct security threat since it is not connected to the wired network. However, an interfering AP may be reclassified as a rogue AP.

Navigate to **IDS** in the Instant UI and click the **IDS** link. The built-in IDS scans for access points that are not controller by this Virtual Controller. These are listed below and classified as either Interfering or Rogue, depending on whether they are on a foreign network or your network.

Figure 132 - *Intrusion Detection*



Foreign Access Points Detected

MAC address	Network	Classification	Chan.	Type	Last Seen	Where
00:24:6c:82:48:72	docomo	Interfering	1	G	11:31:07	📍
00:0b:86:b6:29:31	NTT-SPOT	Interfering	1	G	11:31:07	📍
00:24:6c:80:a4:b2	docomo	Interfering	1	G	11:31:07	📍
00:24:6c:0f:9d:42	docomo	Interfering	1	G	11:31:07	📍
00:24:6c:b0:bc:e2	docomo	Interfering	1	G	11:31:07	📍
00:24:6c:ae:9a:d0	aruba-ap	Interfering	1	GN 20MZ	11:31:07	📍
00:0b:86:b6:34:b2	docomo	Interfering	1	G	11:31:07	📍
00:0b:86:b6:29:32	docomo	Interfering	1	G	11:31:07	📍
00:24:6c:33:0c:11	NTT-SPOT	Interfering	1	G	11:31:07	📍
6c:f3:7f:18:6d:08	hotspot_sach	Interfering	157	AN 40MZ	11:31:07	📍
00:24:6c:33:0c:12	docomo	Interfering	1	G	11:31:07	📍
6c:f3:7f:18:6d:20	nrvap1	Interfering	1	GN 20MZ	11:31:07	📍
d8:c7:c8:27:33:65	sandip-test	Interfering	11	GN 20MZ	11:31:07	📍
00:24:6c:0b:30:40	7SPOT	Interfering	1	GN 20MZ	11:31:07	📍
00:24:6c:06:82:d0	7SPOT	Interfering	1	GN 20MZ	11:31:07	📍
00:24:6c:80:4b:f1	ARUBA-VISITOR	Interfering	1	GN 20MZ	11:31:07	📍
00:0b:86:70:4b:61	san-mdns-psk	Interfering	1	GN 20MZ	11:31:07	📍
d8:c7:c8:27:33:c2	Milford_Staff	Interfering	1	GN 20MZ	11:31:07	📍

Foreign Clients Detected

MAC address	Network	Classification	Chan.	Type	Last Seen	Where
00:26:c6:b7:7a:76	ethersphere-voip	Interfering	1	GN 20MZ	11:31:07	📍
1c:b0:94:a1:9e:b6	ethersphere-wpa2	Interfering	1	GN 20MZ	11:31:07	📍
58:94:6b:57:50:38	ethersphere-wpa2	Interfering	1	GN 20MZ	11:31:07	📍
24:77:03:7a:67:5c	UI_Dashboard	Interfering	1	G	11:31:07	📍
00:1e:65:30:7e:d8	ethersphere-wpa2	Interfering	1	GN 20MZ	11:30:51	📍
04:46:65:8c:00:ea	ethersphere-wpa2	Interfering	1	GN 20MZ	11:30:35	📍
24:77:03:7a:65:ec	ipv6-alpha	Interfering	1	GN 20MZ	11:30:35	📍
00:37:6d:e2:df:b2	ethersphere-voip	Interfering	1	GN 20MZ	11:30:20	📍
00:03:2a:02:5b:b7	akvoice1	Interfering	1	G	11:30:20	📍
20:02:af:9e:6b:b5	ethersphere-wpa2	Interfering	1	GN 20MZ	11:29:34	📍
00:17:ca:ae:7a:a6	ethersphere-voip	Interfering	1	B	11:29:05	📍
84:29:99:11:35:0d	mdns-roaming	Interfering	11	GN 20MZ	11:29:05	📍
5c:0a:5b:13:a5:cd	ethersphere-voip	Interfering	11	GN 20MZ	11:28:50	📍
20:64:32:51:fc:3f	ipv6-alpha	Interfering	1	GN 20MZ	11:27:49	📍
20:64:32:81:d2:37	ethersphere-wpa2	Interfering	1	BN 20MZ	11:23:34	📍
58:94:6b:31:cf:00	mdns-roaming	Interfering	11	B	11:21:49	📍
00:16:6f:31:88:8a	UI_Dashboard	Interfering	6	G	11:18:18	📍
00:26:c6:be:68:b8	ethersphere-voip	Interfering	6	GN 20MZ	11:18:18	📍

Wireless Intrusion Protection (WIP)

WIP offers a wide selection of intrusion detection and protection features to protect the network against wireless threats. Like most other security-related features of the Alcatel-Lucent network, the WIP configuration can be done on the OAW-IAP.

An administrator can configure the following five main options.

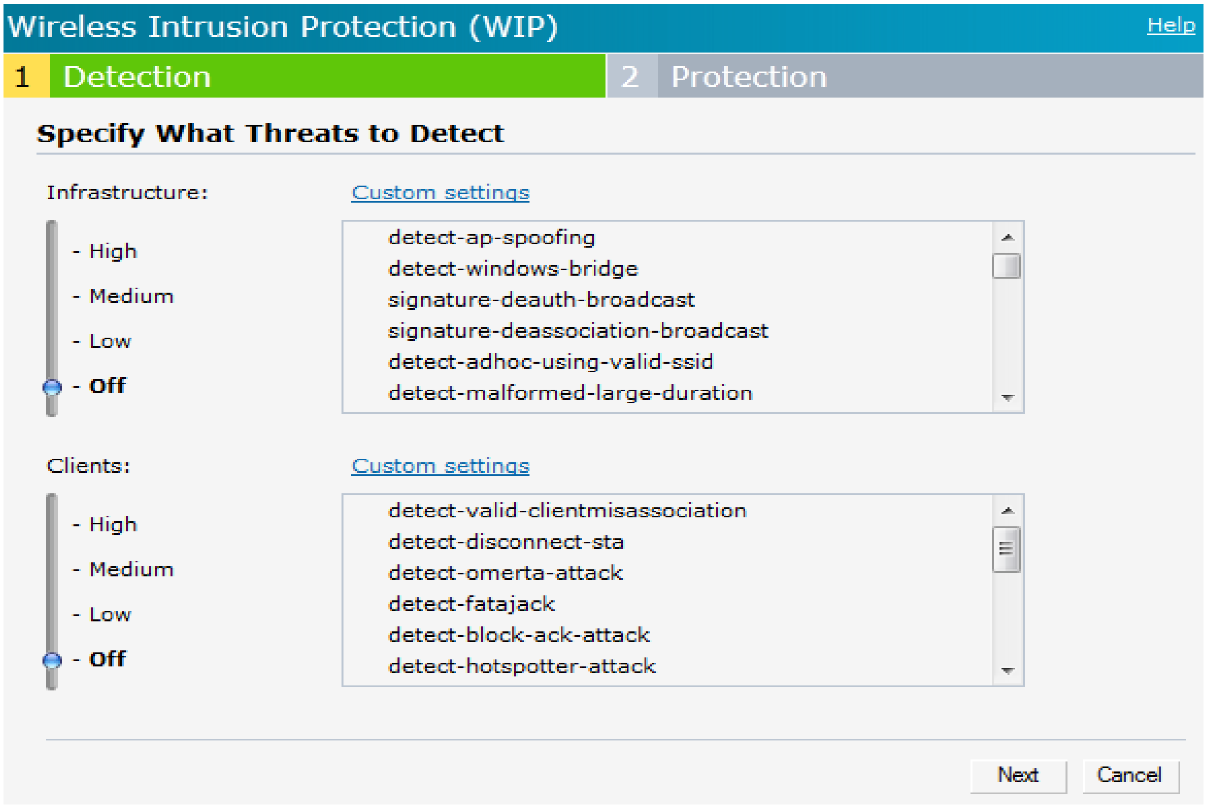
- **Infrastructure Detection Policies**— Specifies which wireless attacks on access points to detect
- **Client Detection Policies**— Specifies which wireless attacks on clients to detect
- **Infrastructure Protection Policies**— Specifies which wireless attacks on access points to protect against
- **Client Protection Policies**— Specifies which wireless attacks on clients to protect against

- **Containment Methods**— Prevents unauthorized stations from connecting to your Instant network.

In each of these options there are several default levels that enable different sets of policies. An administrator can customize (enable/disable) these options accordingly.

Four levels of detection can be configured in the WIP Detection page— **Off**, **Low**, **Medium**, and **High** (as shown in Figure 133).

Figure 133 - *Wireless Intrusion Protection— Detection*



Specify What Threats to Detect

Infrastructure: Custom settings

- High
- Medium
- Low
- Off

detect-ap-spoofing
detect-windows-bridge
signature-deauth-broadcast
signature-deassociation-broadcast
detect-adhoc-using-valid-ssid
detect-malformed-large-duration

Clients: Custom settings

- High
- Medium
- Low
- Off

detect-valid-clientmisassociation
detect-disconnect-sta
detect-omerta-attack
detect-fatajack
detect-block-ack-attack
detect-hotspotter-attack

The following table describes the detection policies that are enabled in the Infrastructure Detection **Custom settings** field.

Table 25 - *Infrastructure Detection Policies*

Detection Level	Detection Policy
Off	Rogue Classification
Low	• Detect AP Spoofing • Detect Windows Bridge • IDS Signature— Deauthentication Broadcast • IDS Signature— Disassociation Broadcast
Medium	• Detect Adhoc networks using VALID SSID— Valid SSID list is auto-configured based on Instant AP configuration • Detect Malformed Frame— Large

Detection Level	Detection Policy
	Duration
High	- Detect AP Impersonation - Detect Adhoc Networks - Detect Valid SSID Misuse - Detect Wireless Bridge - Detect 802.11 40MHz intolerance settings - Detect Active 802.11n Greenfield Mode - Detect AP Flood Attack - Detect Client Flood Attack - Detect Bad WEP - Detect CTS Rate Anomaly - Detect RTS Rate Anomaly - Detect Invalid Address Combination - Detect Malformed Frame— HT IE - Detect Malformed Frame— Association Request - Detect Malformed Frame— Auth - Detect Overflow IE - Detect Overflow EAPOL Key - Detect Beacon Wrong Channel - Detect devices with invalid MAC OUI

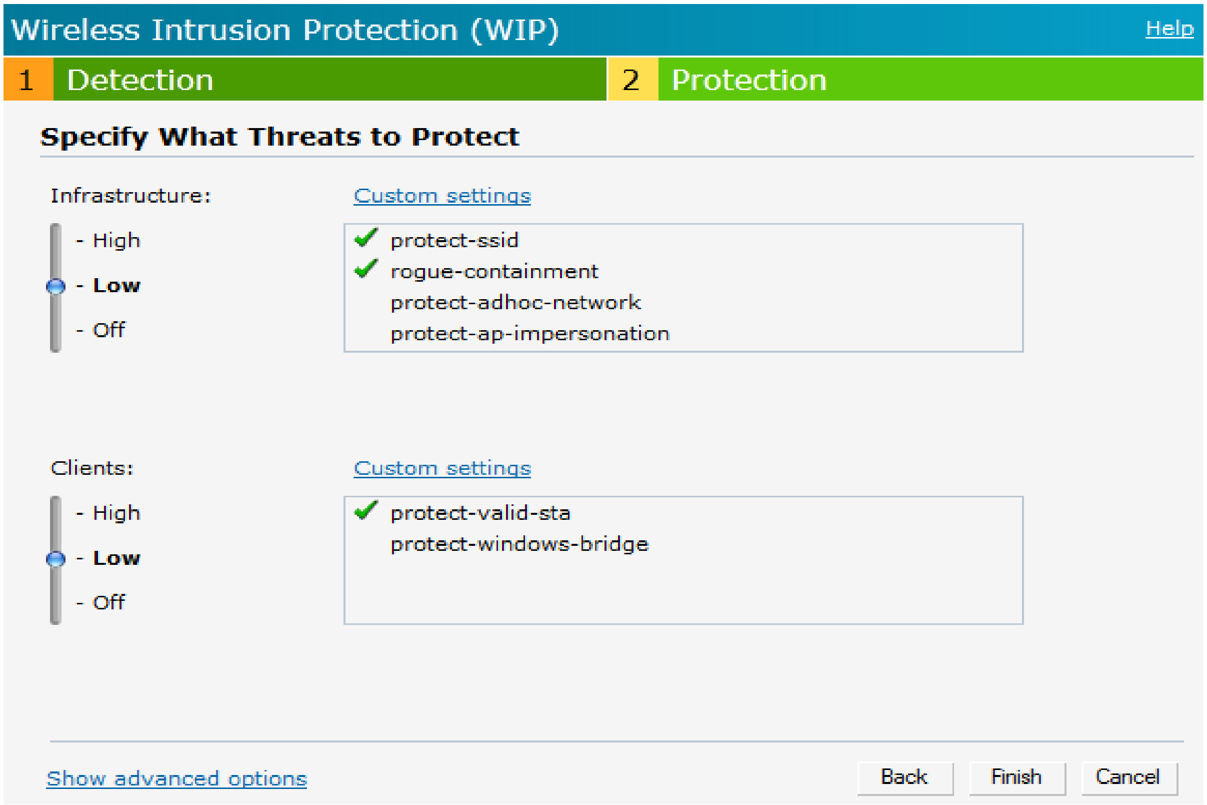
The following table describes the detection policies that are enabled in the Client Detection **Custom settings** field.

Table 26 - *Client Detection Policies*

Detection Level	Detection Policy
Off	All detection policies are disabled.
Low	- Detect Valid Station Misassociation
Medium	- Detect Disconnect Station Attack - Detect Omerta Attack - Detect FATA-Jack Attack - Detect Block ACK DOS - Detect Hotspotter Attack - Detect unencrypted Valid Client - Detect Power Save DOS Attack
High	- Detect EAP Rate Anomaly - Detect Rate Anomaly - Detect Chop Chop Attack - Detect TKIP Replay Attack - IDS Signature— Air Jack - IDS Signature— ASLEAP

Three levels of detection can be configured in the WIP Protection page— **Off**, **Low**, and **High** (as shown in Figure 134)**.**

Figure 134 - *Wireless Intrusion Protection— Detection*



Specify What Threats to Protect

Infrastructure: Custom settings

- High
- **Low** ●
- Off

✓ protect-ssid
✓ rogue-containment
protect-adhoc-network
protect-ap-impersonation

Clients: Custom settings

- High
- **Low** ●
- Off

✓ protect-valid-sta
protect-windows-bridge

The following table describes the detection policies that are enabled in the Infrastructure Protection **Custom settings** field.

Table 27 - *Infrastructure Protection Policies*

Detection Level	Detection Policy
Off	All detection policies are disabled
Low	• Protect SSID – Valid SSID list should be auto derived from Instant configuration • Rogue Containment
High	• Protect from Adhoc Networks • Protect AP Impersonation

The following table describes the detection policies that are enabled in the Client Protection **Custom settings** field.

Table 28 - *Client Protection Policies*

Detection Level	Detection Policy
Off	All detection policies are disabled
Low	• Protect Valid Station
High	• Protect Windows Bridge

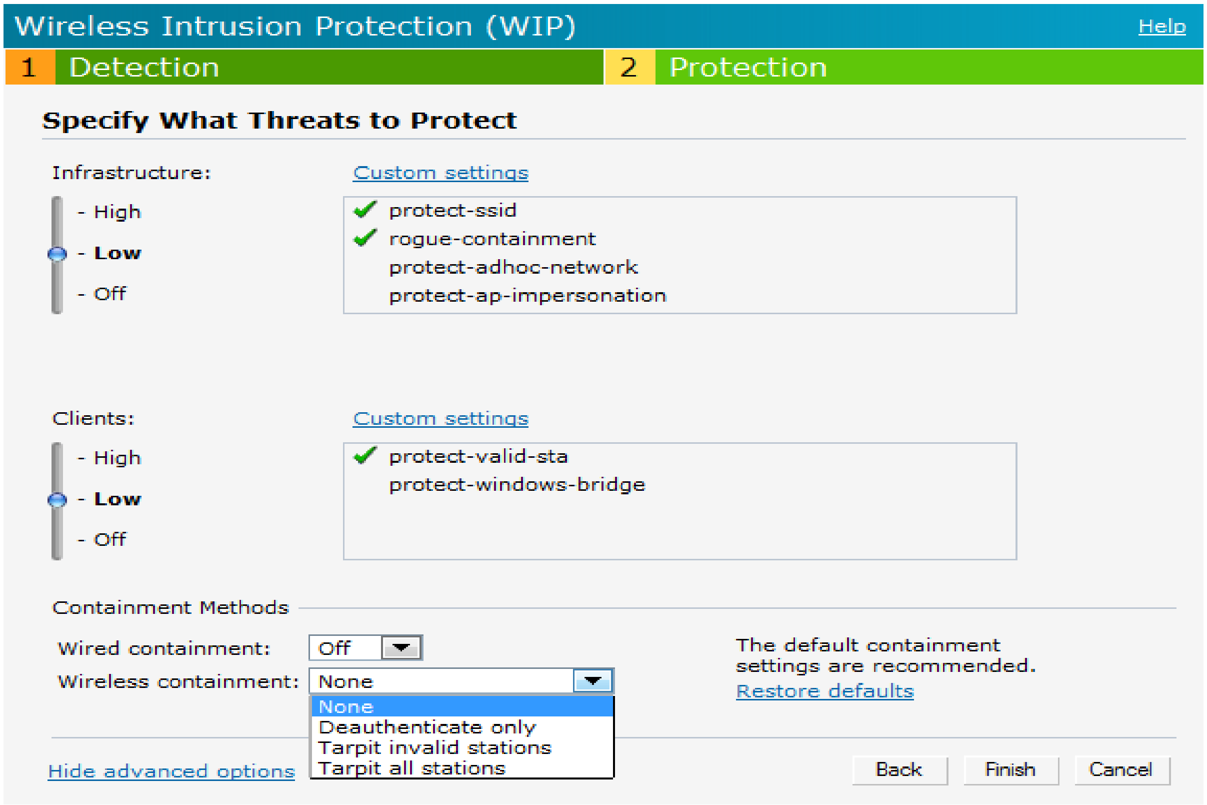
Containment Methods

You can enable wired and wireless containments to prevent unauthorized stations from connecting to your Instant network.

Instant supports the following types of containment mechanisms:

- Wired containment— When enabled, Alcatel-Lucent Access Points generate ARP packets on the wired network to contain wireless attacks.
- Wireless containment— When enabled, the system attempts to disconnect all clients that are connected or attempting to connect to the identified Access Point.
  - None— Disables all the containment mechanisms.
  - Deauthenticate only— With deauthentication containment, the Access Point or client is contained by disrupting the client association on the wireless interface.
  - Tarpit containment— With Tarpit containment, the Access Point is contained by luring clients that are attempting to associate with it to a tarpit. The tarpit can be on the same channel or a different channel as the Access Point being contained.

Figure 135 - *Containment Methods*



Wireless Intrusion Protection (WIP)

1 Detection | 2 Protection

Specify What Threats to Protect

Infrastructure: Low

✓ protect-ssid
✓ rogue-containment
protect-adhoc-network
protect-ap-impersonation

Clients: Low

✓ protect-valid-sta
protect-windows-bridge

Containment Methods

Wired containment: Off

Wireless containment: None

The default containment settings are recommended.

Alcatel-Lucent Instant supports SNMPv1, SNMPv2c, and SNMPv3 for reporting purposes only. An OAW-IAP cannot use SNMP to set values in an Alcatel-Lucent system.

SNMP Parameters for OAW-IAP

You can configure the following parameters for OAW-IAP.

Table 29 - *SNMP Parameters for OAW-IAP*

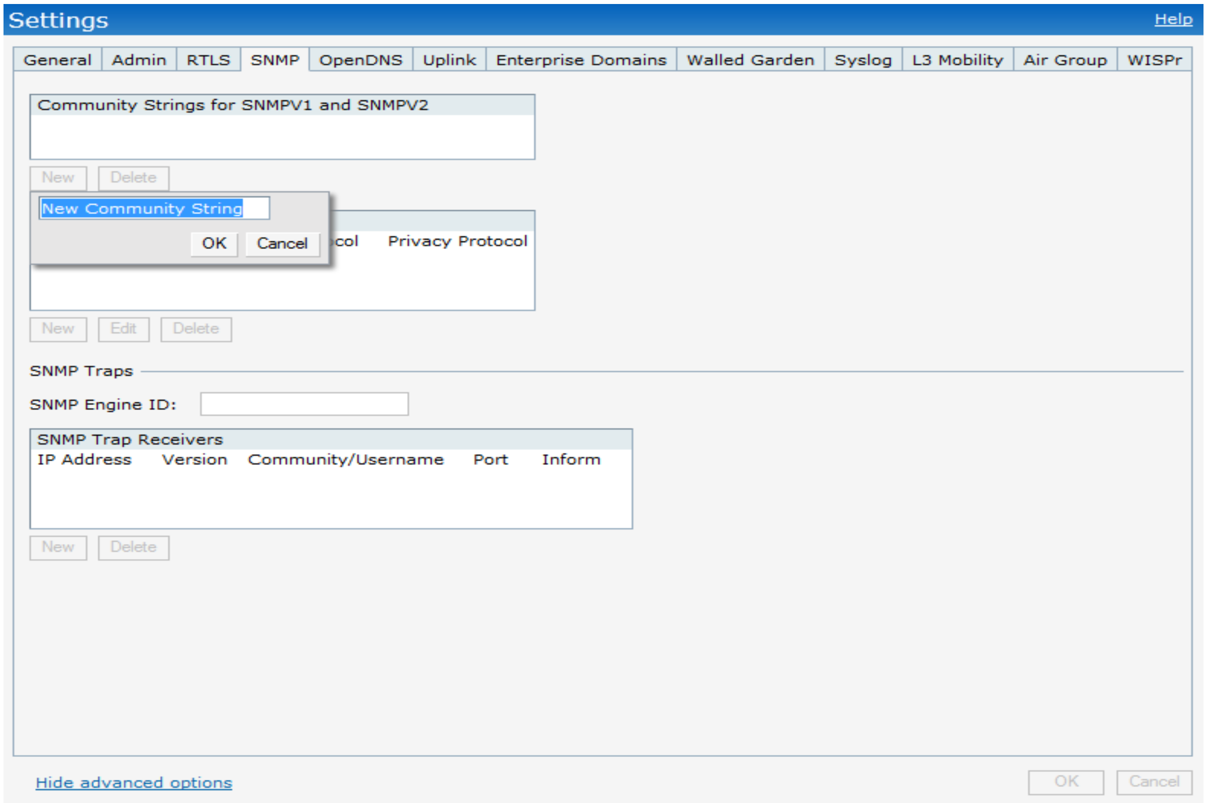
Field	Description
Community Strings for SNMPV1 and SNMPV2	An SNMP Community string is a text string that acts as a password, and is used to authenticate messages sent between the Virtual Controller and the SNMP agent.
If you are using SNMPv3 to obtain values from the Alcatel-Lucent Instant, you can configure the following parameters:	
Name	A string representing the name of the user.
Authentication Protocol	An indication of whether messages sent on behalf of this user can be authenticated, and if so, the type of authentication protocol used. This can take one of the two values: • MD5— HMAC-MD5-96 Digest Authentication Protocol • SHA: HMAC-SHA-96 Digest Authentication Protocol
Authentication protocol password	If messages sent on behalf of this user can be authenticated, the (private) authentication key for use with the authentication protocol. This is a string password for MD5 or SHA depending on the choice above.
Privacy protocol	An indication of whether messages sent on behalf of this user can be protected from disclosure, and if so, the type of privacy protocol which is used. This takes the value DES (CBC-DES Symmetric Encryption).
Privacy protocol password	If messages sent on behalf of this user can be encrypted/decrypted with DES, the (private) privacy key for use with the privacy protocol.

Follow the steps below to create community strings for SNMPV1 and SNMPV2.

1. In the Settings tab, click the **SNMP** tab.
2. Click **New** in the Community Strings for SNMPV1 and SNMPV2 box.
3. Enter the string in the **New Community String** text box.
4. Click **OK.**

To delete a community string, select the string and click **Delete**.

Figure 136 - *Creating Community Strings for SNMPV1 and SNMPV2*

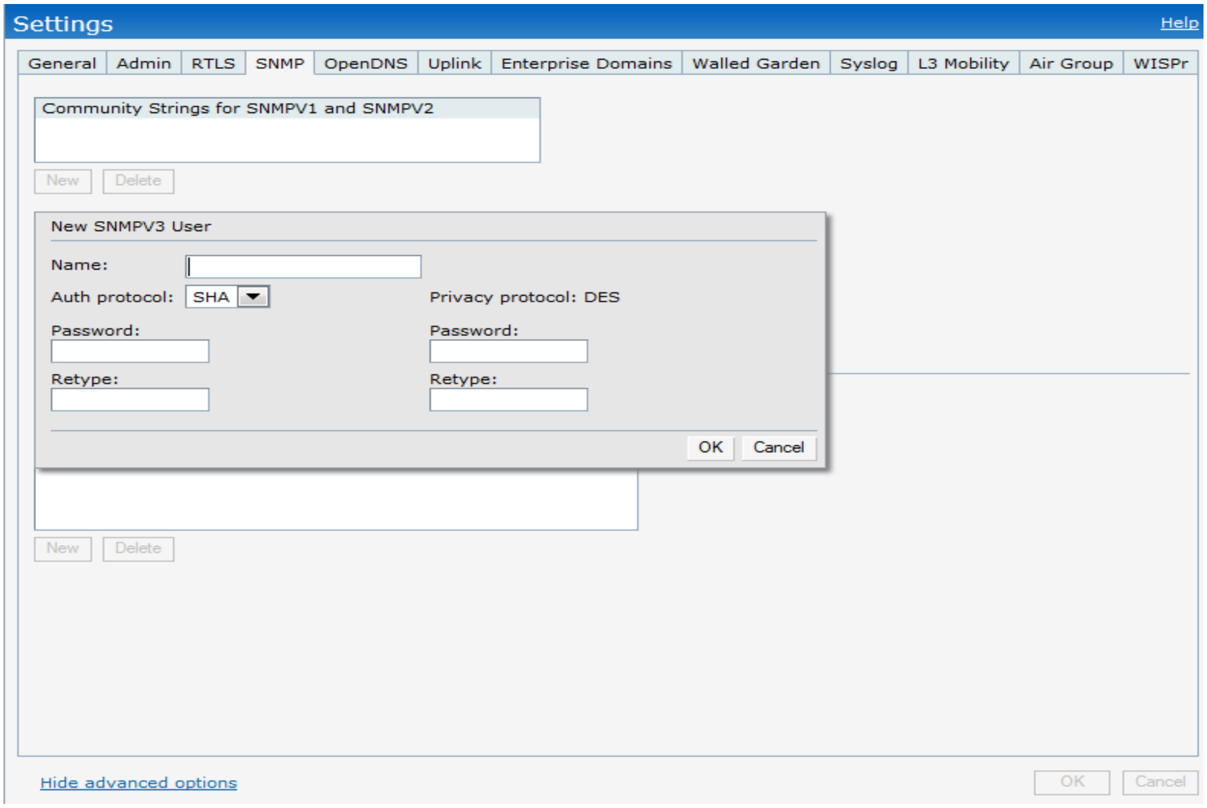


Follow the procedure below to create, edit, and delete users for SNMPV3.

1. In the **Settings** tab, click the **SNMP** tab.
2. Click **New** in the **Users for SNMPV3** box.
3. Enter the name of the user in the **Name** text box.
4. Select the type of authentication protocol from the **Auth protocol** drop-down list.
5. Enter the authentication password in the **Password** text box and retype the password in the **Retype** text box.
6. Select the type of privacy protocol from the **Privacy protocol** drop-down list.
7. Enter the privacy protocol password in the **Password** text box and retype the password in the **Retype** text box.
8. Click **OK.**

To edit the details for a particular user, select the user and click **Edit**. To delete a particular user, select the user and click **Delete**.

Figure 137 - *Creating Users for SNMPV3*



Name:

Auth protocol: SHA

Privacy protocol: DES

Password:

Retype:

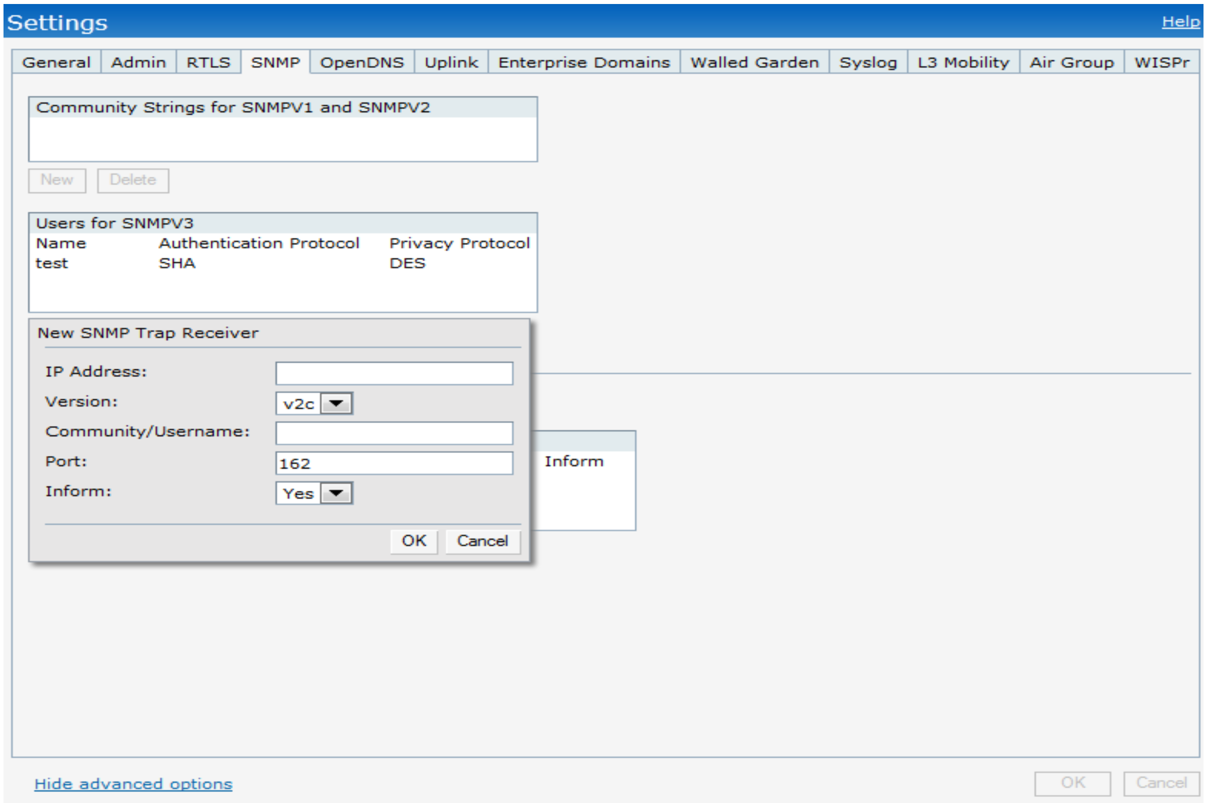
Password:

Retype:

SNMP Traps

Alcatel-Lucent Instant supports the configuration of external trap receivers in the Instant UI. Only the OAW-IAP acting as the Virtual Controller generates traps. The OID of the traps is 1.3.6.1.4.1.14823.2.3.3.1.200.2.X.

Figure 138 - *SNMP Traps*



Name	Authentication Protocol	Privacy Protocol
test	SHA	DES

IP Address:

Version: v2c

Community/Username:

Port: 162

Inform: Yes

To configure an SNMP trap receiver:

1. Enter a name in the **SNMP Engine ID** text box. It indicates the name of the SNMP agent on the access point. SNMPV3 agent has an engine ID that uniquely identifies the agent in the device and is unique to that internal network.
2. Click **New** and update the following fields:
    1. **IP Address—** Enter the **IP Address** of the new SNMP Trap receiver.
    2. **Version—** Select the SNMP version— **v1, v2c, v3** from the drop-down list. The version specifies the format of traps generated by the access point.
    3. **Community/Username—** Specify the community string for SNMPV1 and SNMPV2c traps and a username for SNMPV3 traps.
    4. **Port—** Enter the port to which the traps are sent. The default value is 162.
    5. **Inform—** When enabled, traps are sent as SNMP INFORM messages. It is applicable to SNMPV3 only. The default value is **Yes**.
3. Click **OK** to view the trap receiver information in the **SNMP Trap Receivers** window.

Alcatel-Lucent-specific management Information bases (MIBs) describe the objects that can be managed using SNMP. See the *Alcatel-Lucent Instant 6.2.0.0-3.2 MIB Reference Guide* for information about the Alcatel-Lucent MIBs and SNMP traps.

Ethernet Downlink Overview

The Ethernet downlink ports allow third party devices such as VoIP phones or printers (which support only wired connections) to connect to the wireless network. Additionally, an Access Control List (ACL) can be configured for added security on the Ethernet downlink.

NOTE

This release of Instant supports only the OpenAuth mechanism.

Ethernet Downlink Profile Parameters

To create a new Ethernet downlink profile:

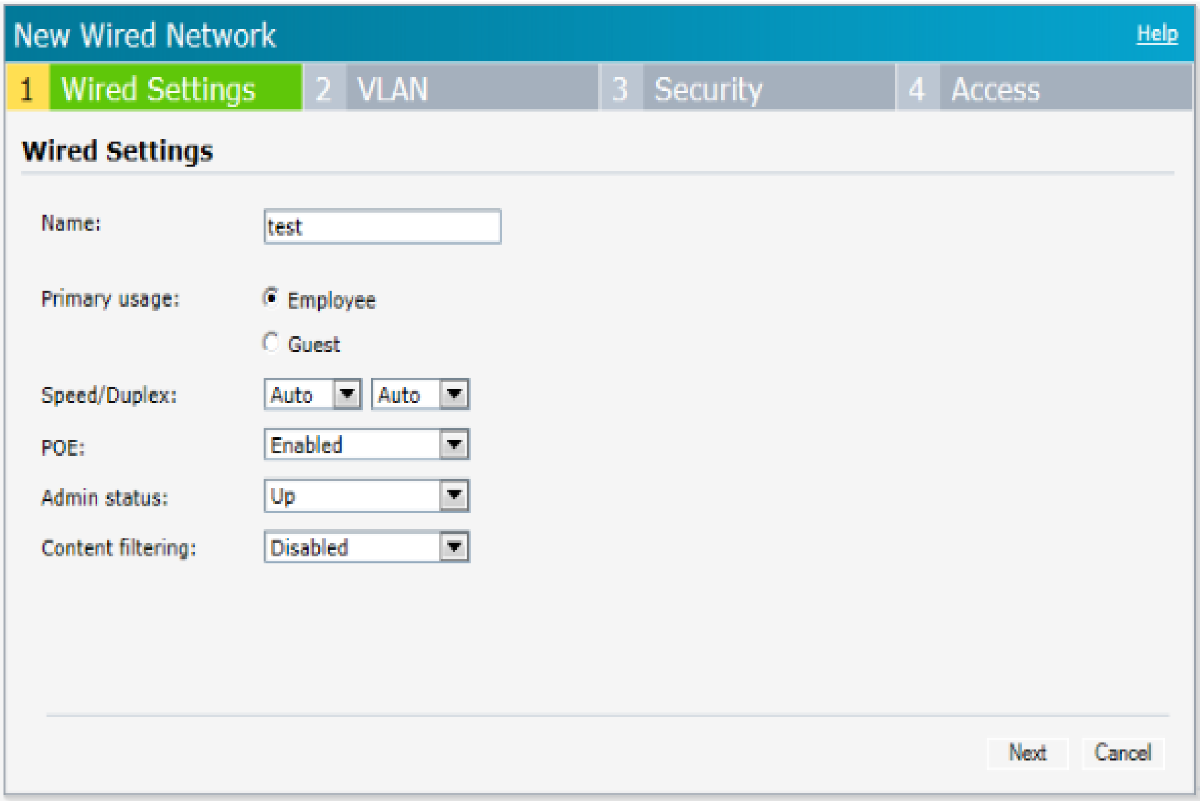
1. Click on the **Wired** link on the top right corner of the Instant UI.
2. Click on the **New** button below the **Wired Networks** window and enter the following information in the **Wired** tab.

Table 30 - *Ethernet Downlink Profile Parameters - Wired Tab*

Field	Description
Name	Name of the Ethernet downlink profile.
Primary Usage	• **Employee** — Employee access. • **Guest**— Guest access.
Speed/Duplex	Only experienced network administrators should change the speed and duplex parameters manually.
POE	When enabled, the system passes electric power along with the data on the Ethernet cable. **NOTE:** The Power Sourcing Equipment (PSE) functionality is available only for the Ethernet port2 on RAP-3WNP.
Admin Status	Displays the status of the admin.

The following figure displays the wired parameters of the Ethernet profile configuration:

Figure 139 - *Ethernet Profile Configuration - Wired Tab*



Wired Settings

Name: test

Primary usage: ● Employee ○ Guest

Speed/Duplex: Auto Auto

POE: Enabled

Admin status: Up

Content filtering: Disabled

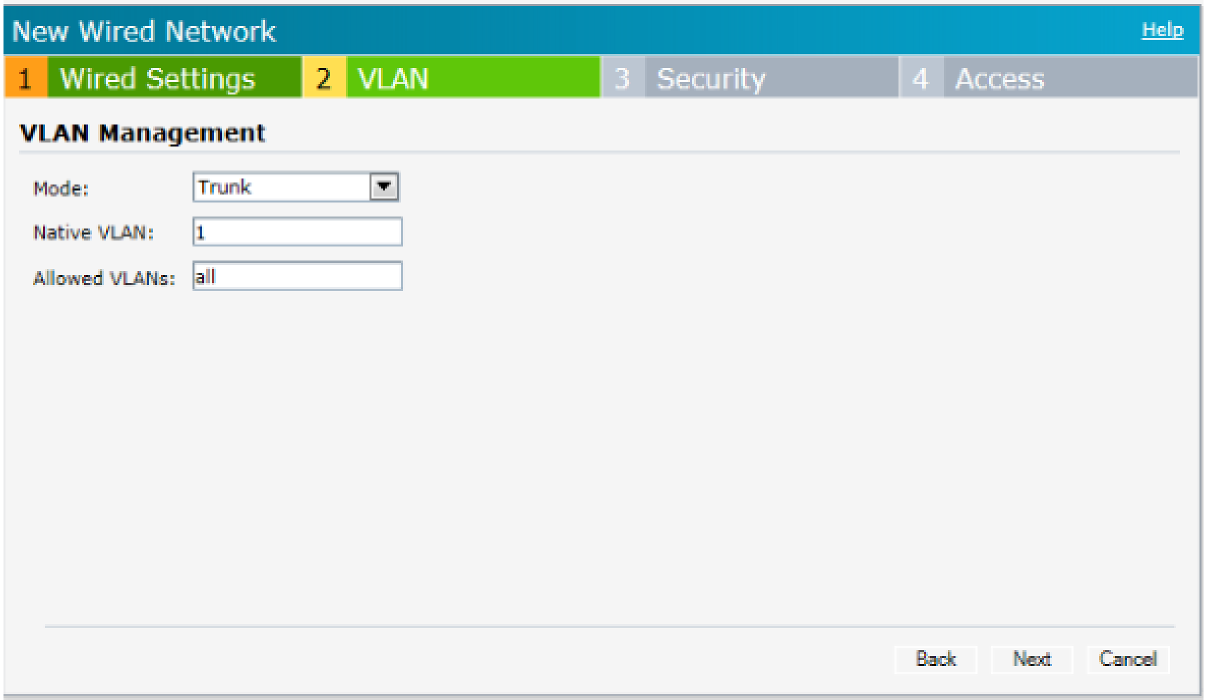
3. Click the **VLAN** tab or click **Next** and enter the following information:

Table 31 - *Ethernet Downlink Profile Parameters - VLAN Tab*

Field	Description
Mode	• In **Access mode** the port carries a single VLAN, specified as the Native VLAN. • In **Trunk mode** the port carries packets for multiple VLANs, specified as the Allowed VALN.
Native VLAN	Specifies the VLAN carried by the port in Access mode.
Allowed VLANs	Specifies the VLAN carried by the port in Trunk mode.

The following figure displays the VLAN parameters of the Ethernet profile configuration:

Figure 140 - *Ethernet Profile Configuration — VLAN Tab*



VLAN Management

Mode: Trunk

Native VLAN: 1

Allowed VLANs: all

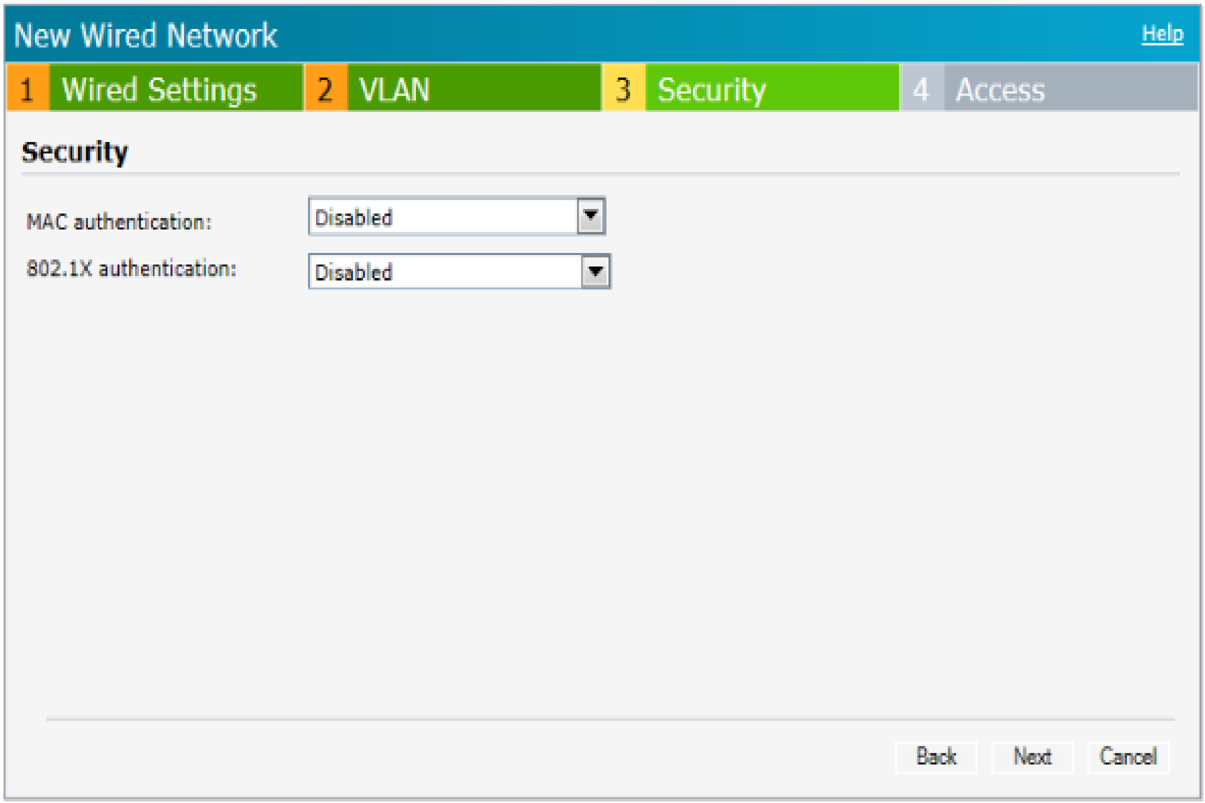
4. Click on **Security** tab or click on **Next** and enter the following information:

Table 32 - *Ethernet Downlink Profile Parameters - Security Tab*

Field	Description
MAC authentication	• Disable— Disable MAC Authentication on the profile (default). • Enable— Enable MAC Authentication on the profile.

The following figure displays the security parameters of the Ethernet profile configuration:

Figure 141 - *Ethernet Profile Configuration - Security Tab*



Security

MAC authentication: Disabled

802.1X authentication: Disabled

5. Click the **Access** tab and configure the access rule for the profile.

Table 33 - *Ethernet Downlink Profile Parameters - Access Tab*

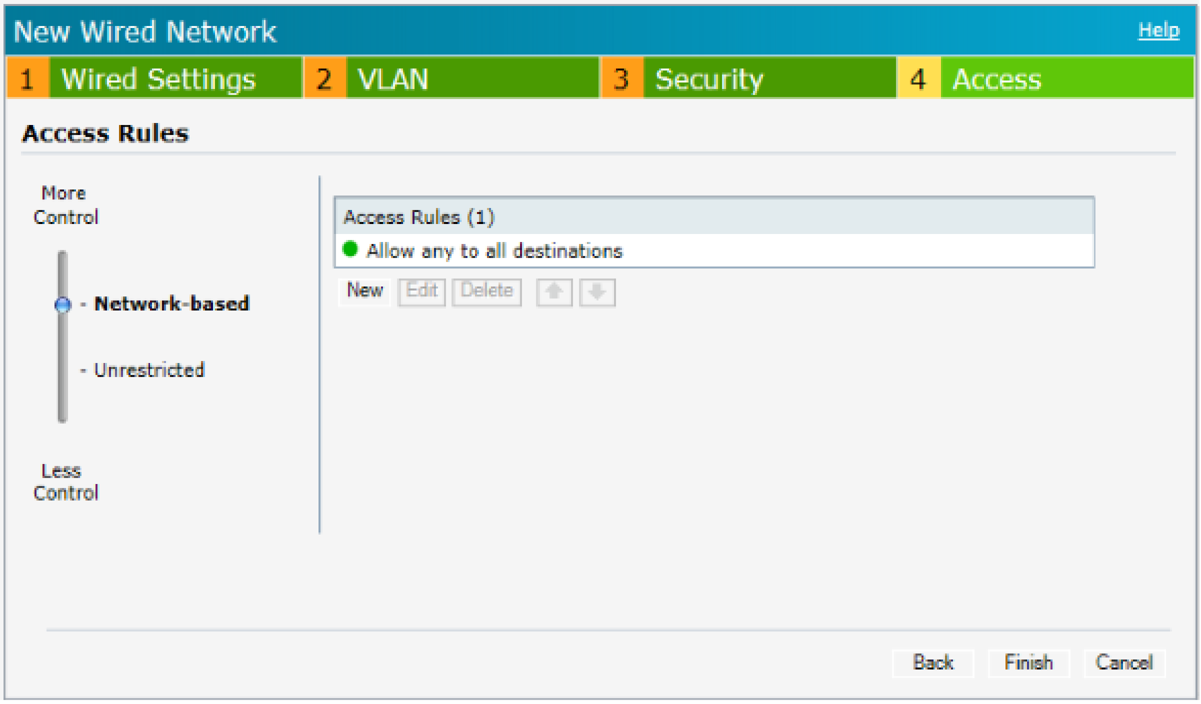
Field	Description
Access Rules	- **Unrestricted**— User gets unrestricted access on the port. - **Network-based**— User is authenticated using the access rules defined here.

NOTE

This release of Instant supports configuration of up to 64 access rules.

The following figure displays the access parameters of the Ethernet profile configuration:

Figure 142 - *Ethernet Profile Configuration - Access Tab*



Access Rules

- Network-based
- Unrestricted

Access Rules (1)

● Allow any to all destinations

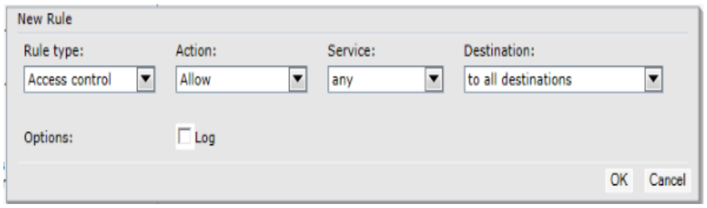
6. Click **New** in the **Access Rules** window to create a new rule and enter the following:

Table 34 - *Access Rule Parameters*

Field	Description
Rule type	**Access Control**
Action	• **Allow**— Allow users based on the access rule. • **Deny**— Deny users based on the access rule.
Service	Type of service.
Destination	Specify the destination.
Options	Disable or enable logging.

