Dell PowerConnect W AirWave 7.2

User Guide

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This preface provides an overview of this guide and contact information for Dell, and includes the following sections:

- "Document Organization" on page 11
- "Notice Icons" on page 12
- "Contacting Support" on page 12

Document Organization

This user guide includes instructions and examples of the graphical user interface (GUI) for installation, configuration, and daily operation of AirWave Wireless Management Suite. This includes wide deployment of wireless access points (APs), device administration, rogue detection and classification, wireless controller devices, security, reports, and additional features of AWMS.

Table 1 *Document Organization and Purposes*

Chapter	Description
Chapter 1, "Introduction"	Introduces and presents the AirWave Wireless Management Suite, components, and general network functions.
Chapter 2, "Installing AWMS"	Describes system and network requirements, Linux OS installation, and AWMS installation.
Chapter 3, "Configuring AWMS"	Describes the primary and required configurations for startup and launch of AWMS, with frequently used optional configurations.
Chapter 4, "Configuring and Using Device Groups in AWMS"	Describes configuration and deployment for group device profiles.
Chapter 5, "Discovering, Adding, and Managing Devices"	Describes how to discover and manage devices on the network.
Chapter 6, "Creating and Using Templates"	Describes and illustrates the use of templates in group and global device configuration.
Chapter 7, "Using RAPIDS and Rogue Classification"	Describes the RAPIDS module of AWMS, and enhanced rogue classification supported in AWMS.
Chapter 8, "Performing Daily Administration in AWMS"	Describes common daily operations and tools in AWMS, to include general user administration, the use of triggers and alerts, network monitoring, and backups.
Chapter 9, "Creating, Running, and Emailing Reports"	Describes AWMS reports, scheduling and generation options, and distribution of reports from AWMS.
Chapter 10, "Using the AWMS Helpdesk"	Describes how to use the AWMS Helpdesk GUI and related functions.
Appendix A, "Package Management for AWMS"	Describes the Yum packaging management system, and provides advisories on alternative methods that may cause issues with AWMS.
Appendix B, "Third-Party Security Integration for AWMS"	Describes additional and optional security configurations in AWMS.
Appendix C, "Access Point Notes"	Provides guidelines and suggestions for APs in AWMS.

Table 1 *Document Organization and Purposes (Continued)*

Chapter	Description
Appendix D, "Initiating a Support Connection"	Provides instructions about how to create and use a support connection between AWMS and AirWave Wireless Support.
Appendix E, "Cisco Clean Access Integration (Perfigo)"	Provides instructions for integrating Cisco Clean Access within AWMS.
Appendix F, "HP Insight Install Instructions for AWMS Servers"	Provides instructions for installing HP Insight on AWMS servers.
Appendix G, "Installing AWMS on VMware ESX (3i v. 3.5)"	Provides instructions for an alternative installation option on VMware ESX for AWMS.
Appendix H, "Third-Party Copyright Information"	Presents multiple copyright statements from multiple equipment vendors that interoperate with AWMS.
Index	Provides extensive citation of and links to document topics, with emphasis on the AWMS GUI and tasks relating to AWMS installation and operation.

Notice Icons

This document uses the following notice icons to emphasize advisories for certain actions, configurations, or concepts:

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

Table 2 *Website contact*

Website	
Main Website	dell.com
Support Website	support.dell.com
Documentation Website	support.dell.com/manuals

Chapter 1

Introduction

Thank you for choosing Dell PowerConnect W AirWave Wireless Management Suite, or AWMS. AWMS makes it easy and efficient to manage your wireless network by combining industry-leading functionality with an intuitive user interface, enabling network administrators and helpdesk staff to support and control even the largest wireless networks in the world.

This User Guide provides instructions for the installation, configuration, and operation of the AirWave Wireless Management Suite. This chapter includes the following topics:

- "AWMS—A Unified Wireless Network Command Center" on page 13
- "Integrating AWMS into the Network and Organizational Hierarchy" on page 15

If you have any questions or comments, please contact Dell support at **support.dell.com**.

AWMS—A Unified Wireless Network Command Center

AWMS is the only network management software that offers you a single intelligent console from which to monitor, analyze, and configure wireless networks in automatic fashion. Whether your wireless network is simple or a large, complex, multi-vendor installation, AWMS manages it all.

The AirWave Wireless Management Suite supports hardware from leading wireless vendors including Dell PowerConnect W, Avaya, Cisco (Aironet and WLC), Enterasys, Juniper Networks, LANCOM Systems, Meru, Nomadix, Nortel, ProCurve by HP, Proxim, Symbol, Trapeze, Tropos, and many others.

The components of the AirWave Wireless Management Suite are listed here, and detailed below:

- The AirWave Management Platform (AMP) wireless network management software, including the ArubaOS Configuration feature that supports global and group configuration of Dell PowerConnect W devices
- *VisualRF* location and RF mapping software module
- *RAPIDS* rogue access point detection software module
- **Master Console** and **Failover** tabs

AirWave Management Platform

The AirWave Management Platform (AMP) is the centerpiece of the Dell PowerConnect W AirWave Wireless Management Solution, offering the following functions and benefits:

- Core network management functionality:
  - Network discovery
  - Configuration of APs & controllers
  - Automated compliance audits
  - Firmware distribution
  - Monitoring of every device and user connected to the network
  - Real-time and historical trend reports
- Granular administrative access
  - Role-based (for example, Administrator contrasted with Help Desk)
  - Network segment (for example, "Retail Store" network contrasted with "Corporate HQ" network)

- Flexible device support
  - Thin, thick, mesh network architecture
  - Multi-vendor support
  - Current and legacy hardware support

Dell PowerConnect W Configuration

AWMS supports global and group-level configuration of ArubaOS (AOS), the operating system, software suite, and application engine that operates Dell PowerConnect W mobility and centralizes control over the entire mobile environment. For a complete description of AOS, refer to the *ArubaOS User Guide* in support.dell.com/manuals.

AWMS consolidates ArubaOS configuration and pushes global Dell PowerConnect W configurations from within AWMS.

Two pages in AWMS support Dell PowerConnect W Configuration:

- **Device Setup > Dell PowerConnect W Configuration** for global Dell PowerConnect W Configuration
- **Groups > Dell PowerConnect W Config** for group-level Dell PowerConnect W Configuration

For additional information that includes a comprehensive inventory of all pages and settings that support Dell PowerConnect W Configuration, refer to the *Dell PowerConnect W Configuration Guide* located in AWMS under **Home > Documentation**.

VisualRF

VisualRF is a powerful tool for monitoring and managing radio frequency (RF) dynamics within your wireless network, to include the following functions and benefits:

- Accurate location information for all wireless users and devices
- Up-to-date heat maps and channel maps for RF diagnostics
  - Adjusts for building materials.
  - Supports multiple antenna types.
- Floor plan, building, and campus views
- Visual display of errors and alerts
- Easy import of existing floor plans and building maps
- Planning of new floor plans and AP placement recommendations

RAPIDS

RAPIDS is a powerful and easy-to-use tool for monitoring and managing security on your wireless network, to include the following features and benefits:

- Automatic detection of unauthorized wireless devices
- Rogue device classification that supports multiple methods of rogue detection
- Wireless detection:
  - Uses authorized wireless APs to report other devices within range.
  - Calculates and displays rogue location on VisualRF map.
- Wired network detection:
  - Discovers rogue APs located beyond the range of authorized APs/sensors.
  - Queries routers and switches.
  - Ranks devices according to the likelihood they are rogues.

- Multiple tests to eliminate false positive results.
- Provides rogue discovery that identifies the switch and port to which a rogue device is connected.

Master Console and Failover

The AWMS **Master Console** and **Failover** tools enable network-wide information in easy-to-understand presentation, to entail operational information and high-availability for failover scenarios. The benefits of these tools include the following:

- Provides network-wide visibility, even when the WLAN grows to 50,000+ devices
- Executive Portal allows executives to view high-level usage and performance data
- Aggregated alerts
- Failover
  - Many-to-one failover
  - One-to-one failover

The Master Console and Failover servers can be configured with a Device Down trigger that generates an alert if communication is lost. In addition to generating an alert, the Master Console or Failover server can also send email or NMS notifications about the event. See "Supporting AWMS Servers with the Master Console" on page 211.

Integrating AWMS into the Network and Organizational Hierarchy

AWMS generally resides in the NOC and communicates with various components of your WLAN infrastructure. In basic deployments, AWMS communicates solely with indoor wireless access points (and WLAN controllers over the wired network. In more complex deployments, AWMS seamlessly integrates and communicates with authentication servers, accounting servers, TACACS+ servers, routers, switches, network management servers, wireless IDS solutions, helpdesk systems, indoor wireless access points, mesh devices. AWMS has the flexibility to manage devices on local networks, remote networks, and networks using Network Address Translation (NAT). AWMS communicates over-the-air or over-the-wire using a variety of protocols.

The power, performance, and usability of the AWMS solution become more apparent when considering the diverse components within a WLAN. Table 3 itemizes such network components, as an example.

Table 3 *Components of a WLAN*

Component	Description
Autonomous AP	Standalone device which performs radio and authentication functions
Thin AP	Radio-only device coupled with WLAN controller to perform authentication
WLAN controller	Used in conjunction with thin APs to coordinate authentication and roaming
NMS	Network Management Systems and Event Correlation (OpenView, Tivoli, and so forth)
RADIUS Authentication	RADIUS authentication servers (Funk, FreeRADIUS, ACS, or IAS)
RADIUS Accounting	AWMS itself serves as a RADIUS accounting client
Wireless Gateways	Provide HTML redirect and/or wireless VPNs
TACACS+	Used to authenticate AWMS administrative users
Routers/Switches	Provide AWMS with data for user information and AP and Rogue discovery
Help Desk Systems	Remedy EPICOR
Rogue APs	Unauthorized APs not registered in the AWMS database of managed APs

The flexibility of AWMS enables it to integrate seamlessly into your business hierarchy as well as your network topology. AWMS facilitates various administrative roles to match each individual user's role and responsibility.

- A Help Desk user may be given read-only access to monitoring data without being permitted to make configuration changes.
- A U.S.-based network engineer may be given read-write access to manage device configurations in North America, but not to control devices in the rest of the world.
- A security auditor may be given read-write access to configure security policies across the entire WLAN.
- NOC personnel may be given read-only access to monitoring all devices from the Master Console.

Chapter 2

Installing AWMS

This chapter contains information and procedures for installing and launching the AirWave Wireless Management Suite (AWMS), and includes the following topics:

- "AWMS Hardware Requirements and Installation Media" on page 17
- "Installing Linux CentOS 5 (Phase 1)" on page 17
- "Installing AWMS Software (Phase 2)" on page 18
- "Configuring and Mapping Port Usage for AWMS" on page 21
- "AWMS Navigation Basics" on page 22
- "Getting Started with AWMS" on page 27

CAUTION: AWMS does not support downgrading to older versions. Significant data could be lost or compromised in such a downgrade. In unusual circumstances requiring that you return to an earlier version of AWMS, we recommend you perform a fresh installation of the earlier AWMS version, and then restore data from a pre-upgrade backup.

AWMS Hardware Requirements and Installation Media

The AWMS installation CD includes all software (including the Linux OS) required to complete the installation of the AirWave Wireless Management Suite. AWMS supports any hardware that is Red Hat Enterprise Linux 5 certified. By default, all installs are based on a 64-bit operating system.

AWMS hardware requirements vary by version. As additional features are added to AWMS, increased hardware resources become necessary. For the most recent hardware requirements, refer to the *Dell PowerConnect W AirWave Sizing Guide* from support.dell.com/manuals.

AWMS is intended to operate as a soft appliance. Other applications should not run on the same installation. Additionally, local shell users can access data on AWMS, so it is important to restrict access to the shell only to authorized users.

You can create sudo users in place of root for companies that don't allow root logins.

Installing Linux CentOS 5 (Phase 1)

Perform the following steps to install the Linux CentOS 5 operating system. The Linux installation is a prerequisite to installing AWMS on the network management system.

CAUTION: This procedure erases the hard drive(s) on the server.

1. Insert the AWMS installation CD-ROM into the drive and boot the server.
2. If this is a new installation of the AWMS software, type **install** and press **Enter**.

   To configure the partitions manually, type **expert** and press **Enter**.

   The following message appears on the screen:

```
Welcome to AWMS Installer Phase I
- To install a new AMP, type install <ENTER>.
  WARNING: This will ERASE all data on your hard drive.
```

```
- To install AWMS and manually configure hard drive settings, type expert <ENTER>.

boot:
```

3. Allow the installation process to continue. Installing the CentOS software (Phase I) takes 10 to 20 minutes to complete. This process formats the hard drive and launches Anaconda to install all necessary packages. Anaconda gauges the progress of the installation.

   Upon completion, the system will prompt you to eject the installation CD and reboot the system.

4. Remove the CD from the drive and store in a safe location.

Installing AWMS Software (Phase 2)

Getting Started

After the reboot, the GRUB screen appears.

1. Press **Enter** or wait six seconds, and the system automatically loads the kernel.
2. When the kernel is loaded, log into the server using the following credentials:
   - login = **root**
   - password = **admin**
3. Start the AWMS software installation script by executing the **./amp-install** command.

   Type **`./amp-install`** at the command prompt and press **Enter** to execute the script.

Step 1: Configuring Date and Time, Checking for Prior Installations

Date and Time

The following message appears, and this step ensures the proper date and time are set on the server:

```
----------------------- Date and Time Configuration ------------------
Current Time: Fri Nov 21 09:18:12 PST 2008
1)  Change Date and Time
2)  Change Time Zone

0)  Finish
```

Ensure that you enter the accurate date and time during this process. *Errors will arise later in the installation if the specified date varies significantly from the actual date, especially if the specified date is in the future and it is fixed later.* It is recommended to configure ntpd to gradually adjust your clock to the correct time.

1. Select **1** to set the date and select **2** to set the time zone. Press **Enter** after each configuration to return to the message menu above.

CAUTION: Changing these settings after the installation can cause data loss, especially for time-series data such as bandwidth and client count graphs. Avoid delayed configuration.

2. Press **0** to complete the configuration of date and time information, and to continue to the next step.

Previous AWMS Installations

The following message appears after date and time are set:

```
Welcome to AWMS Installer Phase 2
STEP 1:  Checking for previous AWMS installations
```

If a previous version of AWMS software is not discovered, the installation program automatically proceeds to "Step 2: Installing AWMS Software, Including AWMS" on page 19. If a previous version of the software is discovered, the following message appears on the screen:

```
The installation program discovered a previous version of the software. Would you
like to reinstall AWMS? This will erase AWMS's database. Reinstall (y/n)?
```

Type **y** and press **Enter** to proceed.

CAUTION: This action erases the current database, including all historical information. To ensure that the AWMS database is backed up prior to reinstallation, answer `n` at the prompt above and contact your Value Added Reseller or directly contact Dell support.

Step 2: Installing AWMS Software, Including AWMS

The following message appears while AWMS software is transferred and compiled:

```
STEP 2:  Installing AWMS software
  This will take a few minutes.
  Press Alt-F9 to see detailed messages.
  Press Alt-F1 return to this screen.
```

This step requires no user input, but you can follow the instructions to monitor its progress and switch back to the installation screen.

Step 3: Checking the AWMS Installation

After the AWMS software installation is complete, the following message appears:

```
STEP 3:  Checking AWMS installation
  Database is up.
  AWMS is running version: (version number)
```

This step requires no user input. Proceed to the next step as prompted to do so.

Step 4: Assigning an IP Address to the AWMS System

While the AWMS primary network interface accepts a DHCP address initially during installation, *AWMS does not function when launched unless a static IP is assigned.* Complete these tasks to assign the static IP address. The following message appears:

```
STEP 4: Assigning AWMS's address
     AWMS must be configured with a static IP.

--------------- Primary Network Interface Configuration -------------

         1)  IP Address   : xxx.xxx.xxx.xxx
         2)  Netmask      : xxx.xxx.xxx.xxx
         3)  Gateway      : xxx.xxx.xxx.xxx
         4)  Primary DNS  : xxx.xxx.xxx.xxx
         5)  Secondary DNS: xxx.xxx.xxx.xxx

         9)  Commit Changes
         0)  Exit (discard changes)

If you want to configure a second network interface, please
use AWMS's web interface, AMP Setup --> Network Tab
```

1. Enter the network information.

NOTE: The Secondary DNS setting is an optional field.

2. Commit the changes by typing **9** and pressing **Enter**.
   To discard the changes, type **0** and press **Enter**.

Step 5: Naming the AWMS Network Administration System

Upon completion of the previous step, the following message appears:

```
STEP 5:  Naming AWMS
AWMS name is currently set to: New AWMS
Please enter a name for your AWMS:
```

At the prompt, enter a name for your AWMS server and press **Enter**.

Step 6: Assigning a Host Name to the AWMS

Upon completion of the previous step, the following message appears on the screen:

```
STEP 6:  Assigning AWMS's hostname
 Does AWMS have a valid DNS name on your network (y/n)?
```

1. If AWMS does not have a valid host name on the network, enter **n** at the prompt. The following appears:

   ```
   Generating SSL certificate for < IP Address >
   ```

2. If AWMS does have a valid host name on the network, enter **y** at the prompt. The following appears:

   ```
   Enter AWMS's DNS name:
   ```

3. Type the AWMS DNS name and press **Enter**. The following message appears:

   ```
   Generating SSL certificate for < IP Address >
   ```

Proceed to the next step as the system prompts you.

Step 7: Changing the Default Root Password

Upon completion of the prior step, the following message appears:

```
STEP 7:  Changing default root password.
You will now change the password for the 'root' shell user.

Changing password for user root.
New Password:
```

Enter the new root password and press **Enter**. The Linux root password is similar to a Windows administrator password. The root user is a super user who has full access to all commands and directories on the computer.

This password should be kept as secure as possible because it allows full access to the machine. This password is not often needed on a day-to-day basis, but is required to perform AWMS upgrades and advanced troubleshooting. If you lose this password, contact Dell support at **support.dell.com** for resetting instructions.

Completing the Installation

Upon completion of all previous steps, the following message appears:

```
CONGRATULATIONS!  AWMS is configured properly.
 To access AWMS web console, browse to https://<IP Address>
 Login with the following credentials:
 Username: admin
 Password: admin
```

- To view the Phase 1 installation log file, type **cat /root/install.log**.
- To view the Phase 2 installation log file, type **cat /tmp/amp-install.log**.
- To access the AWMS GUI, enter the AWMS IP address in the address bar of any browser. The AWMS GUI then prompts for your license key. If you are entering a dedicated **Master Console** or AWMS **Failover** license, refer to "Supporting AWMS Servers with the Master Console" on page 211 for additional information.

Configuring and Mapping Port Usage for AWMS

The following diagram itemizes the communication protocols and ports necessary for AWMS to communicate with wireless LAN infrastructure devices, including access points (APs), controllers, routers, switches, and RADIUS servers. Assign or adjust port usage on the network administration system as required to support these components.

Table 4 *AWMS Protocol and Port Chart*

Port	Type	Protocol	Description	Direction	Device Type
21	TCP	FTP	Firmware distribution	>	APs or controllers
22	TCP	SSH	Configure devices	>	APs or controllers
22	TCP	SSH	Configure AWMS from CLI	<	Laptop or workstation
22	TCP	VTUN	Support connection (optional)	>	AirWave support home office
22	TCP	SCP	Transfer configuration files or FW	<	APs or controllers
23	TCP	Telnet	Configure devices	>	APs or controllers
23	TCP	VTUN	Support connection (Optional)	>	AirWave support home office
25	TCP	SMTP	Support email (optional)	>	AirWave support email server
49	UDP	TACACS	AWMS Administrative Authentication	>	Cisco TACACS+
53	UDP	DNS	DNS lookup from AWMS	>	DNS Server
69	UDP	TFTP	Transfer configuration files or FW	<	APs or controllers
80	TCP	HTTP	Configure devices	>	Legacy APs
80	TCP	VTUN	Support connection (optional)	>	AirWave support home office
161	UDP	SNMP	Get and Set operations	>	APs or controllers
162	UDP	SNMP	Traps from devices	<	APs or controllers
162	UDP	SNMP	Traps from AWMS	>	NMS
443	TCP	HTTPS	Web management	<	Laptop or workstation
443	TCP	HTTPS	WLSE polling	>	WLSE
443	TCP	VTUN	Support connection (optional)	>	AirWave support home office
1701	TCP	HTTPS	AP and rogue discovery	>	WLSE
1741	TCP	HTTP	WLSE polling	>	WLSE
1813	UDP	RADIUS	Retrieve client authentication info	<	Accounting Server
1813	UDP	RADIUS	Retrieve client authentication info	<	APs or controllers
1813	UDP	RADIUS	Outbound from AWMS to a RADIUS server for AWMS admin authentication	>	RADIUS server
2002	TCP	HTTPS	Retrieve client authentication info	>	ACS
5050	UDP	RTLS	Real Time Location Feed	<	Dell thin APs
8211	UDP	PAPI	Real Time Feed	< >	WLAN switches
		ICMP	Ping Probe	>	APs or controllers

AWMS Navigation Basics

Every AWMS page contains three basic sections, as illustrated in :

- Status Section
- Navigation Section
- Activity Section

The AWMS pages also contain **Help** links with GUI-specific help information and certain standard buttons.

Status Section

The **Status** section is a snapshot view of overall WLAN performance and provides direct links for immediate access to key system components. The Status section remains at the top of all pages in the AWMS and RAPIDS modules. AWMS includes the ability to customize the contents of the Status section from the **Home > User Info** page, to include support for both wireless and wired network components. Refer to "Configuring Your Own User Information with the Home > User Info Page" on page 203.

The table below describes these elements in further detail.

Table 5 *Status Section Components of the AWMS GUI*

Field	Description
New Devices	The number of wireless APs or wireless LAN controllers that have been discovered by AWMS but not yet managed by network administrators. When selected, AWMS directs you to a page that displays a detailed list of devices awaiting authorization.
Up	The number of managed authorized devices that are currently responding to AWMS requests. When selected, AWMS shows a detailed list of all Up devices.
Down	The number of managed, authorized devices that are not currently responding to AWMS SNMP requests. When selected, AWMS shows a detailed list of all Down devices.
Mismatched	The total number of Mismatched devices. A device is considered mismatched when the desired configuration in AWMS does not match the actual device configuration read from the device.
Rogue	The number of devices that have been classified by the RAPIDS rules engine above the threshold defined on the **Home > User** Info page.
Users	The number of wireless users currently associated to the wireless network via all the APs managed by AWMS. When selected, AWMS shows a list of users that are associated.
Alerts	Displays the number of non-acknowledged AWMS alerts generated by user-configured triggers. When selected, AWMS shows a detailed list of active alerts.
Severe Alerts (conditional)	When triggers are given a severity of **Critical**, they generate **Severe Alerts**. When a Severe Alert exists, a new component appears at the right of the **Status** field in bold red font. Only users configured on the **Home > User Info** page to be enabled to view critical alerts can see Severe Alerts. The functionality of Severe Alerts is the same as that described above for Alerts. Unlike Alerts, the **Severe Alerts** section is hidden if there are no Severe Alerts.
Device Types to Include in Header Stats	You can support statistics for any combination of the following device types: • Autonomous APs • Controllers • Routers/Switches • Thin APs • Universal Devices Refer to "Configuring Your Own User Information with the Home > User Info Page" on page 203.
Search	Search performs partial string searches on a large number of fields including the notes, version, secondary version, radio serial number, device serial number, LAN MAC, radio MAC and apparent IP of all the APs as well as the client MAC, VPN user, LAN IP, VPN IP fields.

Navigation Section

The **Navigation** Section displays tabs for all main GUI pages within AWMS. The top bar is a static navigation bar containing tabs for the main components of AWMS, while the lower bar is context-sensitive and displays the subtabs for the highlighted tab.