The following figure displays the parameters of the access rule configuration:

Figure 143 - *Access Rule Parameters*



Rule type: Access control

Action: Allow

Service: any

Destination: to all destinations

Options: □ Log

7. Click **Finish** to configure the new network profile.
8. To edit an Ethernet downlink profile, select the configured Ethernet downlink profile and click the **Edit** button below the **Wired Networks** window.
9. To delete an Ethernet downlink profile, select the configured Ethernet downlink profile and click the **Delete** button below the **Wired Networks** window.

Assigning a Profile to the Ethernet Port

You can assign the configured profiles to the Ethernet ports under the **Network Assignments** window.

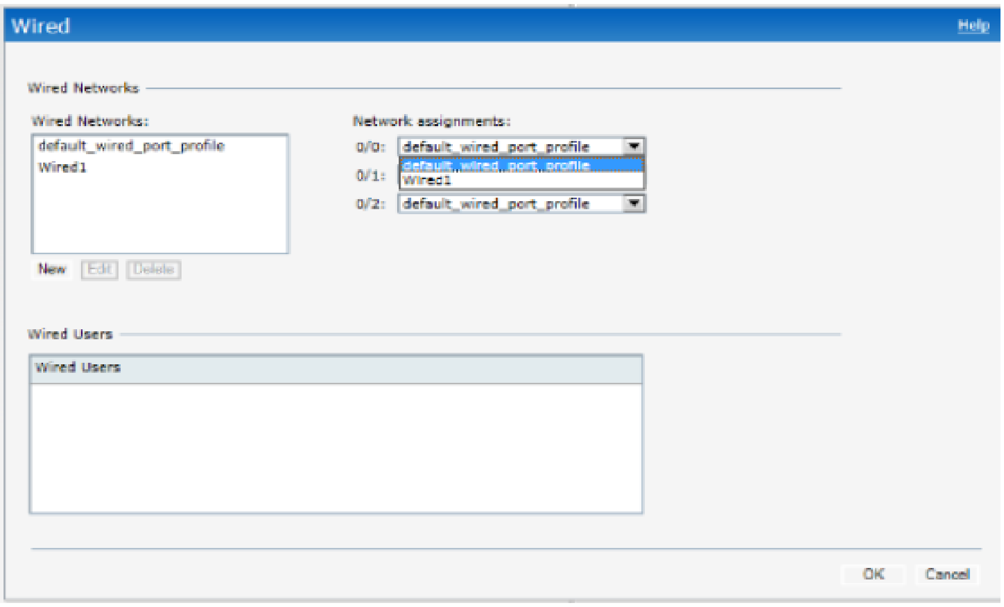
- To assign an Ethernet downlink profile to Ethernet 0 port:
  1. Enable wired bridging on the port. See Configuring Wired Bridging on Ethernet 0 on page 106.
  2. Select and assign a profile from the **0/0** drop down list.

NOTE

Wired bridging must be enable on Ethernet 0 (0/0) port before you can assign a Ethernet downlink profile.

- To assign an Ethernet downlink profile to Ethernet 1 port, select the profile from the **0/1** drop down list.
- To assign an Ethernet downlink profile to Ethernet 2 port, select the profile from the **0/2** drop down list.

Figure 144 - *Assigning a Profile to the Ethernet Ports*



Wired

Wired Networks

Wired Networks:
default_wired_port_profile
Wired1

Network assignments:
0/0: default_wired_port_profile
default_wired_port_profile
Wired1
0/1:
0/2: default_wired_port_profile

Wired Users

Wired Users

Hierarchical Deployment

In earlier releases of Alcatel-Lucent Instant, an OAW-IAP could be connected to another OAW-IAP via the uplink port through a wired switch. If there is no wired infrastructure (Ethernet connection with a L3 NAT router), then multiple OAW-IAPs could not be deployed.

An OAW-IAP-130 series or RAP-3WN AP (with more than one wired port) can now be connected to the downlink wired port of another OAW-IAP (ethX). You can provision an OAW-IAP with a single Ethernet port (like OAW-IAP-90 or OAW-IAP-100 series devices) to use enet0_bridging, so that Eth0 is converted do a downlink wired port. In such single Ethernet port platform deployments, the root AP must use the 3G uplink.

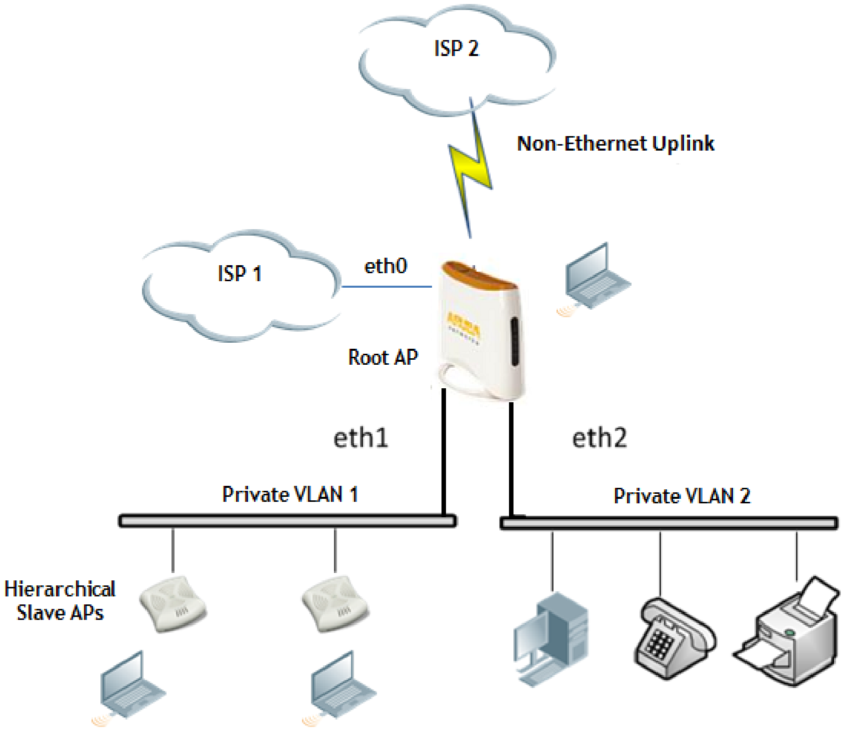
In this release of OAW-IAP Instant, you can form an OAW-IAP network by connecting the downlink port of an AP to other APs. Only one AP in the network uses its downlink port to connect to the other APs. This AP (called the root AP) acts as the wired device for the network, provides DHCP service and an L3 connection to the ISP uplink with NAT. The root AP is always the master of the Instant network. On a single Ethernet port platform, you can use enet0_bridging so that Eth0 is converted to a downlink wired port and the root AP must have the 3G uplink configured.

Deployment

A typical hierarchical deployment is comprised of the following:

- A direct wired ISP connection and/or wireless uplink.
- One or more DHCP pools for private VLANs.
- One downlink port configured on a private VLAN without authentication for connecting to slave APs. This port should not be used for any wired client connection. Other downlink ports can be used for connecting to wired clients.

Figure 145 - *Hierarchical Deployment*

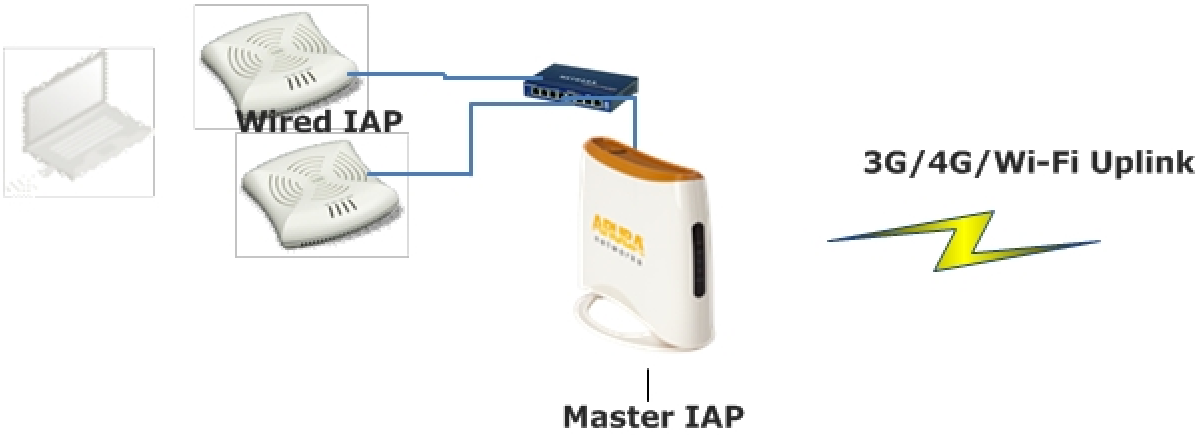


The Alcatel-Lucent Instant network supports Ethernet and 3G/4G USB modems and the Wi-Fi uplink for the corporate Instant network. The 3G/4G USB modems and the Wi-Fi uplink can be used to extend the connectivity to places where an Ethernet uplink cannot be configured, allowing the client traffic to reach the internet and the corporate network. It also provides a reliable backup link for the Ethernet based Instant network.

Uplink Interface Configuration

The following figure describes the OAW-IAP when the Ethernet connection is not configurable on an OAW-IAP network. The other OAW-IAPs also join the Virtual Controller as slave OAW-IAPs through a wired or mesh Wi-Fi uplink.

- Uplink Types



The following types of uplinks are supported on Instant:

- Ethernet
  - PPPoE
  - DHCP
  - Static IP
- 3G/4G LTE modem
- Wi-Fi

Ethernet Uplink

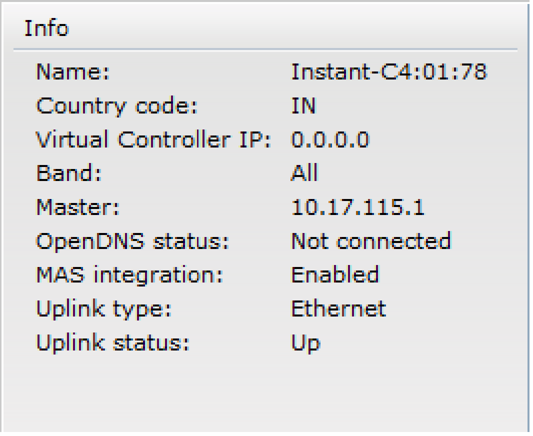
The Ethernet 0 port on an OAW-IAP is enabled as an uplink port by default.

NOTE

Instant does not support configuration of an Eth0 uplink.

View the type of uplink and the status of the uplink in the Instant UI in the **Info** tab.

Figure 146 - *Uplink Status*



Info

Name:	Instant-C4:01:78
Country code:	IN
Virtual Controller IP:	0.0.0.0
Band:	All
Master:	10.17.115.1
OpenDNS status:	Not connected
MAS integration:	Enabled
Uplink type:	Ethernet
Uplink status:	Up

3G/4G Uplink

Instant supports the use of 3G/4G USB modems to provide internet backhaul to an Instant network. The 3G/4G USB modems extend client connectivity to places where an Ethernet uplink is not feasible. This enables the RAP-3 to choose the available network in an area automatically.

NOTE

The 3G and 4G LTE USB modems can be provisioned on RAP-3 and RAP-108/109.

Types of Modems

Instant supports the following three types of 3G modems:

- **True Auto Detect**— Modems of this type can be used only in one country and for a specific ISP. The parameters are configured automatically and hence no configuration is necessary (Plug and Play).
- **Auto-detect + ISP/country**— Modems of this type require the user to specify the Country and ISP. The same modem is used for different ISPs with different parameters configured for each of them.
- **No Auto-detect**—Modems of this type are used where the modems share the same Device-ID, Country, and ISP, but need to configure different parameters for each of them. These modems work with Instant provided the correct parameters are configured. All the new auto-detected modems falls under this category as the parameter necessary to automatically configure them are unknown.

The following table lists the types of supported 3G modems:

Table 35 - *List of Supported 3G Modems*

Modem Type	Supported 3G Modems
True Auto Detect	• USBConnect 881 (Sierra 881U) • Quicksilver (Globetrotter ICON 322) • UM100C (UTstarcom) • Icon 452 • Aircard 250U (Sierra) • USB 598 (Sierra)

Modem Type	Supported 3G Modems
	• U300 (Franklin wireless) • U301 (Franklin wireless) • USB U760 for Virgin (Novatel) • USB U720 (Novatel/Qualcomm) • UM175 (Pantech) • UM150 (Pantech) • UMW190(Pantech) • SXC-1080 (Qualcomm) • Globetrotter ICON 225 • UMG181 • NTT DoCoMo L-05A (LG FOMA L05A) • NTT DoCoMo L-02A • ZTE WCDMA Technologies MSM (MF668?) • Fivespot (ZTE) • c-motech CNU-600 • ZTE AC2736 • SEC-8089 (EpiValley) • Nokia CS-10 • NTT DoCoMo L-08C (LG) • NTT DoCoMo L-02C (LG) • Novatel MC545 • Huawei E220 for Movistar in Spain • Huawei E180 for Movistar in Spain • ZTE-MF820 • Huawei E173s-1 • Sierra 320 • Longcheer WM72 • U600 (3G mode)
Auto-detect + ISP/country	• Sierra USB-306 (HK CLS/1010 (HK)) • Sierra 306/308 (Telstra (Aus)) • Sierra 503 PCIe (Telstra (Aus)) • Sierra 312 (Telstra (Aus)) • Aircard USB 308 (AT&T's Shockwave) • Compass 597(Sierra) (Sprint) • U597 (Sierra) (Verizon) • Tstick C597(Sierra) (Telecom(NZ)) • Ovation U727 (Novatel) (Sprint) • USB U727 (Novatel) (Verizon) • USB U760 (Novatel) (Sprint) • USB U760 (Novatel) (Verizon) • Novatel MiFi 2200 (Verizon Mifi 2200) • Huawei E272, E170, E220 (ATT) • Huawei E169, E180,E220,E272 (Vodafone/SmarTone (HK)) • Huawei E160 (O2(UK)) • Huawei E160 (SFR (France)) • Huawei E220 (NZ and JP) • Huawei E176G (Telstra (Aus)) • Huawei E1553, E176 (3/HUTCH (Aus)) • Huawei K4505 (Vodafone/SmarTone (HK)) • Huawei K4505 (Vodafone (UK)) • ZTE MF656 (Netcom (norway)) • ZTE MF636 (HK CSL/1010) • ZTE MF633/MF636 (Telstra (Aus)) • ZTE MF637 (Orange in Israel) • Huawei E180, E1692,E1762 (Optus (Aus))

Modem Type	Supported 3G Modems
	• Huawei E1731 (Airtel-3G (India)) • Huawei E3765 (Vodafone (Aus)) • Huawei E3765 (T-Mobile (Germany) • Huawei E1552 (SingTel) • Huawei E1750 (T-Mobile (Germany)) • UGM 1831 (TMobile) • Huawei D33HW (EMOBILE(Japan)) • Huawei GD01 (EMOBILE(Japan)) • Huawei EC150 (Reliance NetConnect+ (India)) • KDDI DATA07(Huawei) (KDDI (Japan)) • Huawei E353 (China Unicom) • Huawei EC167 (China Telecom) • Huawei E367 (Vodafone (UK)) • Huawei E352s-5 (T-Mobile (Germany))
No auto-detect	• Huawei D41HW • ZTE AC2726

Table 36 - *4G Supported Modem*

Modem Type	Supported 4G Modem
True Auto Detect	• Pantech UML290

When UML290 runs in auto detect mode, the modem can switch from 4G network to 3G network or vice-versa based on the signal strength. To configure the UML290 for the 3G network only, manually set the USB type to **pantech-3g**. To configure the UML290 for the 4G network only, manually set the 4G USB type to **pantech-lte**.

Provisioning 3G/4G Uplink Manually

To provision a 3G/4G uplink manually, configure the modem parameters. The OAW-IAP has to be rebooted if you configure USB modem parameter from the Instant UI.

Use the following procedure to provision 3G/4G uplink manually:

1. In the **settings** tab, click the **show advanced settings** link.
2. Select the **Uplink** tab. Under **3G/4G** tab, enter the parameters:
   a. Enter the type of the 3G/4G modem driver type:
      - To provision 3G modem, enter the type of 3G modem in the **USB type** text box.
      - To provision 4G modem, enter the type of 4G modem in the **4G USB type** text box.

   b. Enter the identifier of the modem device in the **USB dev** text box.

   c. Enter the TTY port of the modem in the **USB tty** text box.

   d. Enter the parameter to initialize the modem in the **USB init** text box.

   e. Enter the parameter to dial the cell tower in the **USB dial** text box.

   f. Enter the username used to dial the ISP in the **USB user** text box.

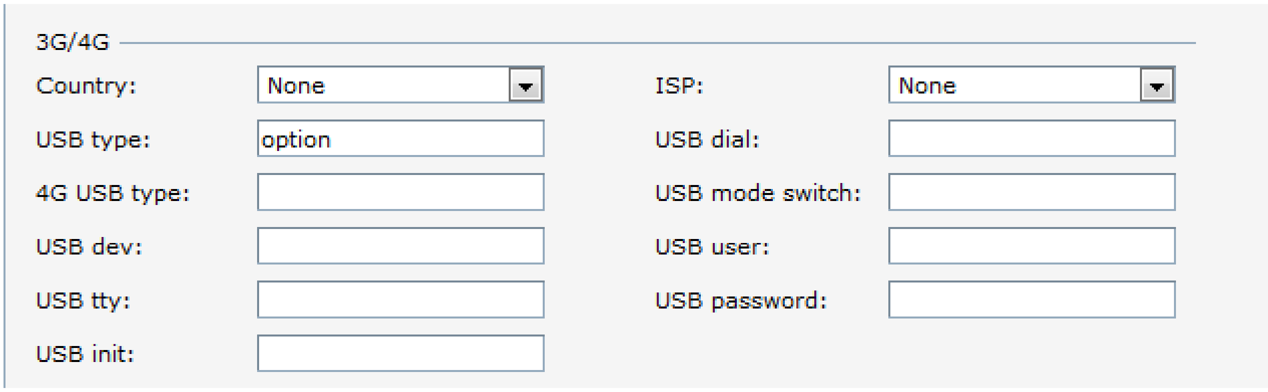
   g. Enter the password used to dial the ISP in the **USB password** text box.

h. Enter the parameter used to switch modem from storage mode to modem mode in the **USB mode switch** text box.

NOTE

The parameter details are available from the manufacturer of your modem or from your IT administrator.

Figure 147 - *Provisioning 3G/4G Uplink— Manually*



3G/4G

Country:	None	ISP:	None
USB type:	option	USB dial:	
4G USB type:		USB mode switch:	
USB dev:		USB user:	
USB tty:		USB password:	
USB init:			

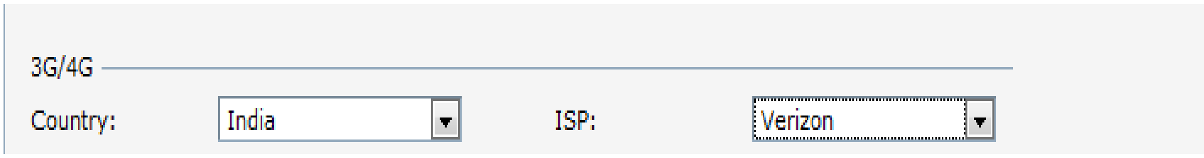
NOTE

You must reboot the OAW-IAP after manually provisioning the OAW-IAP.

Provisioning 3G Uplink Automatically

To provision a 3G uplink automatically, select only the **Country** and **ISP**. The OAW-IAP finds the parameters automatically.

Figure 148 - *Provisioning 3G Uplink— Automatically*



3G/4G

Country:	India	ISP:	Verizon

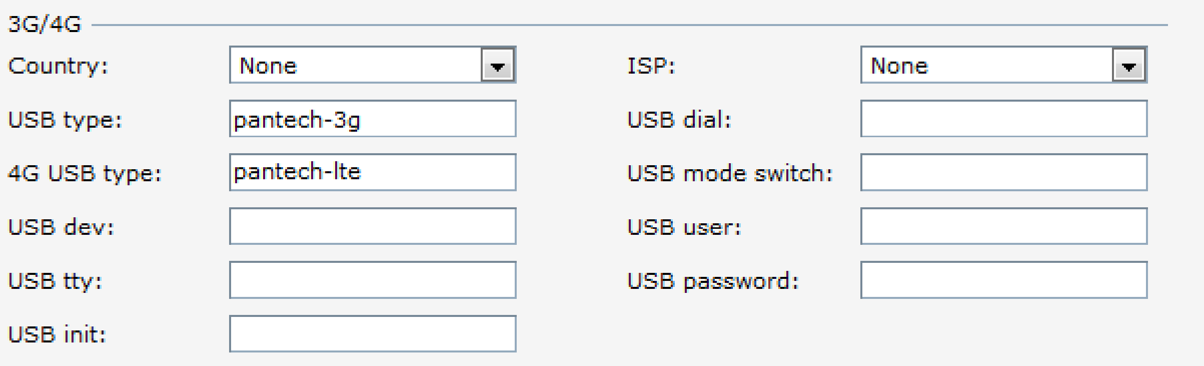
NOTE

In the Instant UI, you can view the list of country or ISP in the country and ISP drop-down lists. You can either use the country or ISP to configure the modem, or configure the individual modem parameters manually. If you cannot view the list of country or ISP from the drop-down list, then configure the modem parameters manually.

Provisioning a 3G/4G Switch Network

To provision a 3G/4G switch network, provide the driver type for the 3G modem in the **USB type** text box and the driver type for 4G modem in the **4G USB type** text box and click **OK**.

Figure 149 - *3G/4G Switch Network*



3G/4G

Country:	None	ISP:	None
USB type:	pantech-3g	USB dial:	
4G USB type:	pantech-lte	USB mode switch:	
USB dev:		USB user:	
USB tty:		USB password:	
USB init:			

Wi-Fi Uplink

The Wi-Fi uplink is supported for all the OAW-IAP models but only the master OAW-IAP uses this uplink. The Wi-Fi allows uplink to open, PSK-CCMP, and PSK-TKIP SSIDs.

- For single radio OAW-IAPs, the radio serves wireless clients and the Wi-Fi uplink.
- For dual radio OAW-IAPs, both radios can be used to serve clients but only one of them can be used for the Wi-Fi uplink.

When the Wi-Fi uplink is in use, the client IP is assigned by the internal DHCP server.

You can provision an Instant AP to support the Wi-Fi uplink.

- To bind or unbind the Wi-Fi uplink on the 5 GHz band, you must reboot the OAW-IAP.
- If the Wi-Fi uplink is used on the 5 GHz band, mesh is disabled. The two are mutually exclusive.
- As of Alcatel-LucentOS 6.2, APs do not support forming a Wi-Fi uplink with an OAW-IAP.

Provisioning Wi-Fi Uplink

To provision the Wi-Fi Uplink:

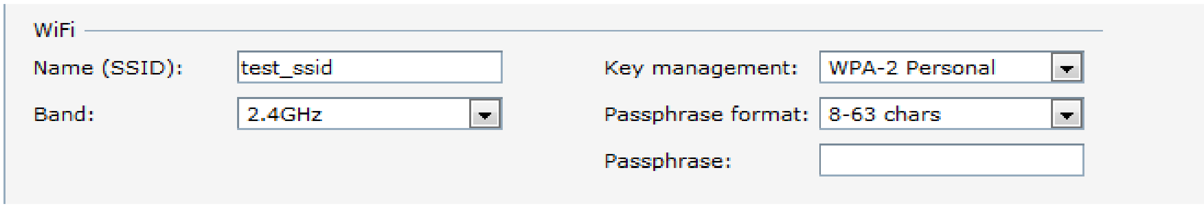
1. Navigate to **Settings > Show advanced options > Uplink**.
2. Under WiFi, enter the name of the wireless network that is used for the Wi-Fi uplink in the Name (SSID) text box.
3. Select the type of key for uplink encryption and authentication from the **Key management** drop-down list. If the uplink wireless router uses mixed encryption, WPA-2 is suggested for Wi-Fi uplink.
4. Select the band in which the Virtual Controller is operating from the **band** drop-down list. Available options are:
    - 2.4GHz (default)
    - 5 GHz
5. Select a passphrase format from the **Passphrase format** drop-down list. Available options are:
    - 8 - 63 alphanumeric characters
    - 64 hexadecimal characters

Ensure that the hexadecimal password string is exactly 64 digits in length.

6. Enter a pre-shared key (PSK) passphrase in the **Passphrase** text box.

7. Click **OK**.

Figure 150 - *Provisioning Wi-Fi Uplink*



WiFi

Name (SSID): test_ssid

Band: 2.4GHz

Key management: WPA-2 Personal

Passphrase format: 8-63 chars

Passphrase:

Provisioning 3G/4G and Wi-Fi Uplink with Factory Setting

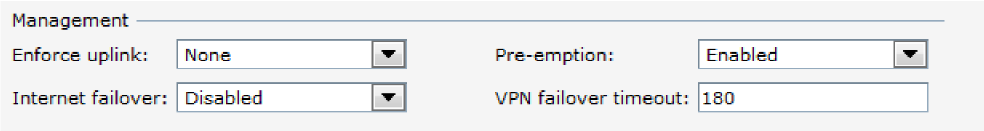
Once the OAW-IAP is rebooted with the factory setting:

1. Plug an Ethernet cable to allow the OAW-IAP to get the IP address.
2. Provision the OAW-IAP for 3G/4G or Wi-Fi uplink (Refer to the above sections).

Uplink Management

Instant allows you to set preferences for uplink preemption and switchover. The following figure shows the fields in the Instant UI, which can be used for configuring the uplink preferences.

Figure 151 - *Uplink Preference*



Management

Enforce uplink: None

Internet failover: Disabled

Pre-emption: Enabled

VPN failover timeout: 180

Enforce Uplink

This feature forces the OAW-IAP to use a specific uplink. For example, to enforce a 3G/4G uplink, select 3G/4G from the Enforce uplink drop-down list.

Preemption is disabled when the Ethernet, 3G/4G or Wi-Fi uplink is enforced.

Uplink Preemption

With this feature, the OAW-IAP tries to get a higher priority link every ten minutes even if the current uplink is up. This does not affect the current uplink connection. If the higher uplink is usable, the OAW-IAP switches over to that uplink. Preemption is enabled by default.

Uplink Switchover

The default priority for uplink switchover is Ethernet and then 3G/4G. The OAW-IAP has the ability to switch to the lower priority uplink if the current uplink is down.

An IAP reboot is not required for uplink switchover process.

Uplink Switching Based on VPN Status

Instant supports switching uplinks based on the VPN status when deploying mixed uplinks (Eth0, 3G/4G, Wi-Fi). When VPN is used with multiple backhaul options, the OAW-IAP switches to an uplink connection based on the VPN connection status instead of only using Eth0, the physical backhaul link. The behavior of the uplink switching is described as follows:

- If the current uplink is Eth0 and the VPN connection is down, the OAW-IAP will retry to connect to VPN. This retry time depends on the configuration of primary/backup and fast-failover for VPN. If all the possibilities fail, then the OAW-IAP waits for a vpn-failover-timeout and then a different uplink (3G,Wi-Fi) is selected.
- If the current uplink is 3G or Wi-Fi, and Eth0 has a physical link, the OAW-IAP periodically suspends user traffic to try and connect to the VPN on the Eth0. If the OAW-IAP succeeds, then the OAW-IAP switches to Eth0. If the OAW-IAP does not succeed, then the OAW-IAP restores the VPN connection to the current uplink.

NOTE

This feature is automatically enabled when a VPN is configured in the IAP. When this feature is enabled, the IAP monitors the VPN status. When VPN status is down for 3 minutes, the uplink switches over (if low priority uplink is detected, and the uplink preference is set to none.

Uplink Switching Based on Internet Connectivity Status

Instant supports switching uplinks based on Internet connectivty status.

With this feature enabled, the OAW-IAP continuously sends ICMP packets to some well known internet servers. If the request is timed out due to a bad uplink connection or uplink interface failure, the OAW-IAP switches to a different connection.

To enable this feature, perform the following steps:

1. Navigate to **Settings > Show advanced options > Uplink**.
2. Under Management, select **Enabled** from the **Internet failover** drop-down list.
3. Specify the required values for Failover detection Count and Failover detection frequence.
4. Click **OK**.

NOTE

When this feature is enabled, the OAW-IAP ignores the VPN status, although uplink switching based on VPN status is enabled.

PPPoE

Point-to-Point Protocol over Ethernet (PPPoE) is a method of connecting to the internet typically used with DSL services where the client connects to the DSL modem. You can use PPPoE for your uplink connectivity in both normal OAW-IAP and VPN OAW-IAP deployments. PPPoE is supported only in a single AP deployment.

NOTE

Uplink redundancy with the PPPoE link is not supported.

When the Ethernet link is up, it is used as a PPPoE or DHCP uplink. Once the PPPoE settings are configured, PPPoE has the highest priority for the uplink. The OAW-IAP can establish a PPPoE session with a PPPoE server at the ISP and get authenticated using Password Authentication Protocol (PAP) or the Challenge Handshake Authentication Protocol (CHAP). Depending upon the request from the PPPoE server, either the PAP or the CHAP credentials are used for authentication. After you configure PPPoE, you have to reboot the OAW-IAP for the configuration to take effect. The PPPoE connection is dialed after the AP comes up. The PPPoE configuration is checked during bootup and if found incorrect, Ethernet is used for the uplink connection.

NOTE

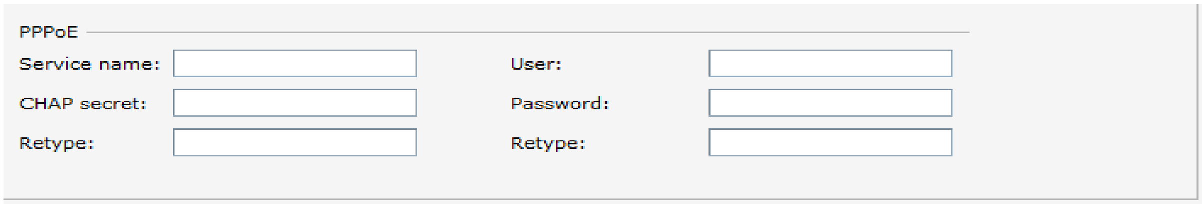
When you use PPPoE, do not configure the IP address of the Virtual Controller. When you use PPPoE, do not use Dynamic RADIUS Proxy. An SSID created with default VLAN is not supported with PPPoE.

Configuring PPPoE

To configure the PPPOE settings:

1. Click the **Settings** link at the upper right corner of the Instant UI.
2. Click the **Show advanced options** link.
3. In the **Uplink** tab, perform the following steps in the **PPPoE** section:
   a. Enter the **PPPoE service name** provided to you by your service provider in the **Service name** field.
   b. In the **CHAP secret** and **Retype** fields, enter the CHAP secret and confirm it.
   c. Enter the user name for the PPPoE connection in the **User** field.
   d. In the **Password** and **Retype** fields, enter the PPPoE password and confirm it.
4. Click **OK**.
5. Reboot the IOAW-IAP for the configuration to take effect.

Figure 152 - *PPPoE Settings*



PPPoE

Service name:		User:	
CHAP secret:		Password:	
Retype:		Retype:	

OmniVista Integration and Management

OmniVista is a powerful and easy-to-use network operations system that manages Alcatel-Lucent wireless, wired, and remote access networks, as well as wired and wireless infrastructures from a wide range of third-party manufacturers. With its easy-to-use interface, OmniVista provides real-time monitoring, proactive alerts, historical reporting, and fast, efficient troubleshooting. It also offers tools that manage RF coverage, strengthen wireless security, and demonstrate regulatory compliance.

Alcatel-Lucent OAW-IAPs communicate with OmniVista using the HTTPS protocol. This allows an OmniVista server to be deployed in the cloud across a NAT device, such as a router.

OmniVista Features

This section describes the OmniVista features that are available in the Alcatel-Lucent Instant network.

Image Management

OmniVista allows you to manage firmware updates on WLAN devices by defining a minimum acceptable firmware version for each make and model of a device. It remotely distributes the firmware image to the WLAN devices that require updates, and it schedules the firmware updates such that updating is completed without requiring you to manually monitor the devices.

The following models can be used to upgrade the firmware:

- Automatic— In this model, the Virtual Controller (VC) periodically checks for newer updates from a configured URL and automatically initiates upgrade of the network.
- Manual— In this model, the user can manually start a firmware upgrade on a VC-by-VC basis or set the desired firmware preference per group of devices.

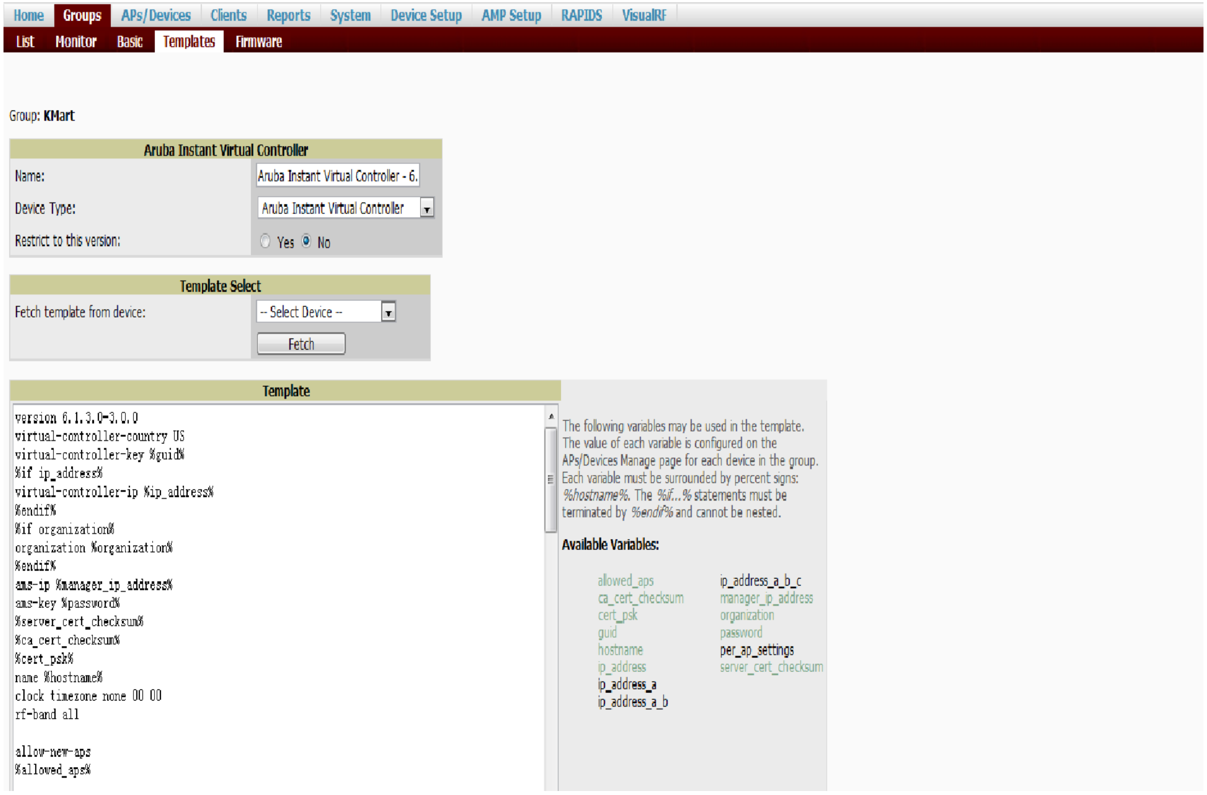
OAW-IAP and Client Monitoring

OmniVista allows you to find any OAW-IAP or client on the wireless network and to see real-time monitoring views. These monitoring views can be used to aggregate critical information and high-end monitoring information.

Template-based Configuration

OmniVista automatically creates a configuration template based on any of the existing OAW-IAPs, and it applies that template across the network as shown in Figure 153. It audits every device on an ongoing basis to ensure that configurations never vary from the enterprise policies. It alerts you whenever a violation is detected and automatically repairs the misconfigured device.

Figure 153 - *Template-based Configuration*



Group: **KMart**

Aruba Instant Virtual Controller

Name:	Aruba Instant Virtual Controller - 6.
Device Type:	Aruba Instant Virtual Controller ▾
Restrict to this version:	○ Yes ● No

Template Select

Fetch template from device:	-- Select Device -- ▾ Fetch

Template

```
version 6.1.3.0-3.0.0
virtual-controller-country US
virtual-controller-key %guid%
%if ip_address%
virtual-controller-ip %ip_address%
%endif%
%if organization%
organization %organization%
%endif%
ams-ip %manager_ip_address%
ams-key %password%
%server_cert_checksum%
%ca_cert_checksum%
%cert_psk%
name %hostname%
clock timezone none 00 00
rf-band all

allow-new-aps
%allowed_aps%
```

The following variables may be used in the template. The value of each variable is configured on the APs/Devices Manage page for each device in the group. Each variable must be surrounded by percent signs: *%hostname%*. The *%if...%* statements must be terminated by *%endif%* and cannot be nested.

Available Variables:

allowed_aps
ca_cert_checksum
cert_psk
guid
hostname
ip_address
ip_address_a
ip_address_a_b
ip_address_a_b_c
manager_ip_address
organization
password
per_ap_settings
server_cert_checksum

Trending Reports

OmniVista saves up to 14 months of actionable information, including network performance data and user roaming patterns, so you can analyze how network usage and performance trends have changed over time. It also provides detailed capacity reports with which you can plan the capacity and appropriate strategies for your organization.

Intrusion Detection System

OmniVista provides advanced, rules-based rogue classification. It automatically detects rogue APs irrespective of their location in the network and prevents authorized OAW-IAPs from being detected as rogue OAW-IAPs. It tracks and correlates the IDS events to provide a complete picture of network security.

Wireless Intrusion Detection System (WIDS) Event Reporting to OmniVista

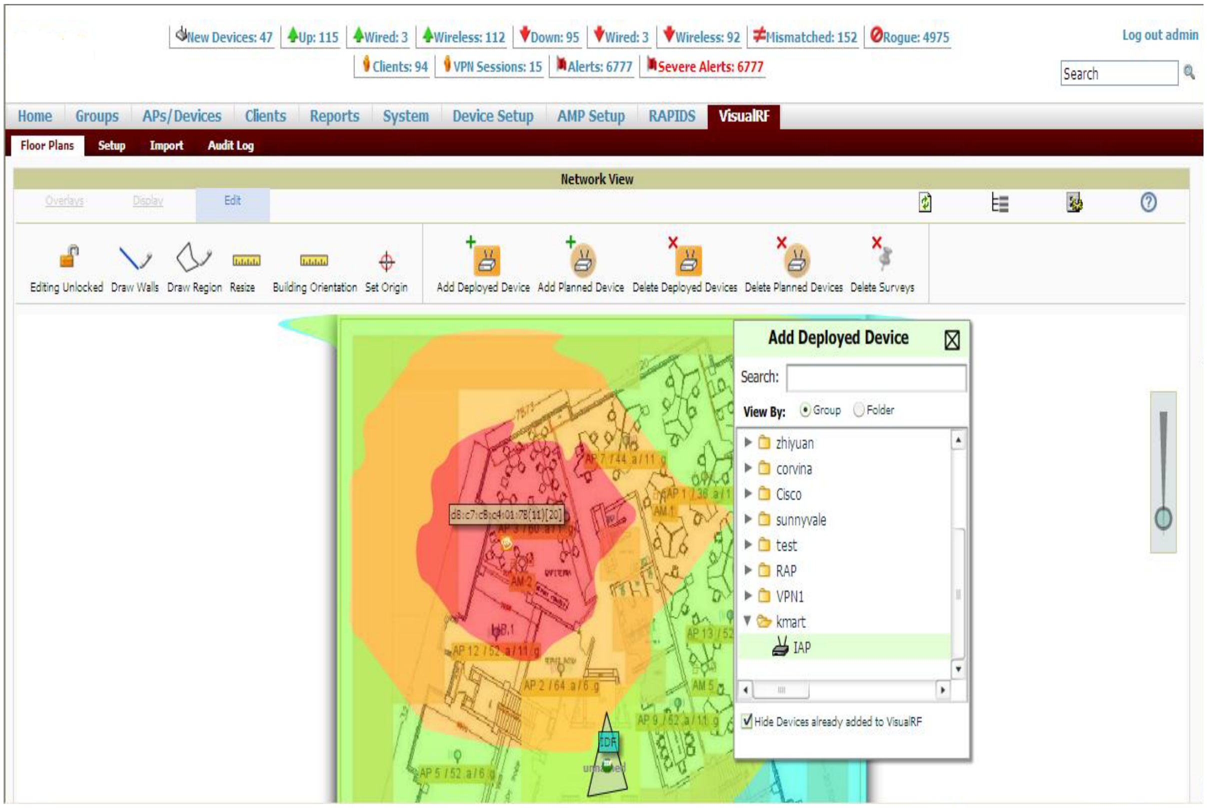
OmniVista supports Wireless Intrusion Detection System (WIDS) Event Reporting, which is provided by Alcatel-Lucent Instant. This includes WIDS classification integration with the RAPIDS (Rogue Access Point Detection Software) module. RAPIDS is a powerful and easy-to-use tool for automatic detection of unauthorized wireless devices. It supports multiple methods of rogue detection and uses authorized wireless APs to report other devices within range.

The WIDS report cites the number of IDS events for devices that have experienced the most instances in the prior 24 hours and provides links to support additional analysis or configuration in response.

RF Visualization Support for Alcatel-Lucent Instant

OmniVista supports RF visualization for Alcatel-Lucent Instant. The VisualRF module provides a real-time picture of the actual radio environment of your wireless network and the ability to plan the wireless coverage of new sites. VisualRF uses sophisticated RF fingerprinting to accurately display coverage patterns and calculate the location of every Instant device in range. VisualRF provides graphical access to floor plans, client location, and RF visualization for floors, buildings, and campuses that host your network.

Figure 154 - *Adding an OAW-IAP in VisualRF*



Configuring OmniVista

This section describes how to configure OmniVista integration. Before configuring the OmniVista, you need the following:

- IP address of the OmniVista server.
- Shared key for service authorization— This is assigned by the OmniVista administrator.

Creating your Organization String

The Organization String is a set of colon-separated strings created by the OmniVista administrator to accurately represent the deployment of each Alcatel-Lucent Instant system. This string is entered into the Alcatel-Lucent Instant UI by the on-site installer.

- AMP Role— "Org Admin" (initially disabled)
- AMP User— "Org Admin" (assigned to the role "Org Admin")
- Folder— "Org" (under the Top folder in AMP)
- Configuration Group— "Org"

Additional strings in the Organization String are used to create a hierarchy of sub folders under the folder named "Org":

- subfolder1 would be a folder under the "Org" folder
- subfolder2 would be a folder under subfolder1

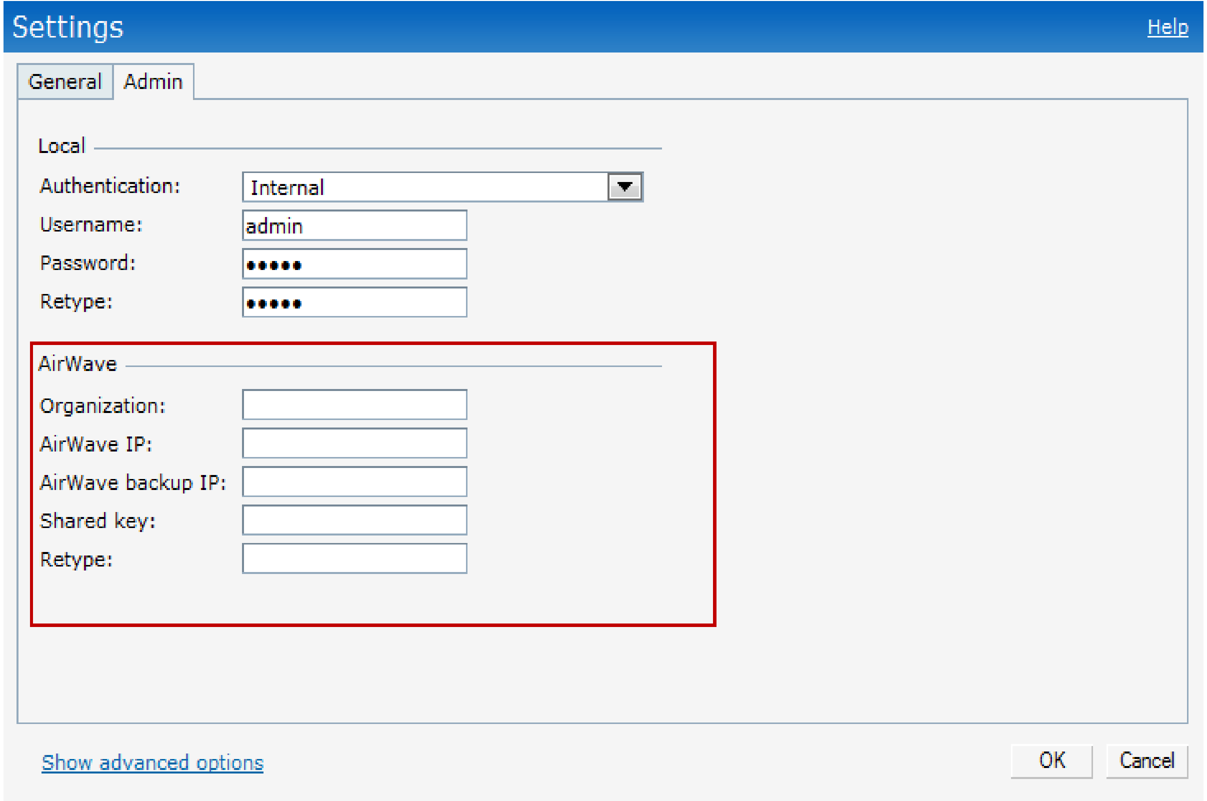
About Shared Key

The Shared Secret key is used by the administrator to manually authorize the first Virtual Controller for an organization. Any string is acceptable.

Entering the Organization String and AMP Information into the OAW-IAP

1. Click the OmniVista **Set Up Now** link in the bottom-middle region of the Instant UI window. The **Settings** window with the **OmniVista** tab selected appears.

Figure 155 - *Configuring OmniVista*



Local

Authentication: Internal

Username: admin

Password: •••••

Retype: •••••

AirWave

Organization:

AirWave IP:

AirWave backup IP:

Shared key:

Retype:

2. Enter the name of your organization in the **Organization** name text box. This name automatically appears in OmniVista under Groups list.
3. Enter the IP address of the OmniVista server in the **OmniVista IP** text box.
4. Enter the IP address of a backup OmniVista server in the **OmniVista backup IP** text box. The backup server provides connectivity when the primary server is down. If the OAW-IAP cannot send data to the primary server, the Virtual Controller switches to the backup server automatically.
5. Enter the shared key in the **Shared key** text box and reconfirm. This shared key is used for configuring the first AP in the Alcatel-Lucent Instant network.
6. Click **OK**.

OmniVista Discovery through DHCP Option

The OmniVista configuration can also be performed on the DHCP option that is configured on the DHCP server. You can configure this only if OmniVista was not configured earlier or if you have deleted the precedent configuration.

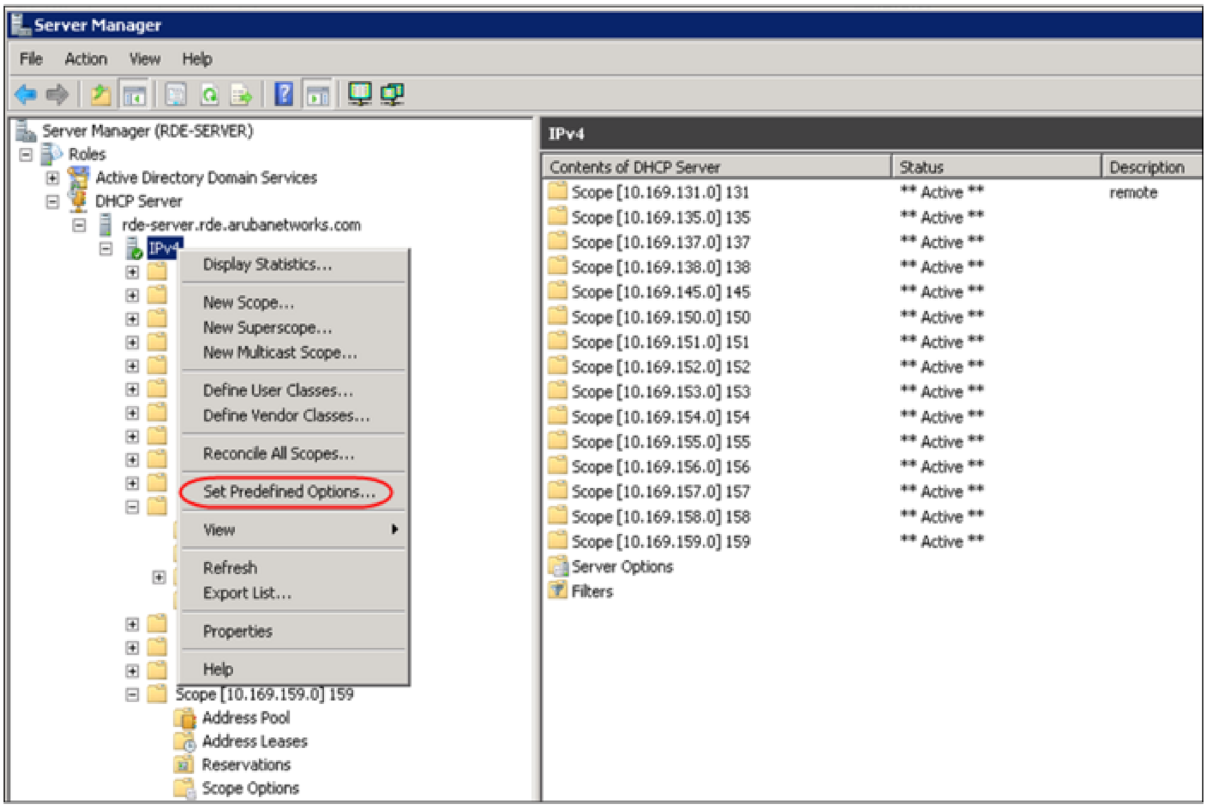
On the DHCP server, the format for option 60 is "**Alcatel-LucentInstantAP**", and the format for option 43 is “**ams-ip,ams-key**”.

Standard DHCP option 60 and 43 on Windows Server 2008

In networks that are not using DHCP option 60 and 43, it is easy to use the standard DHCP options 60 and 43 for Alcatel-Lucent AP or Alcatel-Lucent Instant AP. For Alcatel-Lucent APs these options can be used to indicate the, master controller or the local controller. For OAW-IAP, this can be used to define the OmniVista IP, group and password.

1. From a server running Windows Server 2008 navigate to **Server Manager > Roles > DHCP sever > domain DHCP Server > IPv4**.
2. Right-click on **IPv4** and select **Set Predefined Options.**

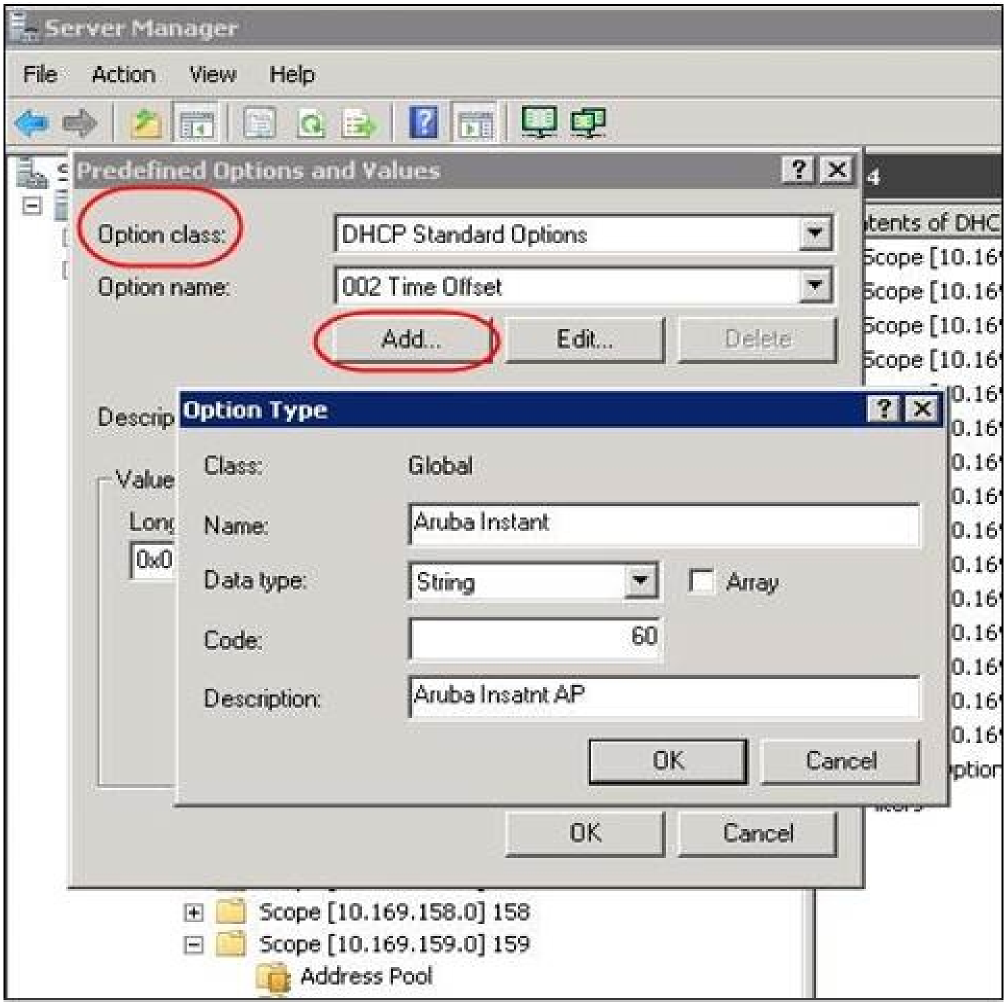
Figure 156 - *Instant and DHCP options for OmniVista— Set Predefined Options*



Contents of DHCP Server	Status	Description
Scope [10.169.131.0] 131	** Active **	remote
Scope [10.169.135.0] 135	** Active **	
Scope [10.169.137.0] 137	** Active **	
Scope [10.169.138.0] 138	** Active **	
Scope [10.169.145.0] 145	** Active **	
Scope [10.169.150.0] 150	** Active **	
Scope [10.169.151.0] 151	** Active **	
Scope [10.169.152.0] 152	** Active **	
Scope [10.169.153.0] 153	** Active **	
Scope [10.169.154.0] 154	** Active **	
Scope [10.169.155.0] 155	** Active **	
Scope [10.169.156.0] 156	** Active **	
Scope [10.169.157.0] 157	** Active **	
Scope [10.169.158.0] 158	** Active **	
Scope [10.169.159.0] 159	** Active **	
Server Options		
Filters		

3. Select **DHCP Standard Options** in the **Option class** drop-down list and then click **Add.** Enter the following information:
   - Name— Alcatel-Lucent Instant
   - Data Type— String
   - Code— 60
   - Description— Alcatel-Lucent Instant AP

Figure 157 - *Instant and DHCP options for OmniVista— Predefined Options and Values*



Predefined Options and Values

Option class: DHCP Standard Options

Option name: 002 Time Offset

Option Type

Class: Global

Name: Aruba Instant

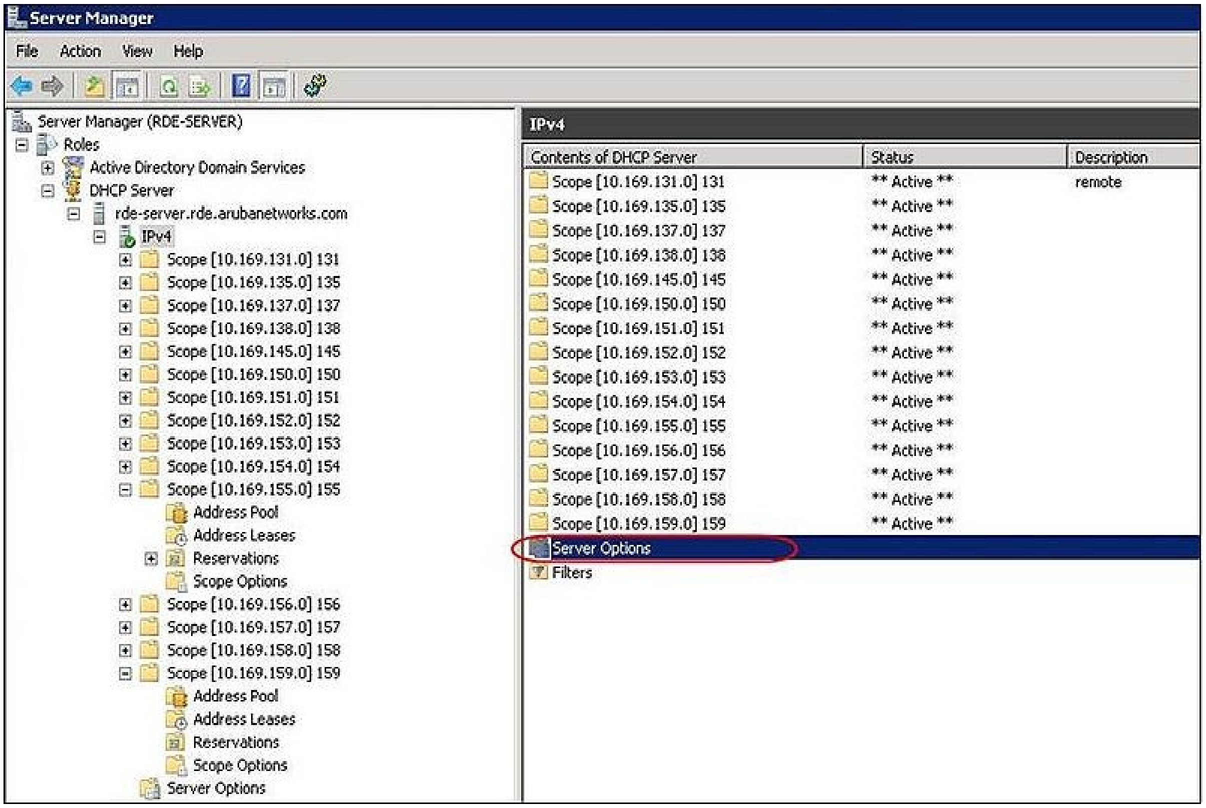
Data type: String □ Array

Code: 60

Description: Aruba Insatnt AP

4. Navigate to **Server Manager** and select **Server Options** in the **IPv4** window. (This sets the value globally. Use options on a per-scope basis to override the global options.)
5. Right-click on **Server Options** and select the configuration options.

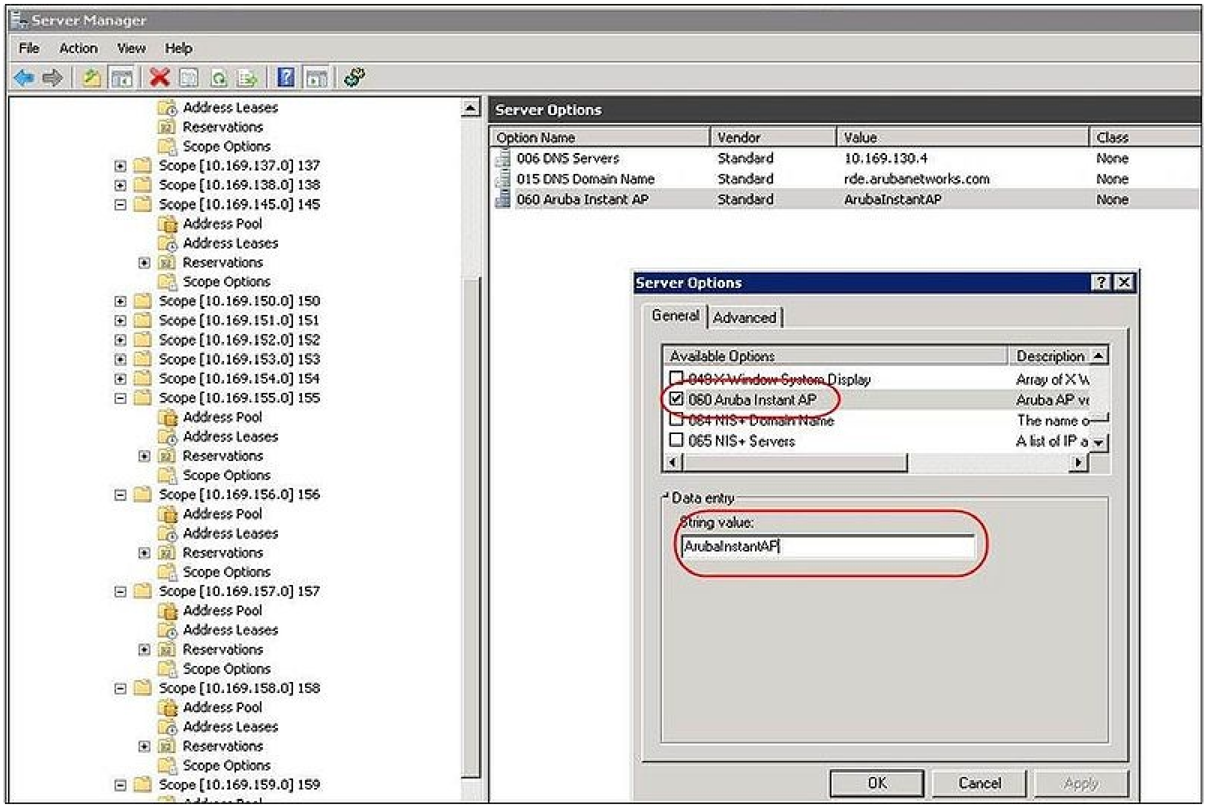
Figure 158 - *Instant and DHCP options for OmniVista— Server Options*



Contents of DHCP Server	Status	Description
Scope [10.169.131.0] 131	** Active **	remote
Scope [10.169.135.0] 135	** Active **	
Scope [10.169.137.0] 137	** Active **	
Scope [10.169.138.0] 138	** Active **	
Scope [10.169.145.0] 145	** Active **	
Scope [10.169.150.0] 150	** Active **	
Scope [10.169.151.0] 151	** Active **	
Scope [10.169.152.0] 152	** Active **	
Scope [10.169.153.0] 153	** Active **	
Scope [10.169.154.0] 154	** Active **	
Scope [10.169.155.0] 155	** Active **	
Scope [10.169.156.0] 156	** Active **	
Scope [10.169.157.0] 157	** Active **	
Scope [10.169.158.0] 158	** Active **	
Scope [10.169.159.0] 159	** Active **	
Server Options		
Filters		

6. Select **060 Alcatel-Lucent Instant AP** in the **Server Options** window and enter **Alcatel-LucentInstantAP** in the String Value.

Figure 159 - *Instant and DHCP options for OmniVista—060 Alcatel-Lucent Instant AP in Server Options*



Server Options

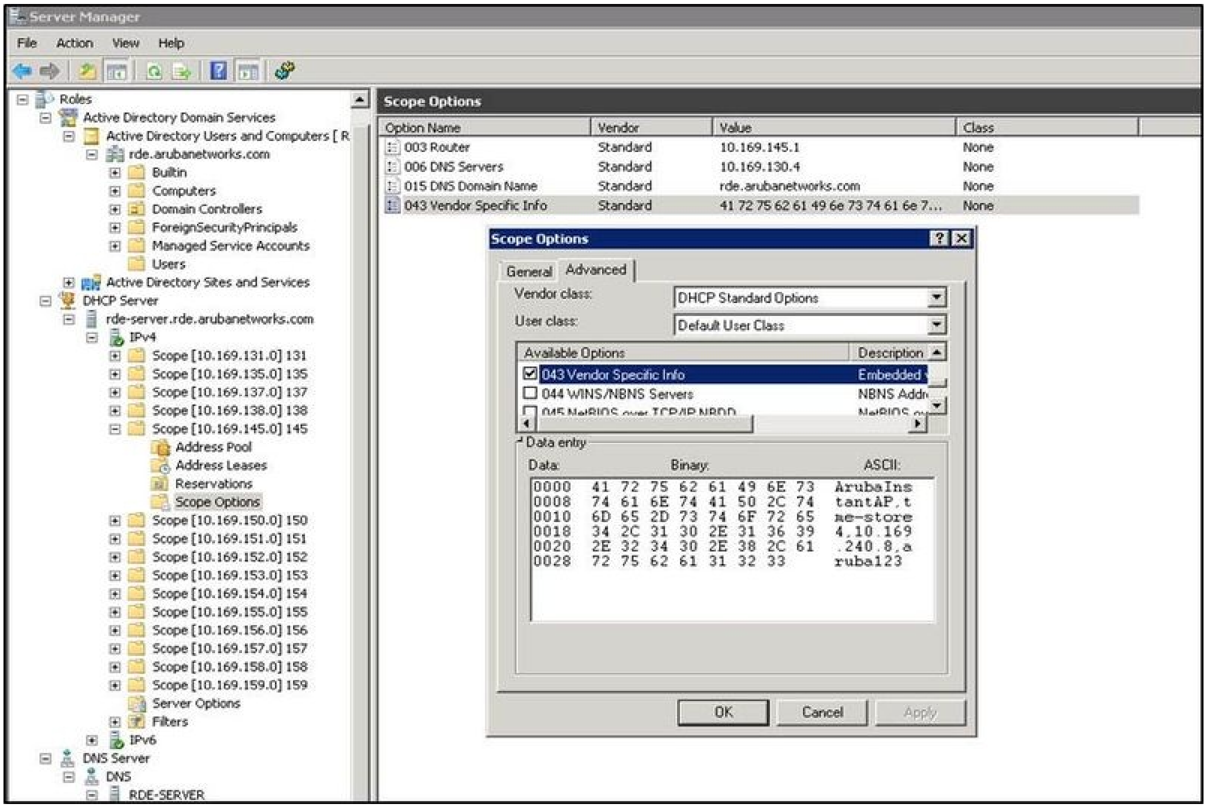
Option Name	Vendor	Value	Class
006 DNS Servers	Standard	10.169.130.4	None
015 DNS Domain Name	Standard	rde.arubanetworks.com	None
060 Aruba Instant AP	Standard	ArubaInstantAP	None

Available Options	Description
□ 049 X Window System Display	Array of X W
☑ 060 Aruba Instant AP	Aruba AP v
□ 064 NIS+ Domain Name	The name o
□ 065 NIS+ Servers	A list of IP a

String value: ArubaInstantAP

7. Select **043 Vendor Specific Info** and enter a value for **airwave-orgn, airwave-ip, airwave-key** in the ASCII field (for example: tme-instant-store1,10.169.240.8, Alcatel-Lucent123).

Figure 160 - *Instant and DHCP options for OmniVista— 043 Vendor Specific Info*



Option Name	Vendor	Value	Class
003 Router	Standard	10.169.145.1	None
006 DNS Servers	Standard	10.169.130.4	None
015 DNS Domain Name	Standard	rde.arubanetworks.com	None
043 Vendor Specific Info	Standard	41 72 75 62 61 49 6e 73 74 61 6e 7...	None

Scope Options

General | Advanced

Vendor class: DHCP Standard Options

User class: Default User Class

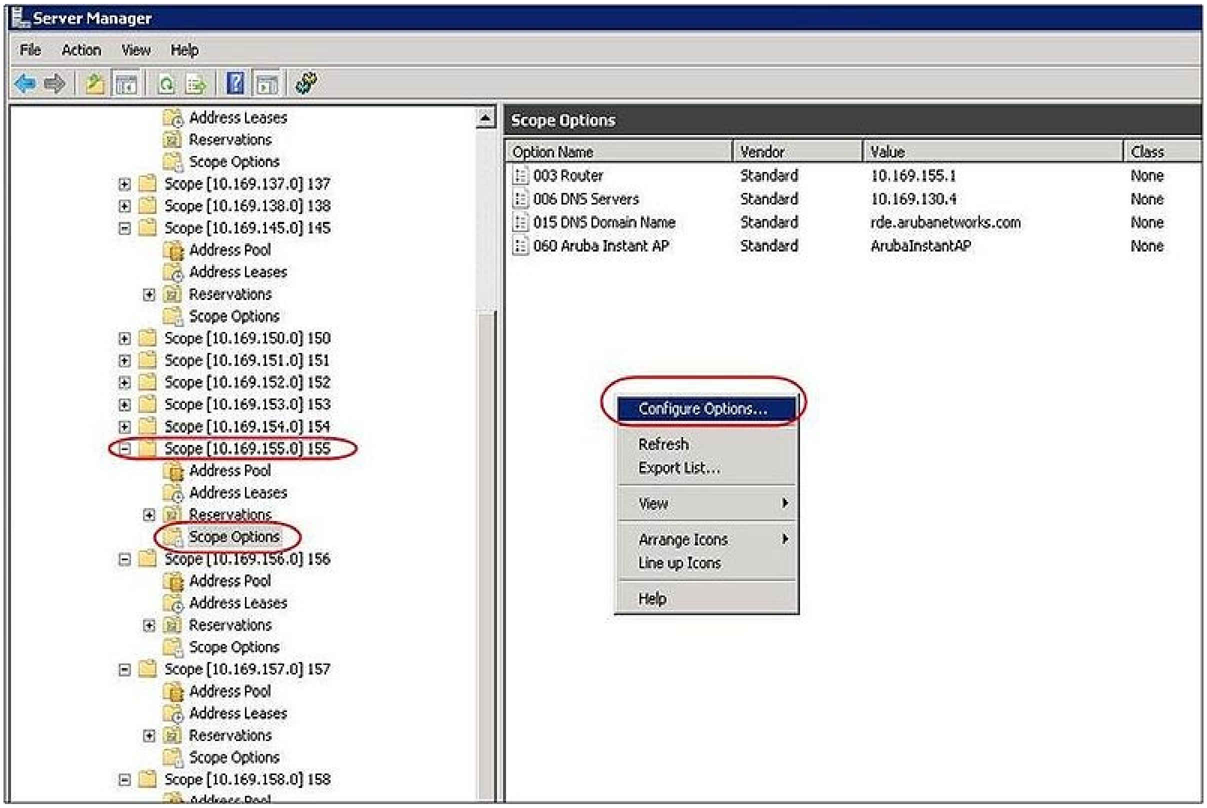
Available Options	Description
☑ 043 Vendor Specific Info	Embedded
□ 044 WINS/NBNS Servers	NBNS Addr
□ 045 NetBIOS over TCP/IP NBDD	NetBIOS ov

Data entry

```
Data:       Binary:                       ASCII:
0000   41 72 75 62 61 49 6E 73   ArubaIns
0008   74 61 6E 74 41 50 2C 74   tantAP,t
0010   6D 65 2D 73 74 6F 72 65   me-store
0018   34 2C 31 30 2E 31 36 39   4,10.169
0020   2E 32 34 30 2E 38 2C 61   .240.8,a
0028   72 75 62 61 31 32 33      ruba123
```

This creates a DHCP option 60 and 43 on a global basis. You can do the same on a per-scope basis. The per-scope option overrides the global option.

Figure 161 - *Instant and DHCP options for OmniVista— Scope Options*



Option Name	Vendor	Value	Class
003 Router	Standard	10.169.155.1	None
006 DNS Servers	Standard	10.169.130.4	None
015 DNS Domain Name	Standard	rde.arubanetworks.com	None
060 Aruba Instant AP	Standard	ArubaInstantAP	None

Alternate Method for Defining Vendor-Specific DHCP Options

This section describes how to add vendor-specific DHCP options for Alcatel-Lucent Instant APs in a network that already uses DHCP options 60 and 43 for other services. Some networks use DHCP standard options 60 and 43 to give the DHCP clients info about certain services such as PXE to the DHCP clients. In such an environment, it is not possible to use the standard DHCP options 60 and 43 for Alcatel-Lucent APs.

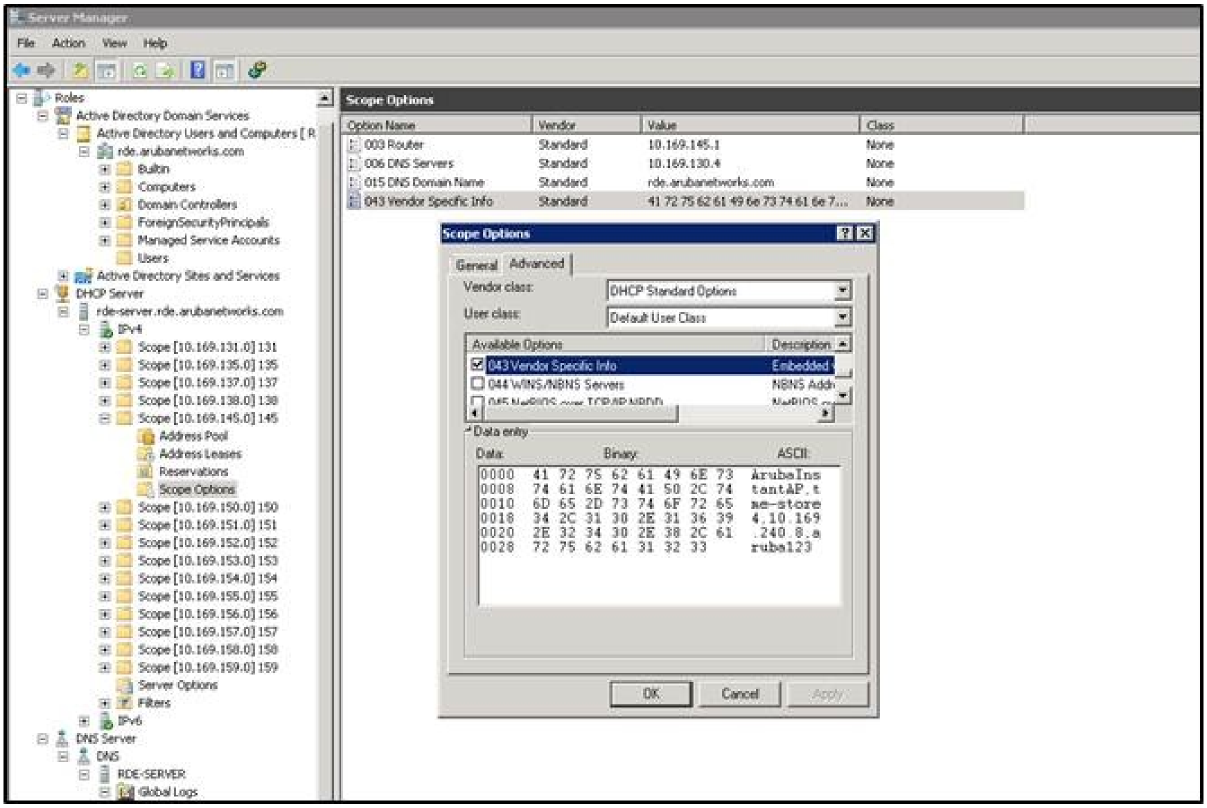
This method describes how to set up a DHCP server to send option 43 with OmniVista information to Alcatel-Lucent Instant OAW-IAP. This section assumes that option 43 is sent per scope because option 60 is being shared by other devices as well.

NOTE

This scope should be specific to Instant, and the PXE devices that use options 60 and 43 should not connect to the subnet defined by this scope. This is because you can specify only one option 43 for a scope, and if other devices that use option 43 connect to this subnet, they are presented with Instant-specific information.

1. In server 2008, navigate to **Server Manager > Roles > DHCP Server > Domain DHCP Server > IPv4**.
2. Select a scope (subnet). Scope (10.169.145.0)145 is selected in the example shown in the figure below.
3. Right click and select **Advanced,** and then specify the following options:
   - Vendor class— DHCP Standard Options
   - User class— Default User Class
   - Available options— Select 043 Vendor-Specific Info
   - String Value— Alcatel-LucentInstantAP, tme-store4, 10.169.240.8, Alcatel-Lucent123 (which is the AP description, organization string, OmniVista IP address, Pre-shared key for OmniVista)

Figure 162 - *Vendor Specific DHCP options*



Option Name	Vendor	Value	Class
003 Router	Standard	10.169.145.1	None
006 DNS Servers	Standard	10.169.130.4	None
015 DNS Domain Name	Standard	rde.arubanetworks.com	None
043 Vendor Specific Info	Standard	41 72 75 62 61 49 6e 73 74 61 6e 7…	None

Scope Options

General | Advanced

Vendor class: DHCP Standard Options

User class: Default User Class

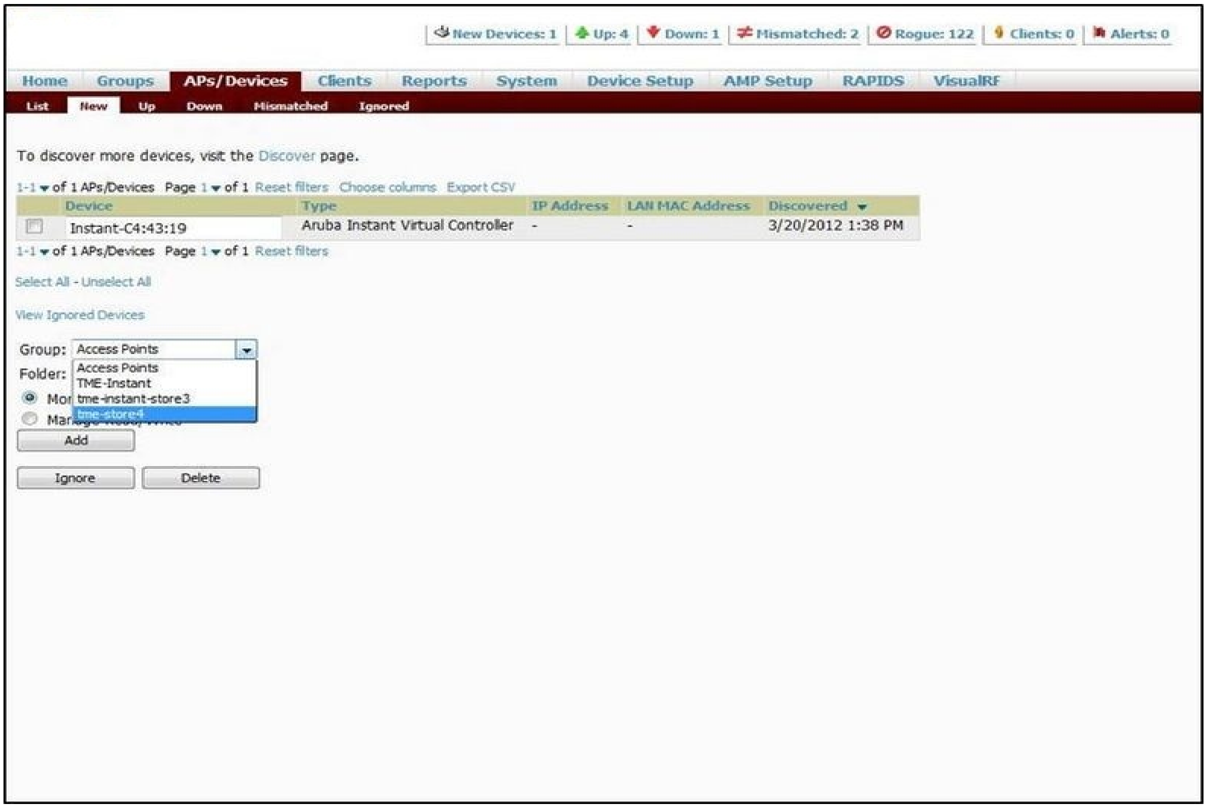
Available Options	Description
☑ 043 Vendor Specific Info	Embedded
☐ 044 WINS/NBNS Servers	NBNS Addr
☐ 045 NetBIOS over TCP/IP NBDD	NetBIOS

Data entry

```
Data:      Binary:                    ASCII:
0000   41 72 75 62 61 49 6E 73   ArubaIns
0008   74 61 6E 74 41 50 2C 74   tantAP,t
0010   6D 65 2D 73 74 6F 72 65   me-store
0018   34 2C 31 30 2E 31 36 39   4,10.169
0020   2E 32 34 30 2E 38 2C 61   .240.8,a
0028   72 75 62 61 31 32 33      ruba123
```

Upon completion, the OAW-IAP shows up as a new device in OmniVista, and a new group called **tme-store4** is created. Navigate to **APs/Devices > New > Group** to view this group.

Figure 163 - *OmniVista — New Group*



To discover more devices, visit the Discover page.

1-1 of 1 APs/Devices Page 1 of 1 Reset filters Choose columns Export CSV

	Device	Type	IP Address	LAN MAC Address	Discovered
☐	Instant-C4:43:19	Aruba Instant Virtual Controller	-	-	3/20/2012 1:38 PM

1-1 of 1 APs/Devices Page 1 of 1 Reset filters

Select All - Unselect All

View Ignored Devices

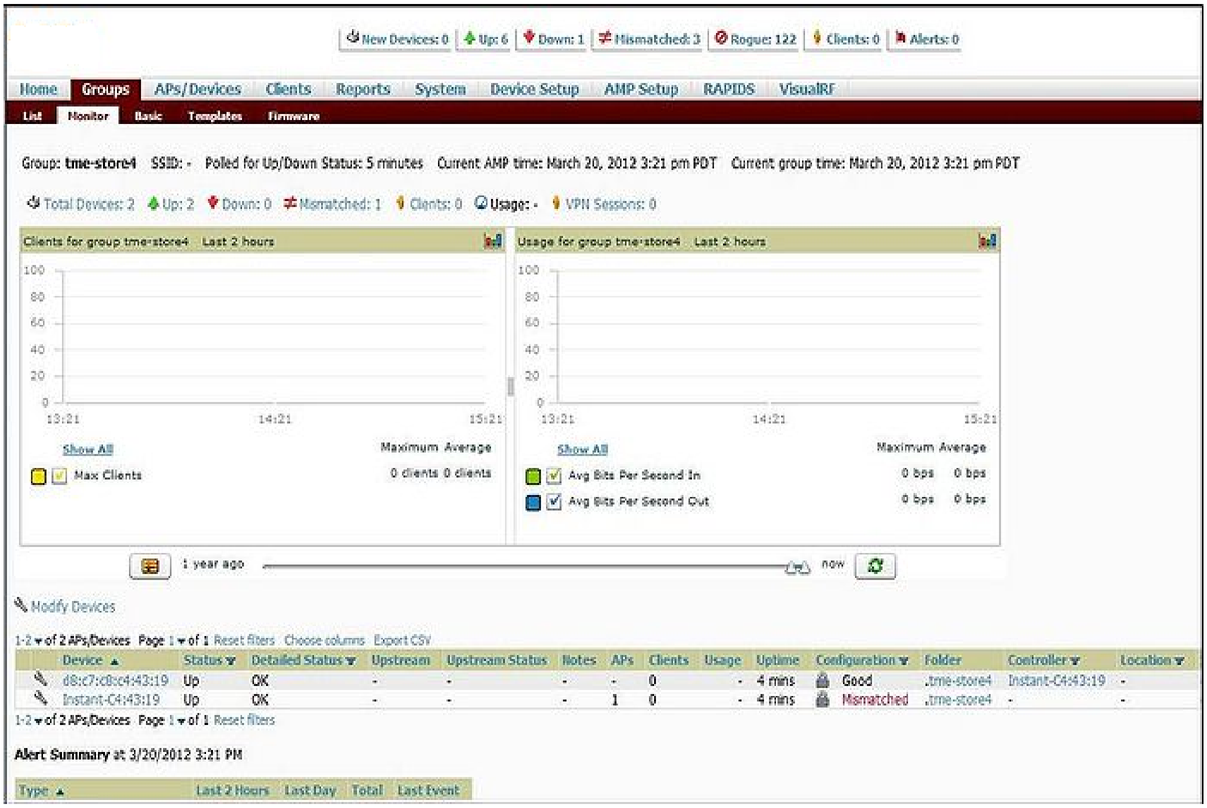
Group: Access Points

Folder:

● Mor

○ Mar

Figure 164 - *OmniVista —Monitor*



Group: **tme-store4** SSID: - Polled for Up/Down Status: 5 minutes Current AMP time: March 20, 2012 3:21 pm PDT Current group time: March 20, 2012 3:21 pm PDT

Total Devices: 2 Up: 2 Down: 0 Mismatched: 1 Clients: 0 Usage: - VPN Sessions: 0

Show All	Maximum	Average
🟨 ☑ Max Clients	0 clients	0 clients

Show All	Maximum	Average
🟩 ☑ Avg Bits Per Second In	0 bps	0 bps
🟦 ☑ Avg Bits Per Second Out	0 bps	0 bps

1-2 ▾ of 2 APs/Devices Page 1 ▾ of 1 Reset filters Choose columns Export CSV

	Device ▲	Status ▾	Detailed Status ▾	Upstream	Upstream Status	Notes	APs	Clients	Usage	Uptime	Configuration ▾	Folder	Controller ▾	Location ▾
	d8:c7:c8:c4:43:19	Up	OK	-	-	-	-	0	-	4 mins	Good	.tme-store4	Instant-C4:43:19	-
	Instant-C4:43:19	Up	OK	-	-	-	1	0	-	4 mins	Mismatched	.tme-store4	-	-

1-2 ▾ of 2 APs/Devices Page 1 ▾ of 1 Reset filters

Alert Summary at 3/20/2012 3:21 PM

Type ▲	Last 2 Hours	Last Day	Total	Last Event

Introducing Alcatel-Lucent AirGroup

Alcatel-Lucent AirGroup™ capabilities are available as a feature in Alcatel-Lucent WLANs where Wi-Fi data is distributed among Alcatel-Lucent Instant APs. AirGroup is a unique enterprise-class capability that leverages zero configuration networking to enable Bonjour® services like Apple® AirPrint and AirPlay from mobile devices in an efficient manner. Bonjour, the trade name for the zeroconf implementation introduced by Apple, is the most common example. Apple AirPlay and AirPrint services are based on the Bonjour protocol are essential services in campus Wi-Fi networks.

AirGroup solution supports both wired and wireless devices. Wired devices which support the Bonjour services are made part of the AirGroup when the VLANs of the devices are terminated on the Virtual Controller.

AirGroup also supports Alcatel-Lucent ClearPass Policy Manager (CPPM).

With Alcatel-Lucent CPPM:

- Users, such as students in dorm rooms can register their personal devices and define a group of users who are allowed to share the users' registered devices.
- Administrators can register and manage an organization's shared devices like printers and conference room Apple TVs. An administrator can grant global access to each device, or restrict access according to the username, role, or user location.

NOTE

Alcatel-Lucent AirGroup is a technology which is made available as part of the Alcatel-Lucent Instant 6.2.0.0-3.2 version. See Enabling or Disabling AirGroup on page 259 to enable AirGroup after you have upgraded to Alcatel-Lucent Instant 6.2.0.0-3.2 version.

What is Bonjour and Zero Configuration Networking?

Zero configuration networking enables service discovery, address assignment, and name resolution for desktop computers, mobile devices, and network services. It is designed for flat, single-subnet IP networks such as wireless networking at home. Bonjour, the trade name for the zeroconf implementation introduced by Apple, is the most common example. It is supported by most of the Apple product lines, including the Mac OS X operating system, iPhone, iPod Touch, iPad, Apple TV and AirPort Express.

Bonjour can be installed on computers running Microsoft Windows® and is supported by most new network-capable printers. Bonjour is also included with popular software programs such as Apple iTunes, Safari, and iPhoto.

Bonjour uses multicast DNS (mDNS) to locate devices and the services that those devices offer. Since the addresses used by the protocol are link-scope multicast addresses, each query or advertisement can only be forwarded on its respective VLAN, but not across different VLANs.

WLANs and Bonjour

In large universities and enterprise networks, it is common for Bonjour-capable devices to connect to the network across VLANs. As a result, user devices such as an iPad on a specific VLAN cannot discover the Apple TV that resides on another VLAN.

Broadcast and multicast traffic are usually filtered out from a wireless LAN network to preserve the airtime and battery life. This inhibits the performance of Bonjour services as they rely on multicast traffic.

AirGroup Solution

Alcatel-Lucent addresses this multicast DNS (mDNS) challenge with the introduction of patent-pending AirGroup technology. AirGroup leverages key elements of Alcatel-Lucent's solution portfolio including operating system software for Alcatel-Lucent Instant and Alcatel-Lucent ClearPass Policy Manager.

AirGroup maintains seamless connectivity between clients and services across VLANs and SSIDs. The mDNS packet traffic is minimized thereby preserving valuable wired network bandwidth and WLAN airtime.

AirGroup also enables context awareness for services across the network:

- AirGroup is aware of personal devices. For example, an Apple TV in a dorm room can be associated with the student who owns it.
- AirGroup is aware of shared resources. This might be an Apple TV in a meeting room or a printer in a supply room that is available to certain users, such as the marketing department. Or, in a classroom, teachers can use AirPlay to wirelessly project a laptop screen onto an HDTV monitor using an Apple TV.
- AirGroup is aware of the location of services through Alcatel-Lucent CPPM (ClearPass Policy Manager) support. For example, depending on proximity, an iPad would be presented with the closest printer instead of all the printers in the building. Another example is a user in a conference room who wants to use AirPlay to project a MacBook screen on an HDTV monitor using an Apple TV receiver. When that users' device queries the network for a list of available Apple TVs, the location-aware OAW-IAP only shows the Apple TV closest to the user.

  All of these above filtering options require ClearPass Policy Manager (CPPM).
- In addition, the OAW-IAP supports Bonjour services' filtering options based on VLANs and roles for which ClearPass Policy Manager is not required.

The following table summarizes the filtering options which are described above.

Table 37 - *AirGroup Features*

Features	Alcatel-Lucent Instant Deployment Models	
	Integrated	**Integrated with CPPM**
Allow mDNS to propagate across subnets/VLANs	Yes	Yes
Limit multicast mDNS traffic on the network	Yes	Yes

VLAN based mDNS service policy enforcement	Yes	Yes
User-role based mDNS service policy enforcement	Yes	Yes
Portal to self register personal leaves	No	Yes
Device owner based policy enforcement	No	Yes
Location based policy enforcement	No	Yes
Shared user list based policy enforcement	No	Yes
Shared role list based policy enforcement	No	Yes

AirGroup Features

- AirGroup sends unicast responses to mDNS queries and reduces mDNS traffic footprint.
- Ensure cross-VLAN visibility and availability of mDNS devices and services.
- Allow or block mDNS services for all users.
- Allow or block mDNS services based on user roles.
- Allow or block mDNS services based on VLANs.
- Match users’ devices, such as iPads, to their closest Bonjour devices, such as printers. This requires CPPM support.

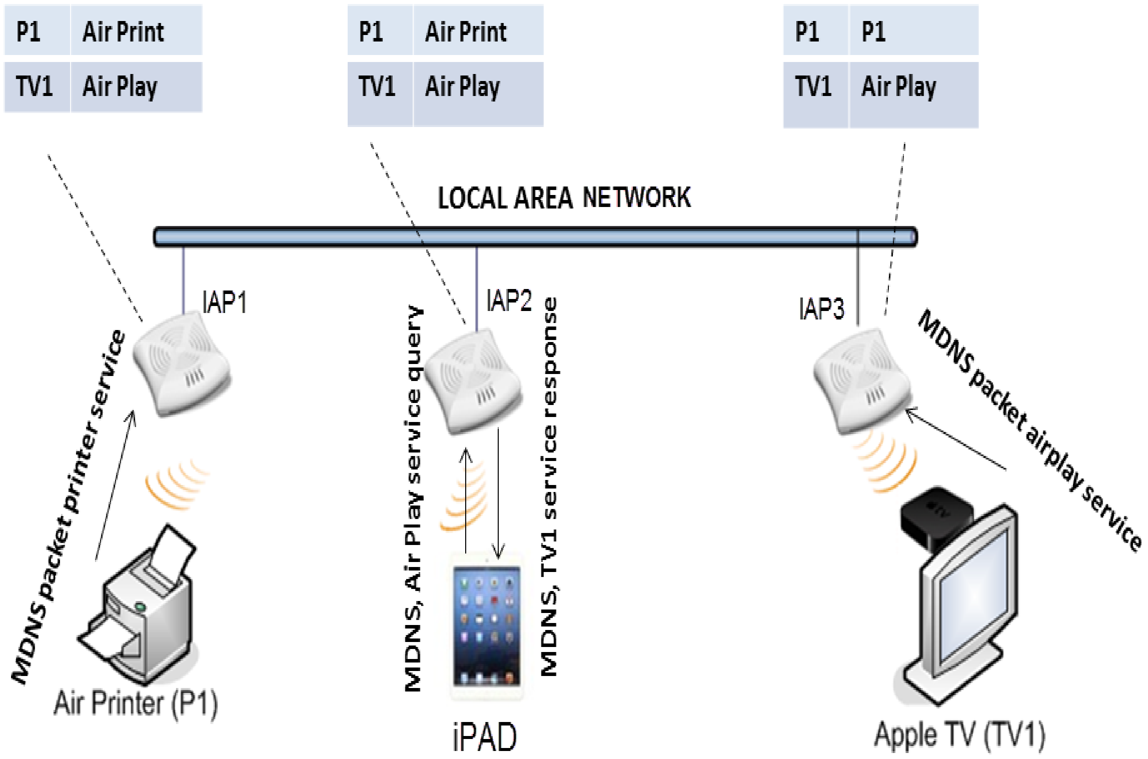
ClearPass Policy Manager and ClearPass Guest Features

- Registration portal for WLAN users to register their personal devices, such as Apple TVs and printers.
- Registration portal for WLAN administrators to register shared devices, such as conference room Apple TVs and printers.
- Operator-defined “personal AirGroups” to specify a list of other users who can share devices with the operator.
- Administrator defined username, user role, and location attributes for shared devices.

AirGroup Architecture

The distibuted AirGroup architecture allows each OAW-IAP to handle Bonjour queries and responses individually instead of over loading a Virtual controller with these tasks. This results in a scalable AirGroup solution.

Figure 165 - *AirGroup Architecture*



As seen in the image above, the OAW-IAP1 discovers Air Printer (P1) and OAW-IAP3 discovers Apple TV (TV1). OAW-IAP1 advertises information about its connected P1 device to the other OAW-IAPs i.e OAW-IAP2 andOAW-IAP3. Similarly, OAW-IAP3 advertises TV1 device to OAW-IAP1 and OAW-IAP2. This type of distributed architecture allows any OAW-IAPs to respond to its connected devices locally. In this example, the iPad connected to OAW-IAP2 gets direct response from the same OAW-IAP about the other Bonjour-enabled services in the network.