Table 6 *Components and Subtabs of the AWMS Navigation Screen*

Main Tab	Description	Subtabs
Home	The **Home** tab provides basic AWMS information including system name, host name, IP address, current time, running time, and software version. The **Home** page also provides a central point for network status information and monitoring tools, giving graphical display of network activity, and links to many of the most frequent tools in AWMS. For additional information, refer to "Monitoring and Supporting AWMS with the Home Pages" on page 199.	• Overview • Search • Documentation • License • User Info
Helpdesk	The **Helpdesk** pages provide an interface for support and diagnostic tools. For additional information refer to Chapter 10, "Using the AWMS Helpdesk" on page 247.	• Incidents • Setup
Groups	The **Groups** pages provide information on the logical "groups" of devices that have been established for efficient monitoring and configuration. For additional information, see Chapter 4, "Configuring and Using Device Groups in AWMS" on page 69. **NOTE:** Some of the focused subtabs will not appear for all groups. Focused subtabs are visible based on the device type field on the **Groups > Basic** page. This subtab is the first page to appear when adding or editing groups. **NOTE:** When individual device configurations are specified, device-level settings override the Group-level settings to which a device belongs.	• List • Focused Subtabs ▪Monitor ▪Basic ▪Templates ▪Security ▪SSIDs ▪AAA Servers ▪Radio ▪Dell Config ▪Cisco WLC Config ▪PTMP ▪Proxim Mesh ▪MAC ACL ▪Firmware ▪Compare
APs/Devices	The **APs/Devices** pages provide detailed information about all authorized APs and wireless LAN switches or controllers on the network, including all configuration and current monitoring data. These pages interact with several additional pages in AWMS. One chapter to emphasize the **APs/Devices** pages is Chapter 5, "Discovering, Adding, and Managing Devices" on page 107. **NOTE:** When specified, device-level settings override the default Group-level settings.	• List • New • Up • Down • Mismatched • Ignored • Focused Subtabs ▪Manage ▪Interfaces ▪Audit ▪Compliance ▪Containment Status
Users	The **Users** pages provide detailed information about all client devices and users currently associated to the WLAN. For additional information, refer to "Monitoring and Supporting WLAN Users" on page 188.	• Connected • All • Guest Users ▪User Detail ▪Diagnostics • Tags

Table 6 *Components and Subtabs of the AWMS Navigation Screen (Continued)*

Main Tab	Description	Subtabs
Reports	The **Reports** pages list all the standard and custom reports generated by AWMS. AWMS supports 13 reports in the AWMS module. For additional information, refer to Chapter 9, "Creating, Running, and Emailing Reports" on page 219.	• Generated • Definition ▪Detail
System	The **System** pages provide information about AWMS operation and administration, including overall system status, the job scheduler, trigger/alert administration, and so forth. For additional information, refer to "Monitoring and Supporting AWMS with the System Pages" on page 205.	• Status • Event Log • Triggers • Alerts • Backups • Configuration Change Jobs • Firmware Upgrade Jobs • Performance
Device Setup	The **Device Setup** pages provide the ability to add, configure, and monitor devices, to include setting AP discovery parameters, performing firmware management, defining VLANs, and so forth. For additional information, refer to "Enabling AWMS to Manage Your Devices" on page 47.	• Discover • Add • Communication • Dell Configuration *(if global Dell Configuration is enabled)* • Upload Files
AMP Setup	The **AMP Setup** pages provide all information relating to the configuration of AWMS itself and its connection to your network. This page entails several processes, configurations, or tools in AWMS. For additional information, start with Chapter 3, "Configuring AWMS" on page 29. **NOTE:** The **AMP Setup** pages may not be visible, depending on the role of the logged-in user and license set in AWMS.	• General • Network • Users • Roles • Guest Users • Authentication • MDM Server • WLSE • ACS • NMS • RADIUS Accounting • PCI Compliance
RAPIDS	The **RAPIDS** pages provide all information relating to rogue access points, including methods of discovery and lists of discovered and possible rogues. For additional information, refer to Chapter 7, "Using RAPIDS and Rogue Classification" on page 165. **NOTE:** The RAPIDS pages may not be visible, depending on the role and license set in AWMS.	• Overview • List • IDS Events • Setup • Rules • Score Override • Audit Log
VisualRF	**VisualRF** pages provide graphical access to floor plans, client location, and RF visualization for floors, buildings, and campuses that host your network. For additional information, refer to the *VisualRF User Guide* in **Home > Documentation**. VisualRF may not be visible depending on the role and license set in AWMS.	• Floor Plans • Setup • Import • Audit Log

NOTE: The **AMP Setup** tab varies with user role. The RAPIDS and VisualRF tabs appear based on the license entered on the **Home > License** page, and might not be visible on your AWMS view.

Activity Section

The **Activity** section displays all detailed configuration and monitoring information, and is where you implement changes.

Help Links in the GUI

The **Help** link is available on every page within AWMS. When selected, this launches a PDF document with information describing the AWMS page that is currently displayed.

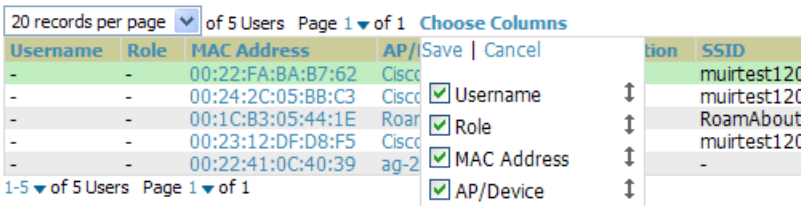
NOTE: Adobe Reader must be installed to view the settings and default values in the PDF help file.

Common List Settings

All of the lists in AWMS have some common options. All lists are paginated with a configurable number of items per page. Selecting the **Records Per Page** dropdown menu enables you select or enter the number of rows that appear at a time in the list. The next down arrow displays a dropdown menu that allows you to select the exact page you would like to view, as shown in Figure 1.

The **Choose Columns** option, illustrated on Figure 1, allows you to configure the columns that are presented in the list and the order in which they are presented. To disable a column, clear its checkbox. To reorder the columns, drag a row to the appropriate new position. When you are satisfied with the enabled columns and their order, select **Save** at the top of the columns list.

Figure 1 *Common List Settings **Choose Columns** Illustration*



These settings are user specific. To reset them, select **Reset List Preferences** on **Home > User Info**.

Buttons and Icons

Standard buttons and icons are used throughout the AWMS as follows:

Table 7 *Standard Buttons and Icons of the AWMS User Page*

Function	Image[a]	Description
Acknowledge		Acknowledges and clears an AWMS alert.
Add		Adds the object to both AWMS' database and the onscreen display list.
Add Folder		Adds a new folder to hierarchically organize APs.
Alert		Indicates an alert.
Apply		Applies all "saved" configuration changes to devices on the WLAN.
Attach		Attaches a snapshot of an AWMS screen to a Helpdesk incident.
Audit		Reads device configuration, compare to desired, and update status.
Bandwidth		Displays current bandwidth for group.
Choose		Chooses a new Helpdesk incident to be the Current Incident.
Create		Creates a new Helpdesk incident.
Customize		Ignores selected settings when calculating the configuration status.
Delete		Deletes an object from AWMS' database.

Table 7 *Standard Buttons and Icons of the AWMS User Page (Continued)*

Function	Image[a]	Description
Down		Indicates down devices and radios.
Drag and Drop		Dragging and dropping objects with this icon changes the sequence of items in relation to each other. Refer to "Using RAPIDS and Rogue Classification" on page 165 as one example of drag-and-drop.
Duplicate		Duplicates or makes a copy of the configuration of an AWMS object.
Edit		Edits the object properties.
Email		Links to email reports.
Filter		Filters rogue list by score and/or ad hoc status.
Google Earth		Views device's location in Google Earth (requires plug-in).
Manage		Manages the object properties.
Mismatched		Indicates mismatched device configuration, in which the most recent configuration in AWMS and the current configuration on a device are mismatched.
Monitor		Indicates an access point is in "monitor only" mode.
Ignore		Ignores specific device(s) - devices selected with check boxes.
Import		Updates a Group's desired settings to match current settings.
New Devices		Indicates new access points and devices.
Poll Now		Polls device (or controller) immediately, override group polling settings.
Preview		Displays a preview of changes applicable to multiple groups.
Print		Prints the report.
Reboot		Reboots devices or AWMS.
Refresh		Refreshes the display of interactive graphs when settings have changed.
Relate		Relates an AP, Group or Client to a Helpdesk incident.
Replace Hardware		Confers configuration and history of one AP to a replacement device.
Revert		Returns all configurable data on the screen to its original status.
Rogue		Indicates a rogue access point and links to RAPIDS.
Run		Runs a new user-defined report.
Save		Saves the information on the page in the AWMS database.
Save & Apply		Saves changes to AWMS' database and apply all changes to devices.
Scan		Scans for devices and rogues using selected networks.
Schedule		Schedules a window for reports, device changes, or maintenance.
Search		Searches AWMS for the specified name, MAC or IP address.
Set Time Range		Sets the time range for interactive graphs to the range specified.
Up		Indicates access points which are in the up status.
Update Firmware		Applies a new firmware image to an AP/device.

Table 7 *Standard Buttons and Icons of the AWMS User Page (Continued)*

Function	Image[a]	Description
User		Indicates a user.
View Historical Graph in New Window		Displays all data series for the selected graph over the last two hours, last day, last week, last month, and last year in one page.
VisualRF		Links to VisualRF - real time visualization.
XML		Links to export XHTML versions of reports.

a. Not all AWMS GUI components are itemized in graphic format in this table.

Getting Started with AWMS

This topic describes how to perform an initial launch of the AWMS network management solution.

Use your browser to navigate to the static IP address assigned to the internal page of the AWMS. Enter the User Name and Password as **admin/admin** for your initial login, and then select **OK**.

After successful authentication, your browser launches the **Home > Overview** page.

NOTE: AWMS pages are protected via SSL. Some browsers will display a confirmation dialog for your self-signed certificate. Signing your certificate will prevent this dialog from displaying. Dell recommends changing the default login and password on the **AMP Setup > Users** page. Refer to the procedure "Creating AWMS User Roles" on page 44 for additional information.

Chapter 3

Configuring AWMS

This chapter contains the following procedures to deploy initial AWMS configuration:

- "Formatting the Top Header" on page 29
- "Customizing Columns in Lists" on page 30
- "Resetting Pagination Records" on page 31
- "Using the Pagination Widget" on page 31
- "Using CSV Export for Lists and Reports" on page 31
- "Defining Graph Display Preferences" on page 32
- "Customizing the Overview Subtab Display" on page 32
- "Setting Severe Alert Warning Behavior" on page 34
- "Defining General AWMS Server Settings" on page 34
- "Defining AWMS Network Settings" on page 41
- "Creating AWMS Users" on page 43
- "Creating AWMS User Roles" on page 44
- "Enabling AWMS to Manage Your Devices" on page 47
- "Configuring TACACS+ and RADIUS Authentication" on page 52
- "Configuring Cisco WLSE and WLSE Rogue Scanning" on page 56
- "Configuring ACS Servers" on page 61
- "Integrating AWMS with an Existing Network Management Solution (NMS)" on page 62
- "Auditing PCI Compliance on the Network" on page 63
- "Deploying WMS Offload" on page 66

NOTE: Additional configurations of multiple types are available after basic configuration is complete.

Before You Begin

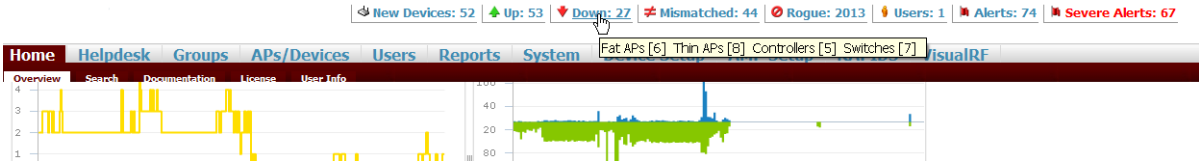
Remember to complete the required configurations in this chapter before proceeding. Dell support remains available to you for any phase of AWMS installation.

Formatting the Top Header

The AWMS interface centers around a horizontal row of tabs with nested subtabs.

A row of statistics hyperlinks called Top Header Stats above the tabs represents many commonly used subtabs. These hyperlinks provide the ability to view certain key statistics by mousing over, such as number and type of **Down** devices, and serve as shortcuts to frequently viewed subtabs. Figure 2 illustrates the navigation bar. For more details on hyperlinks, tabs and subtabs, see "AWMS Navigation Basics" on page 22.

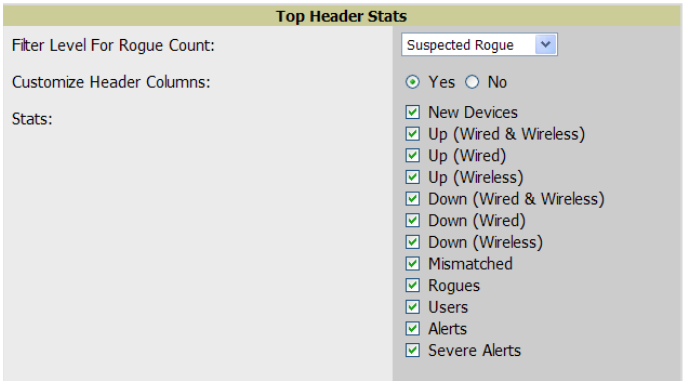
Figure 2 *Navigation Bar Displaying Home Subtabs and Down Device Statistics*



You can control which **Top Header Stats** links appear from the **AMP Setup > General** page, as described in "Defining General AWMS Server Settings" on page 34. Top Header Stats can also be customized for individual user on the **Home > User Info** page. There you can select the statistics to display for certain device types, and override the **AMP Setup** page.

All possible display options for users are shown in Figure 3, and these fields are described in detail in "Configuring Your Own User Information with the Home > User Info Page" on page 203.

Figure 3 ***Home > User Info*** *Top Header Display Options*

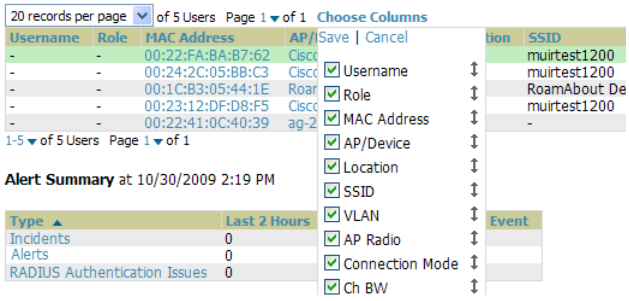


You can also set the severity level of critical alerts displayed for a user role. For details including a description of what constitutes a severe alert, see "Setting Severe Alert Warning Behavior" on page 34.

Customizing Columns in Lists

Customize the columns for any list table selecting **Choose Columns** as shown in Figure 4. Use the up/down arrows to change the order in which the column heads appear.

Figure 4 ***Choose Columns*** *Dropdown List*

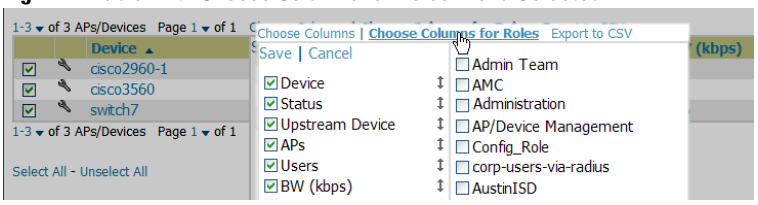


For more information on the universal list elements, see "Common List Settings" on page 25.

You can also control which column heads appear for each user role by selecting **Yes** in the **Customize Header Columns** field, as also appears in Figure 3. This exposes the **Choose Columns for Roles** dropdown menu in all tables shown in Figure 5.

The first column shows the user roles that were customized, if any. The second column allows you to establish left to right columns and order them using the arrows.

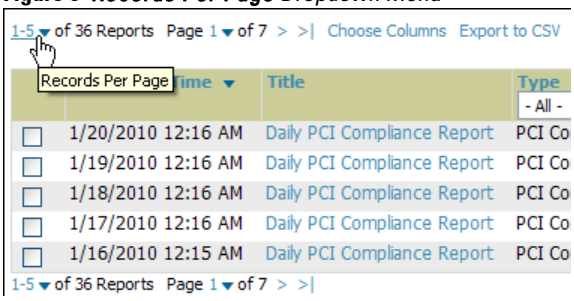
Figure 5 *Table With Choose Columns for Roles Menu Selected*



Resetting Pagination Records

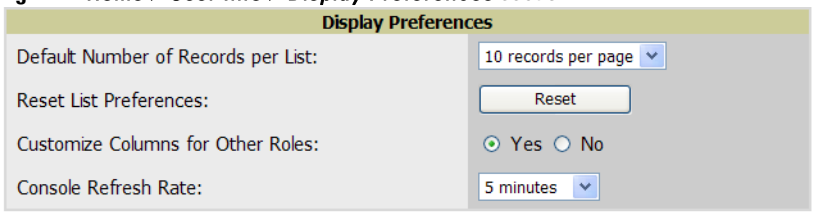
To control the number of records in any individual list, select the link with **Records Per Page** mouseover text at the top left of the table, as shown in Figure 6. AWMS remembers each list table's pagination preferences.

Figure 6 ***Records Per Page*** *Dropdown Menu*



To reset all AMP list Records Per Page preferences, you can select **Reset** in the **Display Preferences** section of the **Home > User Info** page, as shown in Figure 7.

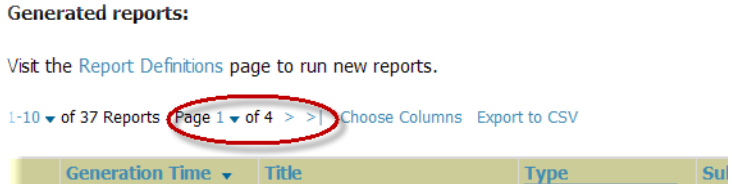
Figure 7 ***Home > User Info > Display Preferences*** *section*



Using the Pagination Widget

The pagination widget is located at the top and bottom of every list table, as shown in Figure 8.

Figure 8 *Pagination Widget*

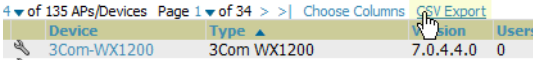


Use the down arrow next to **Page 1** to see all the page numbers for that table in a dropdown menu. From here, you can jump to any portion of the table. Select the **>** symbol to jump to the next page, and **>|** to jump to the last page.

Using CSV Export for Lists and Reports

Some tables have an **Export to CSV** setting you can use export the data as a spreadsheet. See Figure 9 for an example of a list with the **Export to CSV** option selected.

Figure 9 *List with Export to CSV Selected*

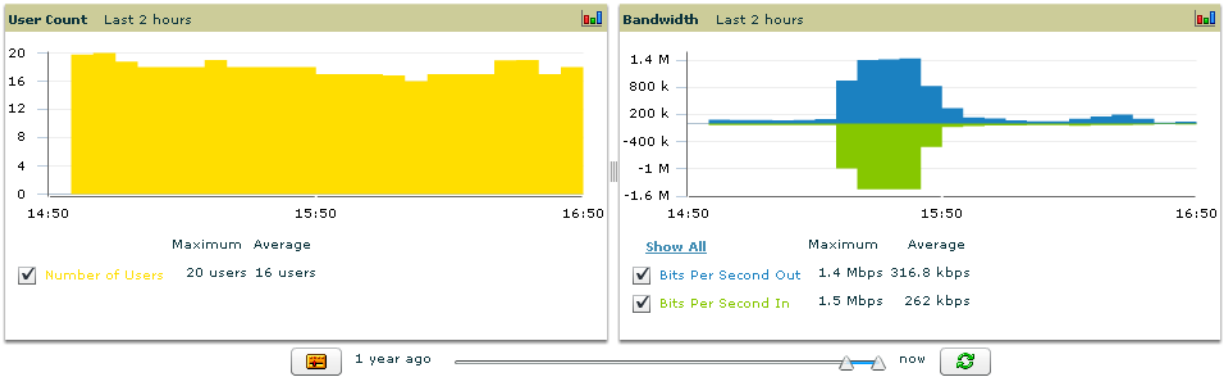


AWMS also enables CSV exporting of all report types. For more information, see "Exporting Reports to XML or CSV" on page 246.

Defining Graph Display Preferences

Many of the graphs in AWMS are Flash-based, which allows you adjust the graph settings attributes, as shown in Figure 10.

Figure 10 *Flash Graphs on the Home > Overview Page*



This Flash-enabled GUI allows for custom settings and adjustments, as follows:

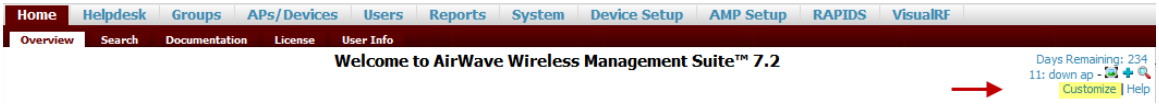
- Drag the slider at the bottom of the screen to move the scope of the graph between one year ago and the current time.
- Drag the slider between graphs to change the relative sizes of each.
- Deselect checkboxes to change the data displayed on each graph. The button with green arrows refreshes data on the graph.
- The **Show All** link displays all of the available checkboxes supporting the Flash graphs.
- Once a change to the slider bars or to the display boxes has been made, the same change can be applied to all other Flash graphs with an **apply** button (appears on mouse-over only).
- For non-Flash graphs, select the graph to open a popup window that shows historical data.

A non-Flash version of the AWMS user page is available if desired; instead of Flash it uses the RRD graphs that were used in earlier versions of AWMS. Contact Dell support for more information on activating this feature in the AWMS database.

Customizing the Overview Subtab Display

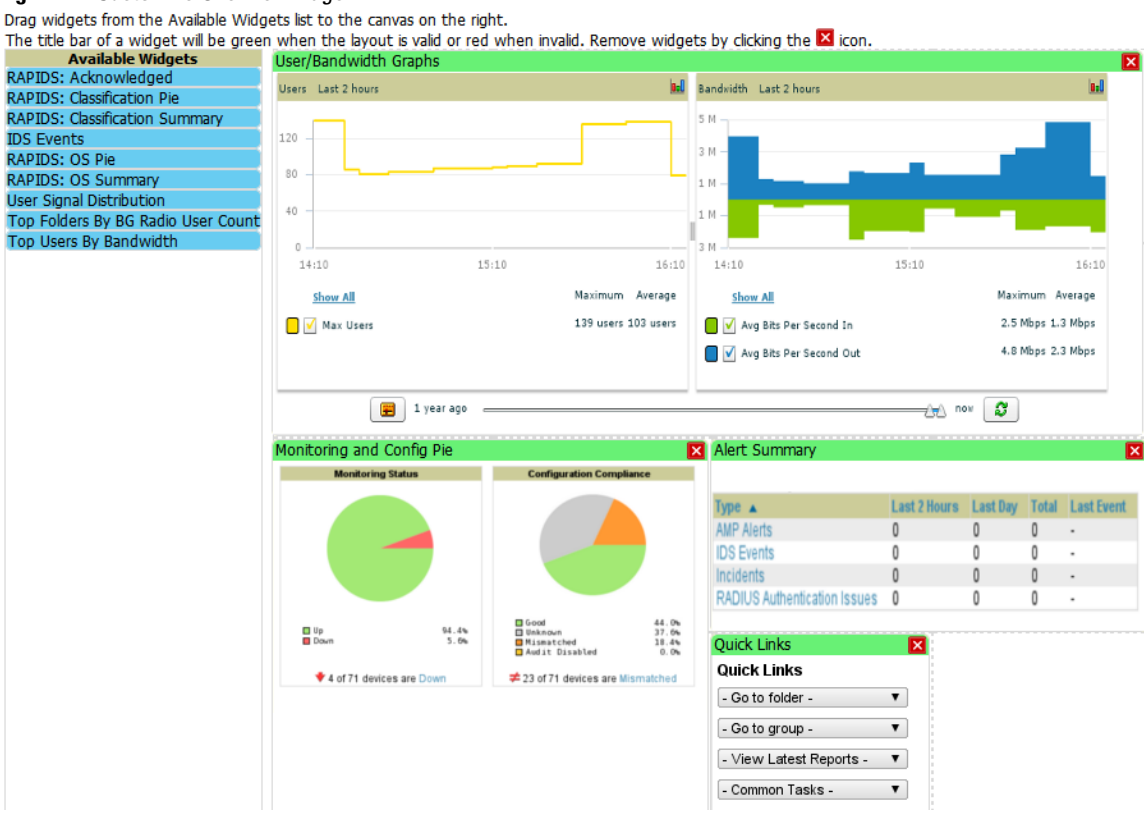
You can rearrange or remove widgets appearing on the **Home > Overview** dashboard by selecting **Customize** to the right of this window, as shown in Figure 11.

Figure 11 *Customize Button on the Home > Overview Page*



The **Customize** workspace is shown in Figure 12.

Figure 12 *Customize Overview Page*



The **Available Widgets** section on the left with no gridlines holds all possible (available) graphical elements (widgets). Select any blue widget tile with a verbal description enclosed, and it immediately turns into a graphical element with a description.

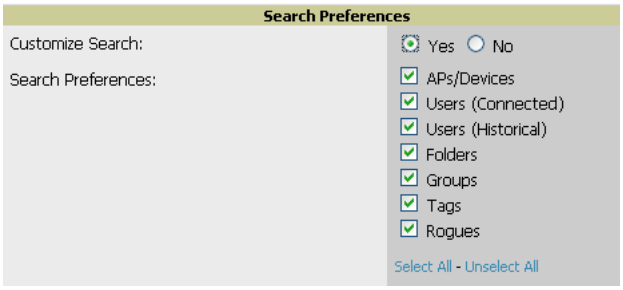
Drag the widgets you want to appear on the **Overview** dashboard across to the gridlines and arrange them in the right section, within the gridlines. A widget snaps back to the nearest available gridline if you drop it across two or more lines, and turns red if you attempt to place it over gridlines already occupied by widgets.

Green widgets are properly placed and set to appear when you select **Save**. Widgets that remain in the left section will not appear (although they can be reinstated by selecting **Restore Defaults**).

Customized Search

You can customize search results to display only desired categories of matches on the **Home > User Info** page. Go to the **Search Preferences** section and select **Yes** in the **Customize Search** field, then select or unselect categories of results and save your changes. Customized search is turned off by default, and all boxes are selected.

Figure 13 ***Home > User Info*** *Customized Search Preferences*

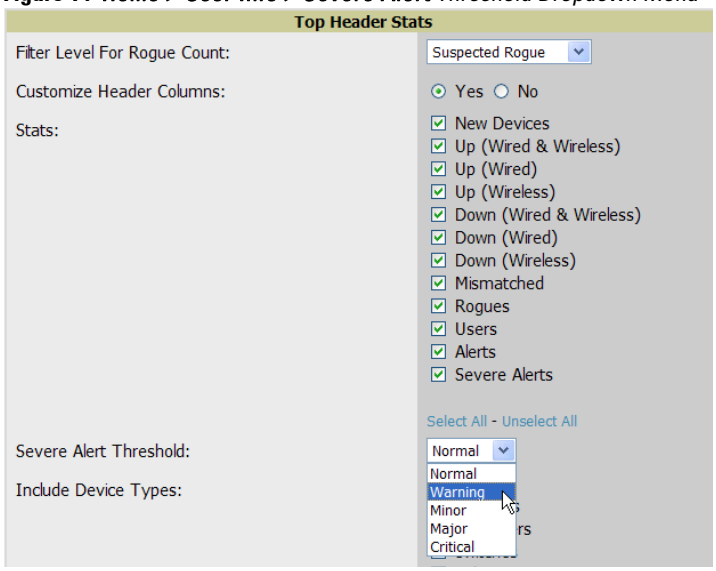


Setting Severe Alert Warning Behavior

You can control the alert levels users can see on the **Alerts** statistics hyperlink from the **Home > User Info** page. These settings will apply unless and until other users change settings for themselves. When a trigger is assigned a severity of **Critical**, it generates a severe alert. When a severe alert exists, a new component appears at the right of the **Status** field in bold red font.

Only users who are enabled for viewing critical alerts on the **Home > User Info** page can see severe alerts. The **Severe Alert Threshold** dropdown menu, located in the Top Header Stats section of the **Home > User Info** page is shown in Figure 14.

Figure 14 ***Home > User Info > Severe Alert*** *Threshold Dropdown Menu*

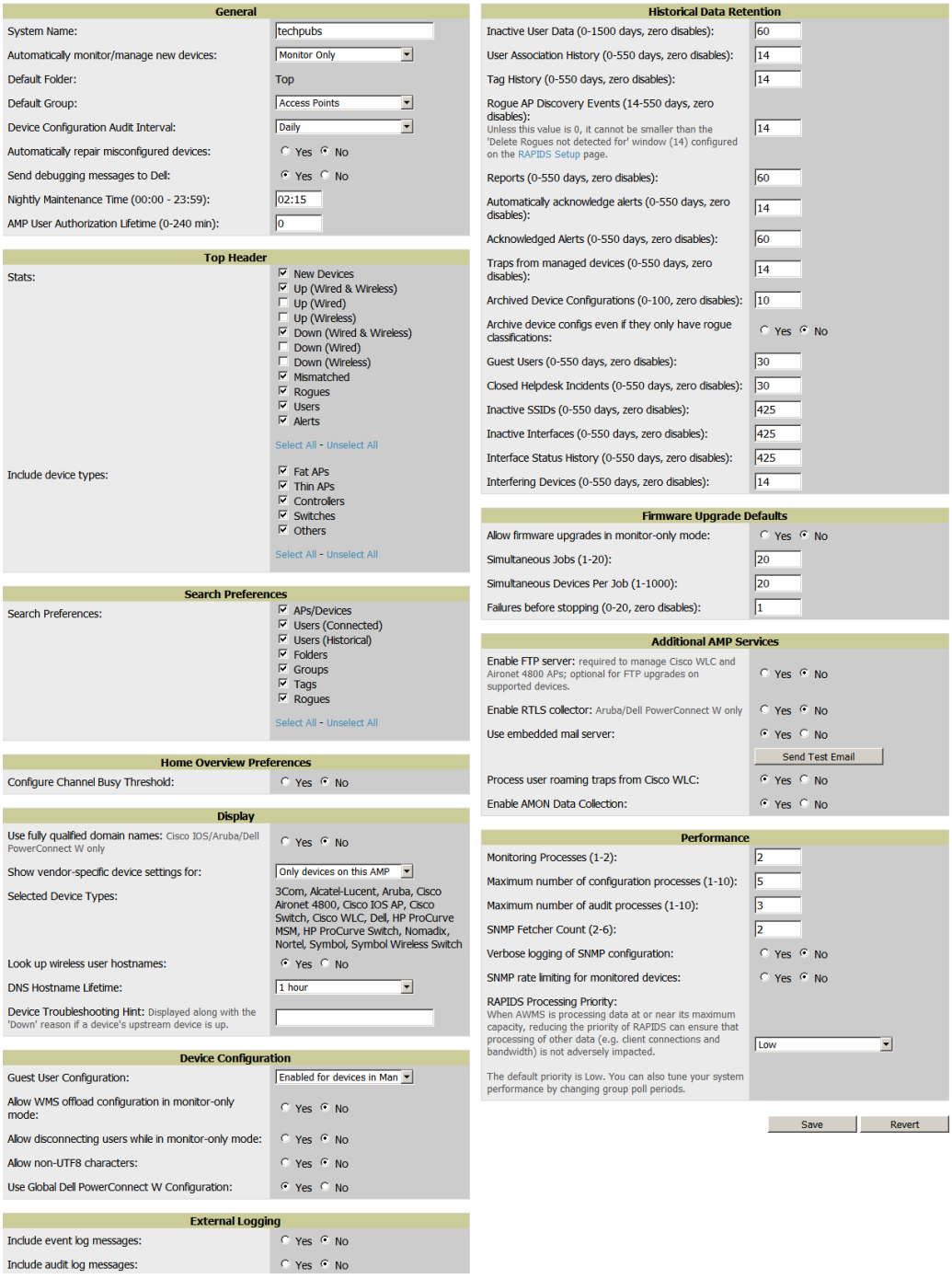


Defining General AWMS Server Settings

This section describes all pages accessed from the **AMP Setup** tab and describes two pages in the **Device Setup** tab—the **Communication** and **Upload Files** pages. Once required and optional configurations in this chapter are complete, continue to later chapters in this document to create and deploy device groups and device configuration and discovery on the network.

The first step in configuring AWMS is to specify the general settings for the AWMS server. Figure 15 illustrates the **AMP Setup > General** page:

Figure 15 ***AMP Setup > General*** *Page Illustration*



Perform the following steps to configure AWMS server settings globally across the product (for all users).

1. Browse to the **AMP Setup > General** page, locate the **General** area, and enter the information described in Table 8:

Table 8 ***AMP Setup > General > General*** *Section Fields and Default Values*

Setting	Default	Description
System Name	AWMS	Defines your name for the AWMS server, with a maximum limit of 20 alphanumeric characters.

Table 8 ***AMP Setup > General > General*** *Section Fields and Default Values (Continued)*

Setting	Default	Description
Automatically monitor/manage new devices	No	Launches a drop-down menu that specifies the behavior AWMS should follow when it discovers a new device. Devices are placed in the default group which is defined in the next field. Choose one of these options: • **Monitor Only:** AWMS compares the current configuration with the policy, and displays any discrepancies on the **APs/Devices > Audit** page, but does not change the configuration of the device. • **Manage Read/Write:** AWMS compares the device's current configuration settings with the Group configuration settings and automatically updates the device's configuration to match the Group policy. Automatically placing devices in **Managed Read/Write** mode will overwrite the configuration with the desired configuration in AWMS, and should only be used when you are certain AWMS has the correct configuration. This can be risky, and generally, devices should be placed in **Monitor Only** mode as the default. • **Thin APs Only**: Only thin APs will be automatically authorized in **Monitor Only** mode. This setting is ideal for mixed environments of thin and autonomous APs, or for very large subnets in which you don't want to auto-monitor all switches.
Default Group	Access Points	Sets the device group that this AWMS server uses as the default for device-level configuration. Select a device group from the drop-down menu. A group must first be defined on the **Groups > List** page to appear in this drop-down menu. For additional information, refer to Chapter 4, "Configuring and Using Device Groups in AWMS" on page 69.
Device Configuration Audit Interval	Daily	If enabled, this setting defines the interval of queries which compares actual device settings to the Group configuration policies stored in the AWMS database. If the settings do not match, the AP is flagged as mismatched and AWMS sends an alert via email, log, or SNMP. Dell PowerConnect W recommends enabling this feature with a frequency of Daily or more frequently to ensure that your AP configurations comply with your established policies.
Automatically Repair Misconfigured Devices	Disabled	If enabled, this setting automatically reconfigures the settings on the device when the device is in **Manage** mode and AWMS detects a variance between actual device settings and the Group configuration policy in the AWMS database.
Send Debugging Messages	Enabled	If enabled, AWMS automatically emails any system errors to Dell Support to assist in debugging.
Nightly Maintenance Time (00:00 - 23:59)	04:15	Specifies the local time of day AWMS should perform daily maintenance. During maintenance, AWMS cleans the database, performs backups, and completes a few other housekeeping tasks. Such processes should not be performed during peak hours of demand.
AWMS User Authorization Lifetime (0-240 min)	120	Sets the amount of time, in minutes, that an AWMS user session lasts before the user must authenticate when a new browser window is opened. Setting the lifetime to **0** requires the user to log in every time a new browser window is opened.
Check for Software Updates	Yes	Enables AWMS to check automatically for multiple update types. Check daily for AWMS updates, to include enhancements, device template files, important security updates, and other important news. This setting requires a direct internet connection via AWMS.

2. Select the **Top Header Stats** to be displayed at the top of the interface. For more detailed information about each option, refer to Table 5 on page 22.
3. On the **AMP Setup > General** page, locate the **Display** section and select the **Group** tabs and options to appear by default in new device groups.

NOTE: Changes to this section apply across all of AWMS. These changes affect all users and all new device groups.

Table 9 describes the settings and default values in this section.

Table 9 ***AMP Setup > General > Display*** *Fields and Default Values*

Setting	Default	Description
Use fully qualified domain names	No	Sets AWMS to use fully qualified domain names for APs instead of the AP name. For example, "testap.yourdomain.com" would be used instead of "testap." This option is supported only for Cisco IOS, Dell PowerConnect W, Aruba Networks, and Alcatel-Lucent devices.
Show vendor-specific device settings for	All Devices	Displays a drop-down menu that determines which **Group** tabs and options are viewable by default in new groups, and selects the device types that use fully qualified domain names. This field has three options, as follows: • **All Device**—When selected, AWMS displays all Group tabs and setting options. • **Only Devices on this AMP**—When selected, AWMS hides all options and tabs that do not apply to the APs and devices currently on AWMS. • **Selected device type**—When selected, a new field appears listing many device types. This option allows you to specify the device types for which AWMS displays group settings. You can override this setting.
Look up wireless user hostnames	Yes	Enables AWMS to look up the DNS for new user hostnames. This setting can be turned off to troubleshoot performance issues.
DNS Hostname Lifetime	24 hours	Defines the length of time, in hours, for which a DNS server hostname remains valid on AWMS, after which AWMS refreshes DNS lookup: • 1 hour • 2 hours • 4 hours • 12 hours • 24 hours
Device Troubleshooting Hint	N/A	The message included in this field is displayed along with the Down if a device's upstream device is up. This applies to all APs and controllers but not to routers and switches.

4. Locate the **Device Configuration** section and adjust settings for whether certain changes can be pushed to devices in **Monitor Only** mode. Table 10 describes the settings and default values of this section.

Table 10 ***AMP Setup > General > Device Configuration*** *Fields and Default Values*

Setting	Default	Description
Guest User Configuration	Disabled	Enables or prevents guest users to/from pushing configurations to devices. Options are **Disabled** (default), **Enabled for Devices in Manage (Read/Write)**, **Enabled for all Devices**.
Allow WMS offload configuration in monitor-only mode	No	When **Yes** is selected, you can enable the ArubaOS WMS offload feature on the **Groups > Basic** page for WLAN switches in **Monitor Only** mode. Enabling WMS offload does not cause a controller to reboot. This option is supported only for Aruba Networks and Dell PowerConnect W devices.
Allow disconnecting users while in monitor-only mode	No	Sets whether you can deauthenticate a user for a device in monitor-only mode. If set to **No**, the **Deauthenticate User** button for in a **Users > User Detail** page is enabled only for Managed devices.
Allow non-UTF8 characters	No	Whether AMP can use character sets other than UTF-8 for configuration settings.

Table 10 ***AMP Setup > General > Device Configuration*** *Fields and Default Values (Continued)*

Setting	Default	Description
Use Global Dell PowerConnect W Configuration	Yes	Enables Dell PowerConnect W configuration profile settings to be globally configured and then assigned to device groups. If disabled, settings can be defined entirely within **Groups > Dell PowerConnect W Config** instead of globally. **NOTE:** Changing this setting may require importing configuration on your devices. When an existing Aruba configuration setup is to be converted from global to group, follow these steps: 1. Set all the devices to Monitor Only mode before setting the flag. 2. Each device Group will need to have an import performed from the Audit page of some controller in the AMP group. 3. All of the thin APs need to have their settings imported after the device group settings have finished importing. 4. If the devices were set to Monitor Only mode, set them back to Managed mode.

5. Locate the **External Logging** section and adjust settings to send audit and system events to an external syslog server. Table 11 describes these settings and default values.

Table 11 ***AMP Setup > General > External Syslog*** *Fields and Default Values*

Setting	Default	Description
Syslog Server	N/A	Enter the IP address of the syslog server.
Syslog Port	514	Enter the port of the syslog server.
Include event log messages	No	Select **Yes** to send event log messages to an external syslog server.
Event log facility	local1	Select the facility for the event log from the drop-down menu.
Include audit log messages	No	Select **Yes** to send audit log messages to an external syslog server.
Audit log facility	local1	Select the facility for the audit log from the drop-down menu.

6. Locate the **Historical Data Retention** section and specify the number of days you wish to keep client session records and rogue discovery events. Table 12 describes the settings and default values of this section. Many settings can be set to have no expiration date.

Table 12 ***AMP Setup > General > Historical Data Retention*** *Fields and Default Values*

Setting	Default	Description
Inactive User Data (2-1500 days)	60	Defines the number of days AWMS stores basic information about inactive users. Dell PowerConnect W recommends a shorter setting of 60 days for customers with high user turnover such as hotels. The longer you store inactive user data, the more hard disk space you require.
User Association History (2-550 days)	14	Defines the number of days AWMS stores client session records. The longer you store client session records, the more hard disk space you require.
Tag History (2-550 days)	14	Sets the number of days AWMS retains location history for Wi-Fi tags.
Rogue AP Discovery Events (2-550 days)	14	Defines the number of days AWMS stores Rogue Discovery Events. The longer you store discovery event records, the more hard disk space you require.
Reports (2-550 days)	60	Defines the number of days AWMS stores Reports. Large numbers of reports, over 1000, can cause the **Reports > List** page to be slow to respond.

Table 12 ***AMP Setup > General > Historical Data Retention*** *Fields and Default Values (Continued)*

Setting	Default	Description
Automatically Acknowledged Alerts (0-550 days, zero disables)	14	Defines automatically acknowledged alerts as the number of days AWMS retains alerts that have been automatically acknowledged. Setting this value to 0 disables this function, and alerts will never expire or be deleted from the database.
Acknowledged Alerts (2-550 days)	60	Defines the number of days AWMS retains information about acknowledged alerts. Large numbers of Alerts, over 2000, can cause the **System > Alerts** page to be slow to respond.
Traps from managed devices (0-550 days, zero disables)	14	Defines the number of days AWMS retains information about SNMP traps from Managed Devices. Setting this value to **0** disables this function, and the trap information will never expire or be deleted from the database.
Archived Device Configurations (1-100)	10	Sets the number of archived configurations to retain for each device.
Guest Users (0-550 days, zero disables)	30	Sets the number of days that AWMS is to support any guest user. A value of **0** disables this function, and guest users will never expire or be deleted from the AWMS database.
Closed Helpdesk Incidents (0-550 days, zero disables)	30	Sets the number of days that AWMS is to retain records of closed Helpdesk incidents once closed. Setting this value to **0** disables this function, and Helpdesk information will never expire or be deleted from the database.
Inactive SSIDs (0-550 days, zero disables)	425	Sets the number of days AWMS retains historical information after AWMS last saw a client on a specific SSID. Setting this value to **0** disables this function, and inactive SSIDs will never expire or be deleted from the database.
Inactive Interfaces (0-550 days, zero disables)	425	Sets the number of days AWMS retains inactive interface information after the interface has been removed or deleted from the device. Setting this value to **0** disables this function, and inactive interface information will never expire or be deleted from the database.
Interface Status History (0-550 days, zero disables)	425	Sets the number of days AWMS retains historical information on interface status. Setting this value to **0** disables this function.
Interfering Devices (0-550 days, zero disables)	14	Sets the number of days AWMS retains historical information on interfering devices. Setting this value to **0** disables this function.

7. Locate the **Default Firmware Upgrade Options** section and adjust settings as required. This section allows you to configure the default firmware upgrade behavior for AWMS. Table 13 describes the settings and default values of this section.

Table 13 ***AMP Setup > General > Default Firmware Upgrade*** *Options Fields and Default Values*

Setting	Default	Description
Allow Firmware Upgrades in Monitor Only mode	No	If **Yes** is selected, **AWMS** upgrades the firmware for APs in **Monitor Only** mode. When **AWMS** upgrades the firmware in this mode, the desired configuration are not be pushed to **AWMS**. Only the firmware is applied. The firmware upgrade may result in configuration changes. **AWMS** does not correct those changes when the AP is in **Monitor Only** mode.
Simultaneous Jobs (1-20)	20	Defines the number of jobs **AWMS** runs at the same time. A job can include multiple APs.
Simultaneous Devices Per Job (1-1000)	20	Defines the number of devices that can be in the process of upgrading at the same time. **AWMS** only runs one TFTP transfer at a time. As soon as the transfer to a device has completed, the next transfer begins, even if the first device is still in the process of rebooting or verifying configuration.

Table 13 ***AMP Setup > General > Default Firmware Upgrade*** *Options Fields and Default Values (Continued)*

Setting	Default	Description
Failures Before Stopping (0-20)	1	Sets the default number of upgrade failures before **AWMS** pauses the upgrade process. User intervention is required to resume the upgrade process. Setting this value to **0** disables this function.

8. Locate the **Additional AMP Services** section, and adjust settings as required. Table 14 describes the settings and default values of this section.

Table 14 ***AMP Setup > General > Additional AMP Services*** *Fields and Default Values*

Setting	Default	Description
Enable FTP Server	No	Enables or disables the FTP server on AMP. The FTP server is only used to manage Cisco Aironet 4800 APs. Dell PowerConnect W recommends disabling the FTP server if you do not have any Cisco Aironet 4800 APs in the network.
Enable RTLS Collector	No	Enables or disables the RTLS Collector, which is used to allow ArubaOS controllers to send signed and encrypted RTLS (real time locating system) packets to VisualRF-- in other words, AWMS becomes the acting RTLS server. The RTLS server IP address must be configured on each controller. This function is used for VisualRF to improve location accuracy and to locate chirping asset tags. This function is supported only for Dell PowerConnect W, Alcatel-Lucent and Aruba Networks devices. With selection of **Yes**, the following additional fields appear, which you should populate to match the settings configured on the controller: • **RTLS Port**—Specify the port for the AWMS RTLS server. • **RTLS Username**—Enter the user name used by the controller to decode RTLS messages. • **RTLS Password**—Enter the RTLS server password that matches the controllers' value.
Use Embedded Mail Server	Yes	Enables or disables the embedded mail server that is included with AWMS.This field supports a **Send Test Email** button for testing server functionality. This button prompts you with a **To** and **From** field in which you must enter valid email addresses, and a button to send a test email.
Process User Roaming Traps from Cisco WLC	Yes	AMP now parses client association and authentication traps from Cisco WLC controllers to give real time information on users connected to the wireless network.
Enable AMON data collection	Yes	Allows AMP to collect enhanced data from Dell PowerConnect W devices on certain firmware versions; see the *Dell PowerConnect W AirWave Best Practices Guide* in **Home > Documentation** for more details.

9. Locate the **Performance Tuning** section. Performance tuning is unlikely to be necessary for many AWMS implementations, and likely provides the most improvements for customers with extremely large Pro or Enterprise installations. Please contact Dell support if you think you might need to change any of these settings. Table 15 describes the settings and default values of this section.

Table 15 ***AMP Setup > General > Performance Tuning*** *Fields and Default Values*

Setting	Default	Description
Monitoring Processes	Based on the number of cores for your server	Optional setting configures the throughput of monitoring data. Increasing this setting allows AWMS to process more data per second, but it can take resources away from other AWMS processes. Please contact Dell support if you think you might need to increase this setting for your network.
Maximum Number of Configuration Processes	5	Increases the number of processes that are pushing configurations to your devices, as an option. The optimal setting for your network depends on the resources available, especially RAM. Please contact Dell support if you think you might need to increase this setting for your network.

Table 15 ***AMP Setup > General > Performance Tuning*** *Fields and Default Values (Continued)*

Setting	Default	Description
Maximum Number of Audit Processes	3	Increases the number of processes that audit configurations for your devices, as an option. The optimal setting for your network depends on the resources available, especially RAM. Contact Dell support if you are considering increasing this setting for your network.
Verbose Logging of SNMP Configuration	No	Enables or disables logging detailed records of SNMP configuration information.
SNMP Rate Limiting for Monitored Devices	No	When enabled, AWMS fetches SNMP data more slowly, potentially reducing device CPU load. Dell PowerConnect W recommends enabling this global setting when monitoring Dell PowerConnect W controllers only if your network contains a majority of legacy controllers (800, 2400, 5000, controllers that use Supervisor Module II). If your network mainly uses newer processors (3000 series, 600 series, the M3 module in the 6000 series), Aruba strongly recommends disabling this setting.
RAPIDS Processing Priority	Low	Defines the processing and system resource priority for RAPIDS in relation to AWMS as a whole. When AWMS is processing data at or near its maximum capacity, reducing the priority of RAPIDS can ensure that processing of other data (such as client connections and bandwidth) is not adversely impacted. The default priority is **Low**. You can also tune your system performance by changing group poll periods.