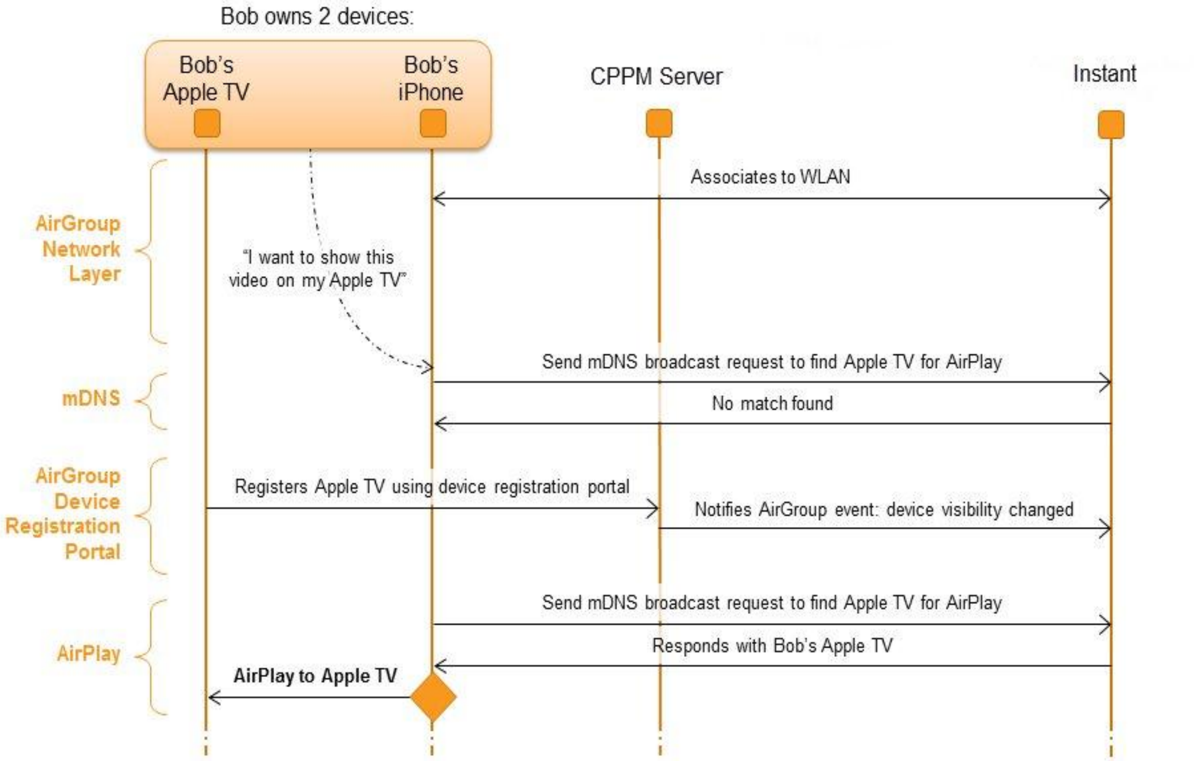
How Does AirGroup Work?

AirGroup functionality is described in the steps below. This flow occurs when an Alcatel-Lucent WLAN is powered by an Alcatel-Lucent Instant and ClearPass Policy Manager.

A device can be registered by an administrator or a guest user.

1. The AirGroup administrator gives an end user the AirGroup operator role which authorizes the user to register the users device—such as an Apple TV on the ClearPass Policy Manager platform.
2. Alcatel-Lucent Instant maintains state information for all mDNS services. Alcatel-Lucent Instant queries ClearPass Policy Manager to map each device’s access privileges to available services.
3. Alcatel-Lucent Instant responds back to the query made by a device based on contextual data – user role, username, and location.

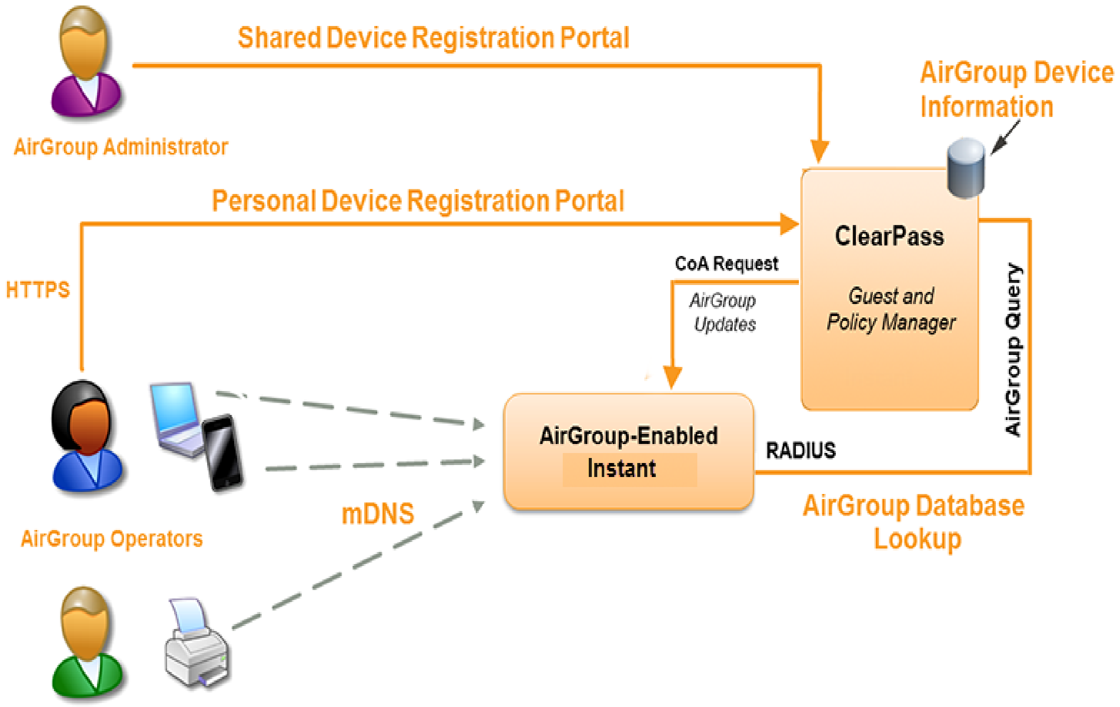
Figure 166 - *AirGroup Enables Personal Device Sharing*


Bob owns 2 devices:
Bob's Apple TV
Bob's iPhone
CPPM Server
Instant
AirGroup Network Layer
mDNS
AirGroup Device Registration Portal
AirPlay
Associates to WLAN
"I want to show this video on my Apple TV"
Send mDNS broadcast request to find Apple TV for AirPlay
No match found
Registers Apple TV using device registration portal
Notifies AirGroup event: device visibility changed
Send mDNS broadcast request to find Apple TV for AirPlay
Responds with Bob's Apple TV
AirPlay to Apple TV

Use Case: Higher Education Wireless LAN

Figure 167 shows a higher-education environment with shared, local, and personal services available to mobile devices. With AirGroup, context-based policies determine which Bonjour services are visible to an end-user's mobile device.

Figure 167- *AirGroup in a Higher-Education Environment*



The AirGroup Solution Components

The components that make up the AirGroup Solution include the Alcatel-Lucent Instant, ClearPass Policy Manager, and ClearPass Guest. The version requirements are described below:

Table 38 - *Alcatel-Lucent Instant, ClearPass Policy Manager, and ClearPass Guest Requirements*

Component	Minimum Version
Alcatel-Lucent Instant	6.2.0.0-3.2
ClearPass Guest software	3.9.7
AirGroup Services plugin	0.8.7
ClearPass Policy Manager software	5.2

NOTE

Starting ClearPass version 6.0, the ClearPass Guest and the AirGroup Services plugin have been integrated into a single platform. This simplifies the configuration of AirGroup services, as outlined in the following app-note: http://support.arubanetworks.com/DOCUMENTATION/tabid/77/DMXModule/512/Command/Core_Download/Default.aspx?EntryId=10233

Configuring AirGroup on Instant

Configuring AirGroup and its service requires that you enable the AirGroup feature. OAW-IAP AirGroup supports two default services i.e. AirPlay and AirPrint.

Using the Instant UI

Enabling or Disabling AirGroup

As the first step in configuring AirGroup services, you must enable AirGroup in the Instant UI.

1. Go to **Settings > Air Group** to enable this feature.
2. Select **Enable Air Group** to view the Air Group Settings.

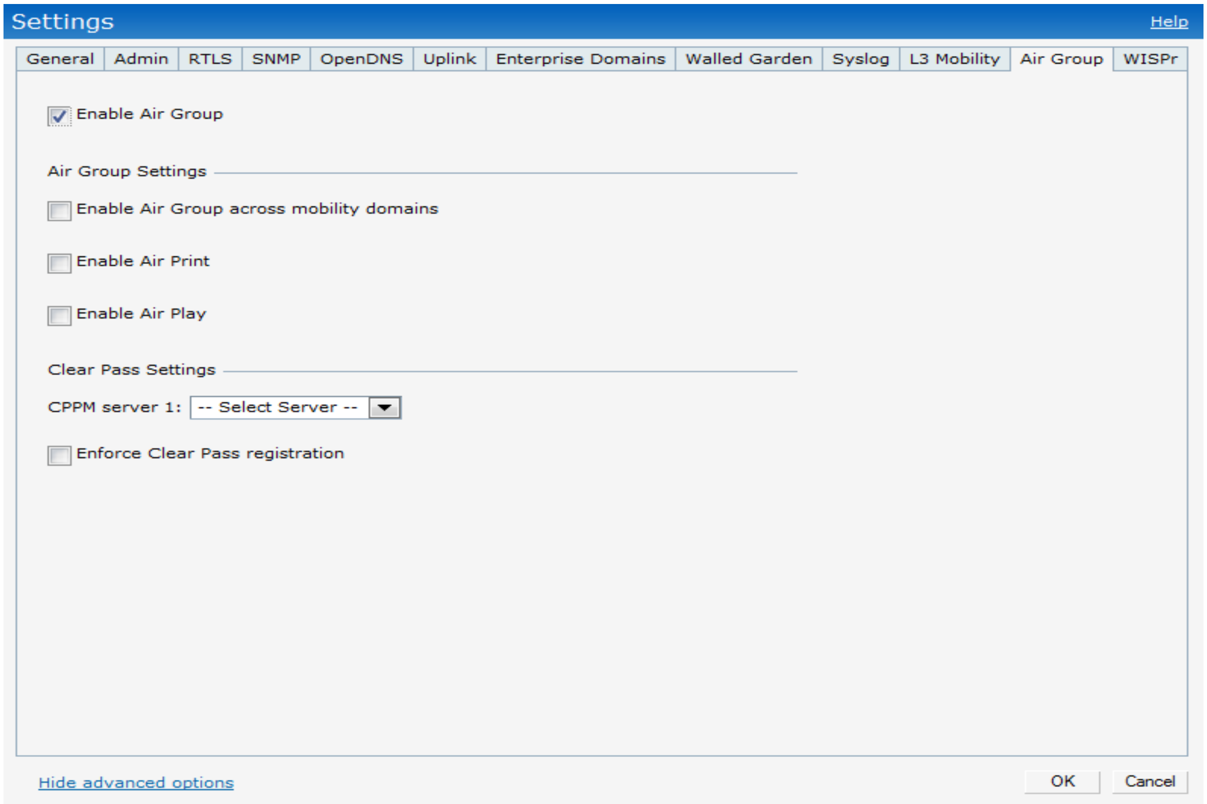
   Instant supports two types deployment models:

   - Intra Cluster
   - Inter Cluster

   In the Intra Cluster model, the OAW-IAP does not share the mDNS database information with the other clusters. In the Inter Cluster model, the OAW-IAP shares the mDNS database information with the other clusters.

- **Enable Air Group across mobility domains**— Select **Enable Air Group across mobility domains** to enable Inter cluster. By default, this feature is disabled. Navigate to **L3 Mobility** tab of **Settings** to define a set of clusters.
- **Enable Air Print**— When enabled, the following two options are made available:
  - Air Print disallowed roles— Clients with these roles will not have access to AirPrint devices.
  - Air Print disallowed VLANs — No AirPrint servers will be seen on these VLANs.
- **Enable Air Play**— When enabled, the following two options are made available:
  - Air Play disallowed roles— Clients with these roles will not have access to AirPlay devices.
  - Air Play disallowed VLANs — No AirPlay servers will be seen on these VLANs.
- **Clear Pass Settings**— Use this section to configure the CPPM server, CoA server and enforce Clear Pass registering.
  - **CPPM server 1**— Indicates the ClearPass Policy Manager server information for AirGroup policy. Refer to Configuring AirGroup-CPPM Interface in Instant on page 262 for more information.
  - **Enforce Clear Pass registering**— When enabled, only devices registered with CPPM will be discovered by Bonjour devices, based on the CPPM policy.

Figure 168 - *Enabling AirGroup*



☑ Enable Air Group

Air Group Settings

☐ Enable Air Group across mobility domains

☐ Enable Air Print

☐ Enable Air Play

Clear Pass Settings

CPPM server 1: -- Select Server --

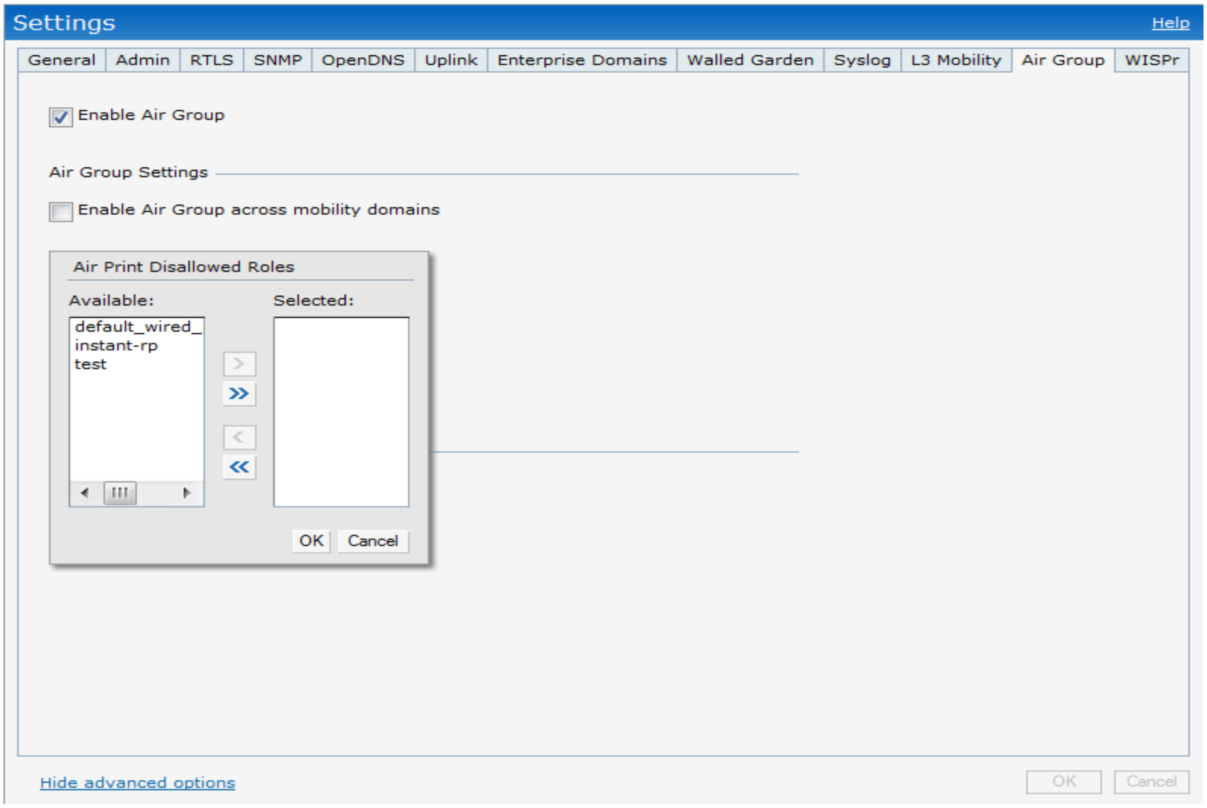
☐ Enforce Clear Pass registration

Disallow Role

By default, an AirGroup service is accessible by all user roles configured in your OAW-IAP cluster. The **disallow role** option selectively prevents specified user roles from accessing AirGroup services.

Perform the following steps to configure disallow role from accessing AirPrint servers and disallow learning of AirPrint servers on the configured VLAN as shown in Figure 169 and Figure 170.

Figure 169 - *AirPrint Disallowed Roles*



☑ Enable Air Group

□ Enable Air Group across mobility domains

Available:

default_wired_
instant-rp
test

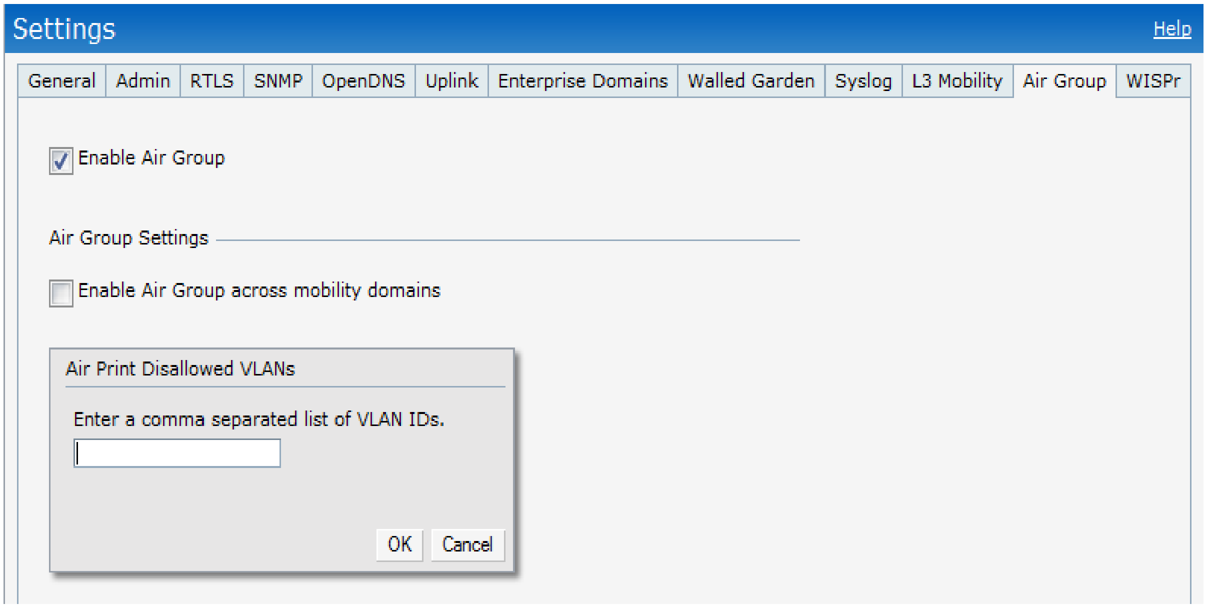
Selected:

1. In the **Enable Air Print** section of the Instant UI, select **Edit** . The **Air Print Disallowed Roles** window appears.
2. Use the arrow keys to move the available roles to the selected window and vice versa.
3. Click **OK** to apply the selected roles as disallowed roles.

Disallow VLAN

By default, an AirGroup service is accessible by users or devices in all VLANs configured in your OAW-IAP cluster. You can enable or disable learning of AirGroup services in a specific VLAN using the **Air Print Disallowed VLANs** configuration window.

Figure 170 - *AirPrint Disallowed VLANs*



☑ Enable Air Group

Air Group Settings

□ Enable Air Group across mobility domains

Air Print Disallowed VLANs

Enter a comma separated list of VLAN IDs.

1. Select **Edit** (the field next to Air Print disallowed VLANs). The **Air Print Disallowed VLANs** window appears.
2. Enter the VLANs on which you want to disallow learning of AirGroup services.
3. Click **OK** to apply these changes.

Configuring AirGroup-CPPM Interface in Instant

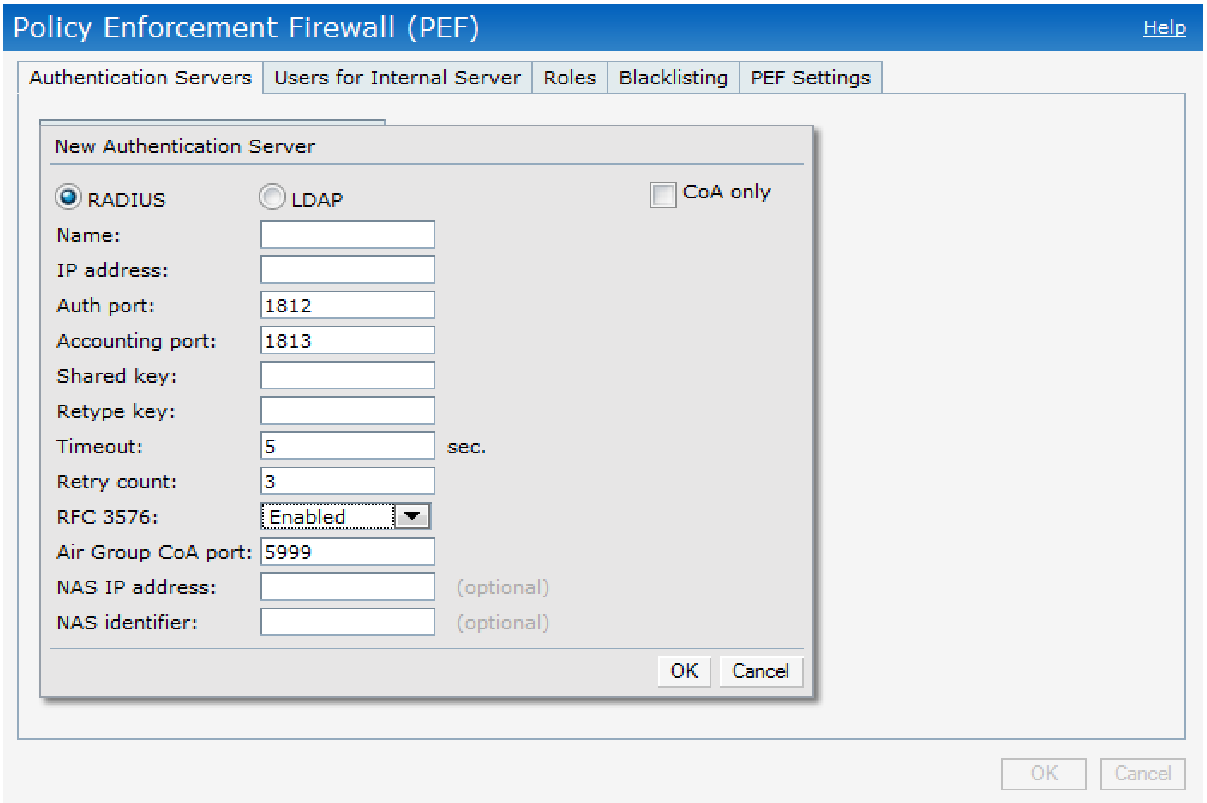
Configure the AirGroup and CPPM interface to allow an AirGroup OAW-IAP and CPPM to exchange information regarding device sharing, and location. The configuration options define the RADIUS server that is used by the AirGroup RADIUS client. The following steps are required for this configuration:

1. Create a RADIUS server.
2. Assign a server to AirGroup.
3. Configure CPPM to enforce registration.

Creating a RADIUS Server

Navigate to the **PEF** link at the top right corner of the Instant UI to configure an external RADIUS server for a wireless network.

Figure 171 - *New Authentication Server*


Policy Enforcement Firewall (PEF)
Help
Authentication Servers
Users for Internal Server
Roles
Blacklisting
PEF Settings
New Authentication Server
OK
Cancel
OK
Cancel

● RADIUS ○ LDAP □ CoA only

Name:

IP address:

Auth port: 1812

Accounting port: 1813

Shared key:

Retype key:

Timeout: 5 sec.

Retry count: 3

RFC 3576: Enabled

Air Group CoA port: 5999

NAS IP address: (optional)

NAS identifier: (optional)

1. Click **New** and update the following fields to configure an external RADIUS server for a wireless network.
   - Name— Enter the name of the new external RADIUS server. The maximum length is 32 characters.
   - IP address— Enter the IP address of the external RADIUS server.
   - Auth port— Enter the authorization port number of the external RADIUS server. The port number is set to 1812 by default.
   - Accounting port— Enter the accounting port number. This port is used to send accounting records to the RADIUS server. The port number is set to 1813 by default
   - Shared key— Enter a shared key for communicating with the external RADIUS server.
   - Timeout— Indicates the timeout for one RADIUS request. The OAW-IAP retries to send the request several times (as configured in the "Retry count") before the user gets disconnected. e.g. If the "Timeout" is 5 sec, "Retry counter" is 3, user is disconnected after 20 sec ("Timeout" x "Retry counter + 1). The default value is 5 seconds. Specify a number between 1 and 30 (seconds).
   - Retry count— Specify a number between 1 and 5. Indicates the maximum number of authentication requests that are sent to server group, and the default value is 3 requests.
   - RFC 3576— When enabled, the Access Points process RFC 3576-compliant Change of Authorization (CoA) messages from the RADIUS server.
   - Air Group CoA port— Indicates that the AirGroup CoA is sent on a different port than the standard CoA port. The default value is 5999.
   - NAS IP address— Enter the Virtual Controller IP address. The NAS IP address is the Virtual Controller IP address that is sent in data packets. Note: If you do not enter the IP address, the Virtual Controller IP address is used by default when Dynamic RADIUS Proxy is enabled.

- NAS identifier— Use this to configure strings for RADIUS attribute 32, NAS Identifier, to be sent with RADIUS requests to the RADIUS server.

2. Click **OK** to apply the changes.

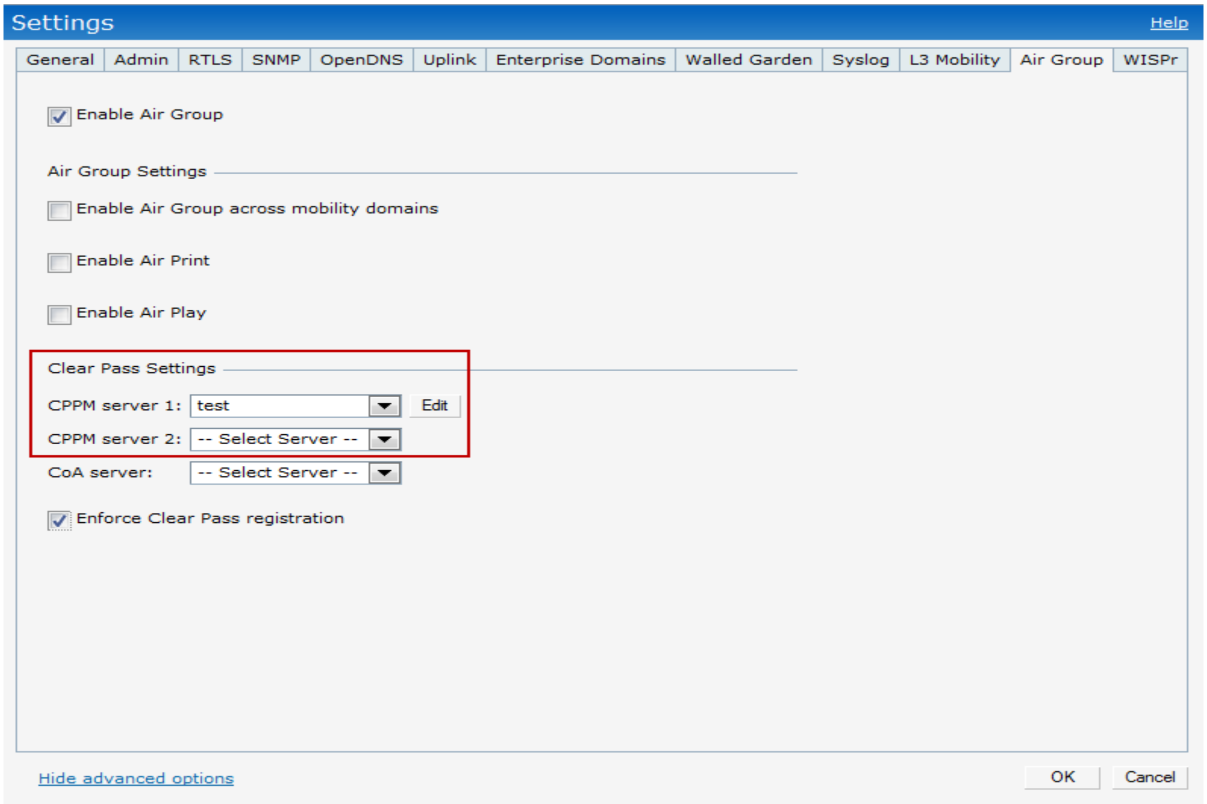
Alternatively, you can also create a RADIUS server in the **Air Group** window of the Instant UI. Navigate to **Settings > Show advanced options > AirGroup > Clear Pass Settings > CPPM server 1>** and select **New** from the drop-down menu.

Assign a Server to AirGroup

After configuration is complete, the server that you configured will appear in the **CPPM server** option section. To view this server go to **Settings > AirGroup > ClearPass Settings** and assign the server for AirGroup policy.

The CPPM server 1 acts as a primary server and the CPPM server 2 is optional and acts as a backup server.

Figure 172 - *CPPM Server*



☑ Enable Air Group

Air Group Settings

☐ Enable Air Group across mobility domains

☐ Enable Air Print

☐ Enable Air Play

Clear Pass Settings

CPPM server 1: test

CPPM server 2: -- Select Server --

CoA server: -- Select Server --

☑ Enforce Clear Pass registration

Configure CPPM to Enforce Registration

When enabled, only devices registered with CPPM will be discovered by Bonjour devices, based on the CPPM policy.

Change of Authorization (CoA)

CoA only server is ClearPass Guest server which allows guest users to register their devices.

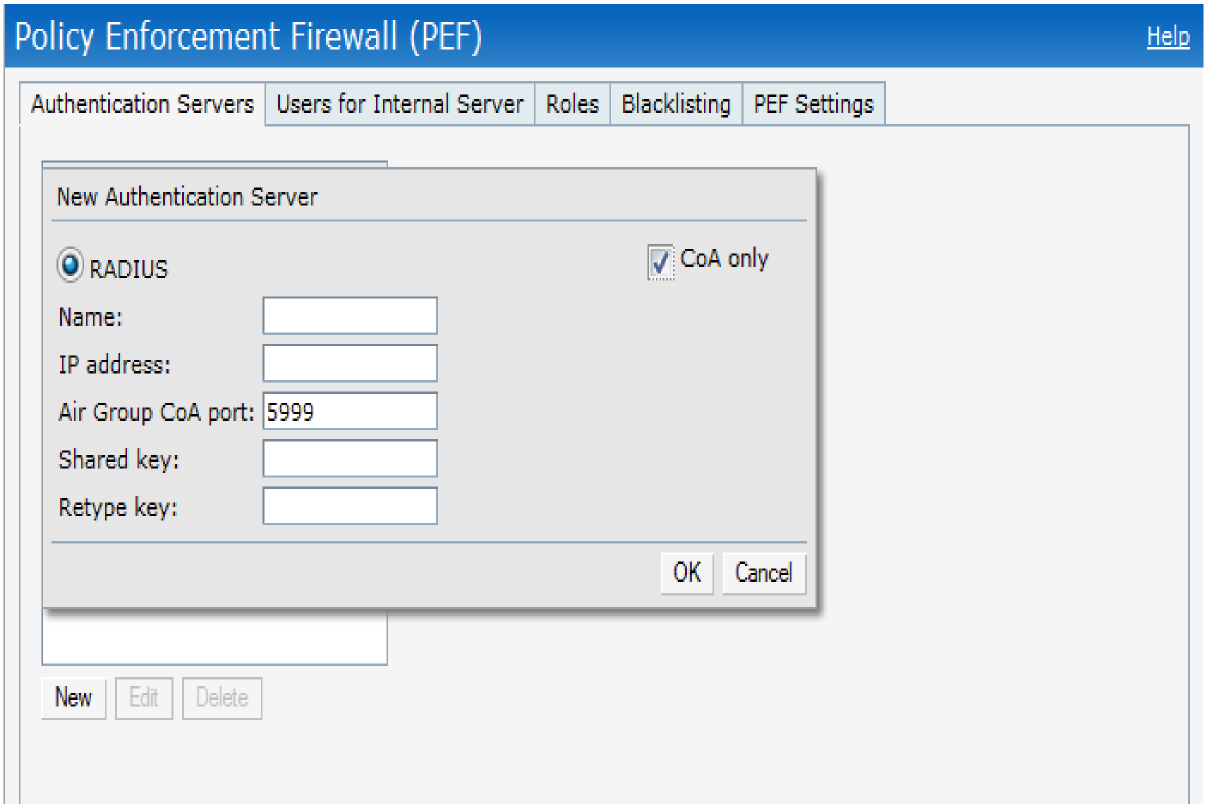
To configure the CoA only server follow the steps below:

1. Navigate to the **PEF** link at the top right corner of the Instant UI and click **New**.

> NOTE
>
> Ensure to configure CPPM server and the AirGroup OAW-IAP with the same AirGroup RFC-3576 UDP port. By default the AirGroup CoA port is 5999 on OAW-IAP as well as the CPPM server. For more information on how to configure the CPPM server refer to "Enabling Support for Dynamic Notifications" on page 1.

2. Select CoA only and update the following fields to enable change of authorization.

Figure 173 - *Change of Authorization*


Policy Enforcement Firewall (PEF)
Help
Authentication Servers
Users for Internal Server
Roles
Blacklisting
PEF Settings
New Authentication Server
OK
Cancel
New
Edit
Delete

● RADIUS

☑ CoA only

Name:

IP address:

Air Group CoA port: 5999

Shared key:

Retype key:

- Name— Enter the name of the new external RADIUS server. The maximum length is 32 characters.
- IP address— Specify the IP address of the external RADIUS server
- Air Group CoA port— Indicates that the AirGroup CoA is sent on a different port than the standard CoA port. The default value is 5999.
- Shared key— Enter a shared key for communicating with the external RADIUS server.

3. Click **OK** to apply the changes.

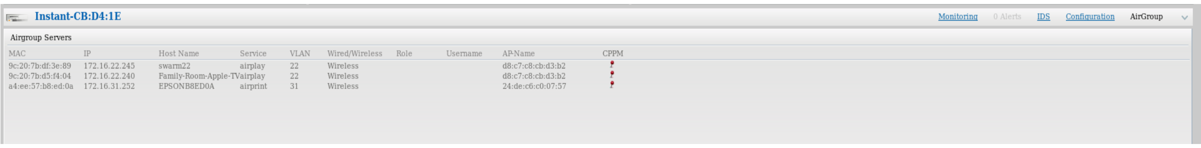
> NOTE
>
> Alternatively, you can also create a **CoA only server** in the **Air Group** window of the Instant UI. Navigate to **Settings > Show advanced options > AirGroup > Clear Pass Settings > CoA server >** and select **New**.

After configuration is complete, this particular server will appear in the CoA server option. To view this server go to **Settings > AirGroup > ClearPass Settings > CoA server**.

AirGroup Monitoring

This link provides an overall view of your AirGroup Bonjour services. Click on each of the features to view or edit the settings.

Figure 174 - *AirGroup Link*



Airgroup Servers

MAC	IP	Host Name	Service	VLAN	Wired/Wireless	Role	Username	AP-Name	CPPM
9c:20:7b:df:3e:89	172.16.22.245	swarm22	airplay	22	Wireless			d8:c7:c8:cb:d3:b2	
9c:20:7b:d5:f4:04	172.16.22.240	Family-Room-Apple-TV	airplay	22	Wireless			d8:c7:c8:cb:d3:b2	
a4:ee:57:b8:ed:0a	172.16.31.252	EPSONB8ED0A	airprint	31	Wireless			24:de:c6:c0:07:57	

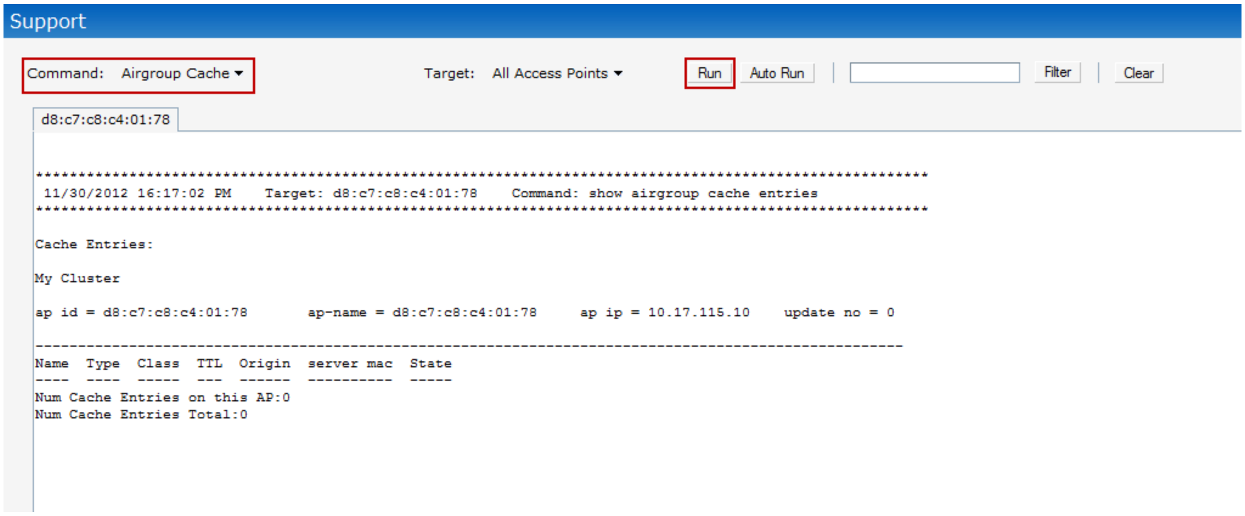
AirGroup consists of the following fields:

- **MAC** — Displays the MAC address of the AirGroup server.
- **IP** — Displays the IP address of the AirGroup Server's.
- **Host Name** — Displays the machine name or hostname of the AirGroup server.
- **Service**— Displays the type of the service offered by the AirGroup server like AirPlay or printer.
- **Wired/Wireless** — Displays if the AirGroup server is connected via wired or wireless interface.
- **Role** — Indicates the role assigned to the specified AirGroup server. Normally it is the SSID name, in case of a wireless client.
- **Username** — If the server is connected using 802.1x, this field displays the user name. If the server is connected via PSK or open auth, this field will be blank.
- **AP-NAME**— Displays the MAC address of the OAW-IAP where the server is connected.
- **Update no/hash**— This is used for debugging issues. Use this to identify the internal database of AirGroup.
- **CPPM**— By clicking on this, you get details of the registered rules in ClearPass Policy Manager (CPPM) for this server.
- **MDNS Cache**— By clicking on this, you receive MDNS record details of a particular server.

Troubleshooting and Log Messages

Navigate to the Support window at the top right corner of the Instant UI. Select the required AirGroup command from the **Command** drop-down list and click **Run**.

Figure 175 - *AirGroup Support Commands*



```
*****************************************************************************************************
 11/30/2012 16:17:02 PM    Target: d8:c7:c8:c4:01:78    Command: show airgroup cache entries
*****************************************************************************************************

Cache Entries:

My Cluster

ap id = d8:c7:c8:c4:01:78       ap-name = d8:c7:c8:c4:01:78     ap ip = 10.17.115.10    update no = 0

---------------------------------------------------------------------------------------------------
Name  Type  Class  TTL  Origin  server mac  State
----  ----  -----  ---  ------  ----------  -----
Num Cache Entries on this AP:0
Num Cache Entries Total:0
```

You can view the following AirGroup commands in the Command drop-down list.

- AP AirGroup Cache— Displays the Bonjour mDNS records for the selected OAW-IAP(s).
- AP AirGroup CPPM Entries— Displays the AirGroup CPPM policies of the registered devices.
- AP AirGroup CPPM Servers— Displays the AirGroup CPPM server information.
- AP AirGroup Debug Statistics— Displays the debug statistics for the selected OAW-IAP(s).
- AP AirGroup Servers— Displays information about the Bonjour devices which supports AirPrint and AirPlay services for the selected OAW-IAP(s).
- AP AirGroup User— Displays IP/MAC address, device name, VLAN, type of connection of the Bonjour devices for the selected OAW-IAP(s).
- VC AirGroup Service— Displays the bonjour services supported for the selected OAW-IAP (s).
- VC AirGroup Status— Displays the enable/disable status of the AirGroup and the parameters of the CPPM servers for the selected OAW-IAP(s).
- VC AirGroup vlan— Displays the AirGroup status information for a VLAN of the selected OAW-IAP(s).

Monitor the Alcatel-Lucent Instant network, OAW-IAPs, Wi-Fi networks, and clients in the network using one or all of the following views:

- Virtual Controller View on page 269
- Network View on page 273
- Instant Access Point View on page 275
- Client View on page 284

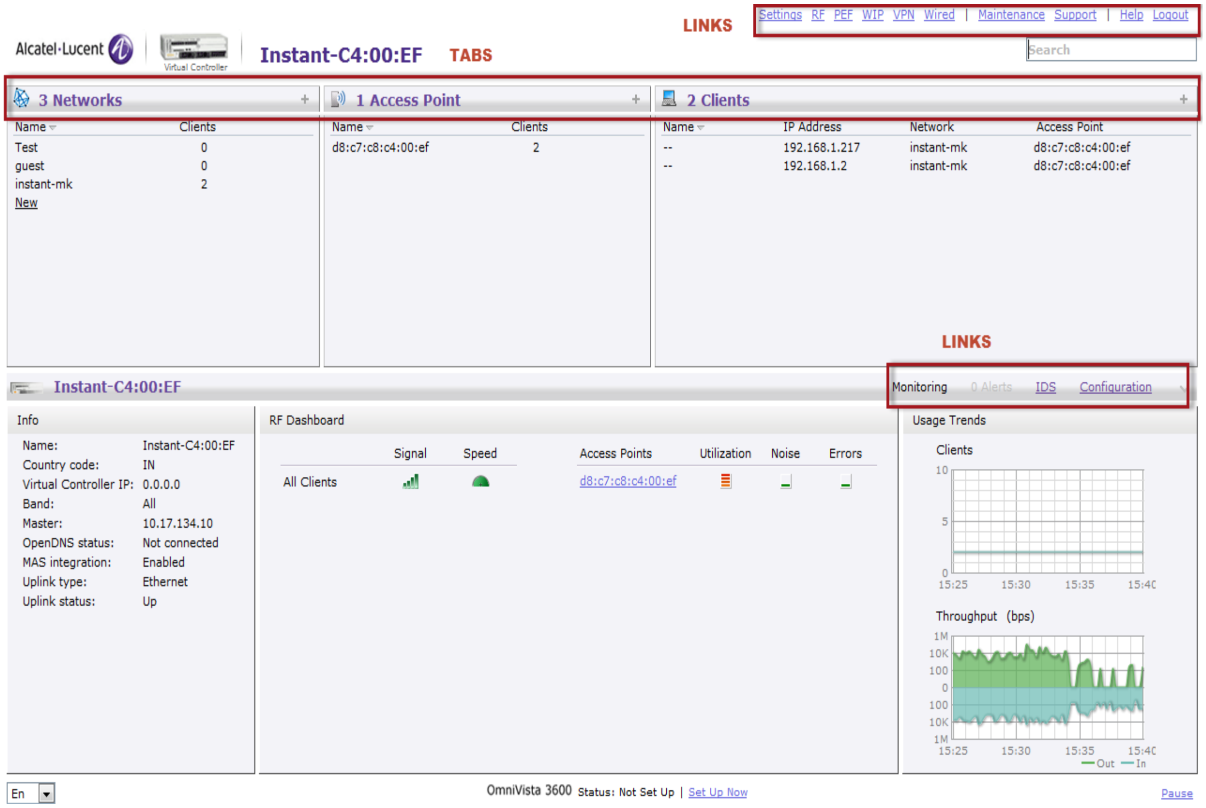
This section provides information about the parameters that can be monitored using these views. It also provides procedures to monitor these parameters.For information on AirGroup monitoring, see AirGroup Monitoring on page 266.

Virtual Controller View

The Virtual Controller view is the default view.This view allows you to monitor the Alcatel-Lucent Instant network. The following Instant UI elements are available in this view:

- Tabs— Contains three tabs— Networks, Access Points, and Clients. For detailed information about the tabs, see Instant User Interface on page 39.
- Links— Contains three links— Monitoring, Client Alerts, and IDS. The Spectrum link is visible if you have configured the OAW-IAP as a spectrum monitor. These links allow you to monitor the Alcatel-Lucent Instant network. For detailed information about the sections in these links and how they can be used to monitor the network, see Monitoring Link on page 270, IDS Link on page 272, Client Alerts Link on page 272, Configuration Link sections. For detailed information about spectrum monitoring, see Spectrum Monitor on page 127.

Figure 176 - *Virtual Controller View*



Name	Clients
Test	0
guest	0
instant-mk	2
New	

Name	Clients
d8:c7:c8:c4:00:ef	2

Name	IP Address	Network	Access Point
--	192.168.1.217	instant-mk	d8:c7:c8:c4:00:ef
--	192.168.1.2	instant-mk	d8:c7:c8:c4:00:ef

Instant-C4:00:EF

Info

Name:	Instant-C4:00:EF
Country code:	IN
Virtual Controller IP:	0.0.0.0
Band:	All
Master:	10.17.134.10
OpenDNS status:	Not connected
MAS integration:	Enabled
Uplink type:	Ethernet
Uplink status:	Up

RF Dashboard

	Signal	Speed	Access Points	Utilization	Noise	Errors
All Clients			d8:c7:c8:c4:00:ef			

Usage Trends

OmniVista 3600 Status: Not Set Up | Set Up Now

Monitoring Link

This link is selected by default and the following sections are displayed. These sections provide information about the Virtual Controller and allow you to monitor the network.

- Info
- RF Dashboard
- Usage Trends

Info

The **Info** section displays the following information about the Virtual Controller:

- **Name**— Displays the Virtual Controller name.
- **Country Code**— Displays the Country in which the Virtual Controller is operating.
- **Virtual Controller IP address**— Displays the IP address of the Virtual Controller.
- **OmniVista IP**— Displays the IP address of the OmniVista server.
- **Band**— Displays the band in which the Virtual Controller is operating— 2.4 GHz band, 5 GHz band, or both.
- **Master**— Displays the IP address of the Access Point acting as a Virtual Controller.
- **OpenDNS Status**— Displays the OpenDNS status. If the OpenDNS is **Not connected**, make sure you have provided the correct credentials on the **OpenDNS** tab of the **Settings** window. In addition, please check if the internet connection is up.
- **MAS integration**— Displays the status of the MAS integration feature.
- **Uplink type**— Displays the type of uplink— Ethernet and 3G
- **Uplink status**— Displays whether the uplink is up or down.

RF Dashboard

The **RF Dashboard** section displays the following information:

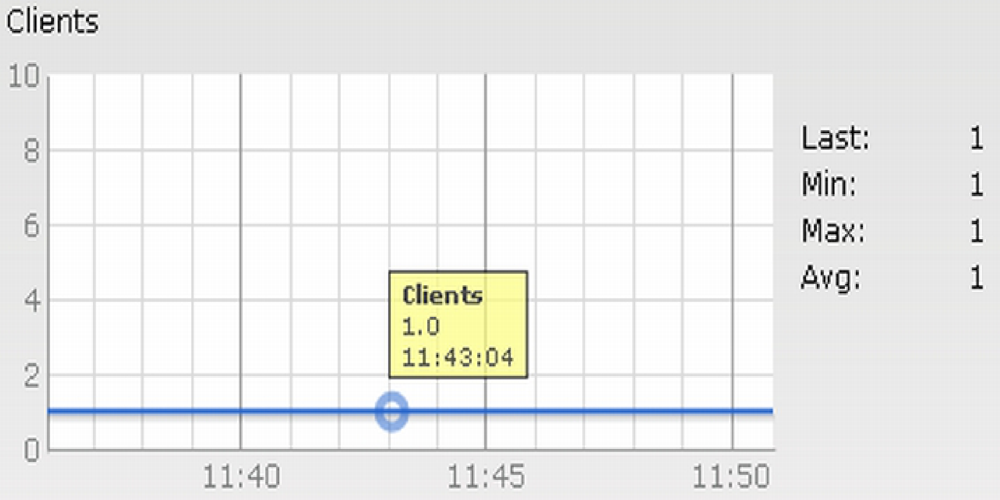
- IP address, Signal, and Speed information about the clients in the Alcatel-Lucent Instant network. If the speed or signal strength of a client is low, IP address of the client appears as a link. Click the link to monitor the client. For more information, see Client View on page 284.
- Instant Access Points, Utilization, Noise, and Errors information about the OAW-IAPs in the Alcatel-Lucent Instant network. If utilization, noise or errors of an OAW-IAP are not within the specified threshold, the OAW-IAP name appears as a link. Click the link to monitor the OAW-IAP. For more information, see Instant Access Point View on page 275.