10. Select **Save** when the **General Server** settings are complete and whenever making subsequent changes.

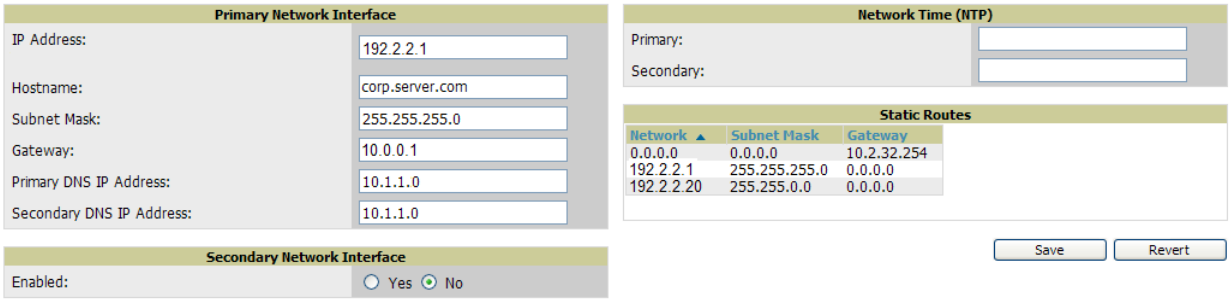
What Next?

- Go to additional tabs in the **AMP Setup** section to continue additional setup configurations.
- *Complete the required configurations in this chapter before proceeding.* Dell support remains available to you for any phase of AWMS installation.

Defining AWMS Network Settings

The next step in configuring AWMS is to confirm the AMP network settings. Define these settings by navigating to the **AMP Setup > Network** page. Figure 16 illustrates the contents of this page.

Figure 16 ***AMP Setup > Network*** *Page Illustration*



Perform the following steps to define the AWMS network settings:

1. Locate the **Primary** and **Secondary Network Interface** sections. The information in these sections should match what you defined during initial network configuration and should not require changes. Table 16 describes the settings and default values.

Table 16 ***Primary and Secondary Network Interface*** *Fields and Default Values*

Setting	Default	Description
IP Address	None	Sets the IP address of the AWMS network interface. This address must be a static IP address.
Hostname	None	Sets the DNS name assigned to the AWMS server.
Subnet Mask	None	Sets the subnet mask for the primary network interface.
Gateway	None	Sets the default gateway for the network interface.
Primary DNS IP	None	Sets the primary DNS IP address for the network interface.
Secondary DNS IP	None	Sets the secondary DNS IP address for the network interface.
Secondary Network Interface	No	Select **Yes** to enable a secondary network interface. You must also define the IP address and subnet mask.

2. On the **AMP Setup > Network** page, locate the **Network Time Protocol (NTP)** section. The Network Time Protocol is used to synchronize the time between AWMS and your network reference NTP server. NTP servers synchronize with external reference time sources, such as satellites, radios, or modems.

NOTE: Specifying NTP servers is optional. NTP servers synchronize the time on the AWMS server, not on individual access points.

To disable NTP services, clear both the **Primary** and **Secondary** NTP server fields. Any problem related to communication between AWMS and the NTP servers creates an entry in the event log. Table 17 describes the settings and default values in more detail. For more information on ensuring that AMP servers have the correct time, please see support.ntp.org/bin/view/Servers/NTPPoolServers.

Table 17 ***AMP Setup > Network > Secondary Network*** *Fields and Default Values*

Setting	Default	Description
Primary	ntp1.yourdomain.com	Sets the IP address or DNS name for the primary NTP server.
Secondary	ntp2.yourdomain.com	Sets the IP address or DNS name for the secondary NTP server.

3. On the **AMP Setup > Network** page, locate the **Static Routes** area. This section displays network, subnet mask, and gateway settings that you have defined elsewhere from a command-line interface.

NOTE: This section does not enable you to configure new routes or remove existing routes.

4. Select **Save** when you have completed all changes on the **AMP Setup > Network** page, or select **Revert** to return to the last settings. **Save** restarts any affected services and may temporarily disrupt your network connection.

What Next?

- Go to additional tabs in the **AMP Setup** section to continue additional setup configurations.
- *Complete the required configurations in this chapter before proceeding.* Dell support remains available to you for any phase of AWMS installation.

Creating AWMS Users

AWMS installs with only one AMP user—the **admin**, who is authorized to:

- define additional users with varying levels of privilege, be it manage read/write or monitoring.
- limit the viewable devices as well as the level of access a user has to the devices.

Each general user that you add needs a **Username**, a **Password,** and a **Role**. Use unique and meaningful user names as they are recorded in the log files when you or other users make changes in AWMS.

NOTE: Username and password are not required if you configure AWMS to use RADIUS or TACACS authentication. You do not need to add individual users to the AWMS server if you use RADIUS or TACACS authentication.

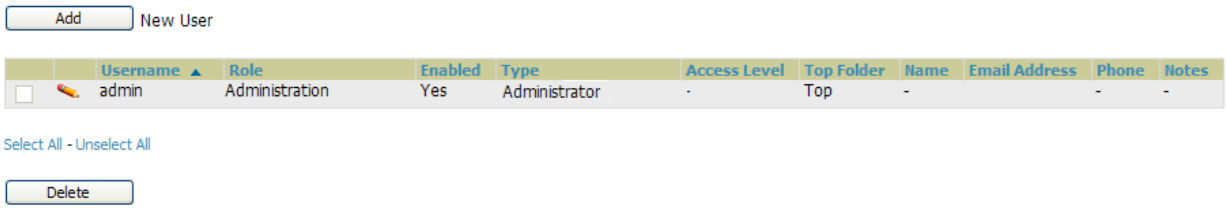
The user *role* defines the user type, access level, and the top folder for that user. User roles are defined on the **AMP Setup > Roles** page. Refer to the next procedure in this chapter for additional information, "Creating AWMS User Roles" on page 44.

The **admin** user can provide optional additional information about the user including the user's real name, email address, phone number, and so forth.

Perform the following steps to display, add, edit, or delete AWMS users of any privilege level. You must be an **admin** user to complete these steps.

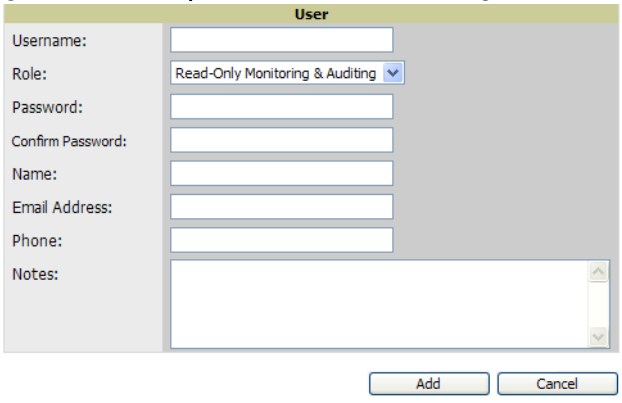
1. Go to the **AMP Setup > Users** page. This page displays all users currently configured in AWMS. Figure 17 illustrates the contents and layout of this page.

Figure 17 ***AMP Setup > Users*** *Page Illustration*



2. Select **Add** to create a new user, select the pencil icon to edit an existing user, or select a user and select **Delete** to remove that user from AWMS. When you select **Add** or the edit icon, the **Add User** page appears, illustrated in Figure 18.

Figure 18 ***AMP Setup > Users > Add/Edit User*** *Page Illustration*



3. Enter or edit the settings on this page. Table 18 describes these settings in additional detail.

Table 18 ***AMP Setup > User > Add/Edit User*** *Fields and Default Values*

Setting	Default	Description
Username	None	Sets the username as an alphanumeric string. The Username is used when logging in to AWMS and appears in AWMS log files.

Table 18 ***AMP Setup > User > Add/Edit User*** *Fields and Default Values (Continued)*

Setting	Default	Description
Role	None	Specifies the **User Role** that defines the Top viewable folder, type and access level of the user specified in the previous field. The **admin** user defines user roles on the **AMP Setup > Roles** page, and each user in the system is assigned to a role.
Password	None	Sets the password for the user being created or edited. Enter an alphanumeric string without spaces, and enter the password again in the **Confirm Password** field. **NOTE:** Because the default user's password is identical to the name, Dell PowerConnect W strongly recommends that your change this password.
Name	None	Allows you to define an optional and alphanumeric text field that takes note of the user's actual name.
Email Address	None	Allows you to specify a specific email address that will propagate throughout many additional pages in AWMS for that user, including reports, triggers, and alerts.
Phone	None	Allows you to enter an optional phone number for the user.
Notes	None	Enables you to cite any additional notes about the user, including the reason they were granted access, the user's department, or job title.

4. Select **Add** to create the new user, **Save** to retain changes to an existing user, or **Cancel** to cancel out of this screen. The user information you have configured appears on the **AMP Setup > Users** page and the user propagates to all other AWMS pages and relevant functions.

NOTE: AWMS enables user roles to be created with access to folders within multiple branches of the overall hierarchy. This feature assists non-administrator users who support a subset of accounts or sites within a single AWMS deployment, such as help desk or IT staff.

What Next?

- Go to additional tabs in the **AMP Setup** section to continue additional setup configurations.
- *Complete the required configurations in this chapter before proceeding.* Dell support remains available to you for any phase of AWMS installation.

Creating AWMS User Roles

The **AMP Setup > Roles** page defines the viewable devices, the operations that can be performed on devices, and general AWMS access. **VisualRF** uses the same user roles as defined for AWMS—users can see floor plans that contain an AP to which they have access in AWMS, although only visible APs appear on the floor plan.

Users can also see any building that contains a visible floor plan, and any campus that contains a visible building.

NOTE: In **VisualRF > Setup > Server Settings**, a new flag added in AWMS 7.2 allows you to restrict the visibility of empty floor plans to the role of the user who created them. In previous versions, a floor plan without APs could be visible to all users. By default, this setting is set to **No**.

When a new role is added to AWMS, VisualRF must be restarted for the new user to be enabled. Refer to the *VisualRF User Guide* in **Home > Documentation** for additional information.

User **roles** can be created that have access to folders within multiple branches of the overall hierarchy. This feature assists non-administrative users, such as help desk or IT staff, who support a subset of accounts or sites within a single AWMS deployment. You can restrict user roles to multiple folders within the overall hierarchy

even if they do not share the same top-level folder. Non-admin users are only able to see data and users for devices within their assigned subset of folders.

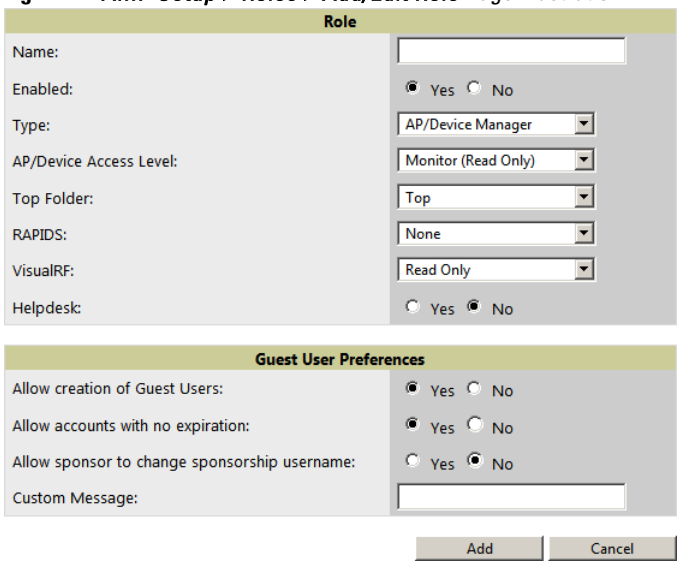
Perform the following steps to view, add, edit, or delete user **roles**:

1. Go to the **AMP Setup > Roles** page. This page displays all roles currently configured in AWMS. Figure 19 illustrates the contents and layout of this page.

Figure 19 ***AMP Setup > Roles*** *Page Illustration*

2. Select **Add** to create a new role, select the pencil icon to edit an existing role, or select a checkbox and select **Delete** to remove that role from AWMS. When you select **Add** or the edit icon, the **Add/Edit Role** page appears, illustrated in Figure 20.

Figure 20 ***AMP Setup > Roles > Add/Edit Role*** *Page Illustration*



3. Enter or edit the settings on this page. Table 19 describes these settings in additional detail.

   As explained earlier in this section, **Roles** define the type of user-level access, the user-level privileges, and the view available to the user for device groups and devices in AWMS. Table 19 describes the settings and default values of this section.

Table 19 ***AMP Setup > Roles > Add/Edit Roles*** *Fields and Default Values*

Setting	Default	Description
Name	None	Sets the administrator-definable string that names the role. Dell PowerConnect W recommends that the role name give an indication of the devices and groups that are viewable, as well as the privileges granted to that role.
Enabled	Yes	Disables or enables the role. Disabling a role prevents all users of that role from logging in to AWMS.

Table 19 ***AMP Setup > Roles > Add/Edit Roles*** *Fields and Default Values (Continued)*

Setting	Default	Description
Type	AP/Device Manager	Defines the type of role. AWMS supports the following role types: • **AMP Administrator**—The AMP Administrator has full access to AWMS and all of the devices. Only the AMP Administrator can create new users or access the **AMP Setup** page. • **AP/Device Manager**—AP/Device Managers have access to a limited number of devices and groups based on the Top folder and varying levels of control based on the Access Level. • **AirWave Management Client**—The AirWave Management Client (AMC) software allows WiFi-enabled devices to serve as additional sensors to gather data for RAPIDS. Use this role type to set up a client to be treated as a user with the AMC role. The user information defined in AMC must match the user with the Dell PowerConnect W Management Client type. • **Guest Access Sponsor**—Limited-functionality role to allow helpdesk or reception desk staff to grant wireless access to temporary personnel. This role only has access to the defined top folder of APs.
AP/Device Access Level	None	Defines the privileges the role has over the viewable APs. AWMS supports three privilege levels, as follows: • **Manage (Read/Write)**—Manage users can view and modify devices and Groups. • **Audit (Read Only)**—Audit users have read only access to the viewable devices and Groups. Audit users have access to the **APs/Devices > Audit** page, which may contain sensitive information including AP passwords. • **Monitor (Read Only)**—Monitor users have read-only access to devices and groups and VisualRF. Monitor users cannot view the **APs/Devices > Audit** page which may contain sensitive information, including passwords.
Top Folder	None	Defines the Top viewable folder for the role. The role is able to view all devices and groups contained by the Top folder. The top folder and its subfolders must contain all of the devices in any of the groups it can view. **NOTE:** AWMS enables user roles to be created with access to folders within multiple branches of the overall hierarchy. This feature assists non-administrator users who support *a subset of accounts or sites* within a single AWMS deployment, such as help desk or IT staff. User roles can be restricted to multiple folders within the overall hierarchy, even if they do not share the same top-level folder. Non-administrator users are only able to see data and users for devices within their assigned subset of folders.
RAPIDS	None	Sets the RAPIDS privileges, which are set separately from the APs/Devices. This field specifies the RAPIDS privileges for the role, and options are as follows: • **None**— Cannot view the RAPIDS tab or any Rogue APs. • **Read Only**—The user can view the RAPIDS pages but cannot make any changes to rogue APs or perform OS scans. • **Read/Write**—The user may ignore, delete, override scores and perform OS scans.
Helpdesk	No	Sets the role to support helpdesk users, with parameters that are specific to the needs of helpdesk personnel supporting users on a wireless network.
Enable Adobe Flash	Yes	Enables the Adobe Flash application for all users who are assigned this role. Adobe Flash supports dynamic graphics on the **Home > Overview** page, VisualRF, Quickview functions, and additional AWMS pages. **NOTE:** This field is only visible if a specific flag is set in the AWMS database. By default this option is hidden and Flash is enabled for all users.
Allow creation of Guest Users	Yes	If this option is enabled, users with an assigned role of Monitoring or Audit can be given access to guest user account creation along with the option to allow a sponsor to change its username. A custom message can also be included. The **Guest User Preferences** section does not apear if Guest User Configuration is disabled in **AMP Setup > General**.

What Next?

- Go to additional tabs in the **AMP Setup** section to continue additional setup configurations.
- *Complete the required configurations in this chapter before proceeding.* Dell support remains available to you for any phase of AWMS installation.

Enabling AWMS to Manage Your Devices

Once AWMS is installed and active on the network, the next task is to define the basic settings that allow AWMS to communicate with and manage your devices. Device-specific firmware files are often required or are highly desirable. Furthermore, the use of Web Auth bundles is advantageous for deployment of Cisco WLC wireless LAN controllers when they are present on the network.

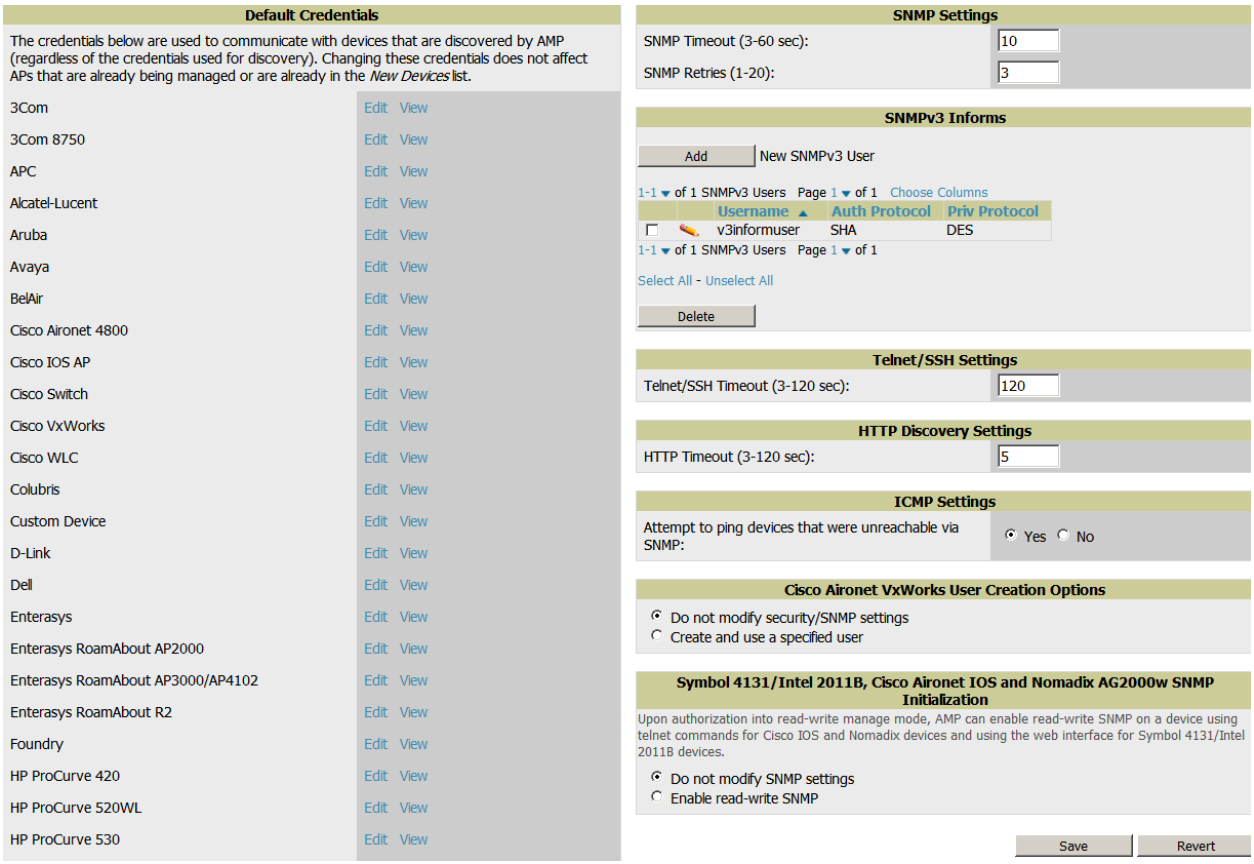
This section contains the following procedures:

- Configuring Communication Settings for Discovered Devices
- Loading Device Firmware Onto AWMS (optional)
  - Overview of the Device Setup > Upload Firmware & Files Page
  - Loading Firmware Files to AWMS

Configuring Communication Settings for Discovered Devices

To configure AWMS to communicate with your devices, to define the default shared secrets, and to set SNMP polling information, navigate to the **Device Setup > Communication** page, illustrated in Figure 21.

Figure 21 ***Device Setup > Communication*** *Page Illustration*



Perform the following steps to define the default credentials and SNMP settings for the wireless network.

1. On the **Device Setup > Communication** page, locate the **Default Credentials** area. Enter the credentials for each device model on your network. The default credentials are assigned to all newly discovered APs.

The **Edit** button edits the default credentials for newly discovered devices. To modify the credentials for existing devices, use the **APs/Devices > Manage** page or the **Modify Devices** link on the **APs/Devices > List** page.

NOTE: Community strings and shared secrets must have read-write access for AWMS to configure the devices. Without read-write access, AWMS may be able to monitor the devices but cannot apply any configuration changes.

2. Browse to the **Device Setup > Communication** page, locate the **SNMP Settings** section, and enter or revise the following information. Table 20 lists the settings and default values.

Table 20 ***Device Setup > Communication > SNMP Settings*** *Fields and Default Values*

Setting	Default	Description
SNMP Timeout	3	Sets the time, in seconds, that AWMS waits for a response from a device after sending an SNMP request.
SNMP Retries	3	Sets the number of times AWMS tries to poll a device when it does not receive a response within the **SNMP Timeout Period** or the Group's **Missed SNMP Poll Threshold** setting (1-100). If AWMS does not receive an SNMP response from the device after the specified number of retries, AWMS classifies that device as **Down**.

3. Locate the **SNMP v3 Informs** section. Select **Add New SNMP v3 User** to reveal its configuration section. AMP users will need to configure all v3 users that are configured on the controller; the SNMP Inform receiver in the AMP will be restarted when users are changed or added to the controller.
   - **Username** - Username of the SNMP v3 user as configured on the controller.
   - **Auth Protocol** - Can be MD5 or SHA. The default setting is SHA.
   - **Auth and Priv Passphrases** - Enter the auth and priv passphrases for the user as configured on the controller.
   - **Priv Protocol** - Can be DES or AES. The default setting is DES.
4. Locate the **Telnet/SSH Settings** section, and complete or adjust the default value for the field. Table 21 shows the setting and default value.

Table 21 ***Telnet/SSH*** *Settings Fields and Default Values*

Setting	Default	Description
Telnet/SSH Timeout (3-120 sec)	10	Sets the timeout period in seconds used when performing Telnet and SSH commands.

5. Locate the **HTTP Discovery Settings** section and adjust the default value. Table 22 shows the setting and default value.

Table 22 ***HTTP Discovery Settings*** *Fields and Default Values*

Setting	Default	Description
HTTP Timeout (3-120 sec)	5	Sets the timeout period in seconds used when running an HTTP discovery scan.

6. Locate the **ICMP Settings** section and adjust the default value as required. Table 23 shows the setting and default value.

Table 23 ***Device Setup > Communication > ICMP Settings*** *Fields and Default Values*

Setting	Default	Description
Attempt to ping devices that were unreachable via SNMP	Yes	• When **Yes** is selected, AWMS attempts to ping the AP device. • Select **No** if performance is affected in negative fashion by this function. If a large number of APs are unreachable by ICMP, likely to occur where there is in excess of 100 APs, the timeouts start to impede network performance. **NOTE:** If ICMP is disabled on the network, select **No** to avoid the performance penalty caused by numerous ping requests.

7. Locate the **Cisco Aironet VxWorks User Creation Options** section. You only need to provide this information if you use VxWorks-based Cisco APs on your network, as follows:
   - Aironet 340
   - Aironet 350
   - Aironet 1200

   Select one of the three options listed. Table 24 describes the settings and default values of this section.

Table 24 ***Cisco Aironet VxWorks User Creation Options*** *Fields and Default Values*

Setting	Default	Description
Do not modify security/SNMP settings	N/A	Enables AWMS using only an existing user account on the AP, as defined in the **Cisco VxWorks Username/Password** section in the **Default Secrets** area. This user account must have all permissions set.
Create and use specified user	N/A	Enables AWMS to create a new user account, specified below, on each AP with all permissions enabled.