Usage Trends

The **Usage Trends** section displays the following graphs for the Virtual Controller:

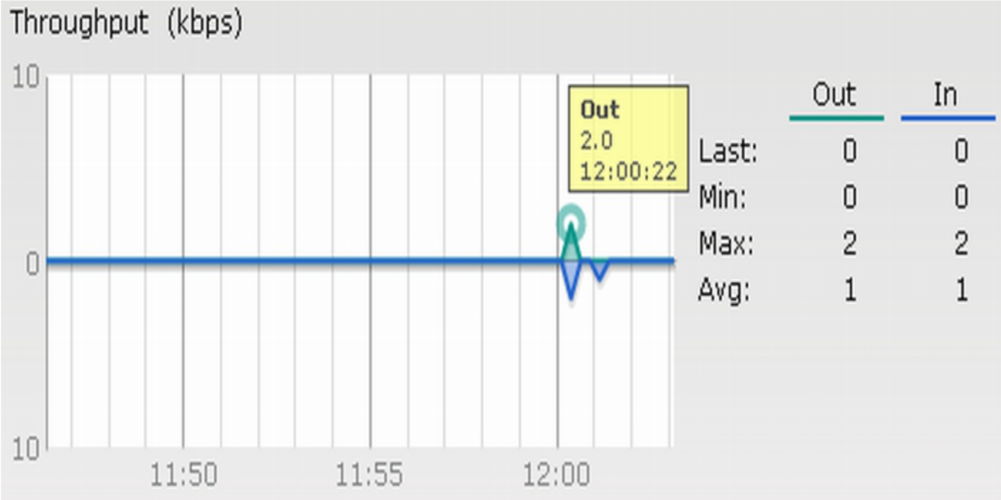
- Clients Graph

Figure 177 - *Clients Graph*



- Throughput Graph

Figure 178 - *Throughput Graph*



For more information about the graphs in the Virtual Controller view and for monitoring procedures, see Table 39.

Table 39 - *Virtual Controller View — Graphs and Monitoring Procedures*

Graph Name	Description	Monitoring Procedure
Clients	The Clients graph shows the number of clients associated with the Virtual Controller for the last 15 minutes. To see an enlarged view, click the graph. - The enlarged view provides Last, Minimum, Maximum, and Average statistics for the number of clients associated with the Virtual Controller for the last 15 minutes. - To see the exact number of clients in the Alcatel-Lucent Instant network at a particular time, hover the cursor over the graph line.	To check the number of clients associated with the Virtual Controller for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. Study the Clients graph in the **Usage Trends** pane. For example, the graph shows that one client is associated with the Virtual Controller at 11:43 hours.
Throughput	The Throughput graph shows the throughput of all networks and OAW-IAPs associated with the Virtual Controller for the last 15 minutes. - Outgoing traffic — Throughput for outgoing traffic is displayed in green. Outgoing traffic is shown above the median line. - Incoming traffic — Throughput for incoming traffic is displayed in blue. Incoming traffic is shown below the median line. To see an enlarged view, click the graph. - The enlarged view provides Last, Minimum, Maximum, and Average statistics for the incoming and outgoing traffic throughput of the Virtual Controller for the last 15 minutes. To see the exact throughput of the Alcatel-Lucent Instant network at a particular time, hover the cursor over the graph line.	To check the throughput of the networks and OAW-IAPs associated with the Virtual Controller for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. Study the Throughput graph in the **Usage Trends** pane. For example, the graph shows 2.0 kbps outgoing traffic throughput at 12:00 hours. It also shows some incoming traffic throughput at the same time.

Client Alerts Link

For information about the Client Alerts link, seeClients Tab on page 42 and Alert Types and Management on page 291 sections.

IDS Link

For information about the IDS link, see IDS on page 58.

Network View

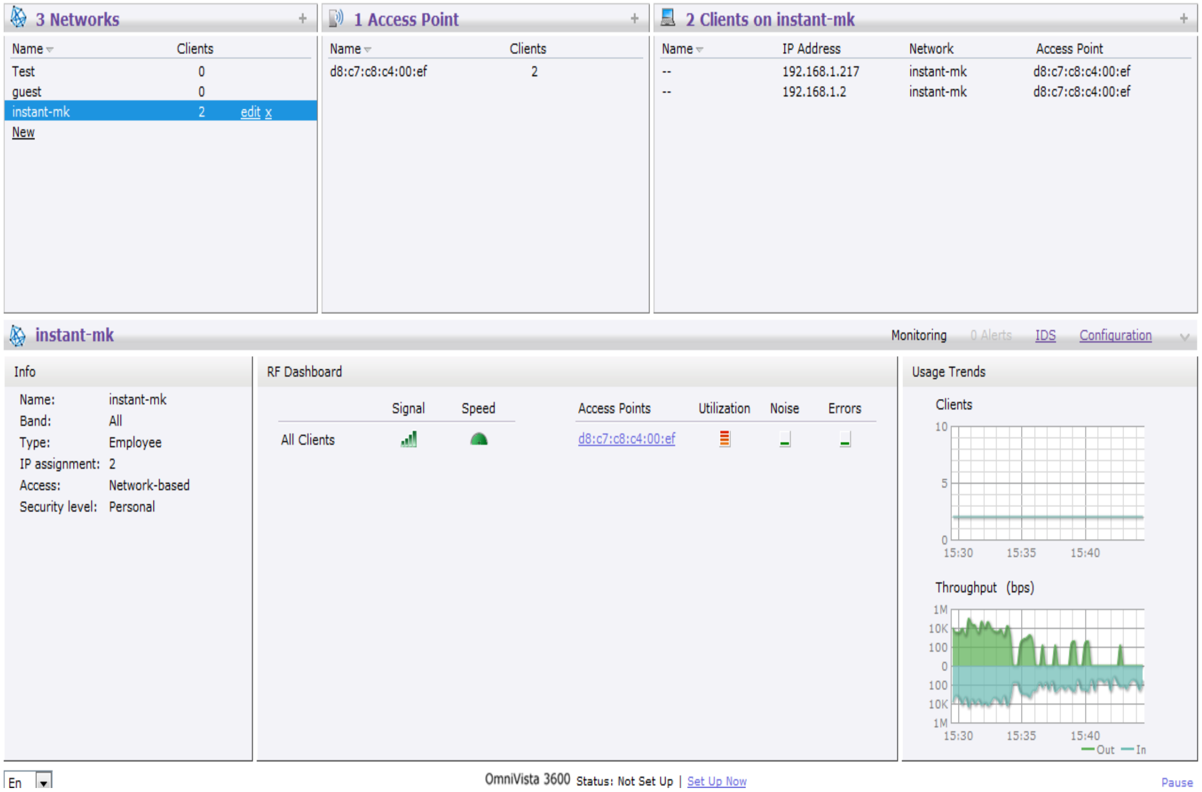
All Wi-Fi networks in the Alcatel-Lucent Instant network are listed in the **Networks** tab. Click the network that you want to monitor. Network View for the selected network appears.

Similar to the Virtual Controller view, the Network view also has three tabs— Networks, Access Points, and Clients.

The following sections in the Instant UI, provide information about the selected network:

- Info
- Usage Trends

Figure 179 - *Network View*



3 Networks

Name	Clients	
Test	0	
guest	0	
instant-mk	2	edit x
New		

1 Access Point

Name	Clients
d8:c7:c8:c4:00:ef	2

2 Clients on instant-mk

Name	IP Address	Network	Access Point
--	192.168.1.217	instant-mk	d8:c7:c8:c4:00:ef
--	192.168.1.2	instant-mk	d8:c7:c8:c4:00:ef

instant-mk

Monitoring 0 Alerts IDS Configuration

Info

Name:	instant-mk
Band:	All
Type:	Employee
IP assignment:	2
Access:	Network-based
Security level:	Personal

RF Dashboard

	Signal	Speed	Access Points	Utilization	Noise	Errors
All Clients			d8:c7:c8:c4:00:ef			

Usage Trends

En

OmniVista 3600 Status: Not Set Up | Set Up Now

Pause

Info

The **Info** section displays the following information about the selected network:

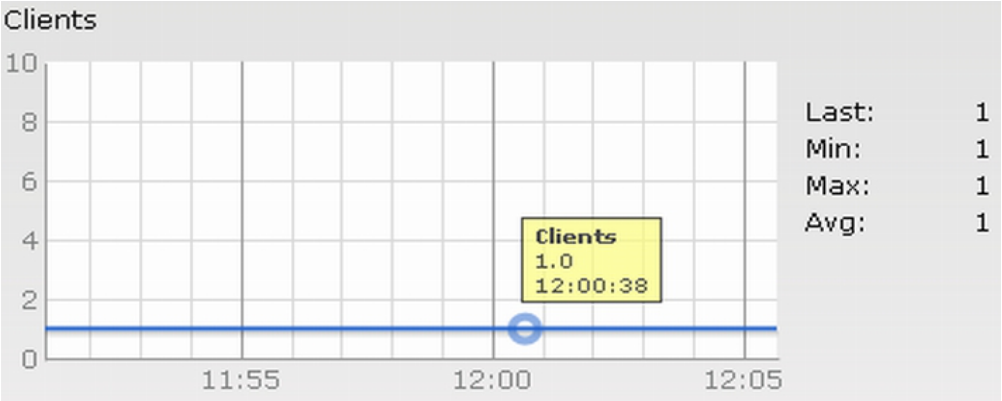
- **Name**— Name of the network.
- **Band**— Band in which the network is broadcast: 2.4 GHz band, 5 GHz band, or both.
- **Type**— Network type: Employee, Guest, or Voice.
- **IP Assignment**— Source of IP address for the client.
- **Access**— The level of access control for this network.
- **Security level**— The type of user authentication and data encryption for this network.

Usage Trends

The **Usage Trends** section displays the following graphs for the selected network:

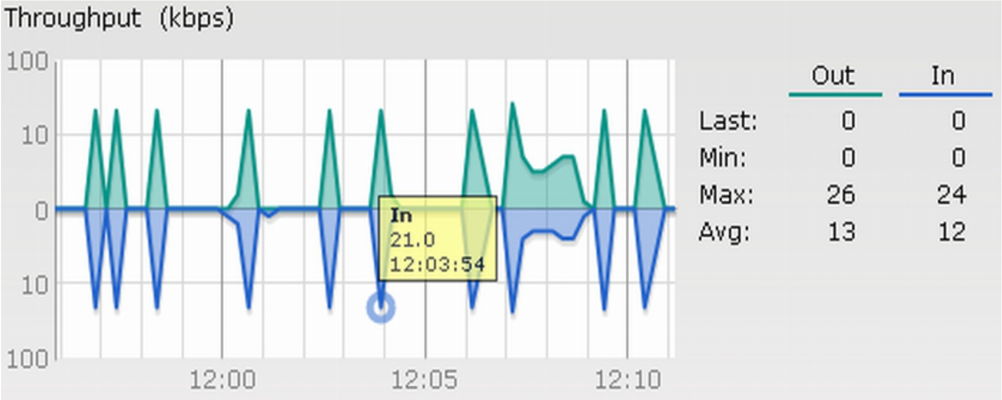
- Clients

Figure 180 - *Clients Graph*



- Throughput

Figure 181 - *Throughput Graph*



For more information about the graphs in the network view and for monitoring procedures, see Table 40.

Table 40 - *Network View – Graphs and Monitoring Procedures*

Graph Name	Description	Monitoring Procedure
Clients	The Clients graph shows the number of clients associated with the network for the last 15 minutes. To see an enlarged view, click the graph. • The enlarged view provides Last, Minimum, Maximum, and Average statistics for the number of clients associated with the Virtual Controller for the last 15 minutes. • To see the exact number of clients in the Alcatel-Lucent Instant network at a particular time, hover the cursor over the graph line.	To check the number of clients associated with the network for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Networks** tab, click the network for which you want to check the client association. The Network view appears. 3. Study the Clients graph in the **Usage Trends** pane. For example, the graph shows that one client is associated with the selected network at 12:00

Graph Name	Description	Monitoring Procedure
		hours
Throughput	The Throughput graph shows the throughput of the selected network for the last 15 minutes. - Outgoing traffic — Throughput for outgoing traffic is displayed in green. Outgoing traffic is shown above the median line. - Incoming traffic — Throughput for incoming traffic is displayed in blue. Incoming traffic is shown below the median line. To see an enlarged view, click the graph. - The enlarged view provides Last, Minimum, Maximum, and Average statistics for the incoming and outgoing traffic throughput of the network for the last 15 minutes. To see the exact throughput of the selected network at a particular time, hover the cursor over the graph line.	To check the throughput of the selected network for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Networks** tab, click the network for which you want to check the client association. The Network view appears. 3. Study the Throughput graph in the **Usage Trends** pane. For example, the graph shows 22.0 kbps incoming traffic throughput for the selected network at 12:03 hours.

Instant Access Point View

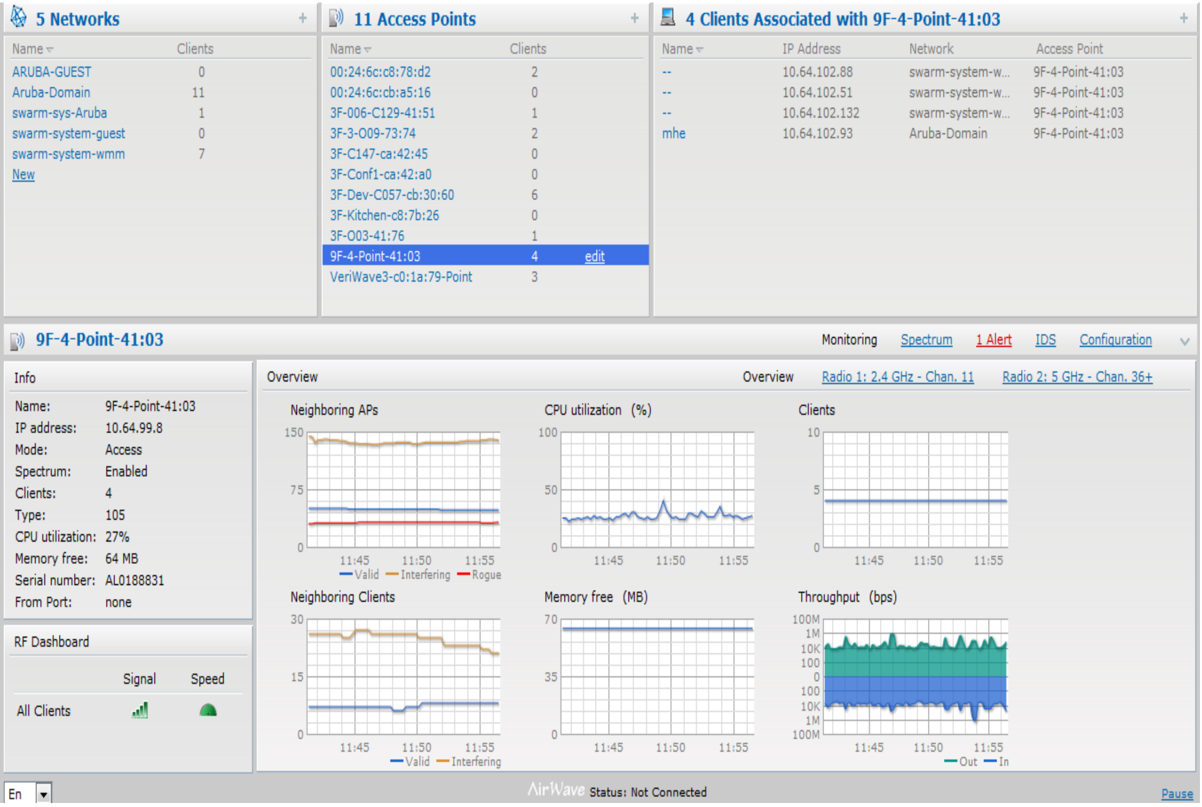
All OAW-IAPs in the Alcatel-Lucent Instant network are listed in the **Access Points** tab. Click the OAW-IAP that you want to monitor. Access Point view for that OAW-IAP appears.

Similar to the Virtual Controller view, the Access Point view also has three tabs— Networks, Access Points, and Clients.

The following sections in the Instant UI provide information about the selected OAW-IAP:

- Info
- RF Dashboard
- Overview

Figure 182 - *Instant Access Point View*



5 Networks

Name	Clients
ARUBA-GUEST	0
Aruba-Domain	11
swarm-sys-Aruba	1
swarm-system-guest	0
swarm-system-wmm	7
New	

11 Access Points

Name	Clients	
00:24:6c:c8:78:d2	2	
00:24:6c:cb:a5:16	0	
3F-006-C129-41:51	1	
3F-3-O09-73:74	2	
3F-C147-ca:42:45	0	
3F-Conf1-ca:42:a0	0	
3F-Dev-C057-cb:30:60	6	
3F-Kitchen-c8:7b:26	0	
3F-O03-41:76	1	
9F-4-Point-41:03	4	edit
VeriWave3-c0:1a:79-Point	3	

4 Clients Associated with 9F-4-Point-41:03

Name	IP Address	Network	Access Point
--	10.64.102.88	swarm-system-w...	9F-4-Point-41:03
--	10.64.102.51	swarm-system-w...	9F-4-Point-41:03
--	10.64.102.132	swarm-system-w...	9F-4-Point-41:03
mhe	10.64.102.93	Aruba-Domain	9F-4-Point-41:03

9F-4-Point-41:03

Info

Name:	9F-4-Point-41:03
IP address:	10.64.99.8
Mode:	Access
Spectrum:	Enabled
Clients:	4
Type:	105
CPU utilization:	27%
Memory free:	64 MB
Serial number:	AL0188831
From Port:	none

RF Dashboard

	Signal	Speed
All Clients	📶	●

Status: Not Connected

Info

The **Info** section provides the following information about the selected OAW-IAP:

- **Name**— Displays the name of the selected OAW-IAP.
- **IP Address**— Displays the IP address of the OAW-IAP.
- **Mode**— Displays the mode type. In **Access** mode the OAW-IAP serves clients, while also monitoring for rogue APs in the background. In **Monitor** mode, the OAW-IAP acts as a dedicated monitor, scanning all channels for rogue APs and clients.
- **Spectrum**— Displays the status of the spectrum monitor.
- **Clients**— Number of clients associated with the OAW-IAP.
- **Type**— Displays the model number of the OAW-IAP.
- **CPU Utilization**— Displays the CPU utilization in percentage.
- **Memory Free**— Displays the memory availability of the OAW-IAP in Mega Bytes (MB).
- **Serial number**— Displays the serial number of the OAW-IAP.
- **From Port**— Displays the port from where the slave OAW-IAP is learned in hierarchy mode.

RF Dashboard

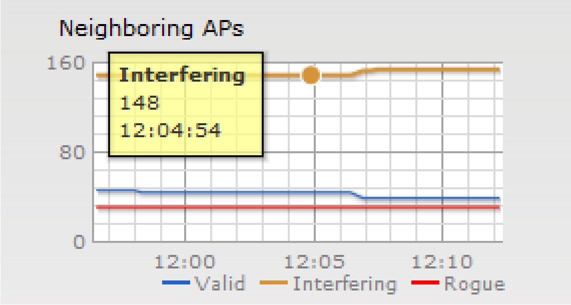
In the Instant Access Point view, the **RF Dashboard** section is moved below the **Info** section. It lists the IP address of the clients that are associated with the selected OAW-IAP if the signal strength or the data transfer speed of the client is low.

Overview

The **Overview** section displays the common RF metrics for the selected access point over the last 15 minutes. The following graphs are displayed for the selected OAW-IAP:

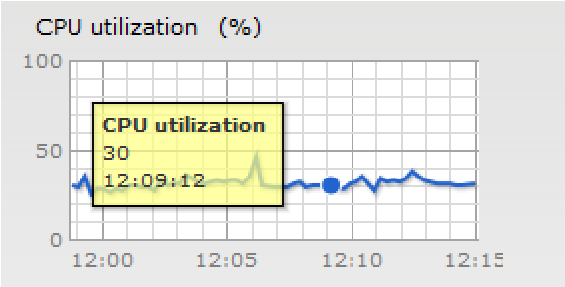
- Neighboring APs

Figure 183 - *Neighboring APs Graph*



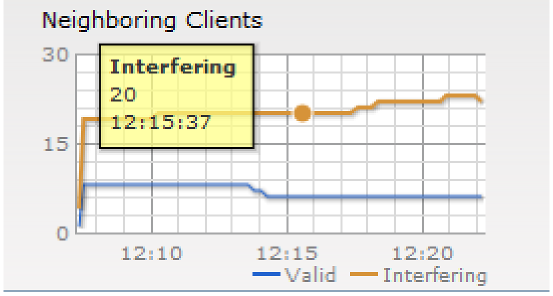
- CPU Utilization

Figure 184 - *CPU Utilization Graph*



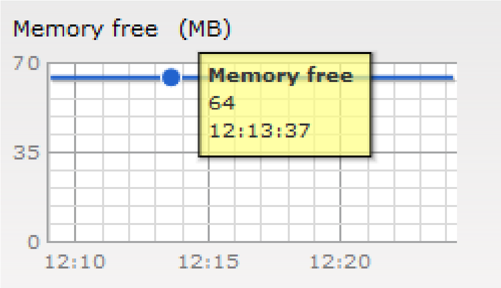
- Neighboring Clients

Figure 185 - *Neighboring Clients Graph*



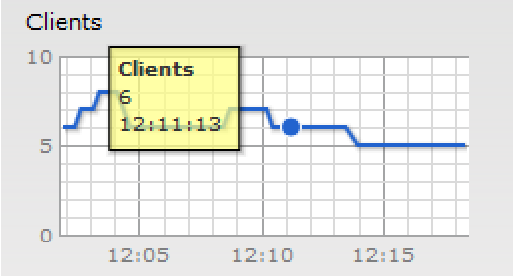
- Memory Free (MB)

Figure 186 - *Memory free Graph*



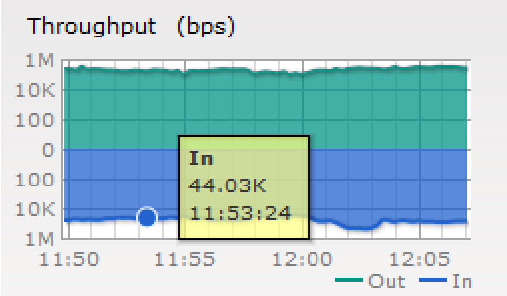
- Clients

Figure 187 - *Clients Graph*



- Throughput (bps)

Figure 188 - *Throughput Graph*



For more information about the graphs in the instant access point view and or monitoring procedures, see Table 41.

Table 41 - *Instant Access Point View — Usage Trends and Monitoring Procedures*

Graph Name	Description	Monitoring Procedure
Neighboring APs	The Neighboring APs graph shows the number of APs heard by the selected IAP: Valid APs: An AP that is part of the enterprise providing WLAN service. Interfering APs: An AP that is seen in the RF environment but is not	To check the neighboring APs detected by the OAW-IAP for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view.

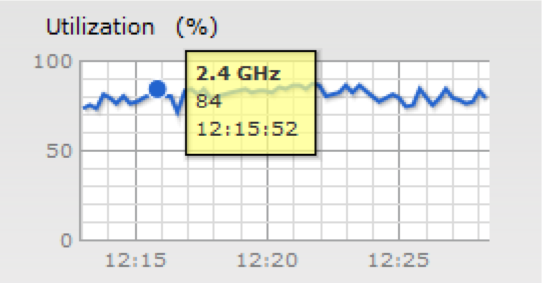
Graph Name	Description	Monitoring Procedure
	connected to the network. Rogue APs: An unauthorized AP that is plugged into the wired side of the network. To see the number of different types of neighboring APs for the last 15 minutes, hover the cursor over the respective graph lines.	2. In the **Access Points** tab, click the OAW-IAP for which you want to monitor the client association. The OAW-IAP view appears. 3. Study the Neighboring APs graph in the **Overview** section. For example, the graph shows that 148 interfering APs are detected by the OAW-IAP at 12:04 hours.
CPU Utilization	The CPU Utilization graph displays the utilization of CPU for the selected IAP. To see the CPU utilization of the IAP, hover the cursor over the graph line.	To check the CPU utilization of the OAW-IAP for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Access Points** tab, click the OAW-IAP for which you want to monitor the client association. The OAW-IAP view appears. 3. Study the CPU Utilization graph in the **Overview** pane. For example, the graph shows that the CPU utilization of the OAW-IAP is 30% at 12:09 hours.
Neighboring Clients	The Neighboring Clients graph shows the number of clients not connected to the selected AP, but heard by it: Valid: Any client that successfully authenticates with a valid AP and passes encrypted traffic is classified as a valid client. Interfering: A client associated to any AP and is not valid. To see the number of different types of neighboring clients for the last 15 minutes, hover the cursor over the respective graph lines.	To check the neighboring clients detected by the OAW-IAP for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Access Points** tab, click the OAW-IAP for which you want to monitor the client association. The OAW-IAP view appears. 3. Study the Neighboring Clients graph in the **Overview** pane. For example, the graph shows that 20 interfering clients were detected by the OAW-IAP at 12:15 hours.
Memory free (MB)	The memory free graph displays the memory availability of the OAW-IAP in Mega Bytes (MB). To see the free memory of the OAW-IAP, hover the cursor over the graph line.	To check the free memory of the OAW-IAP for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Access Points** tab, click the OAW-IAP for which

Graph Name	Description	Monitoring Procedure
		you want to monitor the client association. The OAW-IAP view appears. 3. Study the Memory free graph in the **Overview** pane. For example, the graph shows that the free memory of the OAW-IAP is 64 MB at 12:13 hours.
Clients	The Clients graph shows the number of clients associated with the selected OAW-IAP for the last 15 minutes. To see an enlarged view, click the graph. The enlarged view provides Last, Minimum, Maximum, and Average statistics for the number of clients associated with the OAW-IAP for the last 15 minutes. To see the exact number of clients associated with the selected OAW-IAP at a particular time, hover the cursor over the graph line.	To check the number of clients associated with the OAW-IAP for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Access Points** tab, click the OAW-IAP for which you want to monitor the client association. The OAW-IAP view appears. 3. Study the Clients graph. For example, the graph shows that six clients are associated with the OAW-IAP at 12:11 hours.
Throughput	The Throughput graph shows the throughput for the selected OAW-IAP for the last 15 minutes. • Outgoing traffic — Throughput for outgoing traffic is displayed in green. Outgoing traffic is shown about the median line. • Incoming traffic — Throughput for incoming traffic is displayed in blue. Incoming traffic is shown below the median line. To see an enlarged view, click the graph. • The enlarged view provides Last, Minimum, Maximum, and Average statistics for the incoming and outgoing traffic throughput of the OAW-IAP for the last 15 minutes. To see the exact throughput of the selected OAW-IAP at a particular time, hover the cursor over the graph line.	To check the throughput of the selected OAW-IAP for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Access Points** tab, click the OAW-IAP for which you want to monitor the throughput. The OAW-IAP view appears. 3. Study the Throughput graph. For example, the graph shows 44.03 kbps incoming traffic throughput at 12:08 hours.

The **Overview** section also has two links— **2.4 GHz** and **5 GHz**. The following graphs are displayed for each band:

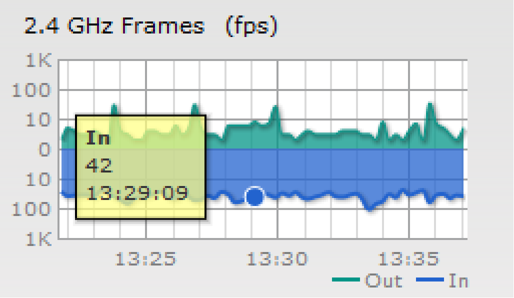
- Utilization

Figure 189 - *Utilization Graph*



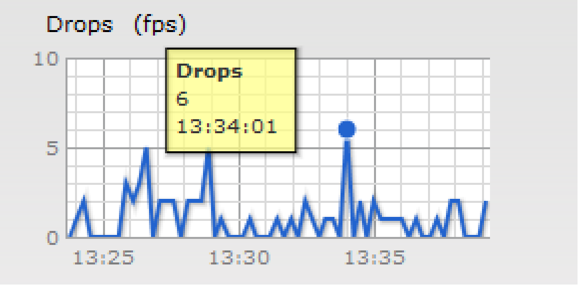
- 2.4 GHz Frames (fps)

Figure 190 - *2.4 GHz Management Frames (fps) Graph*



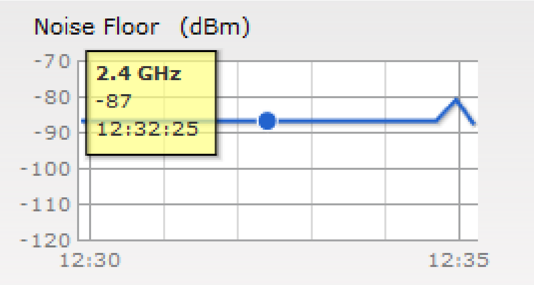
- Drops (fps)

Figure 191 - *Drops (fps) Graph*



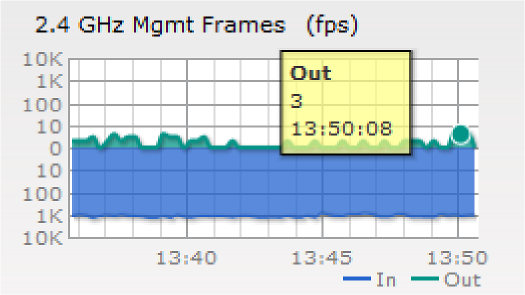
- Noise Floor (dBm)

Figure 192 - *Noise Floor (dBm) Graph*



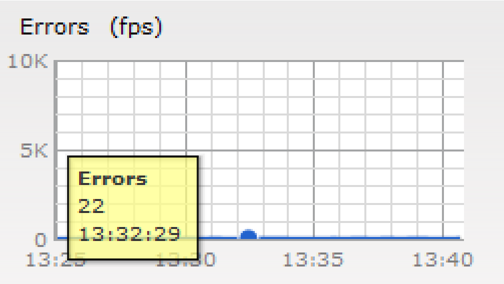
- 2.4 GHz Mgmt Frames

Figure 193 - *2.4 GHz Management Frames (fps) Graph*



- Errors (fps) Graph

Figure 194 - *Errors (fps) Graph*



To see the graphs for the 5 GHz band, click the **5 GHz** link.

For more information about the graphs in the instant access point view and for monitoring procedures, see Table 42.

Table 42 - *Instant Access Point View — RF Trends Graphs and Monitoring Procedures*

Graph Name	Description	Monitoring Procedure
Utilization	The Utilization graph shows the radio utilization percentage of the access point for the last 15 minutes. To see an enlarged view, click the graph.The enlarged view provides Last, Minimum, Maximum, and Average radio utilization statistics for the OAW-IAP for the last 15 minutes. To see the exact utilization percent at a particular time, hover the cursor over the graph line.	To monitor the utilization of the selected OAW-IAP for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Access Points** tab, click the OAW-IAP for which you want to monitor the utilization. The OAW-IAP view appears. 3. Study the Utilization graph in the RF Trends pane. For example, the graph shows 84% OAW-IAP radio utilization for the 2.4 GHz band at 12:15 hours. **NOTE:** You can also click the rectangle icon under the Utilization column in the **RF**

Graph Name	Description	Monitoring Procedure
		Dashboard pane to see the Utilization graph for the selected OAW-IAP. The rectangle icon is seen as follows: ≣
2.4 GHz Frames	The 2.4 GHz Frames graph shows the In and Out frame rate per second for the radio in 2.4 GHz band for the last 15 minutes. ● Outgoing frames — Outgoing frame traffic is displayed in green. It is shown above the median line. ● Incoming frames — Incoming frame traffic is displayed in blue. It is shown below the median line. To see an enlarged view, click the graph. The enlarged view provides Last, Minimum, Maximum, and Average statistics for the incoming and outgoing frames. To see the exact utilization percent at a particular time, hover the cursor over the graph line.	To monitor the In and Out frame rate per second for the radio in 2.4 GHz band, for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Access Points** tab, click the name link of the OAW-IAP for which you want to monitor the frame rate. The OAW-IAP view appears. 3. Study the 2.4 GHz Frames graph. For example, the graph shows 42 incoming frames at 13:29 hours.
Drops	The Drops graph shows dropped frames over the last 15 minutes. To see the number of frames dropped at a particular time, hover the cursor over the graph line.	To monitor the number of frames dropped for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Access Points** tab, click the name link of the OAW-IAP for which you want to monitor the frame rate. The OAW-IAP view appears. 3. Study the Drops graph. For example, the graph shows that 6 frames per second were dropped at 13:34 hours.
Noise Floor	The Noise Floor graph shows the signals created by all the noise sources and unwanted signals in the network. Noise floor is measured in decibels/metre. Too many unwanted signals hamper the performance of the OAW-IAP. Monitor the noise floor regularly for optimal performance of the OAW-IAP. To see an enlarged view, click the graph.The enlarged view provides Last, Minimum, Maximum, and	To monitor the noise floor for the OAW-IAP for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Access Points** tab, click the name link of the OAW-IAP for which you want to monitor the noise floor. The OAW-IAP view appears. 3. Study the Noise Floor graph. For example, the graph shows

Graph Name	Description	Monitoring Procedure
	Average statistics for the In and Out frames. To see the exact utilization percent at a particular time, hover the cursor over the graph line.	that the noise floor for the OAW-IAP at 22:38 hours is — 82.0 dBm. **NOTE:** You can also click the rectangle icon the Noise column in the **RF Dashboard** pane to see the Noise graph for the selected OAW-IAP. The rectangle icon is seen as follows: ▤
2.4 GHz Mgmt Frames	The 2.4 GHz Mgmt Frames graph shows the rate for management frames in and out of the radio in the 2.4 GHz band for the last 15 minutes. Note that the scale for the Y-axis is logarithmic. To see the exact number of management frames per second at a particular time, hover the cursor over the graph lines.	To monitor the rate of management frames in and out of the radio for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Access Points** tab, click the name link of the OAW-IAP for which you want to monitor the noise floor. The OAW-IAP view appears. 3. Study the 2.4 GHz Mgmt Frames graph. For example, the graph shows that 3 management frames were out of the radio at 13:50 hours.
Errors	The Errors graph shows the errors that occurred while receiving the frames for the last 15 minutes. The errors are measured in frames per second. To see an enlarged view, click the graph. The enlarged view provides Last, Minimum, Maximum, and Average statistics for the In and Out frames. To see the exact utilization percent at a particular time, hover the cursor over the graph line.	To monitor the errors for the OAW-IAP for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Access Points** tab, click the name link of the OAW-IAP for which you want to monitor the errors. The OAW-IAP view appears. 3. Study the Errors graph. For example, the graph shows that the errors for the OAW-IAP at 13:32 hours is 22 frames per second. **NOTE:** You can also click the rectangle icon under the Errors column in the **RF Dashboard** pane to see the Errors graph for the selected OAW-IAP. ▤

Client View

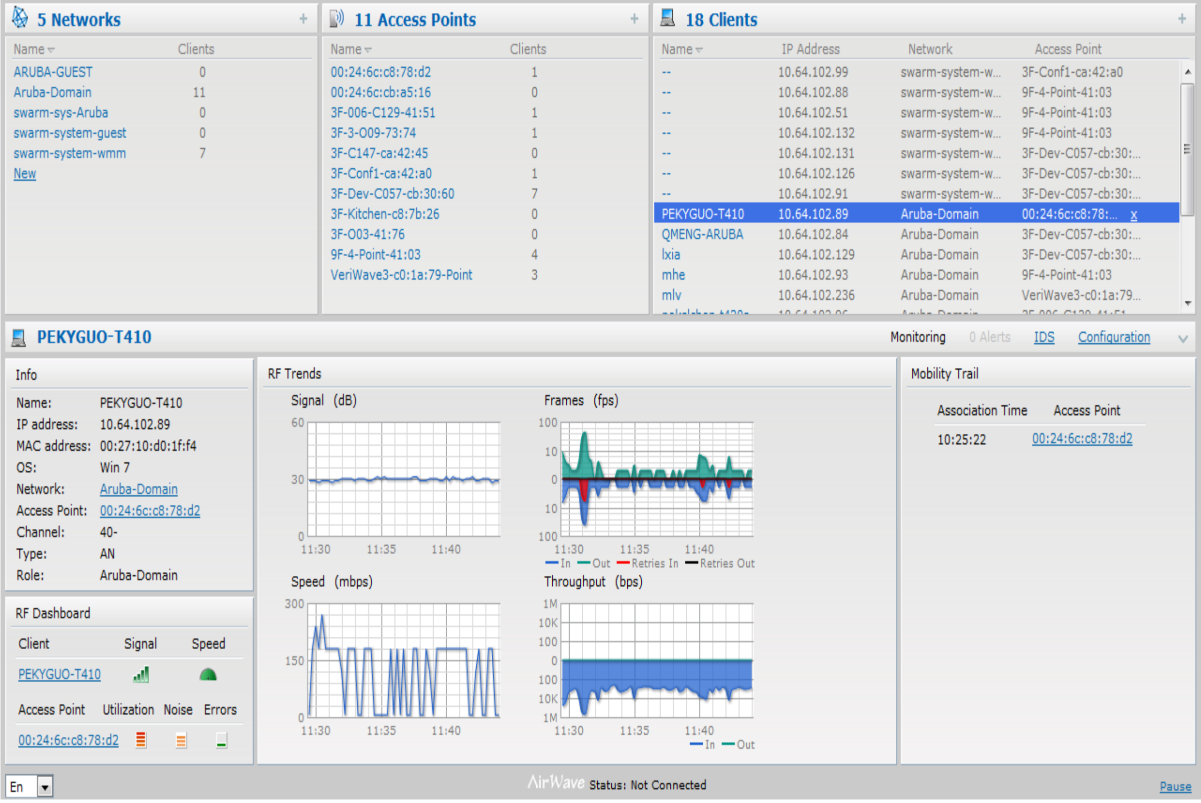
In the Virtual Controller view, all clients in the Alcatel-Lucent Instant network are listed in the **Clients** tab. Click the IP address of the client that you want to monitor. Client view for that client appears.

The Client view has three tabs— Networks, Access Points, and Clients.

The following sections in the Instant UI provide information about the selected client:

- Info
- RF Dashboard
- RF Trends
- Usage Trends

Figure 195 - *Client View*



5 Networks

Name	Clients
ARUBA-GUEST	0
Aruba-Domain	11
swarm-sys-Aruba	0
swarm-system-guest	0
swarm-system-wmm	7
New	

11 Access Points

Name	Clients
00:24:6c:c8:78:d2	1
00:24:6c:cb:a5:16	0
3F-006-C129-41:51	1
3F-3-O09-73:74	1
3F-C147-ca:42:45	0
3F-Conf1-ca:42:a0	1
3F-Dev-C057-cb:30:60	7
3F-Kitchen-c8:7b:26	0
3F-O03-41:76	0
9F-4-Point-41:03	4
VeriWave3-c0:1a:79-Point	3

18 Clients

Name	IP Address	Network	Access Point
--	10.64.102.99	swarm-system-w...	3F-Conf1-ca:42:a0
--	10.64.102.88	swarm-system-w...	9F-4-Point-41:03
--	10.64.102.51	swarm-system-w...	9F-4-Point-41:03
--	10.64.102.132	swarm-system-w...	9F-4-Point-41:03
--	10.64.102.131	swarm-system-w...	3F-Dev-C057-cb:30:...
--	10.64.102.126	swarm-system-w...	3F-Dev-C057-cb:30:...
--	10.64.102.91	swarm-system-w...	3F-Dev-C057-cb:30:...
PEKYGUO-T410	10.64.102.89	Aruba-Domain	00:24:6c:c8:78:... x
QMENG-ARUBA	10.64.102.84	Aruba-Domain	3F-Dev-C057-cb:30:...
lxia	10.64.102.129	Aruba-Domain	3F-Dev-C057-cb:30:...
mhe	10.64.102.93	Aruba-Domain	9F-4-Point-41:03
mlv	10.64.102.236	Aruba-Domain	VeriWave3-c0:1a:79...

PEKYGUO-T410

Info

Name: PEKYGUO-T410
IP address: 10.64.102.89
MAC address: 00:27:10:d0:1f:f4
OS: Win 7
Network: Aruba-Domain
Access Point: 00:24:6c:c8:78:d2
Channel: 40-
Type: AN
Role: Aruba-Domain

RF Dashboard

Client	Signal	Speed
PEKYGUO-T410		

Access Point	Utilization	Noise	Errors
00:24:6c:c8:78:d2			

Mobility Trail

Association Time	Access Point
10:25:22	00:24:6c:c8:78:d2

Status: Not Connected

Info

The **Info** section provides the following information about the selected OAW-IAP:

- **Name**— Name of the selected client.
- **IP Address**— IP address of the client.
- **MAC Address**— MAC Address of the client.
- **OS**— Operating System that is running on the client.
- **Network**— Network to which the client is connected to.
- **Access Point**— OAW-IAP to which the client is connected to.
- **Channel**— Channel that the client is using.
- **Type**— Channel type that the client is broadcasting on.

RF Dashboard

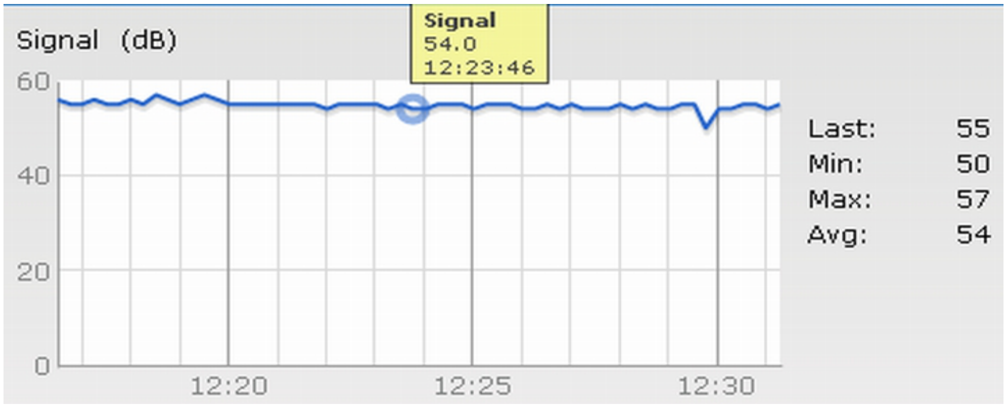
In the Client view, the **RF Dashboard** section is moved below the **Info** section. The **RF Dashboard** section in the client view shows the speed and the signal information for the client and the RF information for the OAW-IAP to which the client is connected to.

RF Trends

The **RF Trends** section displays the following graphs for the selected client:

- Signal

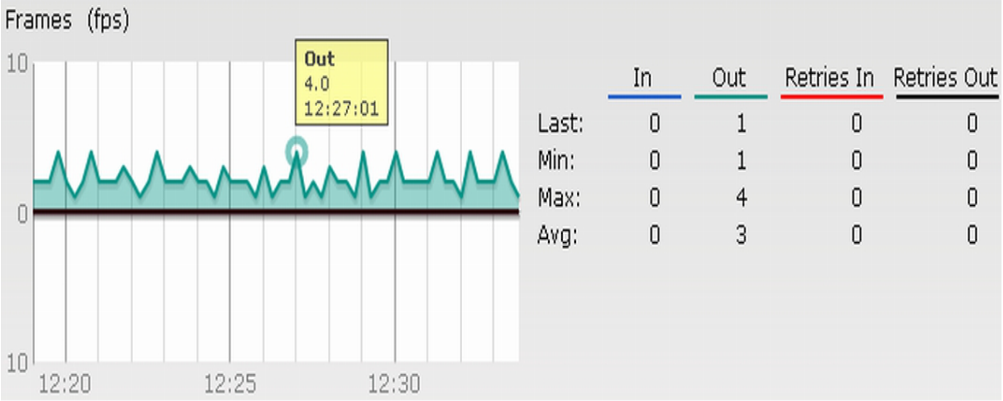
Figure 196 - *Signal Graph*



Last:	55
Min:	50
Max:	57
Avg:	54

- Frames

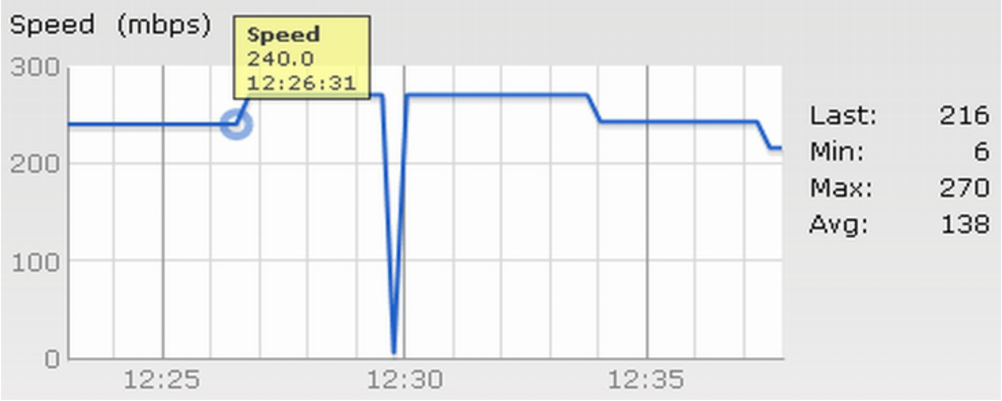
Figure 197 - *Frames Graph*



	In	Out	Retries In	Retries Out
Last:	0	1	0	0
Min:	0	1	0	0
Max:	0	4	0	0
Avg:	0	3	0	0

- Speed

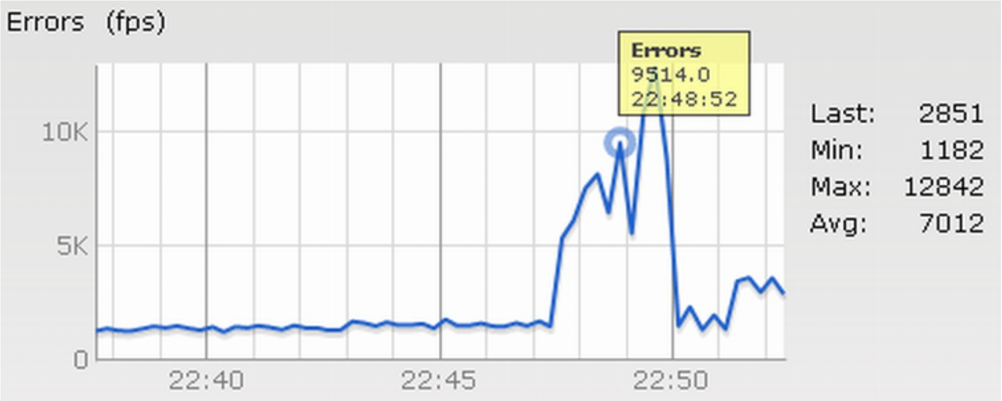
Figure 198 - *Speed Graph*



Last:	216
Min:	6
Max:	270
Avg:	138

- Throughput

Figure 199 - *Throughput Graph*



For more information about RF trends graphs in the client view and for monitoring procedures, see Table 43.