8. Locate the **Symbol 4131, Cisco Aironet IOS and Nomadix AG2000w SNMP Initialization** area. Select one of the options listed. Table 25 describes the settings and default values

Table 25 ***Device Setup > Communications*** *Fields and Default Values*

Setting	Default	Description
Do Not Modify SNMP Settings	Yes	When selected, specifies that AWMS not modify any SNMP settings. If SNMP is not already initialized on the Symbol, Nomadix, and Cisco IOS APs, AWMS is not able to manage them.
Enable read-write SNMP	No	When selected, and when on networks where the Symbol, Nomadix, and Cisco IOS APs do not have SNMP initialized, this setting enables SNMP so the devices can be managed by AWMS.

Loading Device Firmware Onto AWMS (optional)

Overview of the Device Setup > Upload Firmware & Files Page

AWMS enables automated firmware distribution to the devices on your network. Once you have downloaded the firmware files from the vendor, you can upload this firmware to AWMS for distribution to devices via the **Device Setup > Upload Firmware & Files** page.

This page lists all firmware files on AWMS with file information. This page also enables you to add new firmware files, to delete firmware files, and to add **New Web Auth Bundle** files.

The following additional pages support firmware file information:

- Firmware files uploaded to AWMS appear as options in the drop-down menus on the **Group > Firmware** page and on individual **APs/Devices > Manage** pages.
- Use the **AMP Setup** page to configure AWMS-wide default firmware options.

Table 26 below itemizes the contents, settings, and default values for the **Upload Firmware & Files** page.

Table 26 ***Device Setup > Upload Firmware & Files*** *Fields and Default Values*

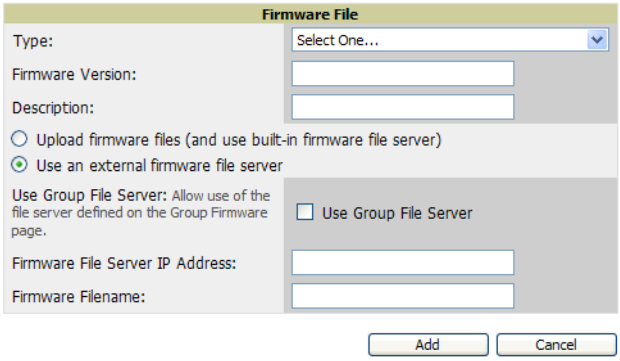
Setting	Default	Description
Type	Aruba Controller (any model)	Displays a drop-down list of the primary AP makes and models that AWMS supports with automated firmware distribution.
Owner Role	None	Displays the user role that uploaded the firmware file. This is the role that has access to the file when an upgrade is attempted.
Description	None	Displays a user-configurable text description of the firmware file.
Server Protocol	None	Displays the file transfer protocol by which the firmware file was obtained from the server.
Use Group File Server	None	Displays the name of the file server supporting the group.
Firmware Filename	None	Displays the name of the file that was uploaded to AWMS and to be transferred to an AP when the file is used in an upgrade.
Firmware Version	None	Displays the firmware version number. This is a user-configurable field.
Firmware MD5 Checksum	None	Displays the MD5 checksum of the file after it was uploaded to AWMS. The MD5 checksum is used to verify that the file was uploaded to AWMS without issue. The checksum should match the checksum of the file before it was uploaded.
Firmware File Size	None	Displays the size of the firmware file in bytes.
HTML Filename	None	Supporting HTML, displays the name of the file that was uploaded to AWMS and to be transferred to an AP when the file is used in an upgrade.
HTML Version	None	Supporting HTML, displays the version of HTML used for file transfer.
HTML MD5 Checksum	None	Supporting HTML, displays the MD5 checksum of the file after it was uploaded to AWMS. The MD5 checksum is used to verify that the file was uploaded to AWMS without issue. The checksum should match the checksum of the file before it was uploaded.
HTML File Size	None	Supporting HTML, displays the size of the file in bytes.
Desired Firmware File for Specified Groups	None	The firmware file is set as the desired firmware version on the **Groups > Firmware Files** page of the specified groups. You cannot delete a firmware file that is set as the desired firmware version for a group.

Loading Firmware Files to AWMS

Perform the following steps to load a device firmware file onto AWMS:

1. Go to the **Device Setup > Upload Firmware & Files** page.
2. Select **Add**. The **Add Firmware File** page appears. Figure 22 illustrates this page.

Figure 22 ***Device Setup > Add New Firmware*** *Page Illustration*



3. Select **Supported Firmware Versions and Features** to view supported firmware versions.

NOTE: Unsupported and untested firmware may cause device mismatches and other problems. Please contact Dell support before installing non-certified firmware.

4. Enter the appropriate information and select **Add**. The file uploads to AWMS and once complete, this file appears on the **Device Setup > Upload Firmware & Files** page. This file also appears on additional pages that display firmware files (such as the **Group > Firmware** page and on individual **APs/Devices > Manage** pages).
5. You can also import a CSV list of groups and their external TFTP firmware servers. Table 27 itemizes the settings of this page.

Table 27 ***Supported Firmware Versions and Features*** *Fields and Default Values*

Setting	Default	Description
Type	Aruba Controller	Indicates the firmware file is used with the specified type. If you select an IOS device from the **Type** drop-down menu, you have the option of choosing a server protocol of TFTP or FTP. If you choose FTP, you may later notice that the firmware files are pushed to the device more quickly. With selection of some types, particularly Cisco controllers, you can specify the boot software version.
Firmware Version	None	Provides a user-configurable field to specify the firmware version number. Appears if you did not select the default **Aruba Controller** type.
Description	None	Provides a user-configurable text description of the firmware file.
Upload firmware files (and use built-in firmware)	Built-in	Selects the TFTP server that access points use to download their firmware. The built-in TFTP server is recommended. If you choose to use an external TFTP server, enter the **File Server IP Address** and the **Firmware Filename**.
Use an external firmware file server	N/A	You can also choose to assign the external TFTP server on a per-group basis. If you select this option, you must enter the IP address on the **Groups > Firmware** page. Complete the **Firmware File Server IP Address** field. **NOTE:** With selection of some Types, you are prompted with the Server Protocol field that lets you select which protocol to use, and this varies from device to device. If you select FTP, AWMS uses an anonymous user for file upload.
Use Group File Server	Disabled	If you opt to use an external firmware file server, this additional option appears. This setting instructs AWMS to use the server that is associated with the group instead of defining a server.
Firmware File Server IP Address	None	Provides the IP address of the External TFTP Server (like SolarWinds) used for the firmware upgrade. This option displays when the user selects the **Use an external firmware file** option.
Firmware Filename	None	Enter the name of the firmware file that needs to be uploaded. Ensure that the firmware file is in the TFTP root directory. If you are using a non-external server, you select **Choose File** to find your local copy of the file.

NOTE: Additional fields may appear for multiple device types. AWMS prompts you for additional firmware information as required. For example, Intel and Symbol distribute their firmware in two separate files: an image file and an HTML file. Both files must be uploaded to AWMS for the firmware to be distributed successfully via AWMS.

6. Select **Add** to import the firmware file.

To delete a firmware file that has already been uploaded to AWMS, return to the **Device Setup > Upload Firmware & Files** page, select the checkbox for the firmware file and select **Delete**.

NOTE: A firmware file may not be deleted if it is the desired version for a group. Use the **Group > Firmware** page to investigate this potential setting and status.

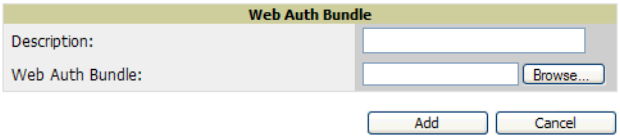
Using Web Auth Bundles in AWMS

Web authentication bundles are configuration files that support Cisco WLC wireless LAN controllers. This procedure requires that you have local or network access to a Web Auth configuration file for Cisco WLC devices.

Perform these steps to add or edit Web Auth bundles in AWMS.

1. Go to the **Device Setup > Upload Firmware & Files** page. This page displays any existing Web Auth bundles that are currently configured in AWMS, and allows you to add or delete Web Auth bundles.
2. Scroll to the bottom of the page. Select **Add New Web Auth Bundle** to create a new Web Auth bundle (see Figure 23), or select the pencil icon next to an existing bundle to edit. You may also delete Web Auth bundles by selecting that bundle with the checkbox, and selecting **Delete**.

Figure 23 ***Add Web Auth Bundle*** *Page Illustration*



3. Enter a descriptive label in the description field. This is the label used to identify and track Web Auth bundles on the page.
4. Enter the path and filename of the Web Auth configuration file in the **Web Auth Bundle** field or select **Choose File** to locate the file.
5. Select **Add** to complete the Web Auth bundle creation, or **Save** if replacing a previous Web Auth configuration file, or **Cancel** to abort the Web Auth integration.

For additional information and a case study that illustrates the use of Web Auth bundles with Cisco WLC controllers, refer to the following document on Cisco.com:

- Wireless LAN controller Web Authentication Configuration Example, Document ID: 69340

  www.cisco.com/en/US/tech/tk722/tk809/technologies_configuration_example09186a008067489f.shtml

Configuring TACACS+ and RADIUS Authentication

As an optional configuration, you can set AWMS to use an external user database to simplify password management for AWMS administrators and users. This section contains the following procedures:

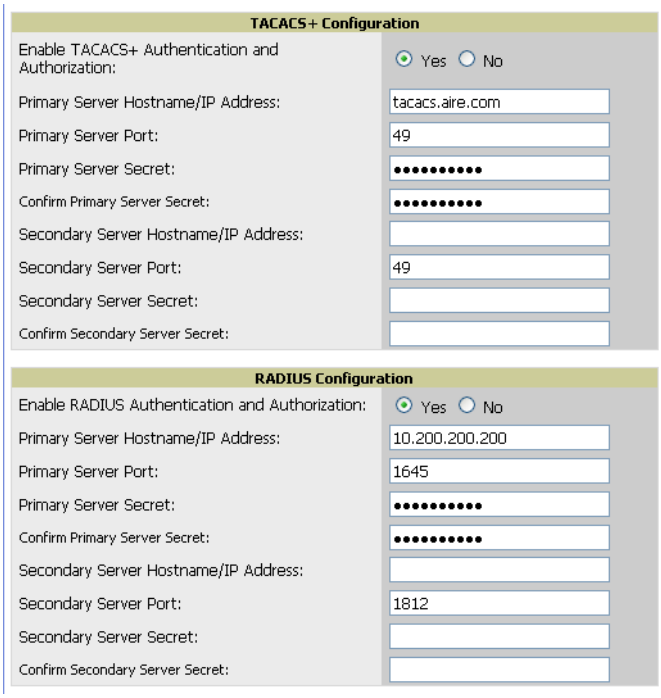
- Configuring TACACS+ Authentication
- Configuring RADIUS Authentication and Authorization
- Integrating a RADIUS Accounting Server

Configuring TACACS+ Authentication

For TACACS+ capability, you must configure the IP/Hostname of the TACACS+ server, the TCP port, and the server shared secret. This TACACS+ configuration is for AWMS users, and does not affect APs or users logging into APs.

1. Go to the **AMP Setup > Authentication** page. This page displays current status of TACACS+. Figure 24 illustrates this page when neither TACACS+ nor RADIUS authentication is enabled in AWMS.

Figure 24 ***AMP Setup > Authentication*** *Page Illustration*



2. Select **No** to disable or **Yes** to enable TACACS+ authentication. If you select **Yes**, several new fields appear. Complete the fields described in Table 28.

Table 28 ***AMP Setup > Authentication*** *Fields and Default Values*

Field	Default	Description
Primary Server Hostname/IP Address	N/A	Enter the IP address or the hostname of the primary TACACS+ server.
Primary Server Port	49	Enter the port for the primary TACACS+ server.
Primary Server Secret	N/A	Specify and confirm the primary shared secret for the primary TACACS+ server.
Secondary Server Hostname/IP Address	N/A	Enter the IP address or hostname of the secondary TACACS+ server.
Secondary Server Port	49	Enter the port for the secondary TACACS+ server.
Secondary Server Secret	N/A	Enter the shared secret for the secondary TACACS+ server.

3. Select **Save** and continue with additional steps.
4. To configure Cisco ACS to work with AWMS, you must define a new service named **AMP** that uses https on the ACS server.
   - The AMP https service is added to the **TACACS+** (Cisco) interface under the **Interface Configuration** tab.
   - Select a checkbox for a new service.

- Enter **AMP** in the service column and **https** in the protocol column.
- Select **Save**.

5. Edit the existing groups or users in TACACS to use the "AMP service" and define a role for the group or user.
   - The role defined on the **Group Setup** page in ACS must match the exact name of the role defined on the **AMP Setup > Roles** page.
   - The defined role should use the following format: **`role=`**`<name_of_AMP_role>`. One example is as follows:

     ```
     role=DormMonitoring
     ```

   As with routers and switches, AWMS does not need to know usernames.
6. AWMS also needs to be configured as an AAA client.
   - On the **Network Configuration** page, select **Add Entry**.
   - Enter the IP address of AWMS as the **AAA Client IP Address**.
   - The secret should be the same value that was entered on the **AMP Setup > TACACS+** page.
7. Select **TACACS+** (Cisco IOS) in the **Authenticate Using** dropdown menu and select **submit + restart**.

NOTE: AWMS checks the local username and password store before checking with the TACACS+ server. If the user is found locally, the local password and local role apply. When using TACAS+, it is not necessary or recommended to define users on the AWMS server. The only recommended user is the backup administrator, in the event that the TACAS+ server goes down.

What Next?

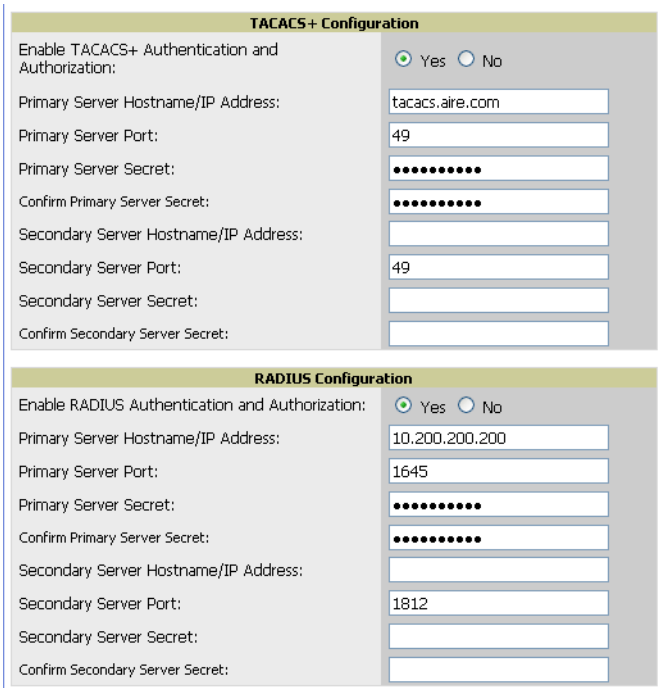
- Go to additional tabs in the **AMP Setup** section to continue additional setup configurations.
- *Complete the required configurations in this chapter before proceeding.* Dell support remains available to you for any phase of AWMS installation.

Configuring RADIUS Authentication and Authorization

For RADIUS capability, you must configure the IP/Hostname of the RADIUS server, the TCP port, and the server shared secret. Perform these steps to configuration RADIUS authentication:

1. Go to the **AMP Setup > Authentication** page. This page displays current status of RADIUS. Figure 25 illustrates this page.

Figure 25 ***AMP Setup > Authentication*** *Page Illustration*



2. Select **No** to disable or **Yes** to enable TACACS+ or RADIUS authentication. If you select **Yes**, several new fields appear. Complete the fields described in Table 29.

Table 29 ***AMP Setup > Authentication*** *Fields and Default Values*

Field	Default	Description
Primary Server Hostname/IP Address	N/A	Enter the IP address or the hostname of the primary RADIUS server.
Primary Server Port	1812	Enter the TCP port for the primary RADIUS server.
Primary Server Secret	N/A	Specify and confirm the primary shared secret for the primary RADIUS server.
Secondary Server Hostname/IP Address	N/A	Enter the IP address or the hostname of the secondary RADIUS server.
Secondary Server Port	1812	Enter the TCP port for the secondary RADIUS server.
Secondary Server Secret	N/A	Enter the shared secret for the secondary RADIUS server.

3. Select **Save** to retain these configurations, and continue with additional steps in the next procedure.

Integrating a RADIUS Accounting Server

NOTE: AWMS checks the local username and password before checking with the RADIUS server. If the user is found locally, the local password and role apply. When using RADIUS, it's not necessary or recommended to define users on the AWMS server. The only recommended user is the backup admin, in case the RADIUS server goes down.

Optionally, you can configure RADIUS server accounting on **AMP Setup > RADIUS Accounting.** This capability is not required for basic AWMS operation, but can increase the user-friendliness of AWMS administration in large networks. Figure 26 illustrates the settings of this optional configuration interface.

Perform the following steps and configurations to enable AWMS to receive accounting records from a separate RADIUS server. Figure 26 illustrates the display of RADIUS accounting clients already configured, and Figure 27 illustrates the **Add RADIUS Accounting Client** page.

Figure 26 ***AMP Setup > RADIUS Accounting*** *Page Illustration*

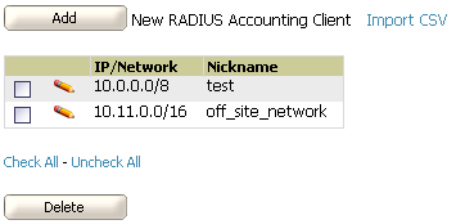
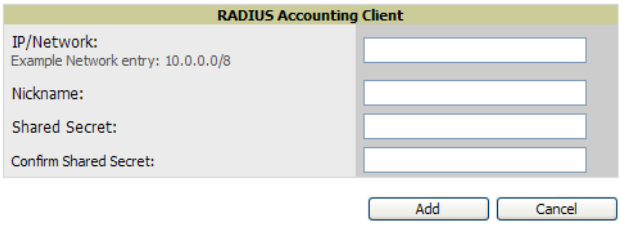


Figure 27 ***AMP Setup > RADIUS > Add RADIUS Accounting Client*** *Page Illustration*



1. To specify the RADIUS authentication server or network, browse to the **AMP Setup > RADIUS Accounting** page and select **Add**, illustrated in Figure 27, and provide the information in Table 30.
2. Select **Add**.

Table 30 ***AMP Setup > RADIUS Accounting*** *Fields and Default Values*

Setting	Default	Description
Nickname	None	Sets a user-defined name for the authentication server.
IP/Network	None	Cites the IP address or DNS Hostname for the authentication server if you only want to accept packets from one device. To accept packets from an entire network enter the IP/Netmask of the network (for example, 10.51.0.0/24).
Shared Secret (Confirm)	None	Sets the Shared Secret that is used to establish communication between AWMS and the RADIUS authentication server.

What Next?

- For more information about configuring WLAN Gateways or WLAN controllers such as BlueSocket, ReefEdge, or ProCurve wireless gateways, refer to "Third-Party Security Integration for AWMS" on page 257.
- Go to additional subtabs in **AMP Setup** to continue additional setup configurations.
- *Complete the required configurations in this chapter before proceeding.* Dell support remains available to you for any phase of AWMS installation.

Configuring Cisco WLSE and WLSE Rogue Scanning

The Cisco Wireless LAN Solution Engine (WLSE) includes rogue scanning functions that AWMS supports. This section contains the following topics and procedures, and several of these sections have additional sub-procedures:

- Introduction to Cisco WLSE
- Configuring WLSE Initially in AWMS
- Configuring IOS APs for WDS Participation
- Configuring ACS for WDS Authentication
- Configuring Cisco WLSE Rogue Scanning

You must enter one or more CiscoWorks WLSE hosts to be polled for discovery of Cisco devices and rogue AP information.

Introduction to Cisco WLSE

Cisco WLSE functions as an integral part of the Cisco Structured Wireless-Aware Network (SWAN) architecture, which includes IOS Access Points, a Wireless Domain Service, an Access Control Server, and a WLSE. In order for AWMS to obtain Rogue AP information from the WLSE, all SWAN components must be properly configured. Table 31 describes these components.

Table 31 *Cisco SWAN Architecture Components*

SWAN Component	Requirements
WDS (Wireless Domain Services)	• WDS Name • Primary and backup IP address for WDS devices (IOS AP or WLSM) • WDS Credentials APs within WDS Group **NOTE:** WDS can be either a WLSM or an IOS AP. WLSM (WDS) can control up to 250 access points. AP (WDS) can control up to 30 access points.
WLSE (Wireless LAN Solution Engine)	• IP Address • Login
ACS (Access Control Server)	• IP Address • Login
APs	• APs within WDS Group

Configuring WLSE Initially in AWMS

Use the following general procedures to configure and deploy a WLSE device in AWMS:

- Adding an ACS Server for WLSE
- Enabling Rogue Alerts for Cisco WLSE
- Configuring WLSE to Communicate with APs
- Discovering Devices
- Managing Devices
- Inventory Reporting
- Defining Access
- Grouping
- WDS Participation
- Primary or Secondary WDS

Adding an ACS Server for WLSE

1. Go to the **Devices > Discover > AAA Server** page.
2. Select **New** from the drop-down list.
3. Enter the **Server Name**, **Server Port** (default 2002), **Username**, **Password**, and **Secret.**
4. Select **Save**.

Enabling Rogue Alerts for Cisco WLSE

1. Go to the **Faults > Network Wide Settings > Rogue AP Detection** page.
2. Select the **Enable**.
3. Select **Apply**.

Additional information about rogue device detection is available in "Configuring Cisco WLSE Rogue Scanning" on page 60.

Configuring WLSE to Communicate with APs

1. Go to the **Device Setup > Discover** page.
2. Configure **SNMP Information**.
3. Configure HTTP Information.
4. Configure Telnet/SSH Credentials.
5. Configure HTTP ports for IOS access points.
6. Configure WLCCP credentials.
7. Configure AAA information.

Discovering Devices

There are three methods to discover access points within WLSE, as follows:

- Using Cisco Discovery Protocol (CDP)
- Importing from a file
- Importing from CiscoWorks

Perform these steps to discover access points.

1. Go to the **Device > Managed Devices > Discovery Wizard** page.
2. Import devices from a file.
3. Import devices from Cisco Works.
4. Import using CDP.

Managing Devices

Prior to enabling radio resource management on IOS access points, the access points must be under WLSE management.

NOTE: AWMS becomes the primary management/monitoring vehicle for IOS access points, but for AWMS to gather Rogue information, the WLSE must be an NMS manager to the APs.

Use these pages to make such configurations:

1. Go to **Device > Discover > Advanced Options**.
2. Select the method to bring APs into management **Auto**, or specify via filter.

Inventory Reporting

When new devices are managed, the WLSE generates an inventory report detailing the new APs. AWMS accesses the inventory report via the SOAP API to auto-discover access points. This is an optional step to enable another form of AP discovery in addition to AWMS' CDP, SNMP scanning, and HTTP scanning discovery for Cisco IOS access points. Perform these steps for inventory reporting.

1. Go to **Devices > Inventory > Run Inventory**.
2. **Run Inventory** executes immediately between WLSE polling cycles.

Defining Access

AWMS requires System Admin access to WLSE. Use these pages to make these configurations.

1. Go to **Administration > User Admin**.
2. Configure **Role** and **User**.

Grouping

It's much easier to generate reports or faults if APs are grouped in WLSE. Use these pages to make such configurations.

1. Go to **Devices > Group Management**.
2. Configure **Role** and **User**.

Configuring IOS APs for WDS Participation

IOS APs (1100, 1200) can function in three roles within SWAN:

- Primary WDS
- Backup WDS
- WDS Member

AMP monitors AP WDS role and displays this information on **AP Monitoring** page.

NOTE: APs functioning as WDS Master or Primary WDS will no longer show up as Down is the radios are enabled.

WDS Participation

Perform these steps to configure WDS participation.

1. Log in to the AP.
2. Go to the **Wireless Services > AP** page.
3. Select **Enable participation in SWAN Infrastructure.**
4. **Select Specified Discovery** and enter the IP address of the Primary WDS device (AP or WLSM).
5. Enter the **Username** and **Password** for the WLSE server.

Primary or Secondary WDS

Perform these steps to configure primary or secondary functions for WDS.