Table 43 - *Client View — RF Trends Graphs and Monitoring Procedures*

Graph Name	Description	Monitoring Procedure
Signal	The Signal graph shows the signal strength of the client for the last 15 minutes. It is measured in decibels. To see an enlarged view, click the graph. The enlarged view provides Last, Minimum, Maximum, and Average signal statistics for the client fr the last 15 minutes. To see the exact signal strength at a particular time, hover the cursor over the graph line.	To monitor the signal strength of the selected client for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Clients** tab, click the IP address of the client for which you want to monitor the signal strength. The client view appears. 3. Study the Signal graph in the RF Trends pane. For example, the graph shows that signal strength for the client is 54.0 dB at 12:23 hours.
Frames	The Frames Graph shows the In and Out frame rate per second for the client for the last 15 minutes. It also shows data for the Retry In and Retry Out frames. - Outgoing frames — Outgoing frame traffic is displayed in green. It is shown above the median line. - Incoming frames — Incoming frame traffic is displayed in blue. It is shown below the median line. - Retry Out — Retries for the outgoing frames is displayed in black and is show above the	To monitor the In and Out frame rate per second and retry frames for the In and Out traffic, for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Clients** tab, click the IP address of the client for which you want to monitor the frames. The client view appears. 3. Study the Frames graph in the RF Trends pane. For example, the graph shows 4.0 frames

Graph Name	Description	Monitoring Procedure
	median line. - Retry In — Retries for the incoming frames is displayed in red and is shown below the median line. To see an enlarged view, click the graph. The enlarged view provides Last, Minimum, Maximum, and Average statistics for the In, Out, Retries In, and Retries Out frames. To see the exact frames at a particular time, hover the cursor over the graph line.	per second for the client at 12:27 hours.
Speed	The Speed graph shows the data transfer speed for the client. Data transfer is measured in Mega bits per second (mbps). To see an enlarged view, click the graph. The enlarged view shows Last, Minimum, Maximum, and Average statistics for the client for the last 15 minutes. To see the exact speed at a particular time, hover the cursor over the graph line.	To monitor the speed for the client for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Clients** tab, click the IP address of the client for which you want to monitor the speed. The client view appears. 3. Study the Speed graph in the RF Trends pane. For example, the graph shows that the data transfer speed at 12:26 hours is 240 Mbps.
Throughput	The Throughput Graph shows the throughput for the selected client for the last 15 minutes. - Outgoing traffic — Throughput for outgoing traffic is displayed in green. Outgoing traffic is shown above the median line. - Incoming traffic — Throughput for incoming traffic is displayed in blue. Incoming traffic is shown below the median line. To see an enlarged view, click the graph. The enlarged view shows Last, Minimum, Maximum, and Average statistics for the incoming and outgoing traffic throughput of the client for the last 15 minutes. To see the exact throughput at a particular time, hover the cursor over the graph line.	To monitor the errors for the client for the last 15 minutes, 1. Log in to the Instant UI. The Virtual Controller view appears. This is the default view. 2. In the **Clients** tab, click the IP address of the client for which you want to monitor the throughput. The client view appears. 3. Study the Throughput graph in the RF Trends pane. For example, the graph shows 1.0 kbps outgoing traffic throughput for the client at 12:30 hours.

Mobility Trail

The **Mobility Trail** section displays the following mobility trail information for the selected client:

- **Association Time**— The time at which the selected client was associated with a particular OAW-IAP.
  The Instant UI shows the client-OAW-IAP association over the last 15 minutes.
- **Access Point**— OAW-IAP name with which the client was associated.

Mobility information about the client is reset each time it roams from one OAW-IAP to another.

Alert Types

Alerts are generated when a user encounters problems accessing or connecting to the Wi-Fi network. These alerts enable you to troubleshoot the problems. The alerts that are generated on Alcatel-Lucent Instant can be categorized as follows:

- 802.11 related association and authentication failure alerts.
- 802.1X related mode and key mismatch, server, and client time-out failure alerts.
- IP address related failure - Static IP address or DHCP related alerts.

Table 44 displays a list of alerts that are generated on the Alcatel-Lucent Instant network.

Table 44 *- Alerts List*

Type Code	Description	Details	Corrective Actions
10010-1	Internal error	The OAW-IAP has encountered an internal error for this client.	Contact the Alcatel-Lucent customer support team.
10010-2	Unknown SSID in association request	The OAW-IAP cannot allow this client to associate because the association request received contains an unknown SSID.	Identify the client and check its Wi-Fi driver and manager software.
10010-3	Mismatched authentication/encryption setting	The OAW-IAP cannot allow this client to associate because its authentication or encryption settings do not match OAW-IAP's configuration.	Ascertain the correct authentication or encryption settings and try to associate again.
10010-4	Unsupported 802.11 rate	The OAW-IAP cannot allow this client to associate because it does not support the 802.11 rate requested by this client.	Check the configuration on the OAW-IAP to see if the desired rate can be supported; if not, consider replacing the OAW-IAP with another model that can support the rate.
10010-5	Maximum capacity reached on OAW-IAP	The OAW-IAP has reached maximum capacity and cannot accommodate any more clients.	Consider expanding capacity by installing additional OAW-IAPs or balance load by relocating OAW-IAPs.
10020-6	Invalid MAC Address	The OAW-IAP cannot authenticate this client because the client's	This condition may be indicative of a misbehaving client. Try

Type Code	Description	Details	Corrective Actions
		MAC address is not valid.	to locate the client device and check its hardware and software.
10030-7	Client blocked due to repeated authentication failures	The OAW-IAP is temporarily blocking the 802.1X authentication request from this client because the credentials provided have been rejected by the RADIUS server too many times.	Identify the client and check its 802.1X credentials.
10030-8	RADIUS server connection failure	The OAW-IAP cannot authenticate this client using 802.1X because the RADIUS server did not respond to the authentication request.	If the OAW-IAP is using the internal RADIUS server, recommend checking the related configuration as well as the installed certificate and passphrase. If the OAW-IAP is using an external RADIUS server, check if there are any issues with the RADIUS server and try connecting again.
10030-9	RADIUS server authentication failure	The OAW-IAP cannot authenticate this client using 802.1X because the RADIUS server rejected the authentication credentials (password, etc) provided by the client.	Ascertain the correct authentication credentials and log in again.
10041-0	Integrity check failure in encrypted message	The OAW-IAP cannot receive data from this client because the integrity check of the received message (MIC) has failed.	Check the encryption setting on the client and on the OAW-IAP.
10051-1	DHCP request timed out	This client did not receive a response to its DHCP request in time.	Check the status of the DHCP server in the network.

Alcatel-Lucent's Policy Enforcement Firewall (PEF) module for Alcatel-Lucent Instant provides identity-based controls to enforce application-layer security, prioritization, traffic forwarding, and network performance policies for wired and wireless networks.

The PEF window displays the external/internal authentication servers, currently defined roles for all the networks, blacklisted clients and to enable or disable the protocols for ALG.

Navigate to the **PEF** link at the top right corner of the Instant UI to view the following features.

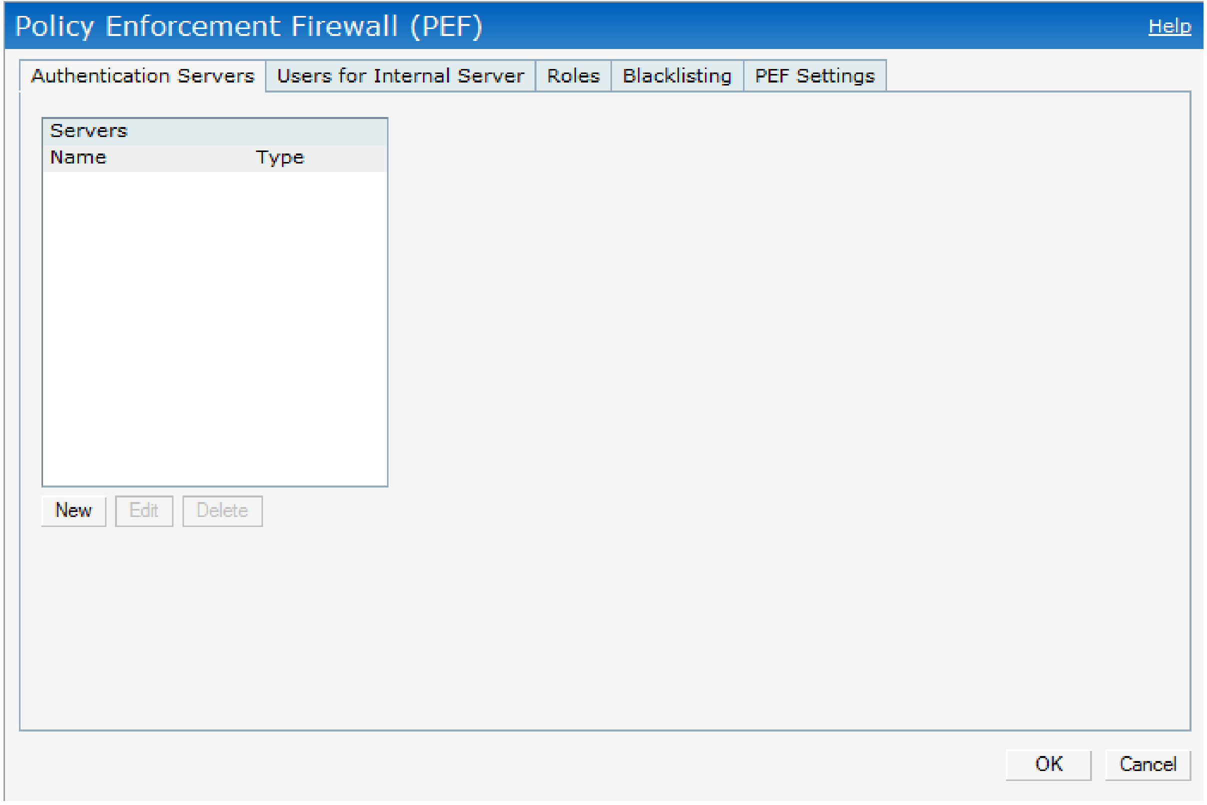
Authentication Servers

This section displays the currently defined external authentication servers.

- **Name**— Indicates the name of the external authentication server.
- **Type**— Indicates the type of the authentication server-RADIUS or LDAP.

1. Click **New** to configure an external RADIUS server for a wireless network. See External RADIUS Server on page 142 for more information.
2. Click **OK** to apply the changes.

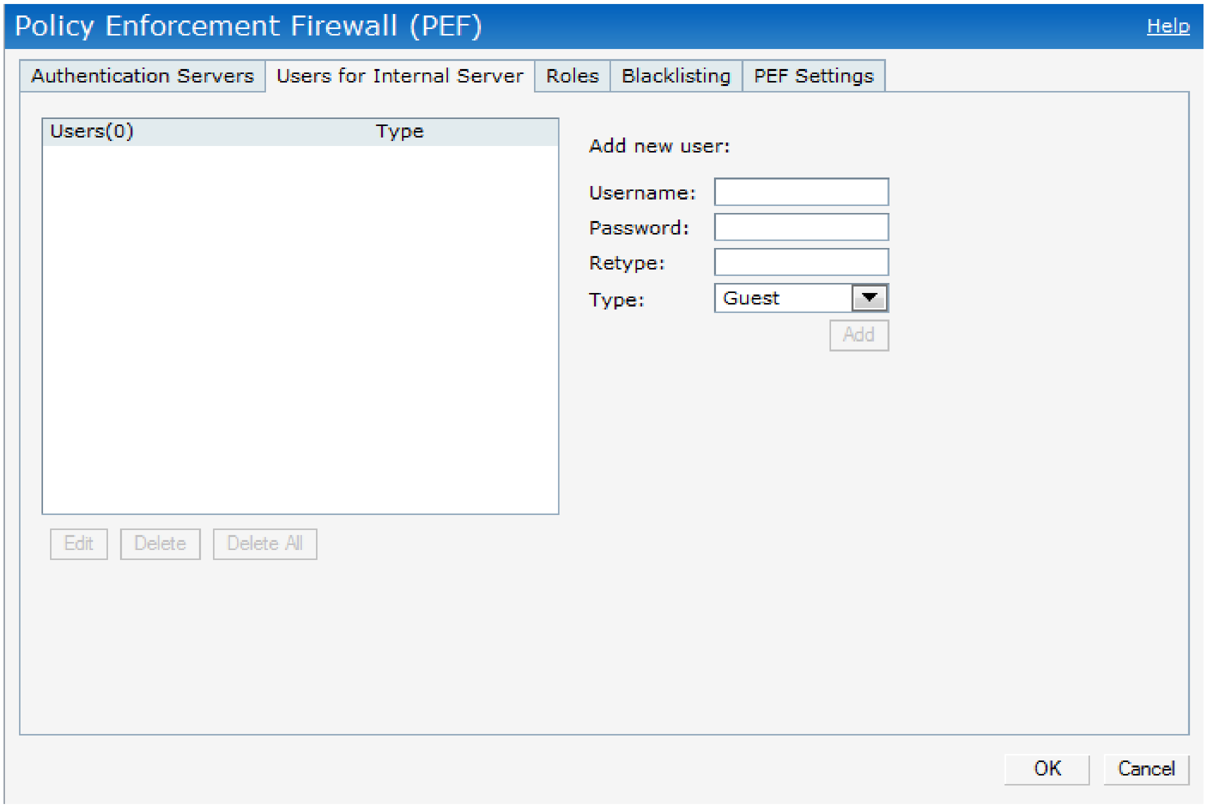
Figure 200 - *Authentication Server*



Users for Internal Server

This section displays the currently defined users for the internal authentication server.

Figure 201 - *Users for Internal Server*



Add new user:

Username:

Password:

Retype:

Type: Guest

To add a user:

1. Enter the username in the **Username** text box.
2. Enter the password in the **Password** text box and reconfirm
3. Select appropriate network type from the **Type** drop-down list.
4. Click **Add** and click **OK.** The users are listed in the **Users** list.

See User Database on page 311 for more information.

Roles

This window consists of the following options:

- **Roles—** This table displays all the roles defined for all the networks. See User Role on page 186 for more information.

NOTE

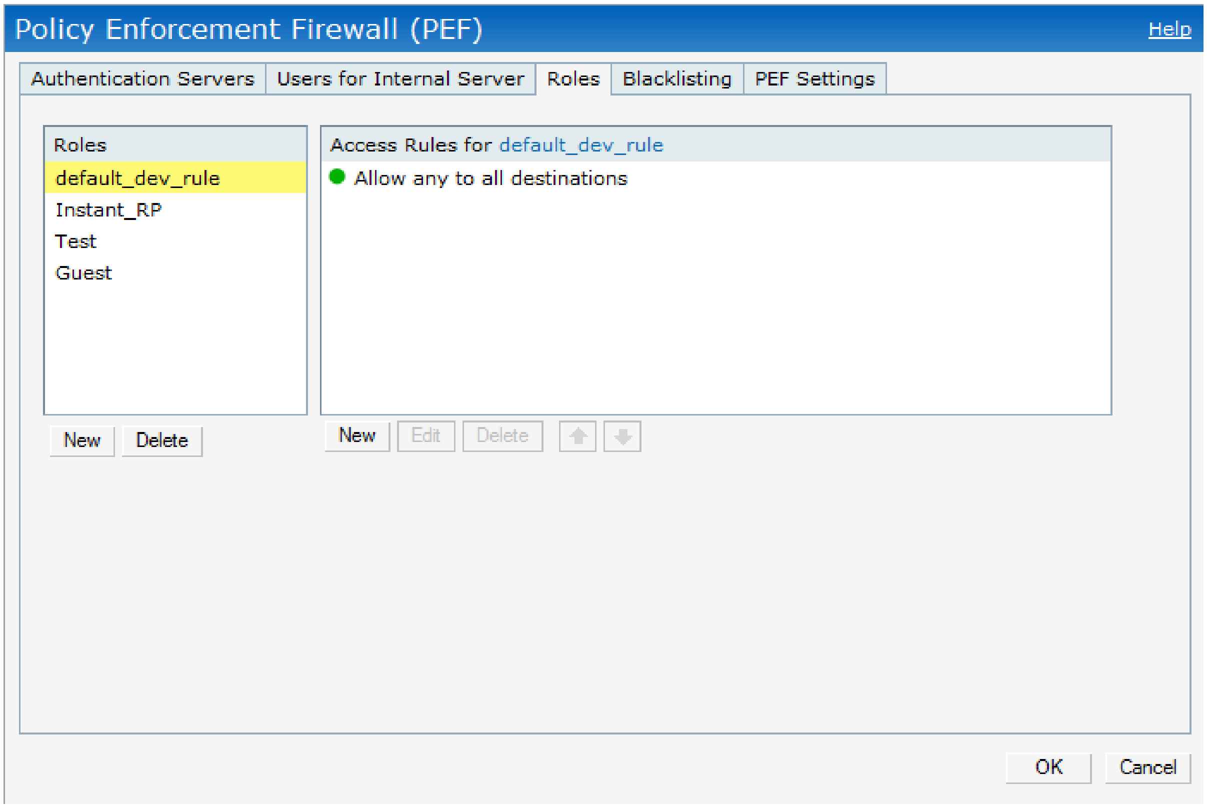
A special default role with the same name as the network is automatically defined for each network. These roles cannot be deleted or renamed.

- **Access Rules—** This table lists the permissions for each Role. See Role Derivation on page 177 for more information.

NOTE

This release of Instant supports configuration of up to 64 access rules.

Figure 202 - *Roles*



Roles

default_dev_rule

Instant_RP

Test

Guest

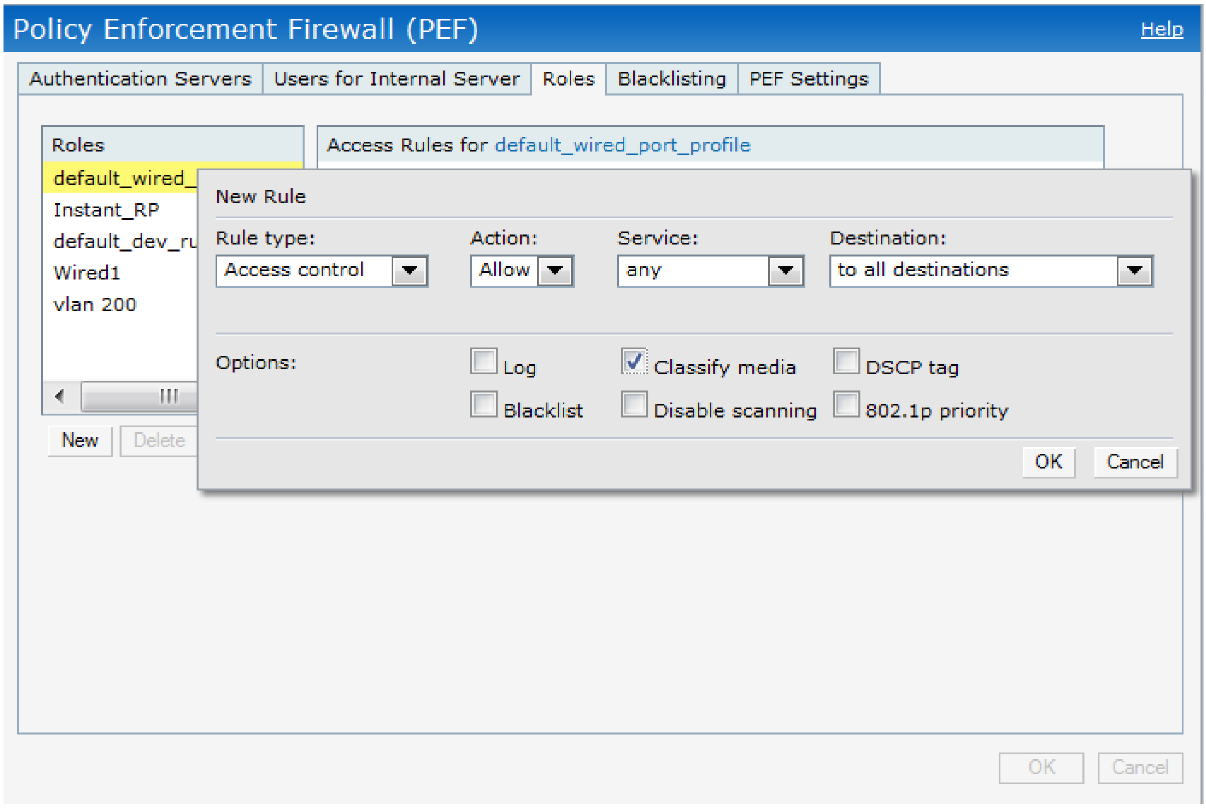
Access Rules for default_dev_rule

● Allow any to all destinations

Extended Voice and Video Functionalities

Instant has the added ability to identify and prioritize voice and video traffic from applications like Microsoft Office Communications Server (OCS) and Apple Facetime.

Figure 203 - *Classify Media*



Roles: default_wired_, Instant_RP, default_dev_ru, Wired1, vlan 200

Access Rules for default_wired_port_profile

New Rule

Rule type: Access control

Action: Allow

Service: any

Destination: to all destinations

Options: □ Log ☑ Classify media □ DSCP tag □ Blacklist □ Disable scanning □ 802.1p priority

QoS for Microsoft Office OCS and Apple Facetime

Voice and video devices use a signaling protocol to establish, control, and terminate voice and video calls.These control or signaling sessions are usually permitted using pre-defined ACLs. If, however, the control signaling packets are encrypted, the OAW-IAP cannot determine which dynamic ports are used for voice or video traffic. In these cases, the OAW-IAP has to use an ACL with the classify-media option enabled to identify the voice or video flow based on a deep packet inspection and analysis of the actual traffic.

Microsoft OCS

Microsoft Office Communications Server (OCS) uses Session Initiation Protocol (SIP) over TLS to establish, control, and terminate voice and video calls.

Apple Facetime

When an Apple device starts a Facetime video call, it initiates a TCP session to the Apple Facetime server over port 5223, then sends SIP signaling messages over a non-default port. When media traffic starts flowing, audio and video data are sent through that same port using RTP. (The audio and video packets are interleaved in the air, though individual the sessions can be uniquely identified using their payload type and sequence numbers.) The RTP header and payload also get encapsulated under the TURN ChannelData Messages. The Facetime call is terminated with a SIP BYE message that can be sent by either party.

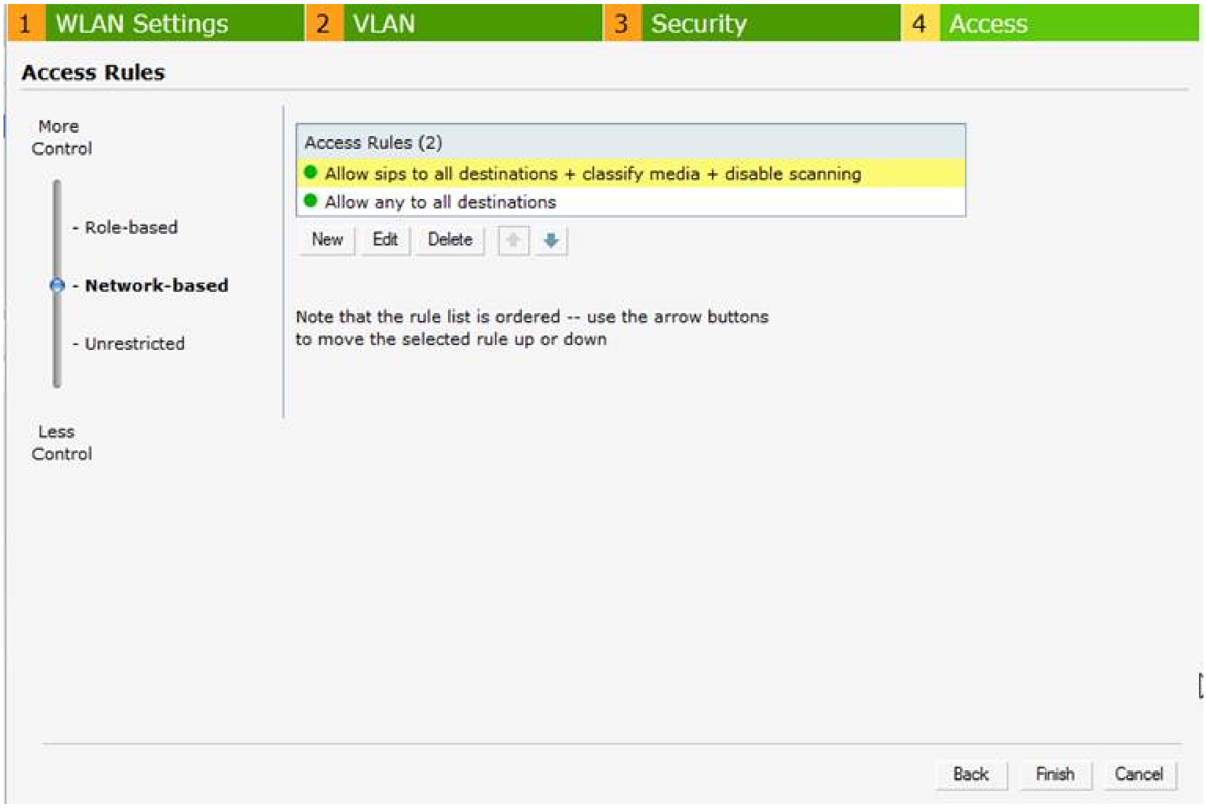
The following table lists the ports used by Apple Facetime. Facetime users need to be assigned a role where traffic is allowed on these ports.

Table 45 - *Ports Used by the Apple Facetime Application*

Port	Packet Type
53	TCP/UDP
443	TCP
3478-3497	UDP
5223	TCP
16384-16387	UDP
16393-16402	UDP

The following screenshots are configuration examples for Microsoft OCS and Apple Facetime applications.

Figure 204 - *Classify Media —Microsoft Lync*

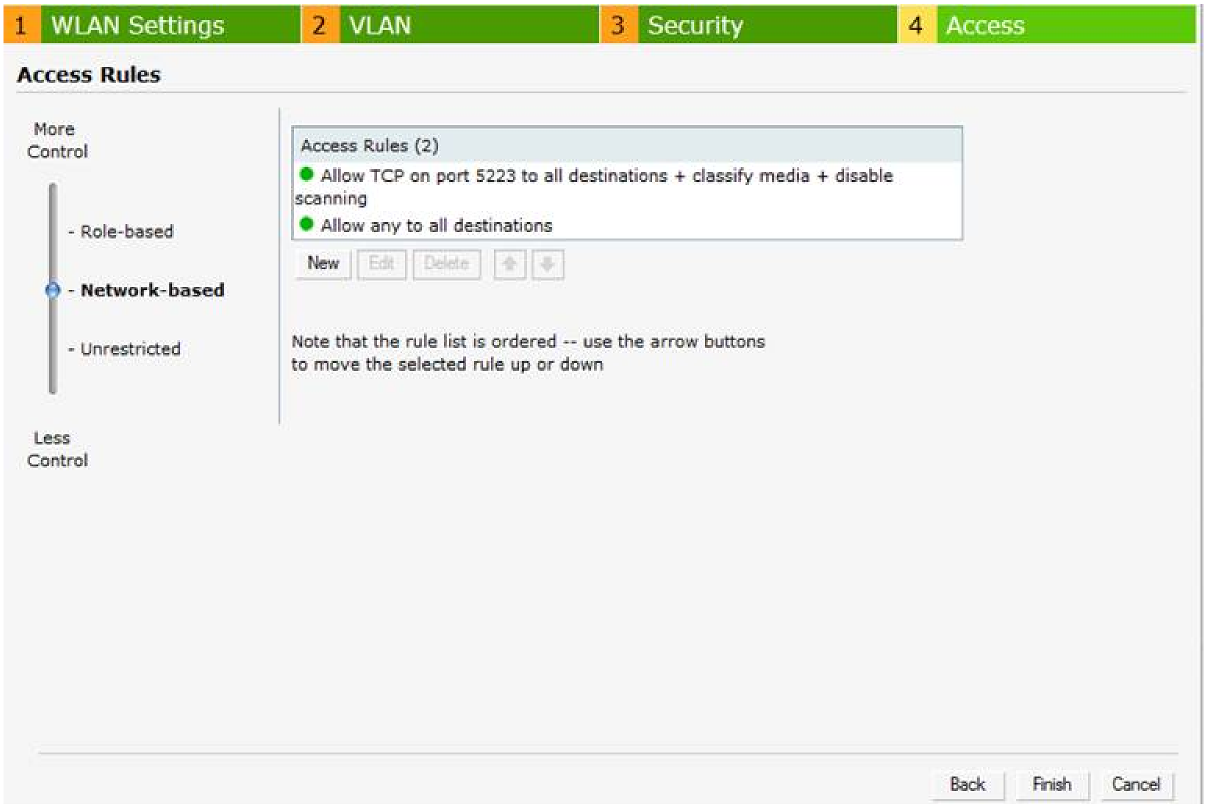


Access Rules (2)

- ● Allow sips to all destinations + classify media + disable scanning
- ● Allow any to all destinations

Note that the rule list is ordered -- use the arrow buttons to move the selected rule up or down

Figure 205 - *Classify Media —Apple Facetime*



● Allow TCP on port 5223 to all destinations + classify media + disable scanning

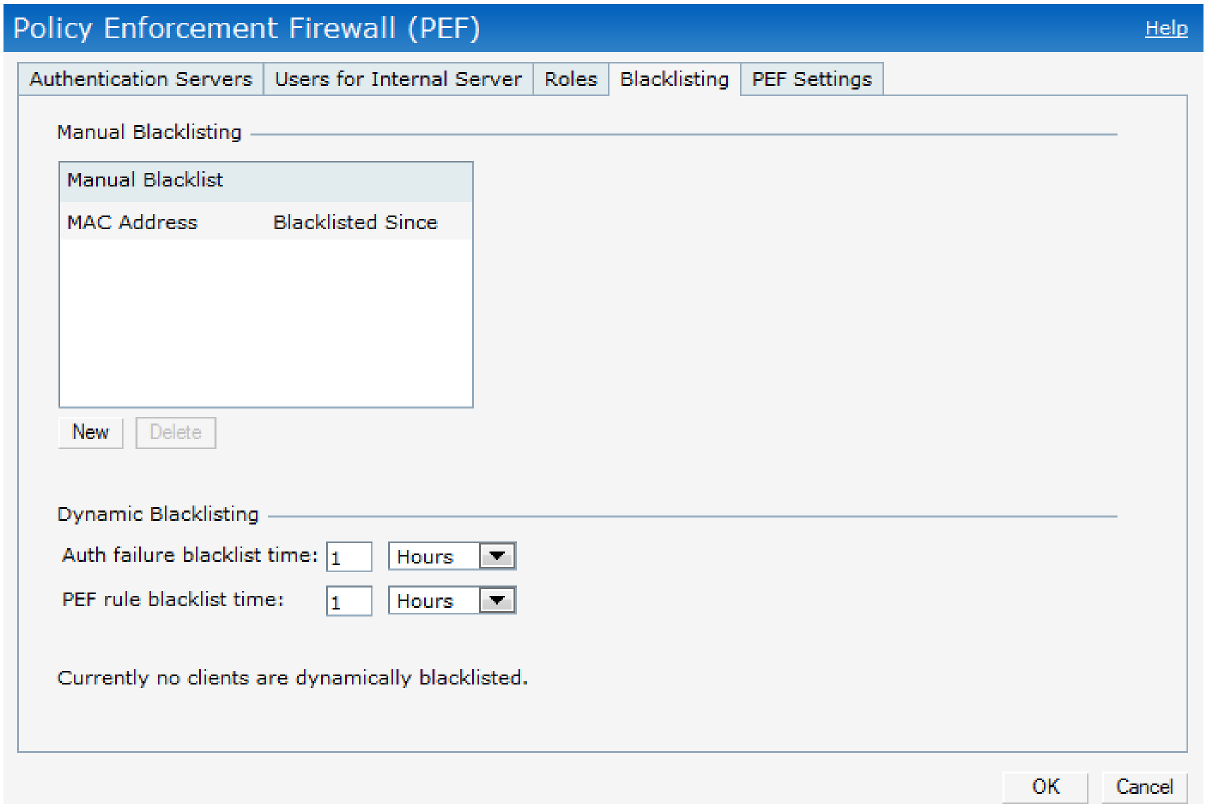
● Allow any to all destinations

Note that the rule list is ordered -- use the arrow buttons to move the selected rule up or down

Client Blacklisting

The client blacklisting denies connectivity to the blacklisted clients. When a client is blacklisted in an Alcatel-Lucent OAW-IAP, the client is not allowed to associate with the OAW-IAP in the network. If a client is connected to the network when it is blacklisted, a deauthentication message is sent to force the client to disconnect.

Figure 206 - *Client Blacklisting*



Auth failure blacklist time: 1 Hours

PEF rule blacklist time: 1 Hours

Currently no clients are dynamically blacklisted.

Types of Client Blacklisting

- The following types of client blacklisting can be generated in an Instant:
- Manual Blacklisting
- Dynamic Blacklisting
  - Authentication Failure Blacklisting
  - Session Firewall Based Blacklisting

Manual Blacklisting

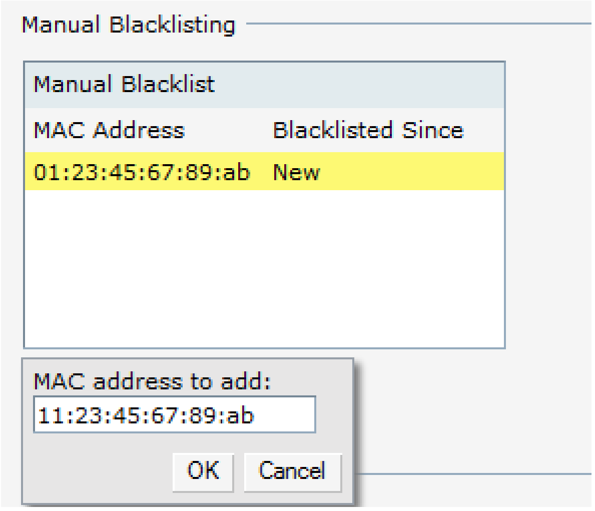
Manual blacklisting is the simplest way to add a client to the blacklist. In manual blacklisting, the MAC address of the client has to be known to the user. These clients would be added into a permanent blacklist. These clients are not allowed to connect to the network unless they are removed from the blacklist.

Adding a Client to the Manual Blacklist

To add a client to the blacklist manually using the MAC address of the client:

1. Click on the **PEF** link and then select **Blacklisting** tab.
2. Click on the **New** button under the **Manual Blacklisting** window.
3. Enter the MAC address of the client to be blacklisted in the **MAC address to add** text box.

Figure 207 - *Manual Blacklisting*



MAC Address	Blacklisted Since
01:23:45:67:89:ab	New

MAC address to add: 11:23:45:67:89:ab

4. Click **Ok**.

The **Blacklisted Since** tab displays the time at which the current blacklisting started for the client.

5. To delete a client from the manual blacklist, select the MAC Address of the client under the **Manual Blacklisting** window and then click **Delete**.

Dynamic Blacklisting

The clients can be blacklisted dynamically when they exceed the authentication failure threshold or a blacklisting rule was triggered as part of the authentication process.

Authentication Failure Blacklisting

When the time taken by a client fails to authenticate exceeds the configured threshold, the client is automatically blacklisted by an OAW-IAP.

Session Firewall Based Blacklisting

In session firewall based blacklisting, an ACL rule is used to enable the option for automation blacklisting. when the ACL rule is hit, it would send out blacklist information and the client would be blacklisted.

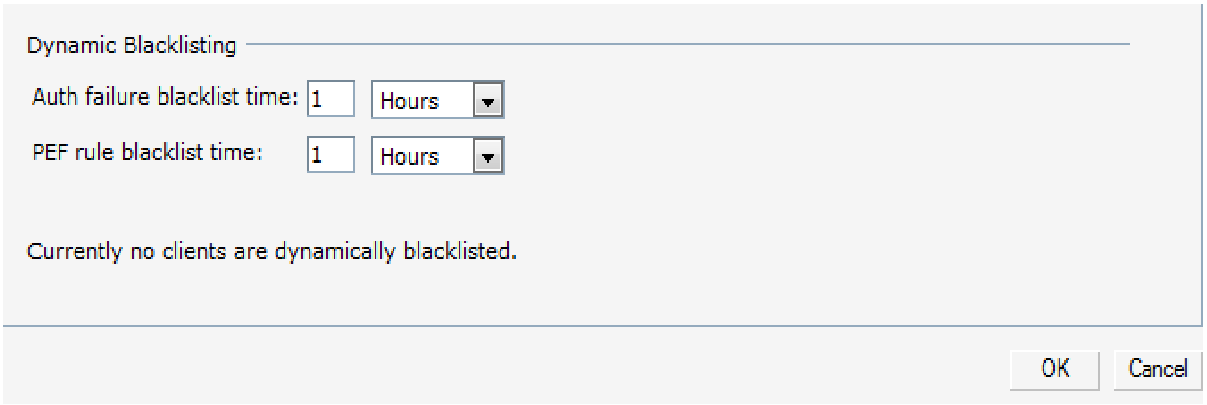
To set the blacklist duration:

1. Select the **PEF** link and then select **Blacklisting** tab.
   - **Auth failure blacklist time**— Enter the duration since the blacklisting has been triggered when the authentication failure threshold is exceeded.
   - **PEF rule blacklisted time**— Enter the duration since the blacklisting has been triggered when a blacklisting rule has been triggered.

NOTE

In the **Networks** tab, click the **New** link and navigate to **New WLAN > VLAN > Security** page to enable Blacklisting. Set a value between 1 to 10 in the max authentication failures field for the selected SSID. To enable session firewall based blacklisting, click **New** and navigate to **WLAN Settings > VLAN > Security > Access** window and enable the **Blacklist** option of the corresponding ACL rule.

Figure 208 - *Dynamic Blacklisting*



Dynamic Blacklisting

Auth failure blacklist time: 1 Hours

PEF rule blacklist time: 1 Hours

Currently no clients are dynamically blacklisted.

PEF Settings

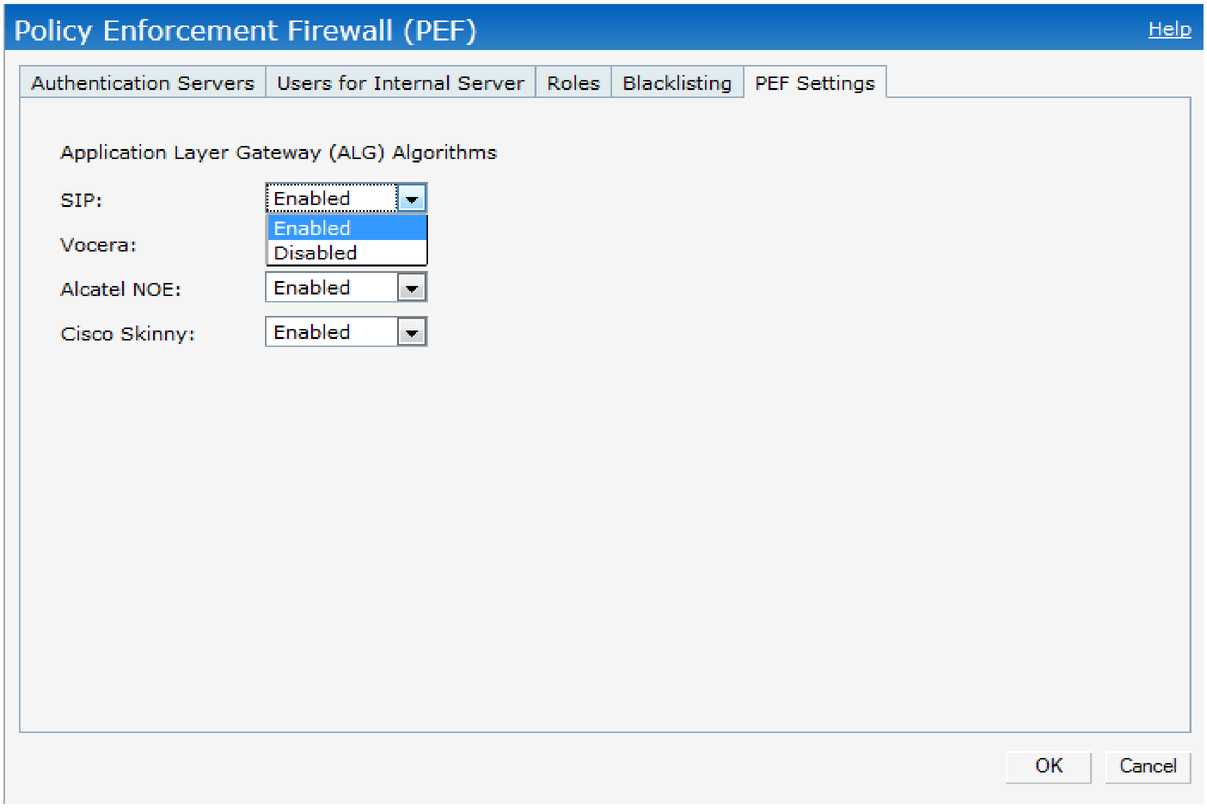
Firewall ALG Configuration

Instant firewall now supports the ALG (Application Layer Gateway) functions such as SIP, Vocera, Alcatel NOE, and Cisco Skinny protocols.

To enable or disable the protocols for ALG in Alcatel-Lucent Instant perform the following steps:

1. Select **PEF** from the top right of the Instant UI.
2. Select **PEF Settings** tab.
3. Select **Enabled** from the corresponding drop-down list to enable SIP, VOCERA, Alcatel NOE, and Cisco skinny protocols.

Figure 209 - *Enabling ALG Protocols*



Policy Enforcement Firewall (PEF)

Application Layer Gateway (ALG) Algorithms

SIP: Enabled

Vocera:

Alcatel NOE: Enabled

Cisco Skinny: Enabled

4. Click **OK.**

NOTE

When the protocols for ALG are **Disabled** the changes do not take effect until the existing user sessions expire. Reboot the IAP and the client, or wait for few minutes to ensure the changes take effect.

Firewall-based Logging

Instant firewall now supports firewall based logging function. The firewall logs on the Instant APs are generated as syslog messages.

Chapter 30
VPN Configuration

The OAW-IAP supports termination of a VPN tunnel on the Alcatel-Lucent controller.

VPN features are ideal for:

- enterprises with many branches that do not have a dedicated VPN connection to the corporate office.
- branch offices that require multiple APs.
- individuals working from home, connecting to the VPN.

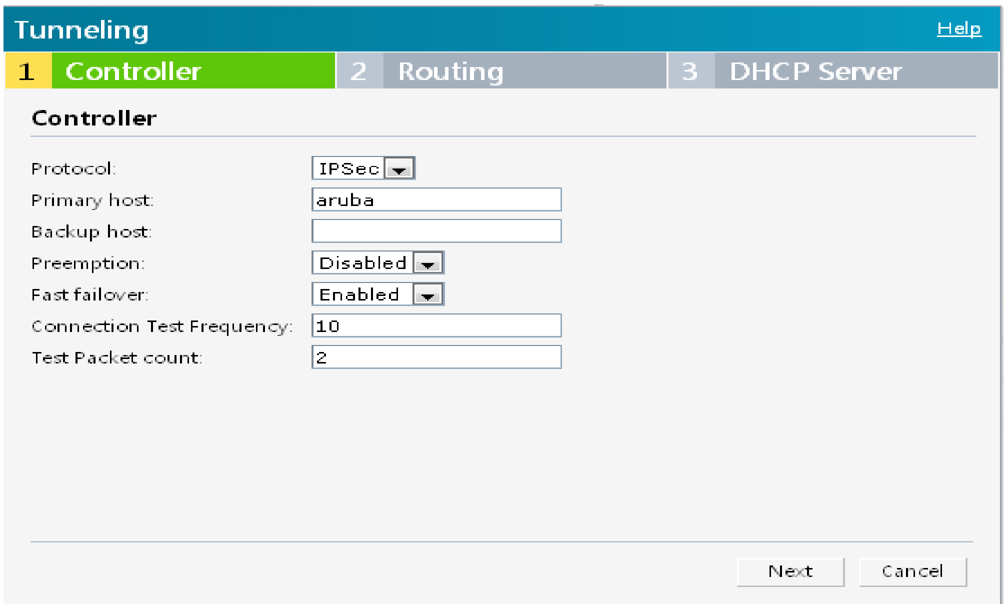
This new architecture and form factor seamlessly adds the survivability feature of Instant APs with the VPN connectivity of RAPs — providing corporate connectivity to non-corporates.

VPN Configuration

The VPN configuration functionality enables the OAW-IAP to create a single VPN tunnel from the Virtual Controller to a Alcatel-Lucent Mobility Switch in your corporate office. Here, the VPN tunnels from the Instant APs terminate on the Alcatel-Lucent Mobility Switch. The controller solely acts as a VPN end-point and does not supply the Instant AP with any configuration.

To create a VPN tunnel from the Virtual Controller to an Alcatel-Lucent Mobility Switch:

Figure 210 - *Tunneling— Controller*



Controller

Protocol: IPSec

Primary host: aruba

Backup host:

Preemption: Disabled

Fast failover: Enabled

Connection Test Frequency: 10

Test Packet count: 2

1. Navigate to the **VPN** link at the top right corner of the Instant UI. The **Tunneling** window appears.
2. Select **IPSec** from the **Protocol** drop-down list.
3. If you select **GRE** from the **Protocol** drop-down list then the packets are sent and received without encryption.
   a. **GRE type** — Enter the value for GRE type parameter.

b. **Per-AP tunnel** — Select **Enabled** or **Disabled** from the **Per-AP tunnel** drop-down list. The user can create GRE tunnels from all of the APs instead of creating tunnels only from the AP that is acting as the Virtual Controller. The traffic going to the corporate is sent via L2 GRE tunnel from the AP itself and does not have to be forwarded through the Virtual Controller.

NOTE

By default, the **Per-AP tunnel** option is disabled.

4. Enter the IP address or fully qualified domain name for the main VPN/GRE endpoint in the **Primary host** field.
5. Enter the IP address or fully qualified domain name for the backup VPN endpoint in the **Backup host** field. This entry is optional.
6. Select **Enabled** from the **Preemption** drop-down list to switch back to the primary host when and if it becomes available again. This step is optional.
7. Select **Enabled** or **Disabled** from the **Fast failover** drop-down list.
8. Enter **Connection test frequency** at which packets are sent to the controller. The unit is seconds per packet and the default value is 10 seconds which means that every 10 seconds the OAW-IAP will send one packet to the controller.

NOTE

This value should be less than L3 user time out value in the Alcatel-Lucent Controller. For example, if L3 user timeout in the Alcatel-Lucent Controller is 5 minutes, the Connection test frequency should be less than 300 seconds.

9. Enter **Test packet count** which is the number of lost packets and after which the OAW-IAP will make the tunnel down. The default value is 2.
10. Click **Next** to continue.

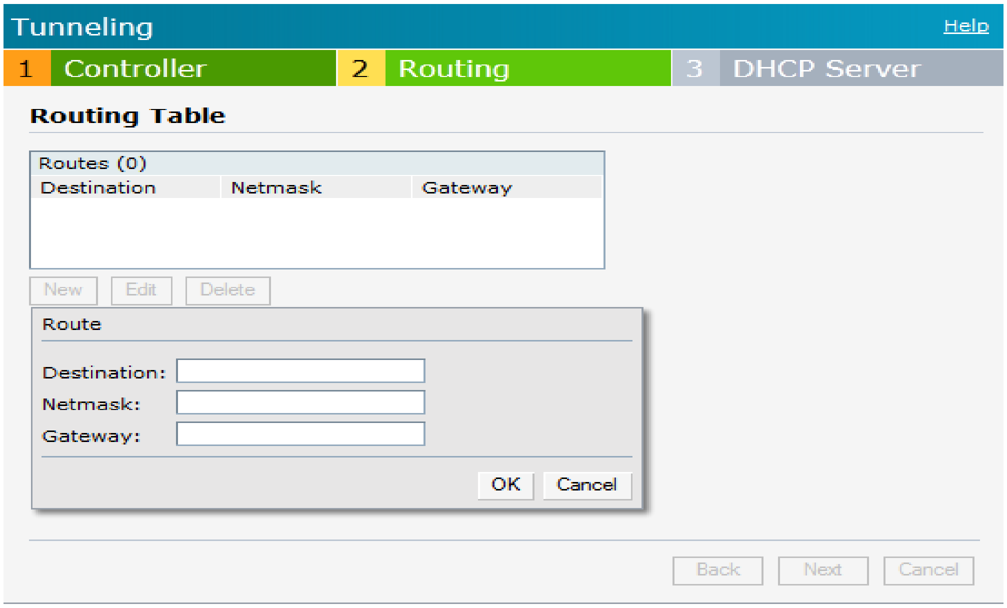
Fast Failover

Enabling the fast failover feature allows the OAW-IAP to create a backup VPN tunnel to the controller along with the primary tunnel, and maintain both the primary and backup tunnel separately. If the primary tunnel fails, the OAW-IAP can switch the data stream to the backup tunnel. This reduces the total failover time to less than one minute.

Routing Profile Configuration

Instant can terminate a single VPN connection on an Alcatel-Lucent Mobility Switch. The Routing profile defines the corporate subnets which need to be tunneled through the IPSec tunnel.