1. Go to the **Wireless Services > WDS > General Setup** page.
2. If the AP is the Primary or Backup WDS, select **Use the AP as Wireless Domain Services**.
   - Select **Priority** (set **200** for Primary, **100** for Secondary).
   - Configure the **Wireless Network Manager** (configure the IP address of WLSE).
3. If the AP is Member Only, leave all options unchecked.
4. Go to the **Security > Server Manager** page.
5. Enter the **IP address** and **Shared Secret** for the ACS server and select **Apply**.
6. Go to the **Wireless Services > WDS > Server Group** page.
7. Enter the WDS Group of AP.
8. Select the **ACS server** in the **Priority 1** drop-down menu and select **Apply**.

Configuring ACS for WDS Authentication

ACS authenticates all components of the WDS and must be configured first. Perform these steps to make this configuration.

1. Login to the ACS.
2. Go to the **System Configuration > ACS Certificate Setup** page.

3. Install a New Certificate by selecting the **Install New Certificate** button, or skip to the next step if the certificate was previously installed.
4. Select **User Setup** in the left frame.
5. Enter the **Username** that will be used to authenticate into the WDS and select **Add/Edit**.
6. Enter the **Password** that will be used to authenticate into the WDS and select **Submit**.
7. Go to the **Network Configuration > Add AAA Client** page.
8. Add **AP Hostname**, **AP IP Address**, and **Community String** (for the key).
9. Enter the **Password** that will be used to authenticate into the WDS and select **Submit**.

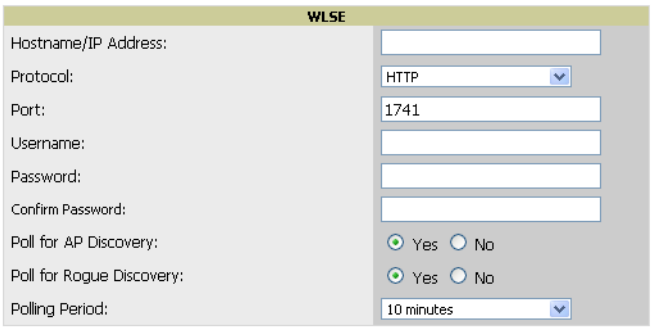
For additional and more general information about ACS, refer to "Configuring ACS Servers" on page 61.

Configuring Cisco WLSE Rogue Scanning

The **AMP Setup > WLSE** page allows AWMS to integrate with the Cisco Wireless LAN Solution Engine (WLSE). AWMS can discover APs and gather rogue scanning data from the Cisco WLSE.

Figure 28 illustrates and itemizes the AWMS settings for communication that is enabled between AWMS and WLSE.

Figure 28 ***AMP Setup > WLSE > Add WLSE*** *Page Illustration*



Perform the following steps for optional configuration of AWMS for support of Cisco WLSE rogue scanning.

1. To add a Cisco WLSE server to AWMS, navigate to the **AMP Setup > WLSE** page and select **Add**. Complete the fields in this page. Table 32 describes the settings and default values.

Table 32 ***AMP Setup > WLSE*** *Fields and Default Values*

Setting	Default	Description
Hostname/IP Address	None	Designates the IP address or DNS Hostname for the WLSE server, which must already be configured on the Cisco WLSE server.
Protocol	HTTP	Specifies the protocol to be used when polling the WLSE.
Port	1741	Defines the port AWMS uses to communicate with the WLSE server.
Username	None	Defines the username AWMS uses to communicate with the WLSE server. The username and password must be configured the same way on the WLSE server and on AWMS. The user needs permission to display faults to discover rogues and inventory API (XML API) to discover manageable APs. As derived from a Cisco limitation, only credentials with alphanumeric characters (that have only letters and numbers, not other symbols) allow AWMS to pull the necessary XML APIs.
Password	None	Defines the password AWMS uses to communicate with the WLSE server. The username and password must be configured the same way on the WLSE server and on AWMS. As derived from a Cisco limitation, only credentials with alphanumeric characters (that have only letters and numbers, not other symbols) allow AWMS to pull the necessary XML APIs.

Table 32 ***AMP Setup > WLSE*** *Fields and Default Values (Continued)*

Setting	Default	Description
Poll for AP Discovery; Poll for Rogue Discovery	Yes	Sets the method by which AWMS uses WLSE to poll for discovery of new APs and/or new rogue devices on the network.
Last Contacted	None	Displays the last time AWMS was able to contact the WLSE server.
Polling Period	10 minutes	Determines how frequently AWMS polls WLSE to gather rogue scanning data.

2. After you have completed all fields, select **Save**. AWMS is now configured to gather rogue information from WLSE rogue scans. As a result of this configuration, any rogues found by WLSE appear on the **RAPIDS > Rogue** page.

What Next?

- Go to additional tabs in the **AMP Setup** section to continue additional setup configurations.
- *Complete the required configurations in this chapter before proceeding.* Dell support remains available to you for any phase of AWMS installation.

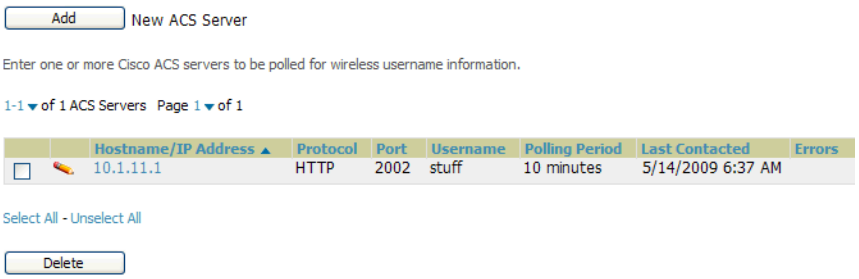
Configuring ACS Servers

This is an optional configuration. The **AMP Setup > ACS** page allows AWMS to poll one or more Cisco ACS servers for wireless username information. When you specify an ACS server, AWMS gathers information about your wireless users. Refer to "Configuring TACACS+ and RADIUS Authentication" on page 52 if you want to use your ACS server to manage your AWMS users.

Perform these steps to configure ACS servers:

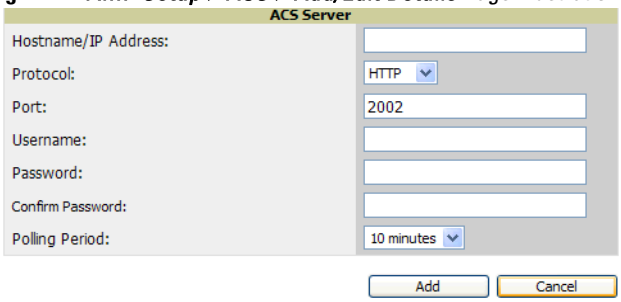
1. Go to the **AMP Setup > ACS** page. This page displays current ACS setup, as illustrated in Figure 29.

Figure 29 ***AMP Setup > ACS*** *Page Illustration*



2. Select **Add** to create a new ACS server, or select a pencil icon to edit an existing server. To delete an ACS server, select that server and select **Delete**. When selecting **Add** or edit, the **Details** page appears, as illustrated in Figure 30.

Figure 30 ***AMP Setup > ACS > Add/Edit Details*** *Page Illustration*



3. Complete the settings on **AMP Setup > ACS > Add/Edit Details**. Table 33 describes these fields:

Table 33 ***AMP Setup > ACS > Add/Edit Details*** *Fields and Default Values*

Field	Default	Description
IP/Hostname	None	Sets the DNS name or the IP address of the ACS Server.
Protocol	HTTP	Launches a drop-down menu specifying the protocol AWMS uses when it polls the ACS server.
Port	2002	Sets the port through which AWMS communicates with the ACS. AWMS generally communicates via SNMP traps on port 162.
Username	None	Sets the Username of the account AWMS uses to poll the ACS server.
Password	None	Sets the password of the account AWMS uses to poll the ACS server.
Polling Period	10 min	Launches a drop-down menu that specifies how frequently AWMS polls the ACS server for username information.

4. Select **Add** to finish creating the new ACS server, or **Save** to finish editing an existing ACS server.
5. The ACS server must have logging enabled for passed authentications. Enable the **Log to CSV Passed Authentications report** option, as follows:
   - Log in to the ACS server, select **System Configuration**, then in the **Select** frame, select **Logging**.
   - Under **Enable Logging**, select **CSV Passed Authentications**. The default logging options function and support AWMS. These include the two columns AWMS requires: **User-Name** and **Caller-ID**.

What Next?

- Go to additional tabs in the **AMP Setup** section to continue additional setup configurations.
- *Complete the required configurations in this chapter before proceeding.* Dell support remains available to you for any phase of AWMS installation.

Integrating AWMS with an Existing Network Management Solution (NMS)

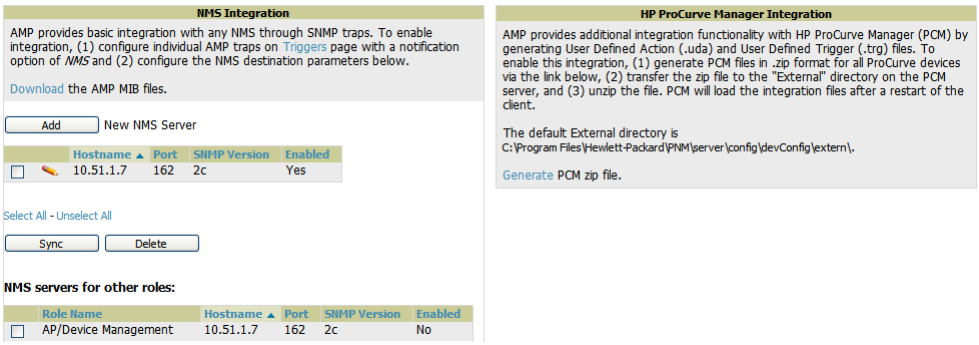
This is an optional configuration. The **AMP Setup > NMS** configuration page allows AWMS to integrate with other Network Management Solution (NMS) consoles. This configuration enables advanced and interoperable functionality as follows:

- AWMS can forward WLAN-related SNMP traps to the NMS, or AWMS can send SNMPv1 or SNMPv2 traps to the NMS.
- AWMS can be used in conjunction with Hewlett-Packard's ProCurve Manager.
- The necessary files for either type of NMS interoperability are downloaded from the **AMP Setup > NMS** page as follows. For additional information, contact support.

Perform these steps to configure NMS support in AWMS:

1. Go to **AMP Setup > NMS**, illustrated in Figure 31.

Figure 31 ***AMP Setup > NMS*** *Page Illustration*



2. Select **Add to integrate a new NMS server, or select the pencil icon to edit an existing server.** Provide the information described in Table 34:

Table 34 ***AMP Setup > NMS Integration Add/Edit*** *Fields and Default Values*

Setting	Default	Description
Hostname	None	Cites the DNS name or the IP address of the NMS.
Port	162	Sets the port AWMS uses to communicate with the NMS. **NOTE:** AWMS generally communicates via SNMP traps on port 162.
Community String	None	Sets the community string used to communicate with the NMS.
SNMP Version	v2C	Sets the SNMP version of the traps sent to the Host.
Enabled	Yes	Enables or disables trap logging to the specified NMS.
Send Configuration Traps	Yes	Enables NMS servers to transmit SNMP configuration traps.

3. The **NMS Integration Add/Edit** page includes the **Netcool/OMNIbus Integration** link to information and instructions. The IBM Tivoli Netcool/OMNIbus operations management software enables automated event correlation and additional features resulting in optimized network uptime.
4. The **NMS Integration Add/Edit** page includes the **HP ProCurve Manager Integration** link. Select this link for additional information, zip file download, and brief instructions for installation with AWMS. Select **Add** to finish creating the NMS server, or **Save** to configure an existing NMS server.

What Next?

- Go to additional tabs in the **AMP Setup** section to continue additional setup configurations.
- *Complete the required configurations in this chapter before proceeding.* Dell support remains available to you for any phase of AWMS installation.

Auditing PCI Compliance on the Network

This section describes PCI requirements and auditing functions in AWMS, with the following topics:

- Introduction to PCI Requirements
- PCI Auditing in the AWMS Interface
- Enabling or Disabling PCI Auditing

Introduction to PCI Requirements

AWMS supports wide security standards and functions in the wireless network. One component of network security is the optional deployment of Payment Card Industry (PCI) Auditing.

The Payment Card Industry (PCI) Data Security Standard (DSS) establishes multiple levels in which payment cardholder data is protected in a wireless network. AWMS supports PCI requirements according to the standards and specifications set forth by the following authority:

- Payment Card Industry (PCI) Data Security Standard (DSS)
  - PCI Security Standards Council Website

    https://www.pcisecuritystandards.org
  - *PCI Quick Reference Guide*, Version 1.2 (October 2008)

    https://www.pcisecuritystandards.org/pdfs/pci_ssc_quick_guide.pdf

PCI Auditing in the AWMS Interface

PCI Auditing in AWMS allows you to monitor, audit, and demonstrate PCI compliance on the network. There are five primary pages in which you establish, monitor, and access PCI auditing, as follows:

- The **AMP Setup > PCI Compliance** page enables or disables PCI Compliance monitoring on the network, and displays the current compliance status on the network. See "Enabling or Disabling PCI Auditing" on page 65.
- The **Reports > Definitions** page allows you to create custom-configured and custom-scheduled PCI Compliance reports. See "Reports > Definitions Page Overview" on page 219.
- The **Reports > Generated** page lists PCI Compliance reports currently available, and allows you to generate the latest daily version of the PCI Compliance Report with a single select. Refer to "Reports > Generated Page Overview" on page 221.
- The **APs/Devices > PCI Compliance** page enables you to analyze PCI Compliance for any specific device on the network. This page is accessible when you select a specific device from the **APs/Devices > Monitor** page. First, you must enable this function through **AMP Setup**. See "Enabling or Disabling PCI Auditing" on page 65.
- The **PCI Compliance Report** offers additional information. Refer to "Using the PCI Compliance Report" on page 235. This report not only contains **Pass** or **Fail** status for each PCI requirement, but cites the action required to resolve a **Fail** status when sufficient information is available.

NOTE: When any PCI requirement is enabled on AWMS, then AWMS grades the network as pass or fail for the respective PCI requirement. Whenever a PCI requirement is not enabled in AWMS, then AWMS does not monitor the network's status in relation to that requirement, and cannot designate Pass or Fail network status. AWMS servers without a RAPIDS license and users without RAPIDS enabled will not see the 11.1 PCI requirements in the PCI Compliance Report.

Table 35 *PCI Requirements and Support in AWMS*

Requirement	Description
1.1	Monitoring configuration standards for network firewall devices When Enabled: PCI Requirement 1.1 establishes firewall and router configuration standards. A device fails Requirement 1.1 if there are mismatches between the desired configuration and the configuration on the device. When Disabled: firewall router and device configurations are not checked for PCI compliance, and Pass or Fail status is not reported or monitored.
1.2.3	Monitoring firewall installation between any wireless networks and the cardholder data environment When Enabled: A device passes requirement 1.2.3 if it can function as a stateful firewall. When Disabled: firewall router and device installation are not checked for PCI compliance.

Table 35 *PCI Requirements and Support in AWMS (Continued)*

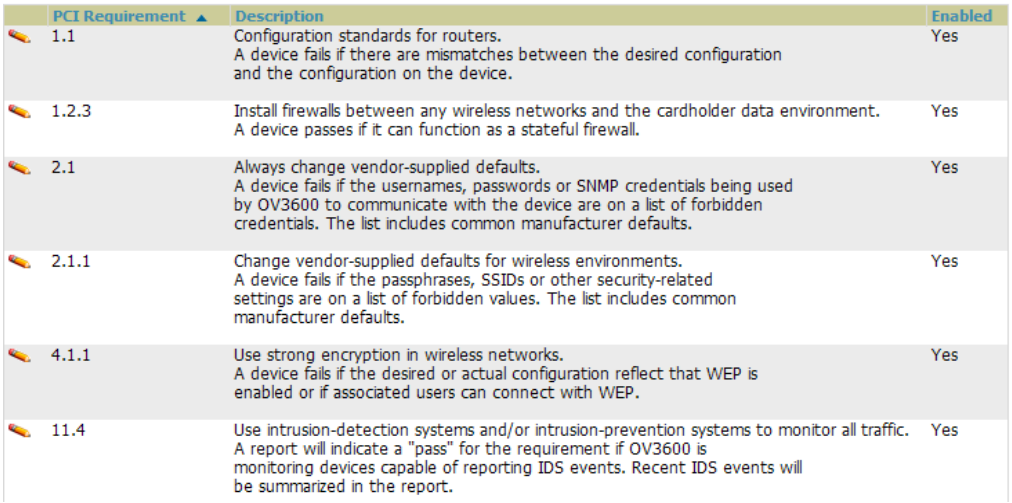
Requirement	Description
2.1	Monitoring the presence of vendor-supplied default security settings When Enabled: PCI Requirement 2 establishes the standard in which all vendor-supplied default passwords are changed prior to a device's presence and operation in the network. A device fails requirement 2.1 if the username, passwords or SNMP credentials being used by AWMS to communicate with the device are on a list of forbidden default credentials. The list includes common vendor default passwords, for example. When Disabled: device passwords and other vendor default settings are not checked for PCI compliance.
2.1.1	Changing vendor-supplied defaults for wireless environments When Enabled: A device fails requirement 2.1.1 if the passphrases, SSIDs, or other security-related settings are on a list of forbidden values that AWMS establishes and tracks. The list includes common vendor default passwords. The user can input new values to achieve compliance. When Disabled: network devices are not checked for forbidden information and PCI Compliance is not established.
4.1.1	Using strong encryption in wireless networks When Enabled: PCI Requirement 4 establishes the standard by which payment cardholder data is encrypted prior to transmission across open public networks. PCI disallows WEP encryption as an approved encryption method after June 20, 2010. A device fails requirement 4.1.1 if the desired or actual configuration reflect that WEP is enabled on the network, or if associated users can connect with WEP. When Disabled: AWMS cannot establish a pass or fail status with regard to PCI encryption requirements on the network.
11.4	Using intrusion-detection or intrusion-prevention systems to monitor all traffic When Enabled: AWMS reports pass or fail status when monitoring devices capable of reporting IDS events. Recent IDS events are summarized in the PCI Compliance report or the IDS Report. When Disabled: AWMS does not monitor the presence of PCI-compliant intrusion detection or prevention systems, nor can it report **Pass** or **Fail** status with regard to IDS events.

Enabling or Disabling PCI Auditing

Perform these steps to verify status and to enable or disable AWMS support for PCI 1.2 requirements. enabling one or all PCI standards on AWMS enables real-time information and generated reports that advise on Pass or Fail status. The PCI auditing supported in AWMS is reported in Table 35.

1. To determine what PCI Compliance standards are enabled or disabled on AWMS, navigate to the **AMP Setup > PCI Compliance** page, illustrated in Figure 32.

Figure 32 ***AMP Setup > PCI Compliance*** *Page Illustration*

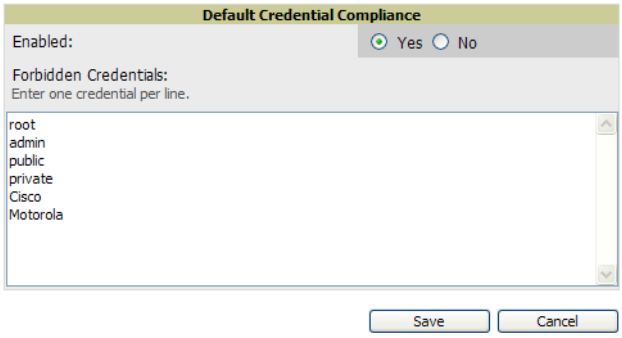


	PCI Requirement ▲	Description	Enabled
	1.1	Configuration standards for routers. A device fails if there are mismatches between the desired configuration and the configuration on the device.	Yes
	1.2.3	Install firewalls between any wireless networks and the cardholder data environment. A device passes if it can function as a stateful firewall.	Yes
	2.1	Always change vendor-supplied defaults. A device fails if the usernames, passwords or SNMP credentials being used by OV3600 to communicate with the device are on a list of forbidden credentials. The list includes common manufacturer defaults.	Yes
	2.1.1	Change vendor-supplied defaults for wireless environments. A device fails if the passphrases, SSIDs or other security-related settings are on a list of forbidden values. The list includes common manufacturer defaults.	Yes
	4.1.1	Use strong encryption in wireless networks. A device fails if the desired or actual configuration reflect that WEP is enabled or if associated users can connect with WEP.	Yes
	11.4	Use intrusion-detection systems and/or intrusion-prevention systems to monitor all traffic. A report will indicate a "pass" for the requirement if OV3600 is monitoring devices capable of reporting IDS events. Recent IDS events will be summarized in the report.	Yes

2. To enable, disable, or edit any category of PCI Compliance monitoring in AWMS, select the pencil icon next to the category. The **Default Credential Compliance** page displays for the respective PCI standard.

3. Create changes as required. Specific credentials can be cited in the **Forbidden Credentials** section of any **Edit** page to enforce PCI requirements in AWMS. Figure 33 shows one example.

Figure 33 *Default Credential Compliance for PCI Requirements*



4. Select **Save**.
5. To view and monitor PCI auditing on the network, use generated or daily reports. See Chapter 9, "Creating, Running, and Emailing Reports" . In addition, you can view the real-time PCI auditing of any given device online. Perform these steps:
   a. Go to the **APs/Devices > List** page, select a specific device, and the **Monitor** page for that device displays. The **Monitor** page displays a **PCI Compliance** subtab in the menu bar.
   b. Select **PCI Compliance** to view complete PCI compliance auditing for that specific device.

What Next?

- For more information about configuring WLAN Gateways or WLAN controllers such as BlueSocket, ReefEdge, or ProCurve wireless gateways, refer to "Third-Party Security Integration for AWMS" on page 257.
- Go to other tabs in the **AMP Setup** section to continue additional setup configurations.
- *Complete the required configurations in this chapter before proceeding.* Dell support remains available to you in any phase of AWMS installation.

Deploying WMS Offload

Overview of WMS Offload in AWMS

This section describes the Dell PowerConnect W Wireless LAN Management Server (WMS) offload infrastructure. WMS Offload is supported with the following two requirements:

- ArubaOS Version 2.5.4 or later
- AWMS Version 6.0 or later

The Dell PowerConnect W WMS feature is an enterprise-level hardware device and server architecture with managing software for security and network policy. There are three primary components of the WMS deployment:

- Air Monitor AP devices establish and monitor RF activity on the network.
- The WMS server manages devices and network activity, to include rogue AP detection and enforcement of network policy.
- The AWMS graphical user interface (GUI) allows users to access and use the WMS functionality.

WMS Offload is the ability to place the burden of the WMS server data and GUI functions on AWMS. WMS master controllers provide this data so that AWMS can support rigorous network monitoring capabilities.

General Configuration Tasks Supporting WMS Offload in AWMS

WMS Offload must be enabled with a six-fold process and related configuration tasks, as follows:

1. Configure WLAN switches for optimal AWMS monitoring.
   - Disable debugging.
   - Ensure AWMS server is a trap receiver host.
   - Ensure proper traps are enabled.
2. Configure AWMS to optimally monitor the Dell infrastructure.
   - Enable WMS offload.
   - Configure SNMP communication.
   - Create a proper policy for monitoring Dell infrastructure.
   - Discover the infrastructure.
3. Configure device classification.
   - Set up rogue classification.
   - Set up rogue classification override.
   - Establish user classification override devices.
4. Deploy ArubaOS-specific monitoring features.
   - Enable remote AP and wired network monitoring.
   - View controller license information.
5. Convert existing floor plans to VisualRF, to include the following elements:
   - MMS
   - AOS
   - RF Plan
6. Use RTLS for increasing location accuracy (optional).
   - Enable RTLS service on the AWMS server.
   - Enable RTLS on ArubaOS Infrastructure.

Additional Information Supporting WMS Offload

For additional information, including detailed concepts, configuration procedures, restrictions, ArubaOS infrastructure, and AWMS version differences in support of WMS Offload, refer to the *Best Practices Guide* from support.dell.com/manuals.

Chapter 4

Configuring and Using Device Groups in AWMS

This chapter describes the deployment of device groups within AWMS. The section below describes the pages or focused subtabs available on the Groups tab. Note that the available subtabs can vary significantly from one device group to another—one or more subtabs may not appear, depending on the **Default Group** display option selected on the **AMP Setup > General** page and the types of devices you add to AMP.

Figure 34 *Subtabs under the **Group** tab*

- **List**—This page is the default page in the **Groups** section of AWMS. It lists all groups currently configured in AWMS and provides the foundation for all group-level configurations. See "Viewing All Defined Device Groups" on page 71.
- **Monitor**—This page displays user and bandwidth information, lists devices in a given group, provides an **Alert Summary** table for monitoring alerts for the group, and provides a detailed **Audit Log** for group-level activity.

NOTE: The **Incidents** portion of the **Alert Summary** table only increments the counter for incidents that are open and associated to an AP in that group, associated with the group itself. It does not include incidents associated with any folder. To view all incidents including those not associated to an AP, go to the **Helpdesk > Incidents** page.

- **Basic**—This page appears when you create a new group on the **Groups > List** page. Once you define a group name, AWMS displays the **Basic** page from which you configure many group-level settings. This page remains available for any device group configured in AWMS. Refer to "Configuring Basic Group Settings" on page 72.
- **Templates**—This page manages templates for any device group. Templates allow you to manage the configuration of Dell PowerConnect W, 3Com, Alcatel-Lucent, Aruba Networks, Cisco Aironet IOS, Cisco Catalyst switches, Enterasys, HP, Nomadix, Nortel, Symbol and Trapeze devices in a given group using a configuration file. Variables in such templates configure device-specific properties, such as name, IP address and channel. Variables also define group-level properties. For additional information about using the **Templates** page, refer to Chapter 6, "Creating and Using Templates" on page 149.
- **Security**—This page defines general security settings for device groups, to include RADIUS, encryption, and additional security settings on devices. Refer to "Configuring Group Security Settings" on page 80.
- **SSIDs**—This page sets SSIDs, VLANs, and related parameters in device groups. Refer to "Configuring Group SSIDs and VLANs" on page 83.
- **AAA Servers**—This page configures authentication, authorization, and accounting settings in support of RADIUS servers for device groups. Refer to "Adding and Configuring Group AAA Servers" on page 79.
- **Radio**—This page defines general 802.11 radio settings for device groups. Refer to "Configuring Radio Settings for Device Groups" on page 87.
- **Dell Config**—This page manages ArubaOS Device Groups, AP Overrides, and other profiles specific to Dell PowerConnect W devices on the network. Use this page as an alternative to the **Device Setup > Dell Configuration** page. The apperance of this page varies depending on whether AMP is configured for global configuration or group configuration. For additional information, refer to the *ArubaOS Configuration Guide* from **support.dell.com/manuals**.
- **Cisco WLC Config**—This page consolidates controller-level settings from the Group Radio, Security, SSIDs, Cisco WLC Radio and AAA Server pages into one navigation tree that is easier to navigate, and has familiar layout and terminology. Bulk configuration for per-thin AP settings, previously configured on the Group

LWAPP APs tab, can now be performed from **Modify Devices** on the **APs/Devices > List** page. Refer to "An Overview of Cisco WLC Configuration" on page 92.

- **PTMP**—This page defines settings specific to Proxim MP devices when present. Refer to "Configuring Group PTMP Settings" on page 97.
- **Proxim Mesh**—This page defines mesh AP settings specific to Proxim devices when present. Refer to "Configuring Proxim Mesh Radio Settings" on page 97.
- **MAC ACL**—This page defines MAC-specific settings that apply to Proxim, Cisco VxWorks, Symbol, and Procurve520 devices when present. Refer to "Configuring Group MAC Access Control Lists" on page 99.
- **Firmware**—This page manages firmware files for many devices. "Specifying Minimum Firmware Versions for APs in a Group" on page 99.
- **Compare**—This page allows you to compare line item-settings between two device groups. On the **Groups > List** page, select **Compare Two Groups**, select the two groups from the drop-down menus, then select **Compare**. "Comparing Device Groups" on page 100.

This chapter also provides the following additional procedures for group-level configurations:

- "Deleting a Group" on page 101
- "Changing Multiple Group Configurations" on page 101
- "Modifying Multiple Devices" on page 102
- "Using Global Groups for Group Configuration" on page 105

AWMS Groups Overview

Enterprise APs, controllers, routers, and switches have hundreds of variable settings that must be configured precisely to achieve optimal performance and network security. Configuring all settings on each device individually is time consuming and error prone. AWMS addresses this challenge by automating the processes of device configuration and compliance auditing. At the core of this approach is the concept of Device **Groups**, with the following functions and benefits:

- AWMS allows certain settings to be managed efficiently at Group-level while others are managed at an individual device level.
- AWMS defines a *Group* as a subset of the devices on the wireless LAN, ranging in size from one device to hundreds of devices that share certain common configuration settings.
- *Groups* may be defined based on geography (such as "5th Floor APs"), usage or security policies (such as "Guest Access APs"), function (such as "Manufacturing APs"), or any other appropriate variable.
- *Devices* within a group may be from different vendors or hardware models. All devices within a Group share certain basic configuration settings.

Typical group configuration variables include basic settings (SSID, SNMP polling interval, and so forth), security settings (VLANs, WEP, 802.1x, ACLs, and so forth), and some radio settings (data rates, fragmentation threshold, RTS threshold, DTIM, preamble, and so forth). When configuration changes are applied at a *group level*, they are assigned automatically to every device within that group. Such changes must be applied with every device in **Managed** mode. **Monitor** mode is the more common mode.

CAUTION: Always review the Audit page before pushing configuration to a device or group.

Individual device settings—such as device name, RF channel selection, RF transmission power, antenna settings, and so forth—typically should not be managed at a group level and must be individually configured for optimal performance. Individual AP settings are configured on the **APs/Devices > Manage** page.

You can create as many different groups as required. Administrators usually establish groups that range in size from five to 100 wireless devices.

Group configuration can be enhanced with the AWMS *Global Groups* feature, which lets you create Global Groups with configurations that are pushed to individual Subscriber Groups.

Viewing All Defined Device Groups

To display a list of all defined groups, browse to the **Groups > List** page, illustrated in Figure 35.

Figure 35 ***Groups > List*** *Page Illustration*

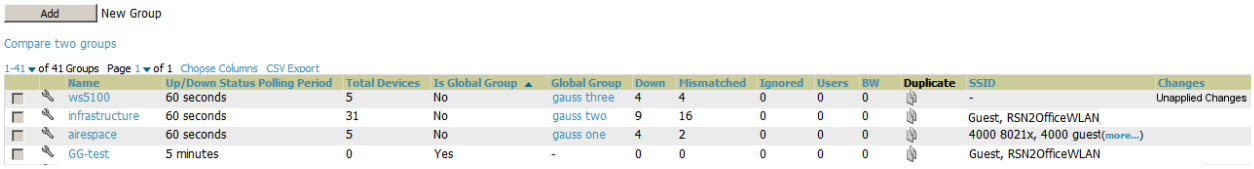


Table 36 describes the columns in the **Groups > List** page.

Table 36 ***Groups > List*** *Columns*

Column	Description
Add New Group	Launches a page that enables you to add a new group by name and to define group parameters for devices in that group. For additional information, refer to "Configuring Basic Group Settings" on page 72.
Manage (wrench icon)	Goes to the **Groups > Basic** configuration page for that group. Hover your mouse over the icon to see a list of shortcuts to group-specific subtabs that would appear across the navigation section if this group is selected.
Name	Uniquely identifies the group by location, vendor, department or any other identifier (such as "Accounting APs," "Floor 1 APs," "Cisco devices," "802.1x APs," and so forth).
Up/Down Status Polling Period	The time between Up/Down SNMP polling periods for each device in the group. Detailed SNMP polling period information is available on the **Groups > Basic** configuration page. Note that by default, most polling intervals do not match the up/down period.
Is Global Group	If a group is designated as global, it may not contain APs but it may be used as a template for other groups. This column may also indicate **Yes** if this group has been pushed to the AMP from a Master Console.
Global Group	Specifies which group this Subscriber Group is using as its template.
SSID	The SSID assigned to supported device types within the group.
Total Devices	Total number of devices contained in the group including APs, controllers, routers, or switches.
Down	The number of devices within the group that are not reachable via SNMP or are no longer associated to a controller. Note that thin APs are not directly polled with SNMP, but are polled through the controller. That controller may report that the thin AP is down or is no longer on the controller. At this point, AWMS classifies the device as down.
Mismatched	The number of devices within the group that are in a mismatched state.
Ignored	The number of ignored devices in that group.
Users	The number of mobile users associated with all APs within the group. To avoid double counting of users, users are only listed in the group of the AP with which they are associated. Note that device groups with only controllers in them report no users.
BW	Bandwidth: A running average of the sum of bytes in and bytes out for the managed radio page.
Duplicate	Creates a new group with the name **Copy of <Group Name>** with configuration settings. (Dell PowerConnect W configuration settings will have to be manually added back.)
Changes	Whether the group has unapplied changes.

NOTE: When you first configure AWMS, there is only one default group labeled **Access Points**. If you have no other groups configured, refer to "Configuring Basic Group Settings" on page 72.

Configuring Basic Group Settings

The first default device group that AWMS sets up is the **Access Points** group, but you can use this procedure to add and configure any device group. Perform these steps to configure basic group settings, then continue to additional procedures to define additional settings as required.

1. Go to the **Groups > List** page. Existing device groups appear on this page.
2. To create a new group, select **Add**. Enter a group name and select **Add**. The **Groups > Basic** page appears.

   To edit an existing device group, select the **manage** (wrench) icon next to the group. The **Groups > Basic** page appears. If you mouse over an existing group's wrench, a popup menu allows you to select **Basic**, **Templates**, **Security**, **SSIDs**, **AAA Servers**, **Radio**, **Dell PowerConnect W Config** or **Cisco WLC Config** to edit those pages as desired, as illustrated in Figure 36.

Figure 36 *Pop-up When Hovering over Wrench Icon in **Groups > List***

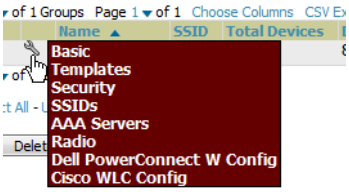
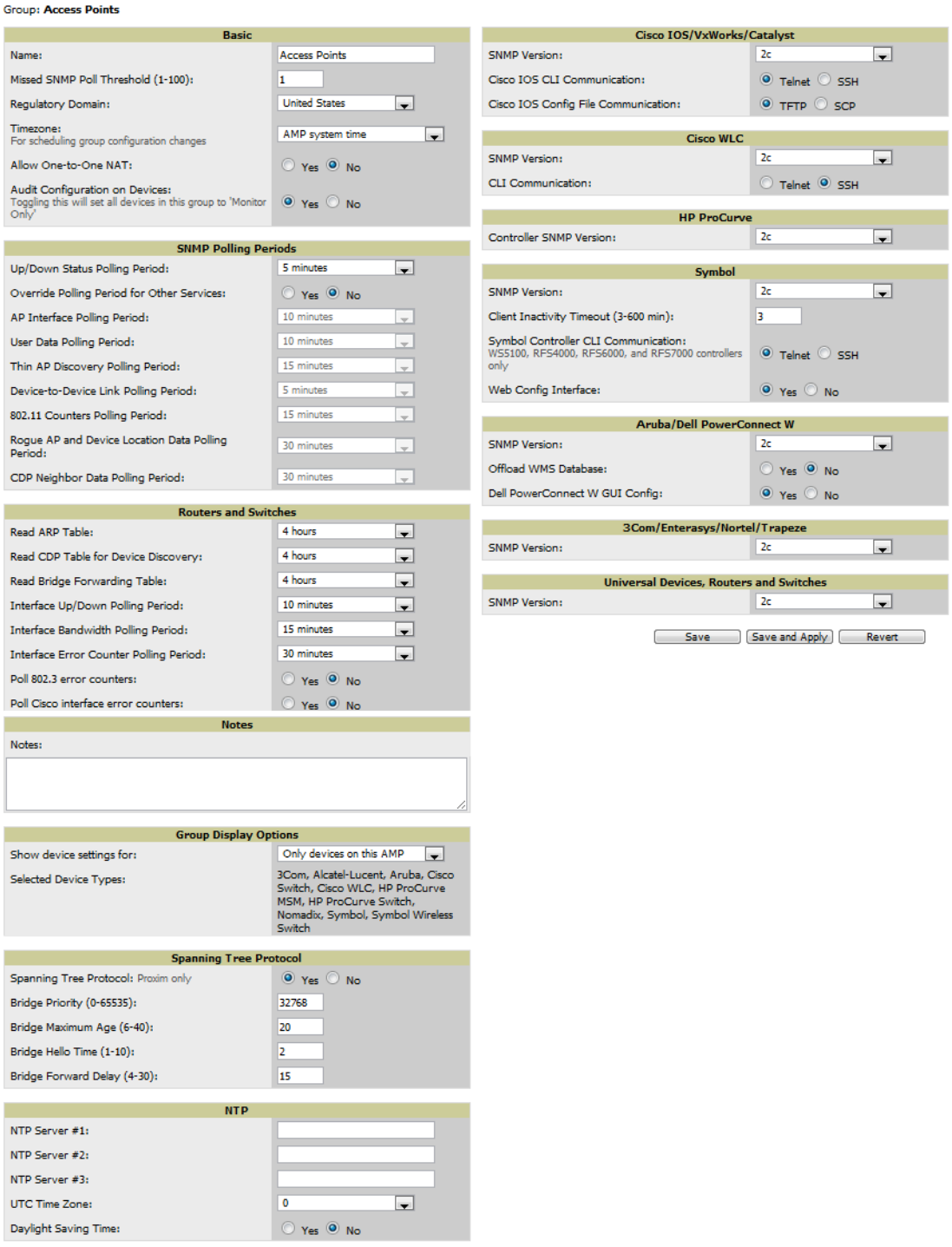


Figure 37 illustrates an example **Groups > Basic** page.

Figure 37 ***Groups > Basic*** *Page Illustration*



3. Define the settings in the **Basic** and **Global Group** sections. Table 37 describes several typical settings and default values of this **Basic** section.

Table 37 ***Basic and Global Groups*** *Fields and Default Values*

Setting	Default	Description
Name	Defined when first adding the group	Displays or changes the group name. As desired, use this field to set the name to uniquely identify the group by location, vendor, department, or any other identifier (such as "Accounting APs," "Cisco devices," "802.1x APs," and so forth).

Table 37 ***Basic and Global Groups*** *Fields and Default Values (Continued)*

Setting	Default	Description
Missed SNMP Poll Threshold	1	Sets the number of Up/Down SNMP polls that must be missed before AWMS considers a device to be down. The number of SNMP retries and the SNMP timeout of a poll can be set on the **Device Setup > Communication** page.
Regulatory Domain	United States	Sets the regulatory domain in AWMS, limiting the selectable channels for APs in the group.
Timezone	AMP System Time	Allows group configuration changes to be scheduled relative to the time zone in which the devices are located. This setting is used for scheduling group-level configuration changes.
Allow One-to-One NAT	No	Allows AWMS to talk to the devices on a different IP address than the one configured on the device. **NOTE:** If enabled, the LAN IP Address listed on the **AP/Devices > Manage** configuration page under the **Settings** area is different than the IP Address under the **Device Communication** area.
Audit Configuration on Devices	Yes	Auditing and pushing of configuration to devices can be disabled on all the devices in the group. Once disabled, all the devices in the groups will not be counted towards mismatched devices.
Use Global Group	No	When enabled, this field allows you to define the device group to be a Global Group. Refer to "Using Global Groups for Group Configuration" on page 105.

4. Complete the **SNMP Polling Periods** section. The information in this section overrides default settings. Table 38 describes the SNMP polling settings.

Table 38 ***SNMP Polling Periods*** *Fields and Default Values*

Setting	Default	Description
Up/Down Status Polling Period	5 minutes	Sets time between Up/Down SNMP polling for each device in the group. The Group SNMP Polling Interval overrides the global parameter configured on the **Device Setup > Communication** page. An initial polling interval of **5** minutes is best for most networks.
Override Polling Period for Other Services	No	Enables or disables overriding the base SNMP Polling Period. If you select **Yes**, the other settings in the SNMP Polling Periods section are activated, and you can override default values.
AP Interface Polling Period	5 minutes	Sets the interval at which AWMS polls for radio monitoring and bandwidth being used by a device.
User Data Polling Period	5 minutes	Sets time between SNMP polls for User Data for devices in the group.
Thin AP Discovery Polling Period	5 minutes	Sets time between SNMP polls for Thin AP Device Discovery. Controllers are the only devices affected by this polling interval.
Device-to-Device link Polling Period	5 minutes	Sets time between SNMP polls for Device-to-Device link polling. Mesh APs are the only devices affected by this polling interval.
802.11 Counters Polling Period	5 minutes	Sets time between SNMP polls for 802.11 Counter information.
Rogue AP and Device Location Data Polling Period	5 minutes	Sets time between SNMP polls for Rogue AP and Device Location Data polling.
CDP Neighbor Data Polling Period	30 minutes	Sets the frequency in which this group polls the network for Cisco Discovery Protocol (CDP) neighbors.

5. Record additional information and comments about the group in the **Notes** section.

6. To configure which options and tabs are visible for the group, complete the settings in the **Group Display Options** section. Table 39 describes the settings and default values.

Table 39 ***Group Display Options*** *Fields and Default Values*

Setting	Default	Description
Show device settings for:	Only devices on this AMP	Drop-down menu determines which Group tabs and options are to be viewable by default in new groups. Settings include the following: • **All Devices**—AWMS displays all Group tabs and setting options. • **Only devices in this group**—AWMS hides all options and tabs that do not apply to the devices in the group. If you use this setting, then to get the group list to display the correct SSIDs for the group, you must **Save and Apply** on the group. • **Only devices on this AMP**— hides all options and tabs that do not apply to the APs and devices currently on AWMS. • **Use system defaults**—Use the default settings on **AMP Setup > General** • **Selected device types**—Allows you to specify the device types for which AWMS displays Group settings.
Selected Device Types	N/A	This option appears if you chose to display selected device types, allowing you to select the device types to display group settings. Use **Select devices in this group** to display only devices in the group being configured.

7. To assign dynamically a range of static IP addresses to new devices as they are added into the group, locate the **Automatic Static IP Assignment** section on the **Groups > Basic** configuration page. If you select **Yes** in this section, additional fields appear. Complete these fields as required. Table 40 describes the settings and default values This section is only relevant for a small number of device types, and will appear when they are present.

Table 40 ***Automatic Static IP Assignment*** *Fields and Default Values*

Setting	Default	Description
Assign Static IP Addresses to Devices	No	Enables AWMS to statically assign IP addresses from a specified range to all devices in the Group.
Start IP Address	Blank	Sets the first address AWMS assigns to the devices in the Group.
Number of Addresses	Blank	Sets the number of addresses in the pool from which AWMS can assign IP addresses.
Subnet Mask	Blank	Sets the subnet mask to be assigned to the devices in the Group.
Subnet Gateway	Blank	Sets the gateway to be assigned to the devices in the Group.
Next IP Address	Blank	Defines the next IP address queued for assignment. This field is disabled for the initial Access Points group.

8. To configure Spanning Tree Protocol on WLC devices and Proxim APs, locate the Spanning Tree Protocol section on the **Groups > Basic** configuration page. Adjust these settings as required. Table 41 describes the settings and default values.

Table 41 ***Spanning Tree Protocol*** *Fields and Default Values*

Setting	Default	Description
Spanning Tree Protocol	No	Enables or disables Spanning Tree Protocol on WLSE devices and Proxim APs.
Bridge Priority	32768	Sets the priority for the AP. Values range from 0 to 65535. Lower values have higher priority. The lowest value is the root of the spanning tree. If all devices are at default the device with the lowest MAC address will become the root.

Table 41 ***Spanning Tree Protocol*** *Fields and Default Values (Continued)*

Setting	Default	Description
Bridge Maximum Age	20	Sets the maximum time, in seconds, that the device stores protocol information. The supported range is from 6 to 40.
Bridge Hello Time	2	Sets the time, in seconds, between Hello message broadcasts.
Bridge Forward Delay	15	Sets the time, in seconds, that the port spends in listening and learning mode if the spanning tree has changed.

9. To configure NTP settings locate the **NTP** section and adjust these settings as required. Table 42 describes the settings and default values.

Table 42 ***NTP*** *Fields and Default Values*

Setting	Default	Description
NTP Server #1,2,3	None	Sets the IP address of the NTP server to be configured on the AP.
UTC Time Zone	0	Sets the hour offset from UTC time to local time for the AP. Times displayed in AWMS graphs and logs use the time set on the AWMS server.
Daylight Saving Time	No	Enables or disables the advanced daylight saving time settings in the Proxim and HP ProCurve 420 sections of the **Groups > Basic** configuration page.

10. To configure settings specific to Cisco IOS/VxWorks, locate the **Cisco IOS/VxWorks** section and adjust these settings as required. Table 43 describes the settings and default values.

Table 43 ***Cisco IOS/VxWorks*** *Fields and Default Values*

Setting	Default	Description
SNMP Version	2c	The version of SNMP used by AWMS to communicate to the AP.
Cisco IOS CLI Communication	Telnet	The protocol AWMS uses to communicate with Cisco IOS devices. Selecting **SSH** uses the secure shell for command line page (CLI) communication. Selecting **Telnet** sends the data in clear text via Telnet.
Cisco IOS Config File Communication	TFTP	The protocol AWMS uses to communicate with Cisco IOS devices. Selecting **SCP** uses the secure copy protocol for file transfers. Selecting **TFTP** will use the insecure trivial file transfer protocol. The SCP login and password should be entered in the Telnet username and password fields.
Track Usernames on Cisco Aironet VxWorks APs	No	Configures VxWorks APs to send SNMP packets to AWMS.

11. To configure settings specific to Cisco WLC, locate the **Cisco WLC** section and adjust these settings as required. Table 44 describes the settings and default values.

Table 44 ***Cisco WLC*** *Fields and Default Values*

Setting	Default	Description
SNMP Version	2c	Sets the version of SNMP used by AWMS to communicate to WLC controllers.
CLI Communication	Telnet	Sets the protocol AWMS uses to communicate with Cisco IOS devices. Selecting **SSH** uses the secure shell for command line page (CLI) communication. Selecting **Telnet** sends the data in clear text via Telnet.

NOTE: When configuring Cisco WLC controllers, refer to "Configuring Wireless Parameters for Cisco Controllers" on page 96.

12. To configure Proxim/Avaya specific settings locate the **Proxim/Avaya** section and adjust these settings as required. Table 45 describes the settings and default values.

Table 45 ***Proxim/Avaya*** *Fields and Default Values*

Setting	Default	Description
SNMP Version	1	Sets the version of SNMP used by AWMS to communicate to the AP.
Enable DNS Client	No	Enables the DNS client on the AP. Enabling the DNS client allows you to set some values on the AP by hostname instead of IP address. If you select **Yes**, additional DNS fields display.
Primary DNS server	Blank	Sets the IP address of the Primary DNS server.
Secondary DNS server	Blank	Sets the IP address of the Secondary DNS server.
Default DNS domains	Blank	Sets the default DNS domain used by the AP.
HTTP Server Port	80	Sets this port as the HTTP server port on all Proxim APs in the group.
Country Code	United States	Configures AWMS to derive its time settings based on the country of location, as specified in this field.

13. To configure HP ProCurve specific settings, locate the **HP ProCurve** section and adjust these settings as required. Table 46 describes the settings and default values.

Table 46 ***HP ProCurve*** *Fields and Default Values*

Setting	Default	Description
SNMP Version	2c	Sets the version of SNMP used by AWMS to communicate to the AP.
ProCurve XL/ZWeSM CLI Communication	Telnet	Sets the protocol AWMS uses to communicate with ProCurve XLWeSM devices. Selecting **SSH** will use the secure shell for command line (CLI) communication. Selecting **Telnet** will send the data in clear text via telnet.
Controller SNMP Version	2c	Specifies the version of SNMP used by AWMS to communicate to the controller.

NOTE: DST Start Month, Start Day, End Month, End Day, and DST Offset are only visible if Daylight Saving Time is enabled in the NTP section of the **Groups > Basic** configuration page.

14. To configure Symbol settings, locate the **Symbol** section and adjust these settings as required. Table 47 describes the settings and default values of this section.