Figure 211 - *Tunneling— Routing*



Use the **Routing Table** to specify policy based on routing into the VPN tunnel. Each routing table entry has a destination, network mask, and default gateway.

1. Click **New** and update the following parameters.
   - Destination— Specify the destination network to be routed into the VPN tunnel.
   - Netmask— Specify the network mask of the network to be routed into the VPN tunnel.
   - Gateway— Specify the gateway to which traffic should be routed. This IP address should be the ‘controller-ip’ of the controller on which the VPN connection is terminated. See Switch Configuration for VPN on page 319 for more information.
2. Click **Next** to continue.
3. The **DHCP Server** window appears. Use this table to define DHCP pools of different types based on your deployment modes as described in the following section.

DHCP Server Configuration

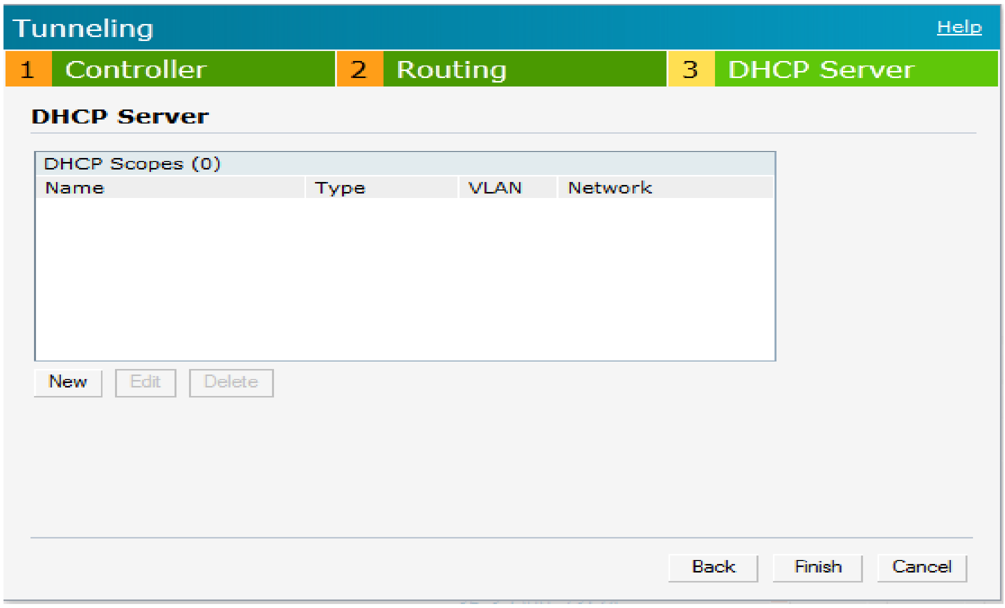
The Virtual Controller (VC) on an Instant AP enables different DHCP pools (various deployment models) in addition to allocating IP subnets to each branch. The following modes of DHCP server are supported:

- Local Subnet— In this mode, the VC assigns an IP address from a configured subnet and forwards traffic to both **corporate** and **non-corporate** destinations. This is achieved by appropriately translating the network address (NAT) and forwarding the packet through the IPSec tunnel or through the uplink.
- L2 Switching Mode— In this mode, Instant supports the following two types to support L2 switching mode of connection to corporate:
  - Distributed L2— In this mode, the VC assigns an IP address from a configured subnet and forwards traffic to both **corporate** and **non-corporate** destinations. The VC adds the VLAN configured in this subnet to the controller VLAN multicast table enabling the L2 subnet to act as an extension of the VLAN on the controller. Corporate traffic is sent on the IPSec tunnel and non-corporate traffic is sent on the uplink.
  - Centralized L2— In this mode, the VC does not assign an IP address to the client, but the DHCP traffic is directly forwarded to the controller over the IPSec tunnel and gets an IP address from either the controller or a DHCP server behind the controller serving the

VLAN of the client. However, Instant AP does forward client traffic in the same way as the **Distributed L2** mode.

- L3 Routing Mode— In this mode, Instant supports L3 routing mode of connection to corporate. VC assigns an IP addresses from the configured subnet and forwards traffic to both **corporate** and **non-corporate** destinations. Instant AP takes care of routing on the subnet and also adds a route on the controller after the VPN tunnel is set up during the registration of the subnet.

Figure 212 - *Tunneling— DHCP Server*



DHCP Scopes (0)

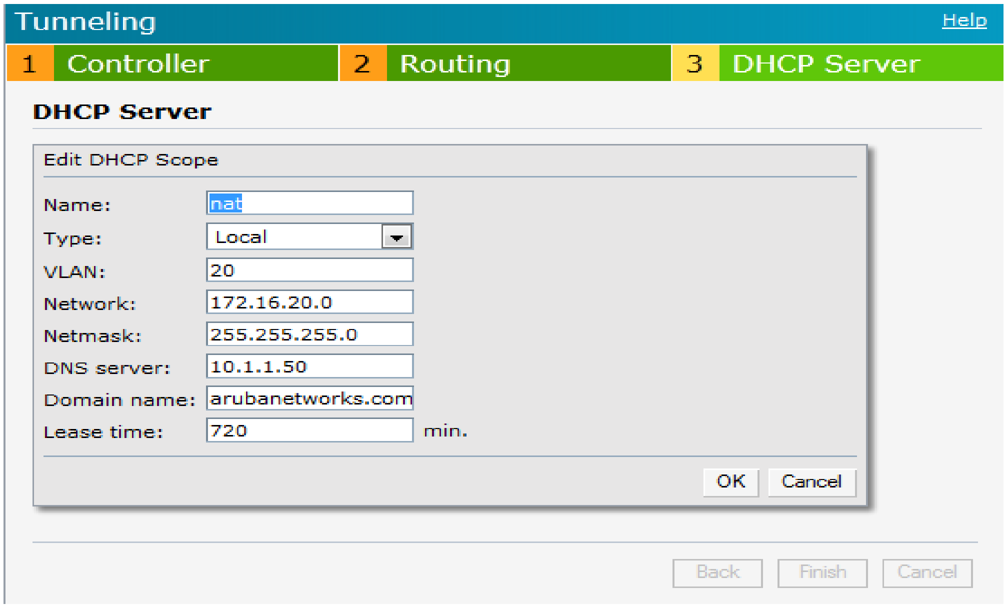
Name	Type	VLAN	Network

NAT DHCP Configuration

In NAT mode, the scope of the subnet is local to the OAW-IAP and forwards traffic through the IPSec tunnel or through the uplink.

1. Click **New** in the **DHCP Server** window and select **Local** to configure the following parameters for NAT mode DHCP pool.
   - Name— Name of the subnet (must be unique).
   - Type— Indicates the type of DHCP server. Available options are Local, Distributed L3, Distributed L2, Centralized L2. **Local** implies that this is a NAT mode DHCP subnet.
   - VLAN— VLAN ID of the subnet. This needs to be referenced in the SSID configuration to make use of this subnet.
   - Network— Network to be used for this subnet.
   - Netmask— Net mask of the subnet. This along with Network determines the size of the subnet.
   - DNS server— An optional field which defines the DNS server.
   - Domain name— An optional field which defines the domain name.
   - Lease time— An optional field which defines the lease time for client.

Figure 213 - *NAT DHCP Configuration*



Name: nat
Type: Local
VLAN: 20
Network: 172.16.20.0
Netmask: 255.255.255.0
DNS server: 10.1.1.50
Domain name: arubanetworks.com
Lease time: 720 min.

2. Click **OK** to apply these changes.

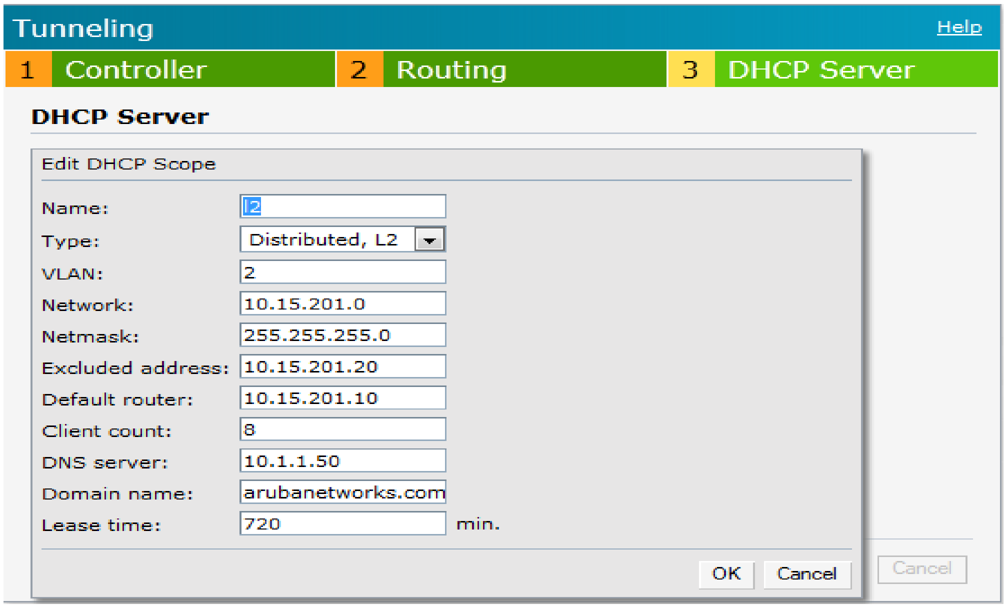
Distributed L2 DHCP Configuration

In Distributed L2 mode, the Virtual Controller acts as the DHCP Server but the default gateway is in the data center. Traffic is bridged into VPN tunnel.

1. Click **New** in the **DHCP Server** window and select **Distributed, L2** to configure the following parameters for Distributed L2 mode DHCP pool:
   - Name— Name of the subnet (must be unique).
   - Type— Indicates the type of DHCP server. Available options are Local, Distributed L3, Distributed L2, Centralized L2. **Distributed, L2** implies that this is a Distributed mode L2 DHCP subnet.
   - VLAN— VLAN ID of the subnet. This needs to be referenced in the SSID configuration to make use of this subnet.
   - Network— Network to be used for this subnet.
   - Netmask— Net mask of the subnet. This along with Network determines the size of the subnet.
   - Excluded address— This determines the exclusion range of the subnet. Based on the size of the subnet and value configured here (location within the subnet scope), this is used to either exclude IP addresses before this IP or after this IP. This is an optional field.
   - Default router— Default router for the subnet. This is an IP address on/behind the controller in the same subnet.
   - Client count— This along with network and mask determines how many branches can be supported. For the current phase of OAW-IAP, it is important that this value is configured consistent across all branches.
   - DNS server— An optional field which defines the DNS server.
   - Domain name— An optional field which defines the domain name.
   - Lease time— An optional field which defines the lease time for client.

2. Click **OK** to apply these changes.

Figure 214 - *Distributed L2 DHCP Configuration*



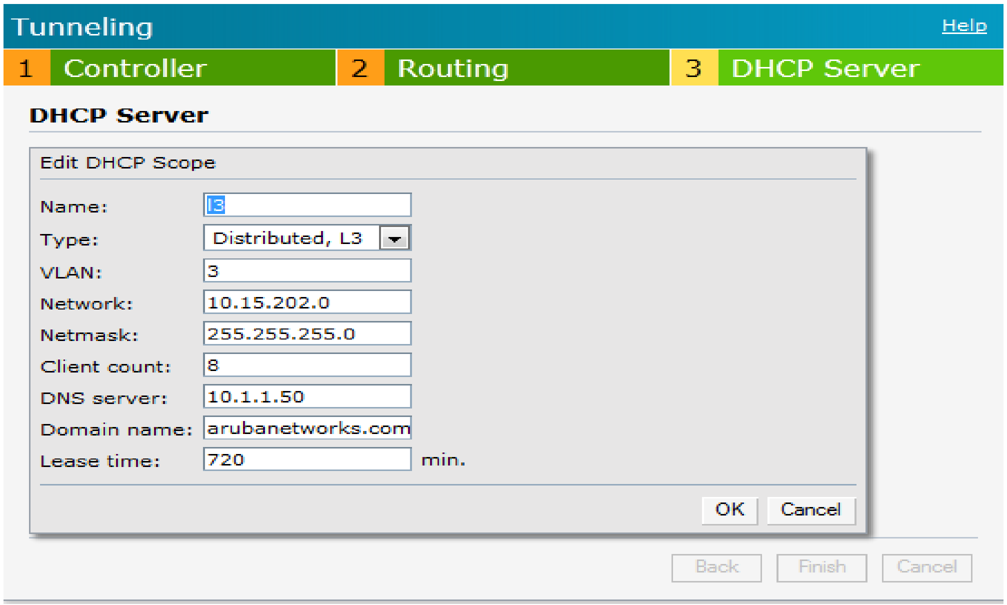
Name: L2
Type: Distributed, L2
VLAN: 2
Network: 10.15.201.0
Netmask: 255.255.255.0
Excluded address: 10.15.201.20
Default router: 10.15.201.10
Client count: 8
DNS server: 10.1.1.50
Domain name: arubanetworks.com
Lease time: 720 min.

Distributed L3 DHCP Configuration

In Distributed L3 mode, the Virtual Controller acts as both DHCP Server and default gateway. Traffic is routed into the VPN tunnel.

1. Click **New** in the **DHCP Server** window and select **Distributed, L3** to configure the following parameters for Distributed L3 mode DHCP pool:
   - Name — Name of the subnet (must be unique).
   - Type— Indicates the type of DHCP server. Available options are Local, Distributed L3, Distributed L2, Centralized L2. **Distributed, L3** implies that this is a Distributed mode L3 DHCP subnet.
   - VLAN— VLAN ID of the subnet. This needs to be referenced in the SSID configuration to make use of this subnet.
   - Network— Network to be used for this subnet.
   - Netmask— Net mask of the subnet. This along with Network determines the size of the subnet.
   - Client count— This along with network and mask determines how many branches can be supported. For the current phase of OAW-IAP, it is important that this value is configured consistent across all branches.
   - DNS server— An optional field which defines the DNS server.
   - Domain name— An optional field which defines the domain name.
   - Lease time— An optional field which defines the lease time for client
2. Click **OK** to apply these changes.

Figure 215 - *Distributed L3 DHCP Configuration*



DHCP Server

Edit DHCP Scope

Name: l3

Type: Distributed, L3

VLAN: 3

Network: 10.15.202.0

Netmask: 255.255.255.0

Client count: 8

DNS server: 10.1.1.50

Domain name: arubanetworks.com

Lease time: 720 min.

Centralized L2 DHCP Configuration

In Centralized L2 mode, both the DHCP server and default gateway are in the data center, on the other side of the VPN tunnel.

1. Click **New** in the **DHCP Server** window and select **Centralized, L2** to configure the following parameters for the Distributed L3 mode DHCP pool:
   - Name — Name of the subnet (must be unique).
   - Type— Indicates the type of DHCP server. Available options are Local, Distributed L3, Distributed L2, Centralized L2. **Centralized, L2** implies that this is a Centralized mode L2 DHCP subnet.
   - VLAN— VLAN ID of the subnet. This needs to be referenced in the SSID configuration to make use of this subnet.
   - DHCP Relay Agent and Option 82— Select to enable or disable these features.

   When a DHCP server is configured with a DHCP Relay agent, the client's Broadcast DHCP Discover packet is not sent to the corporate network, instead the Virtual Controller acts as the DHCP Relay and unicasts DHCP packets to the corporate DHCP server. Enable DHCP Option 82 to allow clients to send DHCP packets with the Option 82 string.

   The Option 82 string is available only in the Alcatel (ALU) format. The ALU format for the Option 82 string consists of the following:
   - Remote Circuit ID¡ X AP-MAC; SSID; SSID-Type
   - Remote Agent¡ X IDUE-MAC

The Option 82 is specific to Alcatel and is not configurable in this version of Instant.

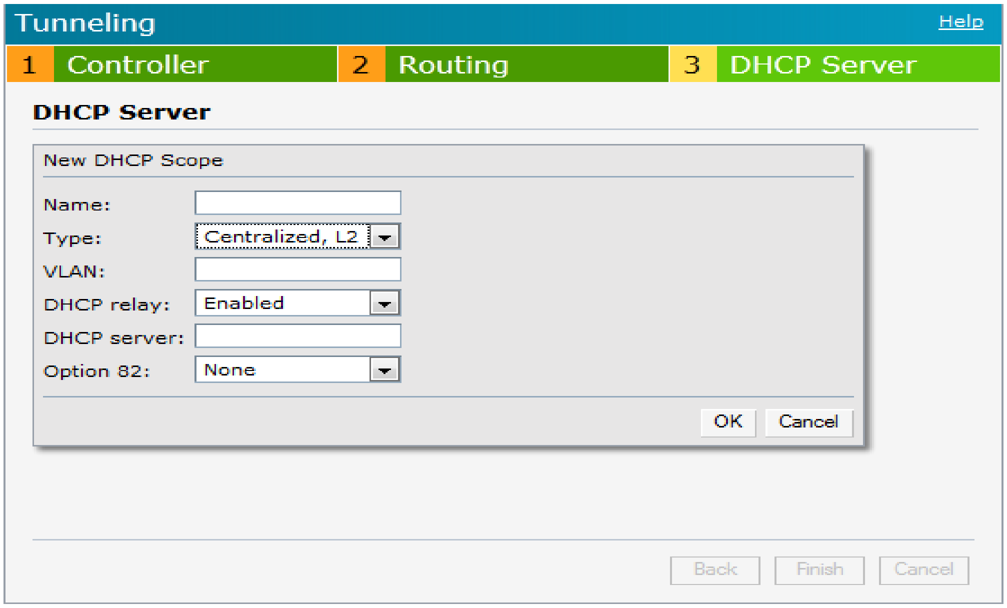
The following table describes the behavior of DHCP Relay Agent and Option 82 in the OAW-IAP.

Table 46 - *DHCP Relay and Option 82*

DHCP Relay	Option 82	Behavior
Enabled	Enabled	DHCP packet relayed with the ALU-specific Option 82 string
Enabled	Disabled	DHCP packet relayed without the ALU-specific Option 82 string
Disabled	Enabled	DHCP packet not relayed, but broadcasted with the ALU-specific Option 82 string
Disabled	Disabled	DHCP packet not relayed, but broadcasted without the ALU-specific Option 82 string

2. Click **OK** to apply these changes.

Figure 216 - *Centralized L2 DHCP Configuration*



Tunneling

DHCP Server

New DHCP Scope

Name:	
Type:	Centralized, L2
VLAN:	
DHCP relay:	Enabled
DHCP server:	
Option 82:	None

In Alcatel-Lucent Instant, the user database consists of a list of guest and employee users. Addition of a user involves specifying a username and password for the user. The login credentials for these users are provided outside the Alcatel-Lucent Instant system.

A guest user can be a visitor who is temporarily using the enterprise network to access the internet. However, you may not want to share the internal network and the intranet with them. To segregate the guest traffic from the enterprise traffic, you can create a Guest WLAN, specify the required authentication, encryption, and access rules and allow the guest user to use the enterprise network.

An employee user is the employee who is using the enterprise network for various official tasks. You can create Employee WLANs, specify the required authentication, encryption and access rules and allow the employees to use the enterprise network.

NOTE

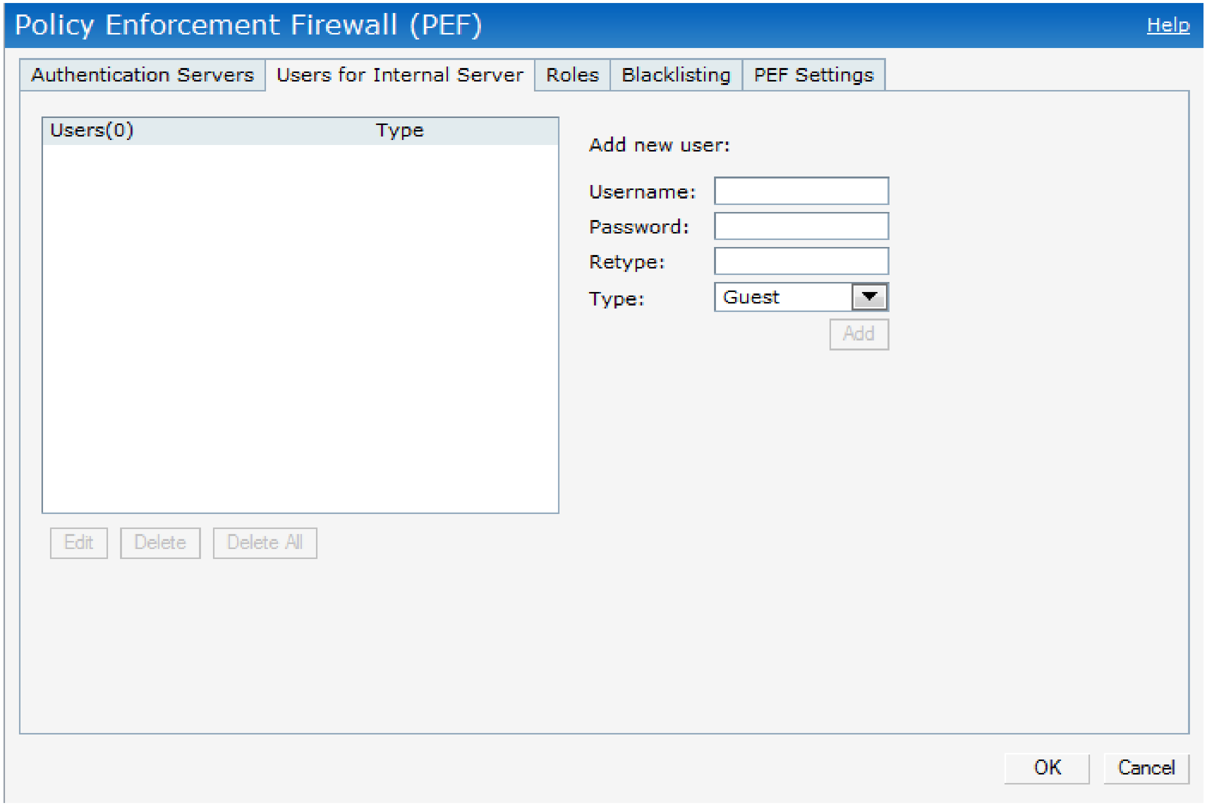
The User Database is also used when Instant is employed as an internal RADIUS server.

Adding a User

To add a user:

1. At the top right corner of the Instant UI, click the **PEF** link and click **Users for Internal Server**.

Figure 217 - *Adding a User*



2. Enter the username in the **Username** text box.
3. Enter the password in the **Password** text box and reconfirm.
4. Select appropriate network type from the **Type** drop-down list.
5. Click **Add** and click **OK.** The users are listed in the **Users** list.

Editing User Settings

To edit user settings:

1. At the top right corner of the Instant UI, click the **Users** link. The **Users** window appears.
2. In the **Users** section, select the username for which you want to edit the settings and click **Edit.** The user's details appear on the right side.
3. Edit as required and click **OK**.

Deleting a User

To delete a user:

1. At the top right corner of the Instant UI, click the **Users** link. The **Users** window appears.
2. In the **Users** section, select the username that you want to delete and click **Delete.**
   To delete all users or multiple users at a time, select the usernames that you want to delete, and click **Delete All**.

NOTE

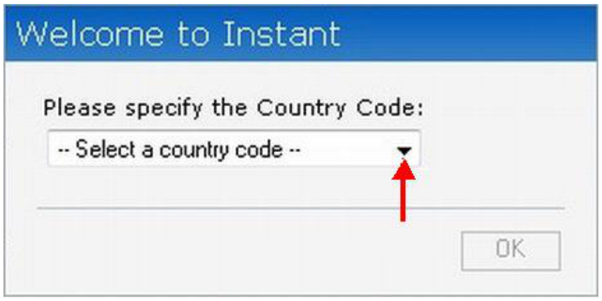
Deleting a user only removes the user record from the user database, and won't disconnect the online user associated with this username.

The IEEE 802.11/b/g/n Wi-Fi networks operate in the 2.4 GHz spectrum and IEEE 802.11a/n operate in the 5.0 GHz spectrum. These spectrums are divided into channels. The 2.4 GHz spectrum is divided into 14 overlapping, staggered 20 MHz wireless carrier channels. These channels are spaced 5 MHz apart. The 5 GHz spectrum is divided into more channels. The channels that can be used in a particular country differ based on the regulations of that country.

The initial Wi-Fi setup requires you to specify the country code for the country in which the Alcatel-Lucent Instant operates. This configuration sets the regulatory domain for the radio frequencies that the OAW-IAPs use. Within the regulated transmission spectrum, a high-throughput 802.11a, 802.11b/g, or 802.11n radio setting can be configured. The available 20 MHz and 40 MHz channels are dependent on the specified country code.

You cannot change the country code for the OAW-IAPs designated for US, Japan, and Israel. Improper country code assignment can disrupt wireless transmissions. Most countries impose penalties and sanctions on operators of wireless networks with devices set to improper country codes. Country Codes List on page 313 shows the list of country codes.

Figure 218 - *Specifying a Country Code*



Welcome to Instant

Please specify the Country Code:

-- Select a country code --

Country Codes List

Table 47 - *Country Codes List*

Code	Country Name
US	United States
CA	Canada
JP3	Japan
DE	Germany
NL	Netherlands
IT	Italy
PT	Portugal

Code	Country Name
LU	Luxembourg
NO	Norway
FI	Finland
DK	Denmark
CH	Switzerland
CZ	Czech Republic
ES	Spain
GB	United Kingdom
KR	Republic of Korea (South Korea)
CN	China
FR	France
HK	Hong Kong
SG	Singapore
TW	Taiwan
BR	Brazil
IL	Israel
SA	Saudi Arabia
LB	Lebanon
AE	United Arab Emirates
ZA	South Africa
AR	Argentina
AU	Australia
AT	Austria
BO	Bolivia
CL	Chile
GR	Greece
IS	Iceland
IN	India

Code	Country Name
IE	Ireland
KW	Kuwait
LI	Liechtenstein
LT	Lithuania
MX	Mexico
MA	Morocco
NZ	New Zealand
PL	Poland
PR	Puerto Rico
SK	Slovak Republic
SI	Slovenia
TH	Thailand
UY	Uruguay
PA	Panama
RU	Russia
KW	Kuwait
LI	Liechtenstein
LT	Lithuania
MX	Mexico
MA	Morocco
NZ	New Zealand
PL	Poland
PR	Puerto Rico
SK	Slovak Republic
SI	Slovenia
TH	Thailand
UY	Uruguay
PA	Panama
RU	Russia

Code	Country Name
EG	Egypt
TT	Trinidad and Tobago
TR	Turkey
CR	Costa Rica
EC	Ecuador
HN	Honduras
KE	Kenya
UA	Ukraine
VN	Vietnam
BG	Bulgaria
CY	Cyprus
EE	Estonia
MU	Mauritius
RO	Romania
CS	Serbia and Montenegro
ID	Indonesia
PE	Peru
VE	Venezuela
JM	Jamaica
BH	Bahrain
OM	Oman
JO	Jordan
BM	Bermuda
CO	Colombia
DO	Dominican Republic
GT	Guatemala
PH	Philippines
LK	Sri Lanka
SV	El Salvador

Code	Country Name
TN	Tunisia
PK	Islamic Republic of Pakistan
QA	Qatar
DZ	Algeria

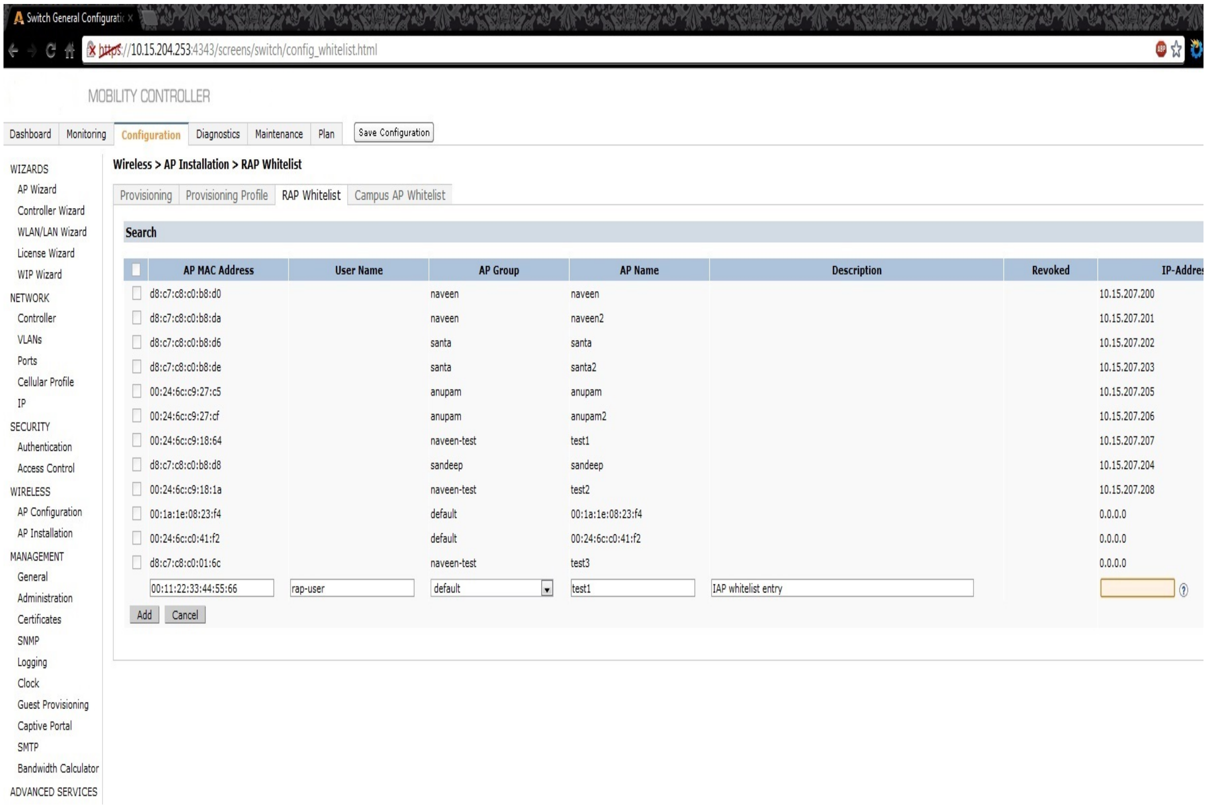
On the switch, the following configuration is needed to setup an OAW-IAP.

Whitelist DB Configuration

If you decide to use the Switch as the whitelist entry to configure the whitelist database, use the following CLI command:

```
(Alcatel-Lucent3400) #local-userdb-ap add mac-address 00:11:22:33 44:55 ap-group test
(Alcatel-Lucent3400) #
```

The ap-group parameter is not used for any configuration, but needs to be configured. The parameter can be any valid string. If an external whitelist is being used, the AP MAC address needs to be saved in the RADIUS server as a lower-case entry without any delimiter.

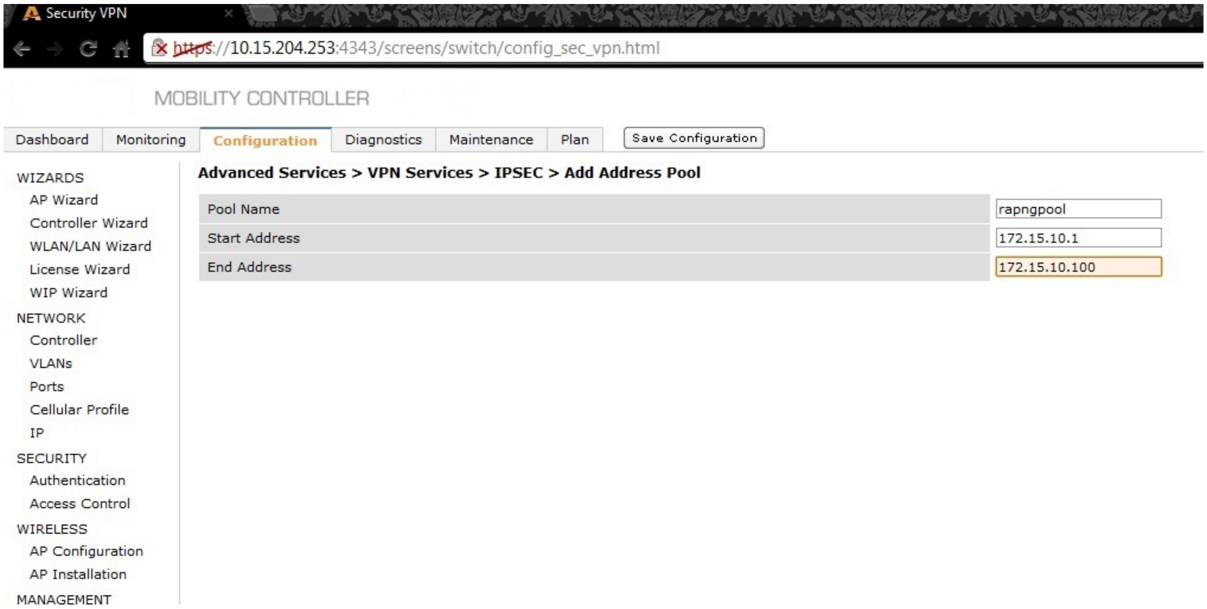


□	AP MAC Address	User Name	AP Group	AP Name	Description	Revoked	IP-Addres
□	d8:c7:c8:c0:b8:d0		naveen	naveen			10.15.207.200
□	d8:c7:c8:c0:b8:da		naveen	naveen2			10.15.207.201
□	d8:c7:c8:c0:b8:d6		santa	santa			10.15.207.202
□	d8:c7:c8:c0:b8:de		santa	santa2			10.15.207.203
□	00:24:6c:c9:27:c5		anupam	anupam			10.15.207.205
□	00:24:6c:c9:27:cf		anupam	anupam2			10.15.207.206
□	00:24:6c:c9:18:64		naveen-test	test1			10.15.207.207
□	d8:c7:c8:c0:b8:d8		sandeep	sandeep			10.15.207.204
□	00:24:6c:c9:18:1a		naveen-test	test2			10.15.207.208
□	00:1a:1e:08:23:f4		default	00:1a:1e:08:23:f4			0.0.0.0
□	00:24:6c:c0:41:f2		default	00:24:6c:c0:41:f2			0.0.0.0
□	d8:c7:c8:c0:01:6c		naveen-test	test3			0.0.0.0
	00:11:22:33:44:55:66	rap-user	default	test1	IAP whitelist entry		

VPN Local Pool Configuration

This pool is used to assign an IP Address to the OAW-IAP after successful VPN authentication.

```
(Alcatel-Lucent3400) # ip local pool "rapngpool" <startip> <endip>
(Alcatel-Lucent3400) #
```



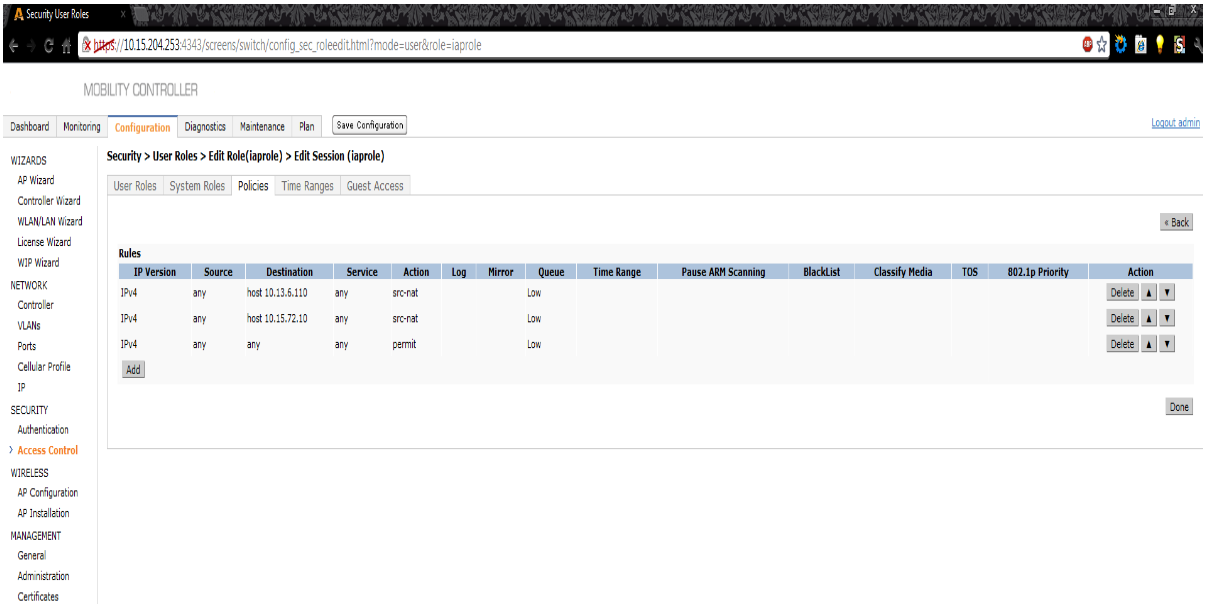
Advanced Services > VPN Services > IPSEC > Add Address Pool

Pool Name	rapngpool
Start Address	172.15.10.1
End Address	172.15.10.100

IAP VPN Profile Configuration

This defines the server used to authenticate the OAW-IAP (internal or an external server) and the role for OAW-IAP user. This role is used to define the src-nat rule to RADIUS server to allow Dynamic RADIUS proxy.

```
(Alcatel-Lucent3400) (config) #ip access-list session iaprole
(Alcatel-Lucent3400) (config-sess-iaprole)#any host <radius-server-ip> any src-nat
(Alcatel-Lucent3400) (config-sess-iaprole)#any any any permit
(Alcatel-Lucent3400) (config-sess-iaprole)#!
```

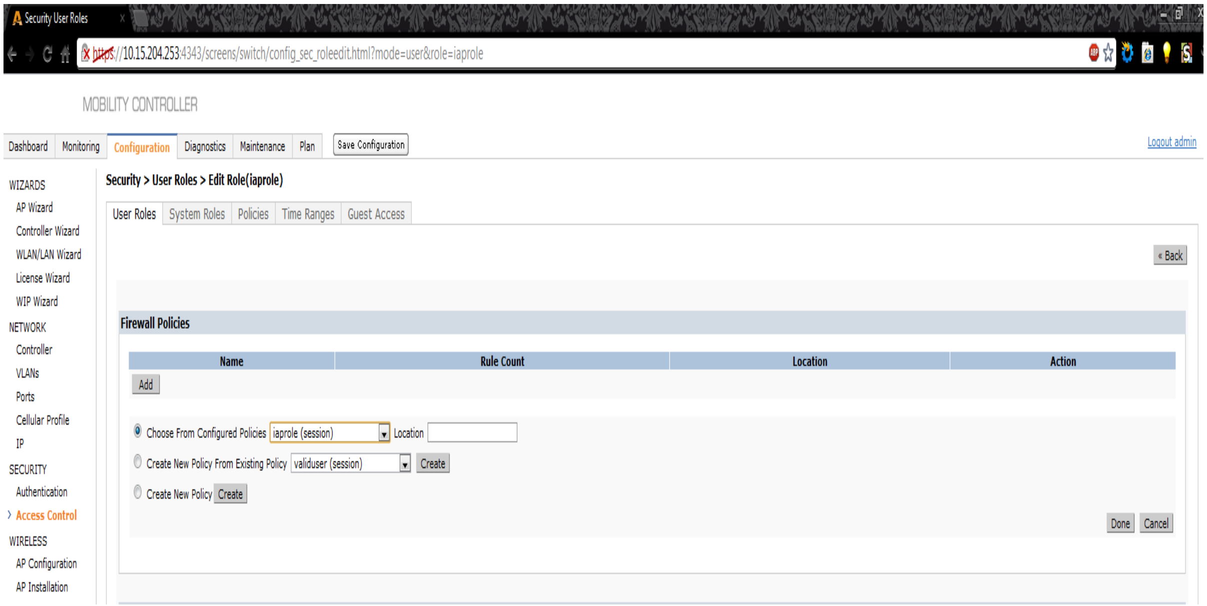


Security > User Roles > Edit Role(iaprole) > Edit Session (iaprole)

Rules

IP Version	Source	Destination	Service	Action	Log	Mirror	Queue	Time Range	Pause ARM Scanning	BlackList	Classify Media	TOS	802.1p Priority	Action
IPv4	any	host 10.13.6.110	any	src-nat			Low							Delete ▲ ▼
IPv4	any	host 10.15.72.10	any	src-nat			Low							Delete ▲ ▼
IPv4	any	any	any	permit			Low							Delete ▲ ▼

```
(Alcatel-Lucent3400) (config) #user-role iaprole
(Alcatel-Lucent3400) (config-role) #session-acl iaprole
(Alcatel-Lucent3400) (config-role) #
```



Security > User Roles > Edit Role(iaprole)

Firewall Policies

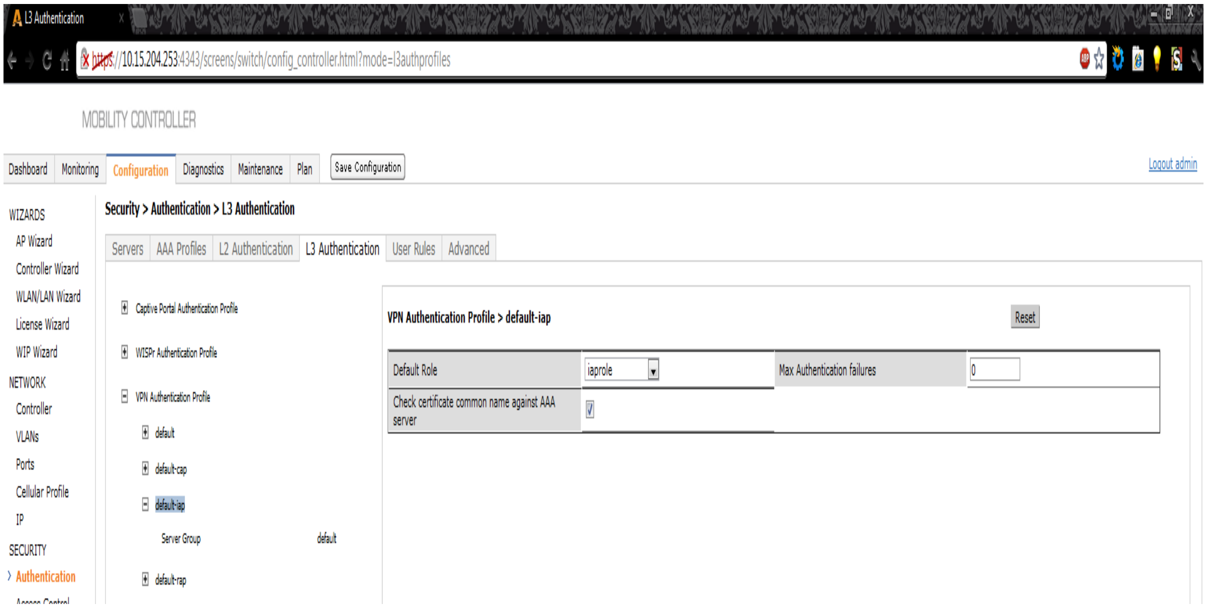
Name	Rule Count	Location	Action

● Choose From Configured Policies: iaprole (session) Location:

○ Create New Policy From Existing Policy: validuser (session) Create

○ Create New Policy Create

```
(Alcatel-Lucent3400) (config) #aaa authentication vpn default-iap
(Alcatel-Lucent3400) (VPN Authentication Profile "default-iap") #server-group default
(Alcatel-Lucent3400) (VPN Authentication Profile "default-iap") #default-role iaprole
(Alcatel-Lucent3400) (VPN Authentication Profile "default-iap") #!
(Alcatel-Lucent3400) (config) #
```



Security > Authentication > L3 Authentication

VPN Authentication Profile > default-iap

Default Role	iaprole	Max Authentication failures	0
Check certificate common name against AAA server	☑		

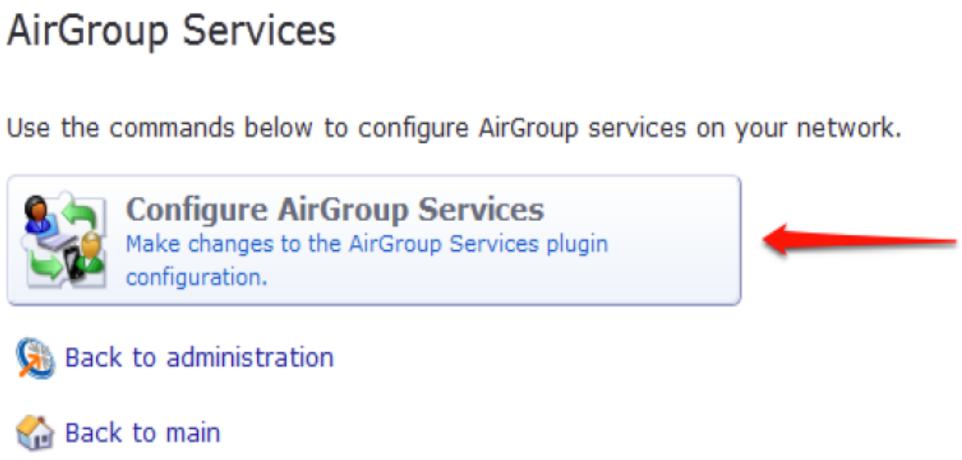
default-iap: Server Group default

The purpose of this chapter is to help you configure AirGroup with ClearPass 6.0.1.

ClearPass Setup

1. On ClearPass Guest, navigate to **Administration > AirGroup Services**.
2. Click **Configure AirGroup Services**.

Figure 219 - *Configure AirGroup Services*



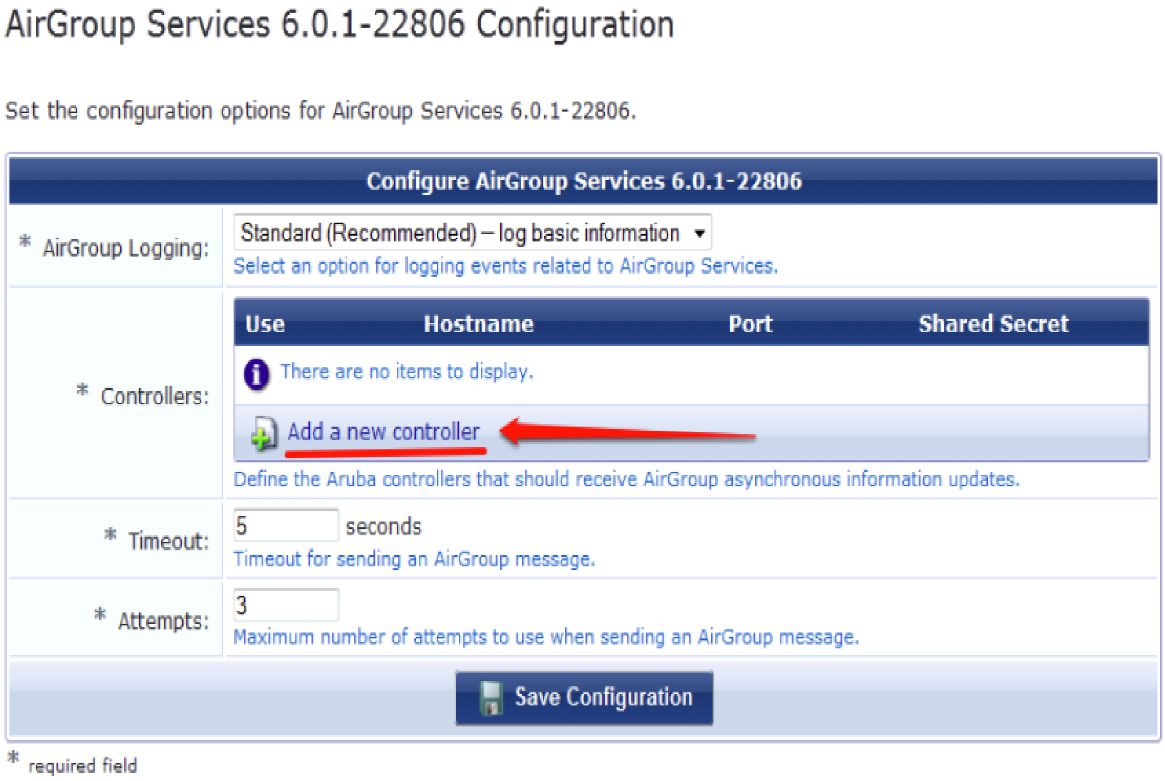
AirGroup Services

Use the commands below to configure AirGroup services on your network.

Configure AirGroup Services
Make changes to the AirGroup Services plugin configuration.
Back to administration
Back to main

3. Click **Add a new controller**.

Figure 220 - *Add a New Controller for AirGroup Services.*



AirGroup Services 6.0.1-22806 Configuration

Set the configuration options for AirGroup Services 6.0.1-22806.

Configure AirGroup Services 6.0.1-22806

* AirGroup Logging:	Standard (Recommended) – log basic information ▾ Select an option for logging events related to AirGroup Services.
* Controllers:	Use / Hostname / Port / Shared Secret There are no items to display. Add a new controller Define the Aruba controllers that should receive AirGroup asynchronous information updates.
* Timeout:	5 seconds Timeout for sending an AirGroup message.
* Attempts:	3 Maximum number of attempts to use when sending an AirGroup message.

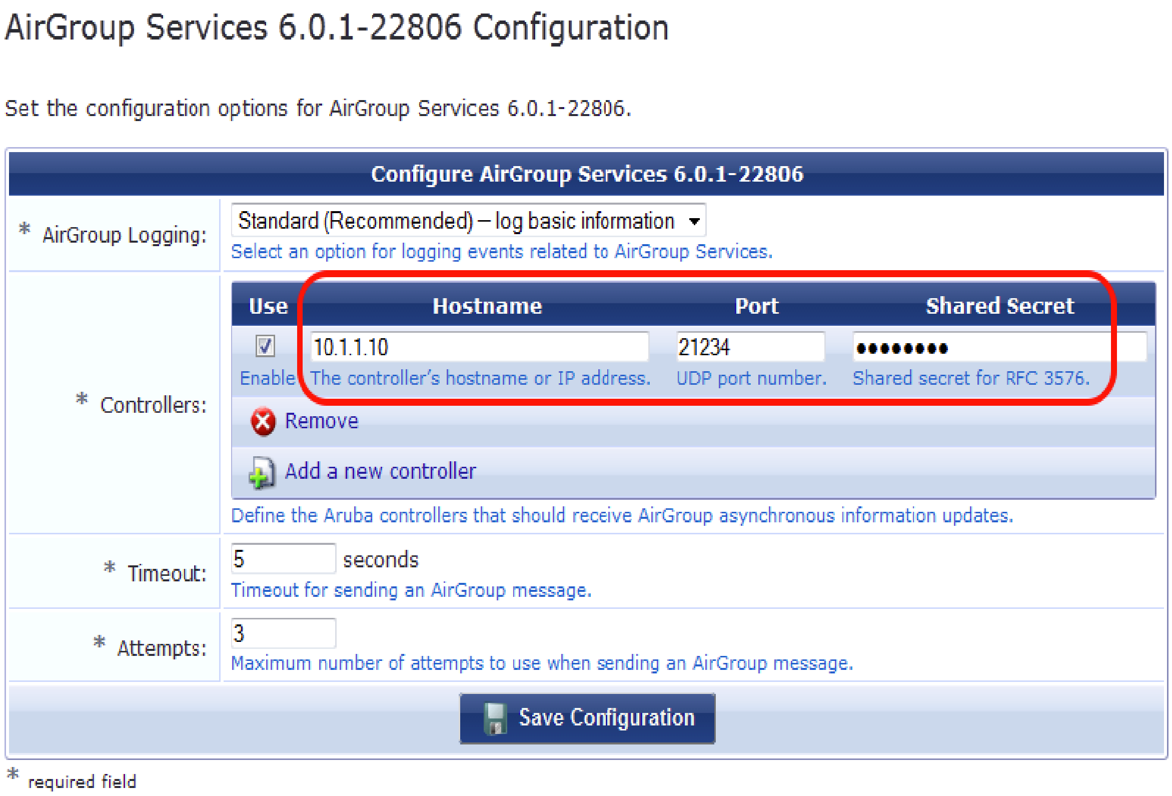
* required field

4. Update the fields with the appropriate information.

NOTE

Ensure that the port configured matches the CoA port (RFC 3576) set on the IAP configuration.

Figure 221 - *Configure AirGroup Services Controller Settings*



AirGroup Services 6.0.1-22806 Configuration

Set the configuration options for AirGroup Services 6.0.1-22806.

Configure AirGroup Services 6.0.1-22806

* AirGroup Logging:	Standard (Recommended) – log basic information ▾ Select an option for logging events related to AirGroup Services.
* Controllers:	See the table below. Define the Aruba controllers that should receive AirGroup asynchronous information updates.
* Timeout:	5 seconds Timeout for sending an AirGroup message.
* Attempts:	3 Maximum number of attempts to use when sending an AirGroup message.

Use	Hostname	Port	Shared Secret
☑ Enable	10.1.1.10 The controller's hostname or IP address.	21234 UDP port number.	•••••••• Shared secret for RFC 3576.

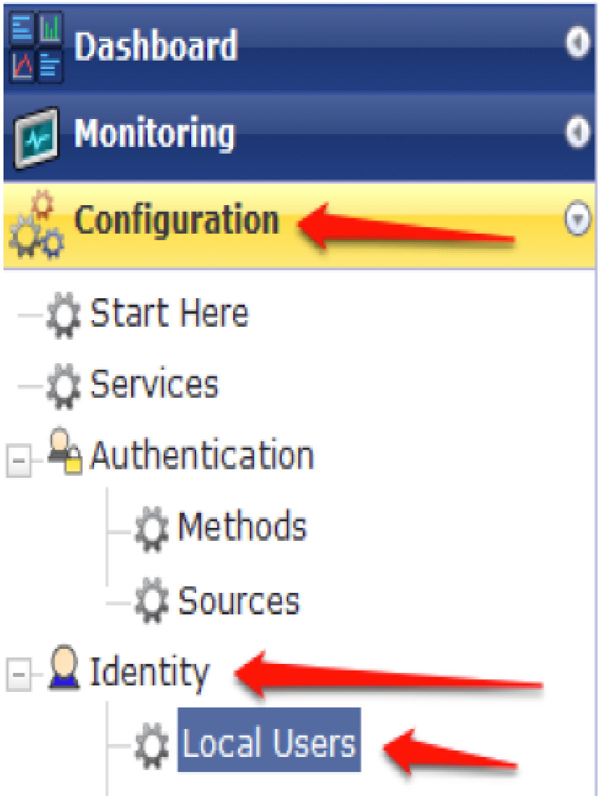
* required field

5. Click **Save Configuration**.

In order to demonstrate AirGroup, either an AirGroup Administrator or an AirGroup Operator account must be created.

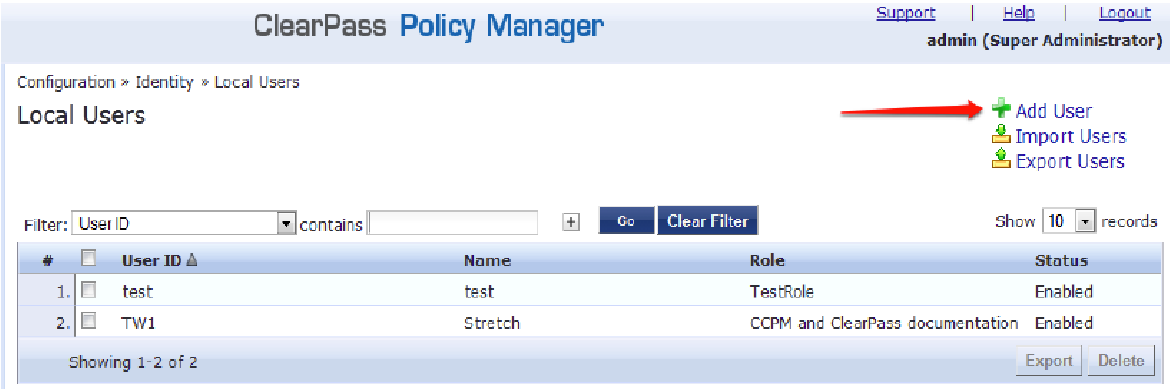
1. Navigate to the ClearPass Policy Manager UI, and navigate to **Configuration > Identity > Local Users**.

Figure 222 - *Configuration > Identity > Local Users Selection*



2. Click **Add User**.

Figure 223 - *Adding a New Local User in CPPM*

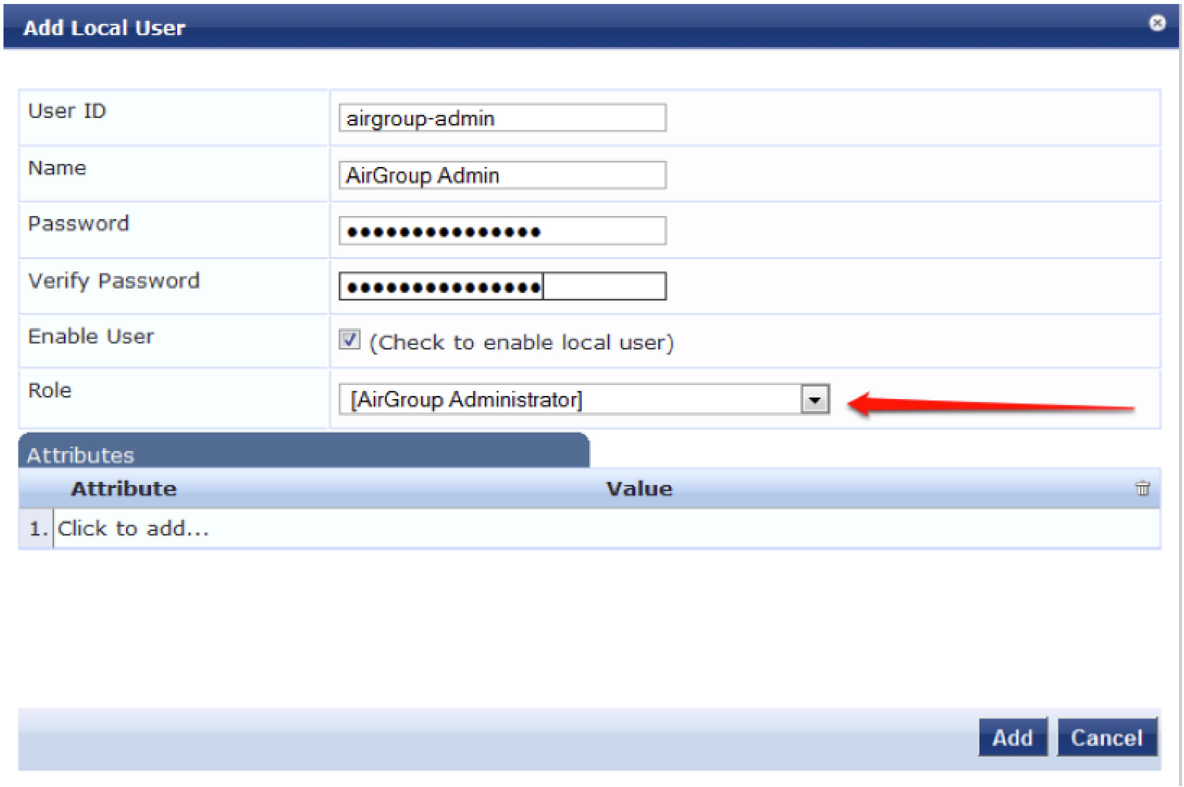


#	User ID	Name	Role	Status
1.	test	test	TestRole	Enabled
2.	TW1	Stretch	CCPM and ClearPass documentation	Enabled

Showing 1-2 of 2

3. Create an **AirGroup Administrator**.

Figure 224 - *Create an AirGroup Administrator*



Add Local User

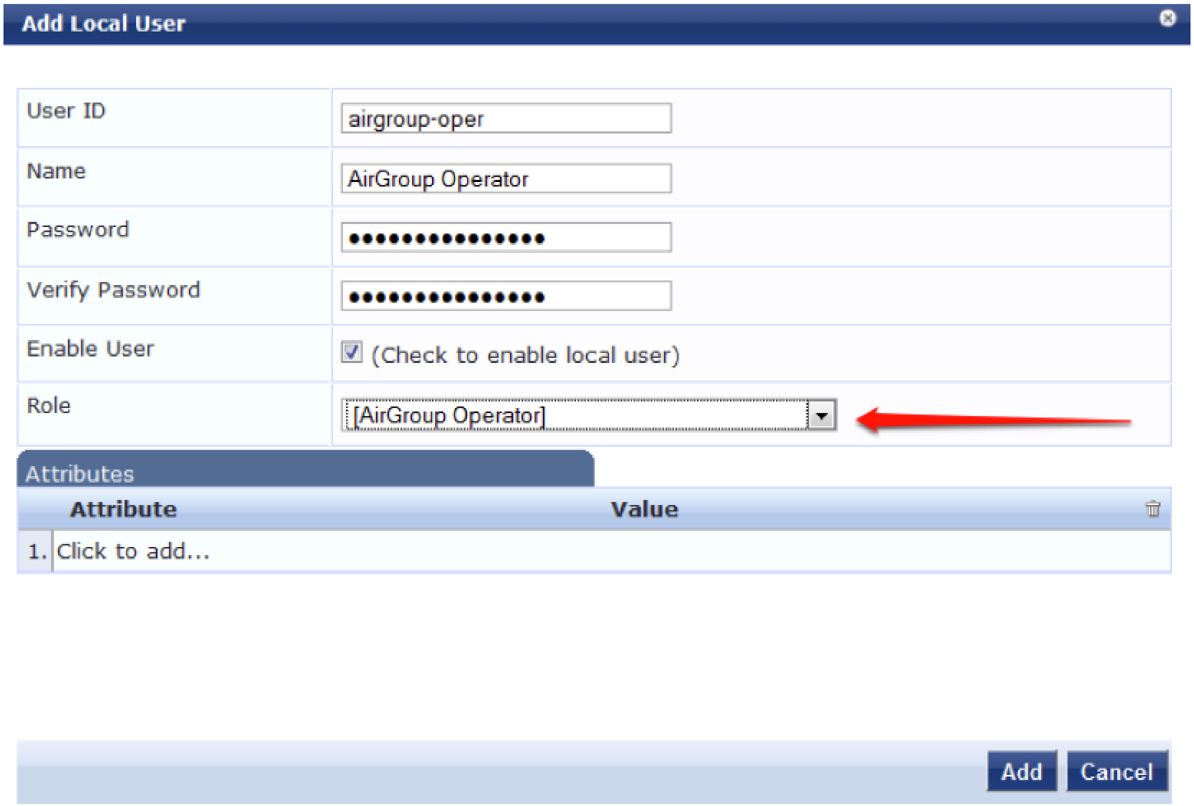
User ID	airgroup-admin
Name	AirGroup Admin
Password	•••••••••••••••
Verify Password	•••••••••••••••
Enable User	☑ (Check to enable local user)
Role	[AirGroup Administrator]

Attributes

	Attribute	Value
1.	Click to add...	

4. In this example, the password used is test123. Click **Add**.
5. Now click **Add User**, and create an **AirGroup Operator**.

Figure 225 - *Create an AirGroup Operator*



Add Local User

User ID	airgroup-oper
Name	AirGroup Operator
Password	•••••••••••••••
Verify Password	•••••••••••••••
Enable User	☑ (Check to enable local user)
Role	[AirGroup Operator]

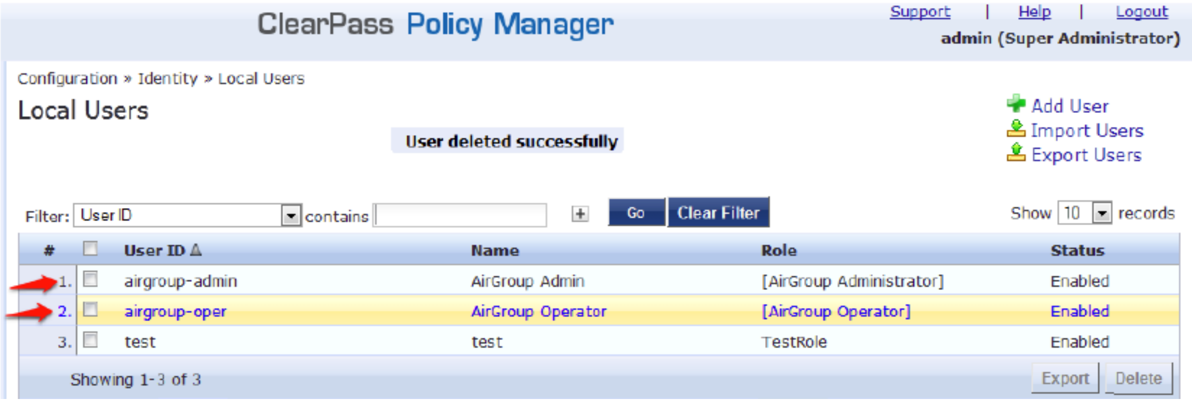
Attributes

	Attribute	Value
1.	Click to add...	

6. Click **Add** to save the user with an **AirGroup Operator** role.

7. The **AirGroup Administrator** and **AirGroup Operator IDs** will be displayed in the **Local Users UI** screen.

Figure 226 - *Local Users UI Screen*



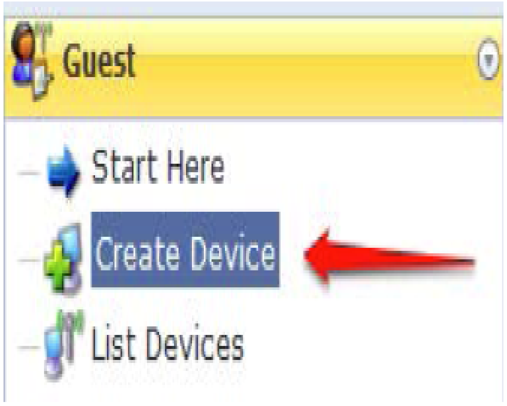
User deleted successfully

#	User ID	Name	Role	Status
1.	airgroup-admin	AirGroup Admin	[AirGroup Administrator]	Enabled
2.	airgroup-oper	AirGroup Operator	[AirGroup Operator]	Enabled
3.	test	test	TestRole	Enabled

Showing 1-3 of 3

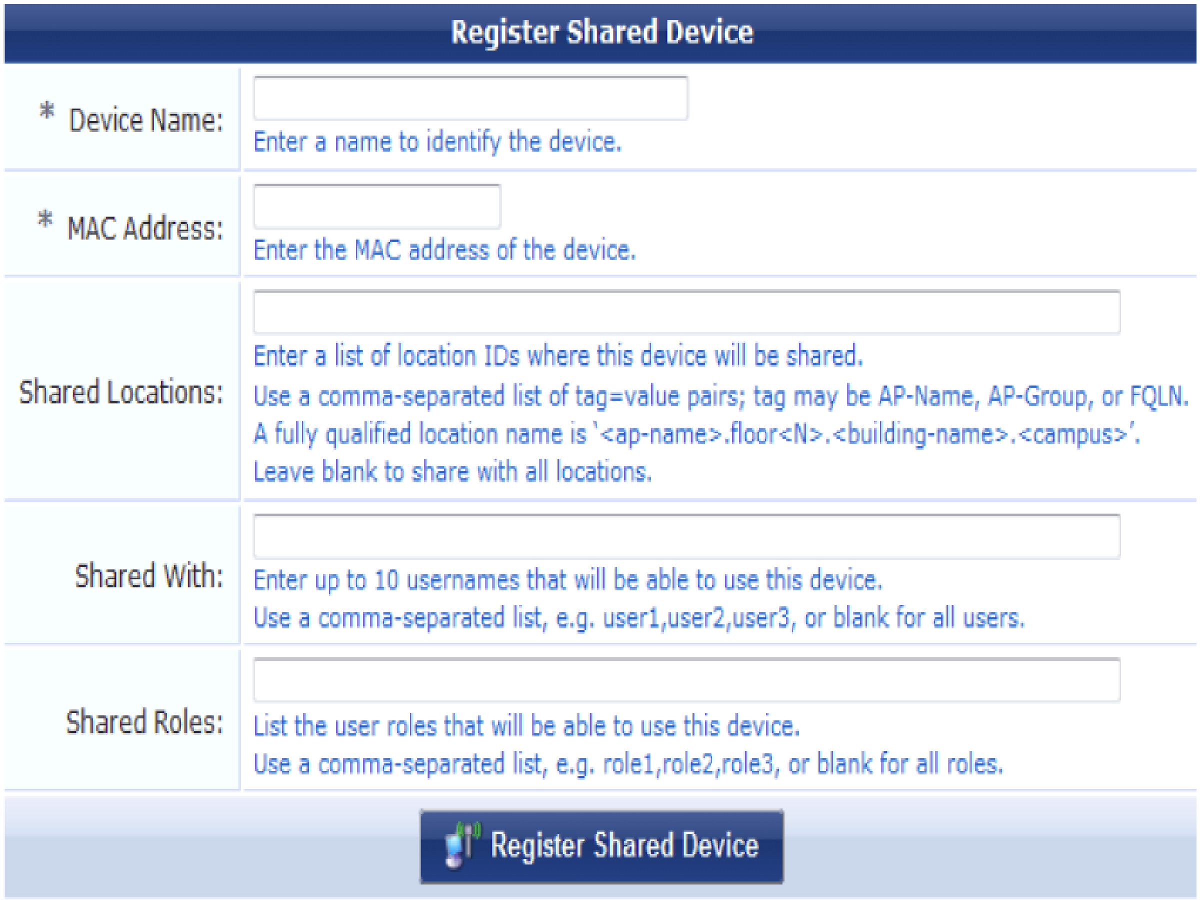
8. Navigate to the ClearPass Guest UI and click **Logout**. The **ClearPass Guest Login** page appears. Use the AirGroup admin credentials to log in.
9. After logging in, click **Create Device**.

Figure 227 - *Create a Device*



The following page is displayed.

Figure 228 - *Register Shared Device*



Register Shared Device

* Device Name:	Enter a name to identify the device.
* MAC Address:	Enter the MAC address of the device.
Shared Locations:	Enter a list of location IDs where this device will be shared. Use a comma-separated list of tag=value pairs; tag may be AP-Name, AP-Group, or FQLN. A fully qualified location name is '<ap-name>.floor<N>.<building-name>.<campus>'. Leave blank to share with all locations.
Shared With:	Enter up to 10 usernames that will be able to use this device. Use a comma-separated list, e.g. user1,user2,user3, or blank for all users.
Shared Roles:	List the user roles that will be able to use this device. Use a comma-separated list, e.g. role1,role2,role3, or blank for all roles.

For this test, add your AppleTV device name and MAC address but leave all other fields empty.

10. Click **Register Shared Device**.

Testing

1. Disconnect your AppleTV and OSX Mountain Lion/iOS 6 devices if they were previously connected to the wireless network. Remove their entries from the controller's user table using these commands:
   - Find the MAC address— `show user table`
   - Delete the address from the table— `aaa user delete mac 00:aa:22:bb:33:cc`
2. Reconnect both devices. To limit access to the AppleTV, access the ClearPass Guest UI using either the AirGroup admin or the AirGroup operator credentials. Next, navigate to **List Devices > Test Apple TV > Edit**. Add a username that is not used to log in to the Apple devices in the **Shared With field**.
3. Disconnect and remove the OSX Mountain Lion/iOS 6 device from the controller's user table. Reconnect the device by not using the username that you added to the **Shared With field**. The AppleTV should not be available to this device.
4. Disconnect the OSX Mountain Lion/iOS 6 device and delete it from the controller's user table. Reconnect using the username that was added to the **Shared With field**. The OSX Mountain Lion/iOS 6 device should once again have access to the AppleTV.

Troubleshooting

Table 48 - *Troubleshooting*

Problem	Solution
Limiting devices has no effect.	Ensure IPv6 is disabled.
Apple Macintosh running Mountain Lion can use AirPlay but iOS devices cannot.	Ensure IPv6 is disabled.

The RAP- NG (RNG) functionality on the switch release provides the ability to terminate VPN and GRE tunnels from the Instant AP and provides corporate connectivity to the branch Instant AP network.

VPN features are ideal for:

- enterprises with many branches that do not have a dedicated VPN connection to the HQ.
- branch offices that require multiple APs.
- individuals working from home, connecting to the VPN.

This new architecture and form factor seamlessly adds the survivability feature of Instant APs with the VPN connectivity of RAPs — providing corporate connectivity to branches.

All Alcatel-Lucent switches that are supported on the Alcatel-LucentOS 6.2.0 release will work on RNG 6.1.3.1.

Licensing Requirements

The following table lists the licensing requirements for RNG functionality:

Table 49 - *Licensing Requirements for RNG*

License Name	Supported Functionality	Limitations
Base OS (Without license)	IPSec tunnel works with both internal and external DBs.	• IPSec tunnel does not work with internal DB for version 6.1.3.1. A minimum of one AP license is required to add an OAW-IAP MAC address in localDB. • No support for DRP. • Roles cannot be edited.
Only PEF-V license	You can edit the default-role inside aaa auth VPN default-iap. A new user role can be created with src-nat rule and applied to default-iap VPN profile.	—
Only NG-PEF license	You can edit the user-role logon.	default-role in default-iap VPN profile cannot be edited. However, the OAW-IAP is assigned with a default-vpn-role, which can be edited to include the src-NAT rule.

VPN Configuration

The following VPN configuration steps on the controller, enable OAW-IAPs to terminate their VPN connection on the controller:

Creating an IAP Whitelist

Controller Whitelist DB

OAW-IAP whitelist is the list of approved AP's that can be provisioned on your controller. To create an OAW-IAP whitelist:

1. Navigate to **Configuration > AP Installation (under Wireless)** and then click the **RAP Whitelist** tab on the right side.
2. Click the **New** button and provide the following details:
   a. AP MAC Address — Mandatory parameter. Enter the MAC address of the AP.
   b. Username — Enter a username that will be used when the AP is provisioned.
   c. AP Group — Select a group to add the AP.
   d. AP Name — Enter a name for the AP. If an AP name is not entered, the MAC address will be used instead.
   e. Description — Enter a text description for the AP.
   f. IP-Address — Enter an IP address for the AP.
3. Click the **Add** button to add the instant AP to the whitelist.

The `ap-group` parameter is not used for any configuration, but needs to be configured. The parameter can be any valid string. If an external whitelist is being used, the MAC address of the AP needs to be saved in the Radius server as a lower case entry without any delimiter.

External Whitelist DB

The external whitelist functionality enables you to configure the RADIUS server to use an external whitelist for authentication of MAC addresses of RAPs.

If you are using Windows 2003 server, perform the following steps to configure external whitelist on it. There are equivalent steps available for Windows Server 2008 and other RADIUS servers.

1. Add the MAC addresses for all the RAPs in the Active Directory of the Radius server:
   a. Open the **Active Directory and Computers** window, add a new user and specify the MAC address (without the colon delimiter) of the RAP for the user name and password.
   b. Right-click the user that you have just created and click **Properties**.
   c. In the **Dial-in** tab, select **Allow access in the Remote Access Permission** section and click **OK**.
   d. Repeat Step a through Step b for all RAPs.
2. Define the remote access policy in the Internet Authentication Service:
   a. In the **Internet Authentication Service** window, select **Remote Access Policies**.
   b. Launch the wizard to configure a new remote access policy.
   c. Define filters and select **grant remote access permission** in the **Permissions** window.
   d. Right-click the policy that you have just created and select **Properties**.
   e. In the **Settings** tab, select the policy condition, and **Edit Profile....**
   f. In the **Advanced** tab, select **Vendor Specific**, and click **Add** to add new vendor specific attributes.

g. Add new vendor specific attributes and click **OK**.
h. In the **IP** tab, provide the IP for the RAP and click **OK**.

VPN Local Pool Configuration

To configure the VPN Local Pool:

1. Navigate to the **Configuration > Advanced Services > VPN Services > IPSec** page.
2. Select (check) **Enable L2TP**.
3. Make sure that only **PAP** (Password Authentication Protocol) is selected for Authentication Protocols.
4. To configure the L2TP IP pool, click **Add** in the **Address Pools** section. Configure the L2TP pool from which the APs will be assigned addresses, then click **Done**.

NOTE

The size of the pool should correspond to the maximum number of APs that the controller is licensed to manage.

5. To configure an Internet Security Association and Key Management Protocol (ISAKMP) encrypted subnet and preshared key, click **Add** in the IKE Shared Secrets section and configure the preshared key. Click **Done** to return to the IPSec page.
6. Click **Apply**.

VPN Profile Configuration

The VPN profile configuration defines the server used to authenticate the OAW-IAP (internal or an external server) and the role for OAW-IAP user. This role is used to define `src-nat` rule to Radius server to get Dynamic Radius proxy working.

1. Navigate to the **Configuration > Security > Authentication > L3 Authentication** page.
2. In the Profiles list, select the **VPN Authentication Profile> default-iap**.
3. For Default Role, enter the user role you created previously (for example, InstantAP).
4. Click **Apply**.
5. In the **Profile** list, under **VPN Authentication Profile**, select **Server Group**.
6. Select the server group from the drop-down menu.
7. Click **Apply**.

For more information on VPN profile configuration, see VPN Configuration on page 303.

Radius Proxy for VPN Connected IAPs

The Radius proxy for VPN connected OAW-IAPs functionality defines the server used to authenticate the OAW-IAP (internal or an external server) and the role for OAW-IAP user. This role is used to define `src-nat` rule to Radius server to get Dynamic Radius proxy working.

1. Navigate to the **Configuration > Security > Access Control > User Roles** page. Click **Add** to create the sysadmin role.
2. For Role Name, enter **sysadmin**.
3. Under Firewall Policies, click **Add**. In Choose from Configured Policies, select the predefined allowall policy. Click **Done**.
4. Click **Apply**.

For more information on VPN profile configuration, seeVPN Configuration on page 303.

Viewing Branch Status

To view the details of the branch information connected to the controller, issue the `show iap table` command.

Example

This example shows the details of the branches connected to the controller.

```
(Alcatel-Lucent3400) (config) #show iap table
Branch Key                                 Index Status  Inner IP       MAC Address
----------                                 ----- ------  --------       -----------
d8f6095a01f89b7aea4340c080c3e3c8bd062758461c32c92d   8     DOWN    0.0.0.0        d8:c7:c8:c0:01:6c
4619fa8b014ff058d99e9fe63286c19851e61466627d054968   16    DOWN    0.0.0.0        00:1a:1e:08:21:e1
0e26e65a01732247f98b5d463f1fb56c0200d0944fab521e57   3     DOWN    0.0.0.0        d8:c7:c8:c0:01:6c
cc0b838d014df7db3eb453ef4f513204df4d74bb4063e46587   7     DOWN    0.0.0.0        d8:c7:c8:c0:b8:d0
6bccde5901997e534d14b10580371792ef4c13ca868c929150   15    DOWN    0.0.0.0        d8:c7:c8:c0:01:6c
764f6038018f2c2765292911e55fedc0c98f86cf79331d8905   6     UP      10.15.207.206  00:24:6c:c9:27:cf
c2b46b530119844dcbdb55ddb94ff308d1f08ec7cb4eda113c   0     DOWN    0.0.0.0        d8:c7:c8:c0:b8:d6
9deb828c0106f4562b50c8141cfa28ad5c1a3f89b3e171efcc   14    DOWN    0.0.0.0        00:1a:1e:08:23:f4
be5ffcf801eedd92a76b978ceee53f4e2284c8e8f3dbd84457   5     DOWN    0.0.0.0        00:24:6c:c9:27:cf
b5d279460166c39a5fb9462a65559eb91266b9ac9f8e2356a0   13    DOWN    0.0.0.0        d8:c7:c8:c0:01:6c
0f7057990174cde7901a0c8779baeb7393b26d974a45eb8602   10    DOWN    0.0.0.0        00:24:6c:c0:41:f2
a1e23c1201cfb76a50fb3328e58c9825e716a259dd71874c67   4     UP      10.15.207.207  00:24:6c:c9:18:64
47f930fc019317069d04fd1c2ffdf6a49a6e51c148c2164ed0   9     DOWN    0.0.0.0        d8:c7:c8:c0:01:6c
0c478ce101df81e3c0a46fe4f3ab6eca9bb012151dea99a82f   1     DOWN    0.0.0.0        d8:c7:c8:c0:01:6c
747c20ac0155736c3b11bd972c967ebdf7c9883e69ec2a01fb   2     DOWN    0.0.0.0        d8:c7:c8:c0:b8:d0
0e40138601b34eb33fb57d94208848b0f8e37bba0a6a0d43ca   12    DOWN    0.0.0.0        00:24:6c:c9:18:64
de293919019196d7c8ac8f04a50fbd5b96c2af3d3576aa1dc2   11    DOWN    0.0.0.0        d8:c7:c8:c0:b8:d8
208c416e01e1cfaf0fdc11190349ad43334879f39ba9e19188   17    DOWN    0.0.0.0        d8:c7:c8:c0:01:6c

(Aruba3400) (config) #
```

The output of this command includes the following parameters:

Table 50 - *show iap table Parameters*

Parameter	Description
Branch Key	Key for the branch, which is unique to each branch.
Index	Index assigned to the branch.
Status	Current status of the branch (UP/DOWN).
Inner IP	VPN inner IP of the branch.
MAC Address	MAC address of the VC of the branch.

The Support module Alcatel-Lucent Instant provides CLI commands to view logs for APs.

Viewing Logs

To view the log information for APs:

1. At the top right corner of Instant UI, click **Support**. The **Support** window appears.
2. Select the required option from the **Command** drop-down list. For example, **AP ARM Configuration**.
3. Select **All Access Points** or a specific OAW-IAP from the **Target** drop-down list for which you want to view the **AP ARM Configuration**.
4. Click **Run**.

Support Commands

You can view the following information for each access point in the Alcatel-Lucent Instant network using the support window:

AP 3G/4G Status—Displays the cellular status of the OAW-IAPs.

AP 802.1X Statistics— Displays the 802.1X statistics of the selected OAW-IAP.

AP Access Rule Table— Displays all the ACL rules of the selected OAW-IAP.

AP Active— Displays all the APs of Instant.

AP Airgroup Cache— Displays the Bonjour mDNS records for the selected OAW-IAP(s)

AP Airgroup CPPM Entries —Displays the AirGroup CPPM policies of the registered devices.

AP Airgroup CPPM Servers— Displays the AirGroup CPPM server information.

AP Airgroup Debug Statistics— Displays the debug statistics for the selected OAW-IAP(s).

AP Airgroup Servers— Displays information about the Bonjour devices which supports Airprint and Airplay services for the selected OAW-IAP(s).

AP Airgroup User— Displays the IP/MAC address, device name, VLAN, type of connection of the Bonjour devices for the selected OAW-IAP(s).

AP Allowed Channels— Displays information of the allowed channels for the selected OAW-IAP.

AP All Supported Timezones— Displays all the supported time zones of Instant.

AP ARM Bandwidth Management— Displays bandwidth management information for the selected OAW-IAP.

AP ARM Channels— Displays channels of ARM in the selected OAW-IAP.

AP ARM Configuration— Displays configuration of ARM in the selected OAW-IAP.

AP ARM History— Displays the channel history and power changes due to Adaptive Radio Management (ARM) for the selected OAW-IAP.

AP ARM Neighbors— Displays the ARM settings for the selected OAW-IAP's neighbors.

AP ARM RF Summary— Displays the state and statistics for all channels being monitored by the selected OAW-IAP.

AP ARM Scan Times— Displays AM channel scan times for the selected OAW-IAP.

AP ARP Table— Displays the ARP table of the selected OAW-IAP.

AP Association Table— Displays information of the selected OAW-IAP association.

AP Authentication Frames— Displays the authentication trace buffer information of the selected OAW-IAP.

AP BSSID Table— Displays the Basic Service Set (BSS) table of the selected OAW-IAP.

AP Country Codes— Displays country code for the selected OAW-IAP.

AP CPU Utilization— Displays utilization of CPU for the selected OAW-IAP.

AP Crash Info— Displays crash log information (if it exists) for the selected OAW-IAP. The stored information is cleared from the flash after the AP reboots.

AP Current Time— Displays current time of the selected OAW-IAP.

AP Current Timezone— Displays current time zone of the selected OAW-IAP.

AP Datapath ACL Table Allocation

AP Datapath ACL Tables

AP Datapath Bridge Table— Displays bridge table entry statistics including MAC address, VLAN, assigned VLAN, Destination and flag information for the selected OAW-IAP.

AP Datapath DMO Session

AP Datapath Multicast Table—Displays datapath multicast table statistics for the selected OAW-IAP.

AP Datapath Route Table— Displays datapath route table statistics for the selected OAW-IAP.

AP Datapath Session Table— Displays the datapath session table statistics for the selected OAW-IAP.

AP Datapath Statistics— Displays the hardware packet statistics for the selected OAW-IAP.

AP Datapath User Table— Displays datapath user statistics such as current entries, pending deletes, high water mark, maximum entries, total entries, allocation failures, invalid users, and maximum link length for the selected OAW-IAP.

AP Datapath VLAN Table— Displays the VLAN table information such as VLAN memberships inside the datapath including L2 tunnels for the selected OAW-IAP.

AP Daylight Saving Time

AP Driver Configuration— Displays driver configuration details of the selected OAW-IAP.

AP Election Statistics

AP ESSID Table— Displays networks of the selected OAW-IAP.

AP Flash Configuration— Displays statistics of the selected OAW-IAP in flash.

AP IGMP Group Table

AP Interface Counters— Displays the package counters of bond0 of the selected OAW-IAP.

AP Interface Status— Displays the status of br0 of the selected OAW-IAP.

AP Internal DHCP Status

AP IP Interface

AP IP Route Table— Displays the route table of the selected OAW-IAP.

AP L3 Mobility Datapath

AP L3 Mobility Events Log

AP L3 Mobility Status

AP Log All— Displays all logs of the selected OAW-IAP.

AP Log AP-Debug— Displays logs about the selected OAW-IAP.

AP Log Conversion

AP Log Driver

AP Log Network— Displays network logs of the selected OAW-IAP.

AP Log PPPd

AP Log Rapper

AP Log Sapd

AP Log Security— Displays security logs of the selected OAW-IAP.

AP Log System— Displays system logs of the selected OAW-IAP.

AP Log Tunnel Status Management

AP Log Upgrade

AP Log User-Debug— Displays user-debug logs of the selected OAW-IAP.

AP Log User— Displays user logs of the selected OAW-IAP.

AP Log VPN Tunnel Log

AP Log Wireless— Displays wireless logs of the selected OAW-IAP.

AP Management Frames— Displays the traced 802.11 management frames for the selected OAW-IAP.

AP Memory Allocation State Dumps — Displays the Malloc State dump details.

AP Memory Utilization— Displays memory utilization of the selected OAW-IAP.

AP Mesh Counters— Displays the mesh counters of the selected OAW-IAP.

AP Mesh Link— Displays the mesh link of the selected OAW-IAP.

AP Mesh Neighbors— Displays the mesh link neighbors of the selected OAW-IAP.

AP Monitor Active Laser Beams

AP Monitor AP Table— Displays the list of monitored APs of the selected OAW-IAP.

AP Monitor ARP Cache

AP Monitor Client Table— Displays the list of monitored clients of the selected OAW-IAP.

AP Monitor Containment Information

AP Monitor Potential AP Table— Displays the list of potential AP of the selected OAW-IAP.

AP Monitor Potential Client Table— Displays the list of potential AP of the selected OAW-IAP.

AP Monitor Router

AP Monitor Scan Information

AP Monitor Status— Displays the configuration and status of monitor information of the selected OAW-IAP.

AP Persistent Clients— Displays the persistent clients of the selected OAW-IAP.

AP PPPoE uplink debug

AP PPPoE uplink status

AP Processes— Displays the processes of the selected OAW-IAP.

AP Radio 0 Stats— Displays aggregate debug statistics of the selected OAW-IAP Radio 0.

AP Radio 1 Stats— Displays aggregate debug statistics of the selected OAW-IAP Radio 1.

AP RADIUS Statistics— Displays the RADIUS statistics of the selected OAW-IAP.

AP Shaping Table— Displays the VAP statistics of the selected OAW-IAP.

AP Sockets— Displays the using sockets of the selected OAW-IAP.

AP STM Configuration— Displays the SSID configuration in STM of the selected OAW-IAP.

AP System Status— Displays detailed system status information for the selected OAW-IAP.

AP System Summary— Displays the OAW-IAP configuration.

AP Tech Support Dump— Displays the technical support dump logs of the selected OAW-IAP.

AP Uplink Status

AP User Table

AP Valid Channels— Displays valid channels of the selected OAW-IAP.

AP Version— Displays the version number of the selected OAW-IAP.

AP VPN Status

AP Wired Port Settings

AP Wired User Table

VC 802.1x Certificate— Displays the CA certificate and server certificate of the selected OAW-IAP.

VC About— Displays some info of the selected OAW-IAP, including AP type, build time of image, image version.

VC Active Configuration— Displays the active configuration of Virtual Controller.

VC Airgroup Service— Displays the Bonjour services supported for the selected OAW-IAP(s).

VC Airgroup Status— Displays the enable/disable status of the AirGroup and the parameters of the CPPM servers for the selected OAW-IAP(s).

VC Airgroup vlan— Displays the AirGroup status information for a VLAN of the selected OAW-IAP(s).

VC Allowed AP Table— Displays allowed AP enable/disable status and allowed AP list of the selected OAW-IAP.

VC AMP Current State Data

VC AMP Current Stats Data

VC AMP Data Sent

VC AMP Events Pending

VC AMP Last Configuration Received

VC AMP Single Sign-on Key

VC Application Services— Displays the details of application services of the selected OAW-IAP, which includes protocol number, port number.

VC Auth-Survivability cache— Displays the list of 802.1X cached user's information for the selected OAW-IAP(s).

VC DHCP Option 43 Received

VC Global Alerts— Displays all the alerts about client of the selected OAW-IAP.

VC Global Statistics— Displays the flow information and signal strength of the selected OAW-IAP.

VC IDS AP List— Displays the list of OAW-IAPs monitored by the selected OAW-IAP.

VC IDS Client List— Displays the IDS detected client list of the selected OAW-IAP.

VC Internal DHCP Server Configuration— Displays the configuration of internal DHCP server of the selected OAW-IAP.

VC Local User Database— Displays the user configuration of the selected OAW-IAP.

VC OpenDNS Configuration and Status— Displays configuration and status about OpenDNS server.

VC Radius Attributes— Displays the RADIUS attributes of the selected OAW-IAP.

VC Radius Servers— Displays the RADIUS servers' configuration of the selected OAW-IAP.

VC Saved Configuration— Displays the saved configuration of Virtual Controller.

VC Scanning Statistics

VC SNMP Configuration— Displays the SNMP configuration of the selected OAW-IAP.

VC Uplink 3G/4G Configuration

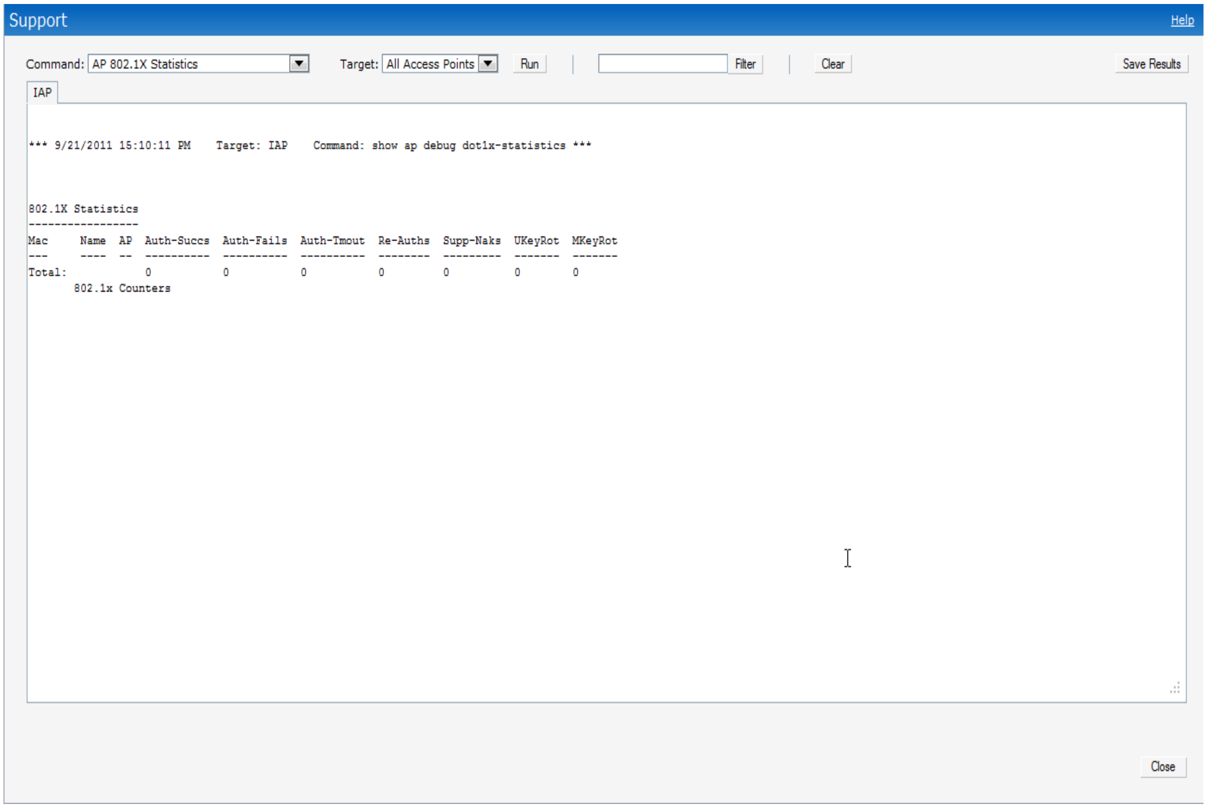
VC Uplink Management Configuration

VC WISPr Configuration — Displays the WISPr configuration details

NOTE

Use the support commands under the supervision of Alcatel-Lucent technical support.

Figure 229 - *Support Commands*



Command: AP 802.1X Statistics

Target: All Access Points

```
*** 9/21/2011 15:10:11 PM    Target: IAP    Command: show ap debug dot1x-statistics ***



802.1X Statistics
-----------------
Mac     Name  AP  Auth-Succs  Auth-Fails  Auth-Tmout  Re-Auths  Supp-Naks  UKeyRot  MKeyRot
---     ----  --  ----------  ----------  ----------  --------  ---------  -------  -------
Total:            0           0           0           0         0          0        0
       802.1x Counters
```

Abbreviations

The following table lists the abbreviations used in this user guide.

Table 51 - *List of abbreviations*

Abbreviation	Expansion
ARM	Adaptive Radio Management
ARP	Address Resolution Protocol
BSS	Basic Server Set
BSSID	Basic Server Set Identifier
CA	Certification Authority
CLI	Command Line Interface
DHCP	Dynamic Host Configuration Protocol
DMZ	Demilitarized Zone
DNS	Domain Name System
EAP-TLS	Extensible Authentication Protocol- Transport Layer Security
EAP-TTLS	Extensible Authentication Protocol-Tunneled Transport Layer Security
OAW-IAP	Instant Access Point
IDS	Intrusion Detection System
IEEE	Institute of Electrical and Electronics Engineers
ISP	Internet Service Provider
Instant UI	Instant User Interface
LEAP	Lightweight Extensible Authentication Protocol
MX	Mail Exchanger
MAC	Media Access Control
NAS	Network Access Server
NAT	Network Address Translation
NS	Name Server

Abbreviation	Expansion
NTP	Network Time Protocol
PEAP	Protected Extensible Authentication Protocol
PEM	Privacy Enhanced Mail
PoE	Power over Ethernet
RADIUS	Remote Authentication Dial In User Service
VC	Virtual Controller
VSA	Vendor-Specific Attributes
WLAN	Wireless Local Area Network