Table 47 ***Symbol*** *Fields and Default Values*

Setting	Default	Description
SNMP Version	2c	Specifies the version of SNMP used by AWMS to communicate to the device.
Symbol Client Inactivity Timeout (3-600 min)	3	Sets the minutes of inactivity after which a client associated to a Symbol AP will be considered "inactive." A lower value typically provides a more accurate representation of current WLAN usage. **NOTE:** For other APs, AWMS has more precise methods to determine when inactive clients are no longer associated to an AP.
Symbol Controller CLI Communication	Telnet	The connection type to support the command-line interface (CLI) connection. The options are **Telnet** and secure shell (**SSH**). This is supported for WS5100, RFS4000, RFS6000 and RFS7000 devices only.
Web Config Interface	Yes	Enables or disables the **http/https** configuration page for the Symbol 4131 devices.

15. To configure settings specific to DellPowerConnect W, locate the **Aruba/Dell PowerConnect W** section and adjust these settings as required. Table 48 describes the settings and default values of this section.

Table 48 ***Aruba/Dell PowerConnect W*** *Fields and Default Values*

Setting	Default	Description
SNMP Version	2c	The version of SNMP used by AWMS to communicate to the AP.
Offload WMS database	No	Configures commands previously documented in the *Best Practices Guide* in **Home > Documentation.** When enabled, this feature allows AWMS to display historical information for WLAN switches. Changing the setting to **Yes** pushes commands via SSH to all WLAN switches in Monitor Only mode without rebooting the controller. The command can be pushed to controllers in manage mode (also without rebooting the controller) if the **Allow WMS Offload** setting on **AMP Setup > General** is changed to **Yes**.
Dell PowerConnect W GUI Config	Yes	This setting selects whether you'd like to configure your Dell PowerConnect W devices using the **Groups > Dell PowerConnect W Config** method (either global or group) or using Templates.

16. To configure settings for 3Com, Enterasys, Nortel, or Trapeze devices, locate the **3Com/Enterasys/Nortel/ Trapeze** section and define the version of SNMP to be supported.
17. To configure support for routers and switches in the group, locate the **Routers and Switches** section and adjust these settings as required. This section defines the frequency in which all devices in the group polled. These settings can be disabled entirely as desired. Table 49 describes the settings and default values of this section.

Table 49 ***Routers and Switches*** *Fields and Default Values*

Setting	Default	Description
Read ARP Table	4 hours	Sets the frequency in which devices poll routers and switches for Address Resolution Protocol (ARP) table information. This setting can be disabled, or set to poll for ARP information in a range from every 15 seconds to 12 hours.
Read CDP Table for Device Discovery	4 hours	Sets the frequency in which devices poll routers and switches for Cisco Discovery Protocol (CDP) information. This setting can be disabled, or set to poll for CDP neighbor information in a range from every 15 seconds to 12 hours.
Read Bridge Forwarding Table	4 hours	Sets the frequency in which devices poll the network for bridge forwarding information. This setting can be disabled, or set to poll bridge forwarding tables from switches in a range from every 15 seconds to 12 hours.

Table 49 ***Routers and Switches*** *Fields and Default Values (Continued)*

Setting	Default	Description
Interface Up/Down Polling Period	5 minutes	Sets the frequency in which network interfaces are polled for up/down status. This setting can be disabled, or set to poll from switches in a range from every 15 seconds to 30 minutes.
Interface Bandwidth Polling Period	15 minutes	Sets the frequency in which network interfaces are polled for bandwidth usage. This setting can be disabled, or set to poll from switches in a range from every 5 minutes to 30 minutes.
Interface Error Counter Polling Period	30 minutes	Sets the frequency in which network interfaces are polled for up/down status. This setting can be disabled, or set to poll bridge forwarding tables from switches in a range from every 5 minutes to 30 minutes.
Poll 802.3 error counters	No	Sets whether 802.3 error counters should be polled.
Poll Cisco interface error counters	No	Sets whether the interface error counters for Cisco devices should be polled.

18. To configure settings for universal devices on the network, including routers and switches that support both wired and wireless networks, locate the **Universal Devices, Routers and Switches** section of the **Groups > Basic** page and define the version of SNMP to be supported.
19. Select **Save** when the configurations of the **Groups > Basic** configuration page are complete to retain these settings, but without pushing these settings to all devices in the group. **Save** is a good option if you intend to make additional device changes in the group, and wish to wait until all configurations are complete before you push all configurations at one time.

    Select **Save and Apply** to make the changes permanent, or select **Revert** to discard all unapplied changes.

What Next?

Continue to additional sections in this chapter to create new groups or to edit existing groups.

Once general group-level configurations are complete, continue to later chapters in this document to add or edit additional device-level configurations and to use several additional AWMS functions.

Adding and Configuring Group AAA Servers

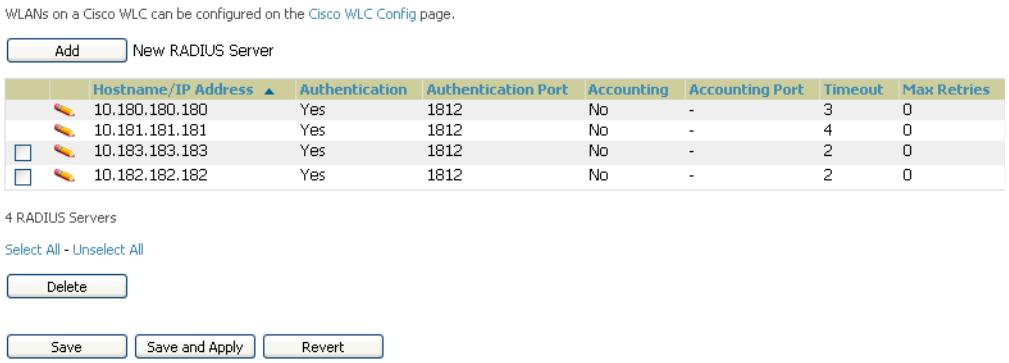
Configure RADIUS servers on the **Groups > AAA Servers** page.

Once defined on this page, RADIUS servers are selectable in the drop-down menus on the **Groups > Security and Groups > SSIDs** configuration pages. Perform these steps to create RADIUS servers.

NOTE: TACACS+ servers are configurable only for Cisco WLC devices. Refer to "Configuring Security Parameters and Functions" on page 96.

1. Go to the **Groups > List** page and select the group for which to define AAA servers by selecting the group name. The **Monitor** page appears.
2. Select the **AAA Servers** page. The **AAA Servers** page appears, enabling you to add a RADIUS server. Figure 38 illustrate this page for AAA RADIUS Servers:

Figure 38 ***Groups > AAA Servers*** *Page Illustration*



3. To add a RADIUS server or edit an existing server, select **Add New RADIUS Server** or the corresponding pencil icon to edit an existing server. Table 50 describes the settings and default values of the **Add/Edit** page.

Table 50 ***Adding a RADIUS Server*** *Fields and Default Values*

Setting	Default	Description
Hostname/IP Address	None	Sets the IP Address or DNS name for RADIUS Server. **NOTE:** IP Address is required for Proxim/ORiNOCO and Cisco Aironet IOS APs.
Secret and Confirm Secret	None	Sets the shared secret that is used to establish communication between AWMS and the RADIUS server. **NOTE:** The shared secret entered in AWMS must match the shared secret on the server.
Authentication	No	Sets the RADIUS server to perform authentication when this setting is enabled with **Yes**.
Authorization Port	1812	Sets the port used for communication between the AP and the RADIUS server.
Accounting	No	Sets the RADIUS server to perform accounting functions when enabled with Yes.
Accounting Port	No	Sets the port used for communication between the AP and the RADIUS server.
Timeout (Seconds)	None	Sets the time (in seconds) that the AP waits for a response from the RADIUS server.
Max Retries (0-20)	None	Sets the number of times a RADIUS request is resent to a RADIUS server before failing. **NOTE:** If a RADIUS server is not responding or appears to be responding slowly, consider increasing the number of retries.

4. Select **Add** to complete the creation of the RADIUS server, or select **Save** if editing an existing RADIUS server. The **Groups > AAA Servers** page displays this new or edited server. You can now reference this server on the **Groups > Security** page.

   AWMS supports reports for subsequent RADIUS Authentication. These are viewable by selecting **Reports > Generated**, scrolling to the bottom of the page, and selecting **Latest RADIUS Authentication Issues Report**.

5. To make additional RADIUS configurations for device groups, use the **Groups > Security** page and continue to the next topic.

Configuring Group Security Settings

The **Groups > Security** page allows you to set security policies for APs in a device group:

1. Select the device group for which to define security settings from the **Groups > List** page.
2. Go to **Groups > Security**. Some controls on this page interact with additional AWMS pages. Figure 39 illustrates this page and Table 51 explains the fields and default values.

Figure 39 ***Groups > Security*** *Page Illustration*

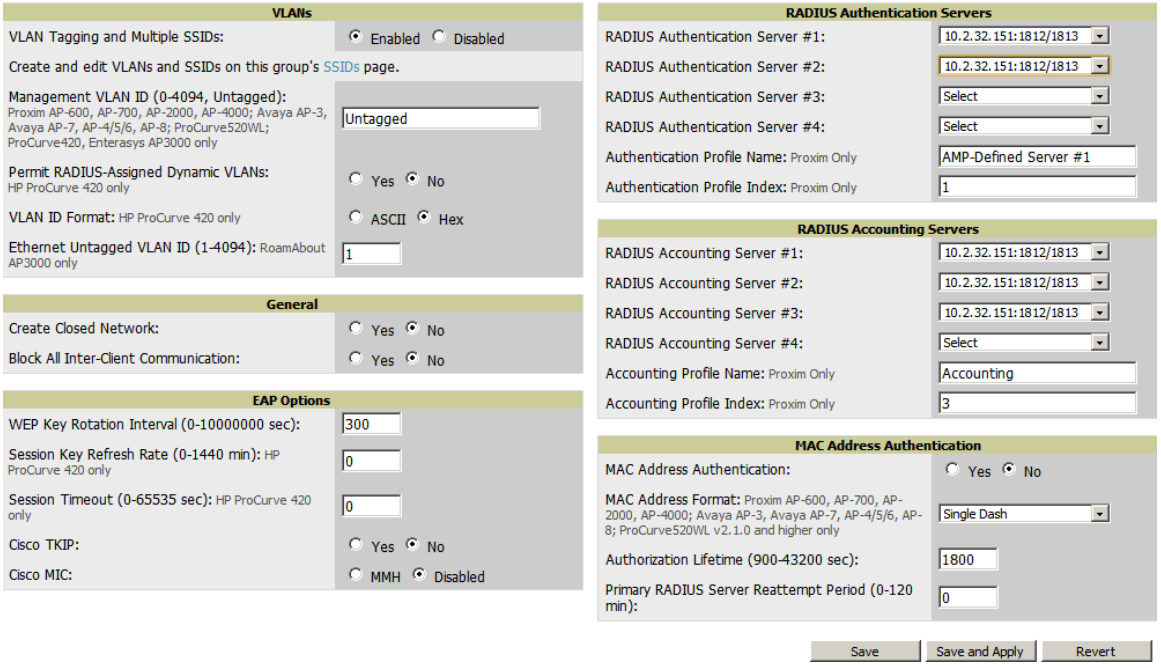


Table 51 ***Groups > Security*** *Page Fields and Default Values*

Setting	Default	Description
VLANs Section		
VLAN Tagging and Multiple SSIDs	Enabled	This field enables support for VLANs and multiple SSIDs on the wireless network. If this setting is enabled, define additional VLANs and SSIDs on the **Groups > SSIDs** page. Refer to "Configuring Group SSIDs and VLANs" on page 83.
Management VLAN ID	Untagged	This setting sets the ID for the management VLAN when VLANs are enabled in AWMS. This setting is supported only for the following devices: • Proxim AP-600, AP-700, AP-2000, AP-4000 • Avaya AP-3, Avaya AP-7, AP-4/5/6, AP-8 • ProCurve520WL; ProCurve420 • Enterasys AP3000
Permit RADIUS-Assigned Dynamic VLANs	No	This setting enables dynamic VLANs to be assigned by the RADIUS server. This setting is supported only for HP ProCurve 420.
VLAN ID Format	Hex	This setting defines the naming convention for VLANs to be supported in AWMS. The supported naming formats are ASCII and Hexadecimal.
Ethernet Untagged VLAN ID (1-4094)	1	This field defines the VLAN that will use untagged Ethernet. The VLAN must be a number between 1 and 4094, and defines the untagged VLAN ID for the RoamAbout AP3000.
General Section		
Create Closed Network	No	If enabled, the APs in the Group do not broadcast their SSIDs. **NOTE:** Creating a closed network will make it more difficult for intruders to detect your wireless network.
Block All Inter-client Communication	No	If enabled, this setting blocks client devices associated with an AP from communicating with other client devices on the wireless network. **NOTE:** This option may also be identified as PSPF (Publicly Secure Packet Forwarding), which can be useful for enhanced security on public wireless networks.

Table 51 ***Groups > Security*** *Page Fields and Default Values (Continued)*

Setting	Default	Description
EAP Options Section		
WEP Key Rotation Interval	300	Sets the frequency at which the Wired Equivalent Privacy (WEP) keys are rotated in the device group being configured. The supported range is from 0 to 10,000,000 seconds.
Session Key Refresh Rate	0	Sets the frequency at which the general session key is refreshed in the device group being configured. The supported range is from 1 to 40 minutes. This setting is supported only for HP ProCurve 420.
Session Timeout	0	Sets the time at which the session times out for the device group being configured. The supported range is from 0 to 65,535 seconds. This setting is supported only for HP ProCurve 420.
Cisco TKIP	No	Sets the device group to use the Cisco Temporal Key Integrity Protocol (TKIP). If enabled, TKIP provides per-packet key mixing, a message integrity check and a re-keying mechanism, thus fixing the flaws of WEP. **NOTE:** TKIP can only be enabled when EAP-based security is used.
Cisco MIC	Disabled	Sets the device group to use the Cisco Message Integrity Check (MIC). Selecting MMH encryption enables this function. If enabled, Message Integrity Check (MIC) adds several bytes per packet to make it more difficult to tamper with the packets.
RADIUS Authentication Servers Section		
RADIUS Authentication Server #1 - #4	Not selected	Defines one or more RADIUS Authentication servers to be supported in this device group. Select up to four RADIUS authentication servers from the four drop-down menus.
Authentication Profile Name	AMP-Defined Server #1	For Proxim devices only, this field sets the name of the authentication profile to be supported in this device group.
Authentication Profile Index	1	For Proxim devices only, this field sets the name of the authentication profile index to be supported in this device group.
RADIUS Accounting Servers Section		
RADIUS Accounting Server #1 - #4	Not selected	Defines one or more RADIUS Accounting servers to be supported in this device group. Select up to four RADIUS accounting servers from the four drop-down menus.
Authentication Profile Name	Accounting	For Proxim devices only, this field sets the name of the accounting profile to be supported in this device group.
Authentication Profile Index	3	For Proxim devices only, this field sets the name of the accounting profile index to be supported in this device group.
MAC Address Authentication Section		
MAC Address Authentication	No	If enabled, only MAC addresses known to the RADIUS server are permitted to associate to APs in the Group.
MAC Address Format	Single Dash	Allows selection of the format for MAC addresses used in RADIUS authentication and accounting requests: ■ Dash Delimited: xx-xx-xx-xx-xx-xx (default) ■ Colon Delimited: xx:xx:xx:xx:xx:xx ■ Single-Dash: xxxxxx-xxxxxx ■ No Delimiter: xxxxxxxxxxxx This option is supported only for Proxim AP-600, AP-700, AP-2000, AP-4000, Avaya AP3/4/5/6/7/8, HP ProCurve 520WL, ProCurve 420 v2.1.0 and higher.

Table 51 ***Groups > Security*** *Page Fields and Default Values (Continued)*

Setting	Default	Description
Authorization Lifetime	1800	Sets the amount of time a user can be connected before reauthorization is required. The supported range is from 900 to 43,200 seconds.
Primary RADIUS Server Reattempt Period	0	Specifies the time (in minutes) that the AP awaits responses from the primary RADIUS server before communicating with the secondary RADIUS server, and so forth

3. Select **Save** to retain these security configurations for the group, select **Save and Apply** to make the changes permanent, or select **Revert** to discard all unapplied changes.
4. Continue with additional security-related procedures in this document for additional RADIUS and SSID settings for device groups, as required.

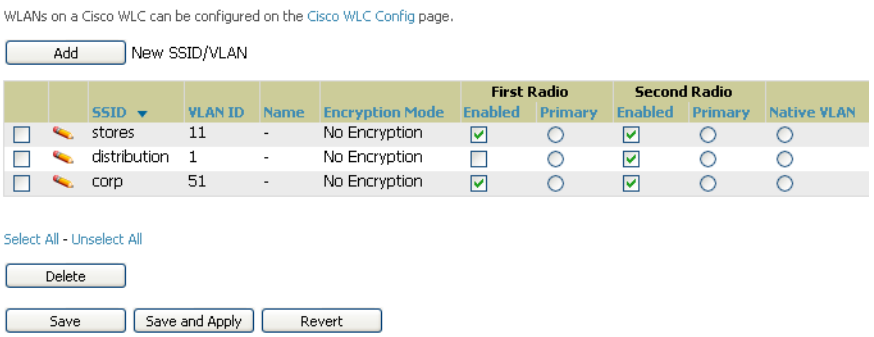
Configuring Group SSIDs and VLANs

The **Groups > SSIDs** configuration page allows you to create and edit SSIDs and VLANs that apply to a device group. Perform these steps to create or edit VLANs and to set SSIDs.

NOTE: WLANs that are supported from one or more Cisco WLC controllers can be configured on **Groups > Cisco WLC Config**.

Figure 40 illustrates an example of the **Groups > SSIDs** page.

Figure 40 ***Groups > SSIDs*** *Page Illustration*



NOTE: AWMS reports users by radio and by SSID. Graphs on the AP and controller monitoring pages display bandwidth in and out based on SSID. AWMS reports can also be run and filtered by SSID. An option on the **AMP Setup > General** page can age out SSIDs and their associated graphical data; by default, this is set to 365 days.

1. Go to **Groups > List** and select the group name for which to define SSIDs/VLANs.
2. Select the **Groups > SSIDs** configuration page. Table 52 describes the information that appears for SSIDs and VLANs that are currently configured for the device group.

Table 52 ***Groups > SSIDs*** *Fields and Descriptions*

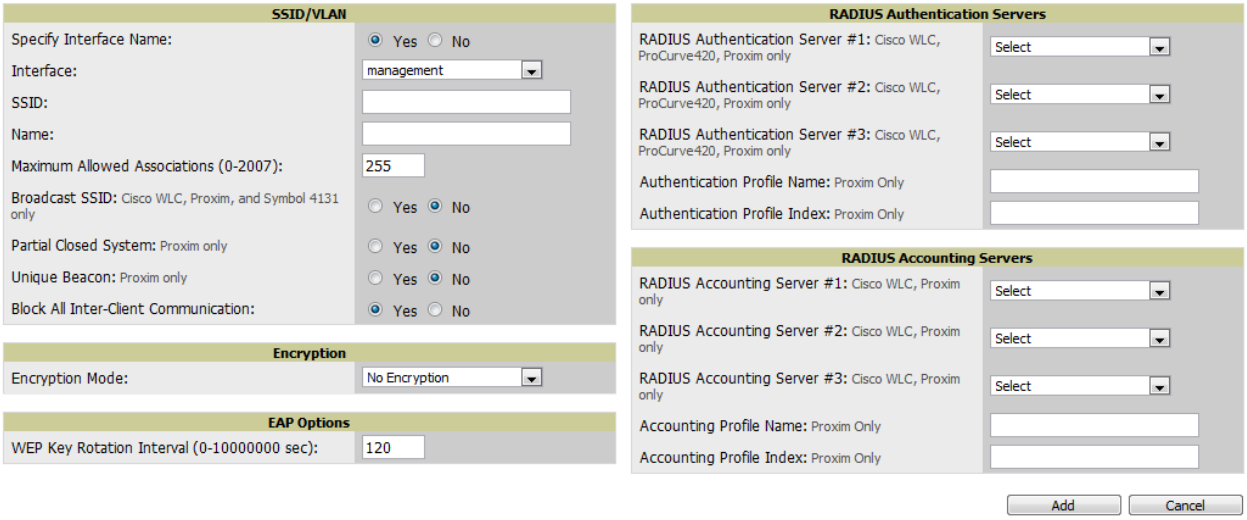
Field	Description
SSID	Displays the SSID associated with the VLAN.
VLAN ID	Identifies the number of the primary VLAN SSID on which encrypted or unencrypted packets can pass between the AP and the switch.
Name	Displays the name of the VLAN.

Table 52 ***Groups > SSIDs*** *Fields and Descriptions (Continued)*

Field	Description
Encryption Mode	Displays the encryption on the VLAN.
First or Second Radio Enabled	Enables the VLAN, SSID and Encryption Mode on the radio control.
First or Second Radio Primary	Specifies which VLAN to be used as the primary VLAN. A primary VLAN is required. **NOTE:** If you create an open network (see the **Create Closed Network** setting below) in which the APs broadcast an SSID, the primary SSID is broadcast.
Native VLAN	Sets this VLAN to be the native VLAN. Native VLANs are untagged and typically used for management traffic only. AWMS requires a Native VLAN to be set. For AP types do not require a native VLAN, create a dummy VLAN, disable it on both radio controls, and ensure that it has the highest VLAN ID.

3. Select **Add** to create a new SSID or VLAN, or select the pencil icon next to an existing SSID/VLAN to edit that existing SSID or VLAN. The **Add SSID/VLAN** configuration page appears as illustrated in Figure 41 and explained in Table 53.

Figure 41 ***Groups > SSIDs > Add SSID/VLAN*** *Page Illustration*



4. Locate the **SSID/VLAN** section on the **Groups > SSIDs** configuration page and adjust these settings as required. This section encompasses the basic VLAN configuration. Table 53 describes the settings and default values. Note that the displayed settings can vary.

Table 53 ***Groups > SSIDs > SSID/VLAN*** *Section Fields and Default Values*

Setting	Default	Description
Specify Interface Name	Yes	Enables or disables an interface name for the VLAN interface. Selecting **No** for this option displays the **Enable VLAN Tagging** option.
Interface	None	Sets the interface to support the SSID/VLAN combination.
SSID	None	Sets the Service Set Identifier (SSID), which is a 32-character user-defined identifier attached to the header of packets sent over a WLAN. It acts as a password when a mobile device tries to connect to the network through the AP, and a device is not permitted to join the network unless it can provide the unique SSID.
Name	None	Sets a user-definable name associated with SSID/VLAN combination.
VLAN ID	None	Indicates the number of the VLAN designated as the **Native VLAN**, typically for management purposes

Table 53 ***Groups > SSIDs > SSID/VLAN*** *Section Fields and Default Values (Continued)*

Setting	Default	Description
Service Priority (Cisco VxWorks only)	None	Identifies the delivery priority which packets receive on the VLAN/SSID (VxWorks only).
Maximum Allowed Associations (0-2007)	255	Indicates the maximum number of mobile users which can associate with the specified VLAN/SSID. **NOTE:** 0 means unlimited for Cisco.
Broadcast SSID (Cisco WLC, Proxim and Symbol 4131 only)	No	For specific devices as cited, this setting enables the AP to broadcast the SSID for the specified VLAN/SSID. This setting works in conjunction with the **Create Closed Network** setting on the **Groups > Security** configuration page. Proxim devices support a maximum of four SSIDs. **NOTE:** This option should be enabled to ensure support of legacy users.
Partial Closed System (Proxim only)	No	For Proxim only, this setting enables to AP to send its SSID in every beacon, but it does not respond to any probe requests.
Unique Beacon (Proxim only)	No	For Proxim only, if more than one SSID is enabled, this option enables them to be sent in separate beacons.
Block All Inter-Client Communication	Yes	This setting blocks communication between client devices based on SSID.

5. Locate the **Encryption** area on the **Groups > SSIDs** page and adjust these settings as required. Table 54 describes the settings and default values.

Table 54 ***Groups > SSIDs > Encryption*** *Section Fields and Default Values*

Setting	Default	Description
Encryption Mode	No Encryption	Drop-down menu determines the level of encryption required for devices to associate to the APs. The drop-down menu options are as follows. Each option displays additional encryption settings that must be defined. Complete the associated settings for any encryption type chosen: • No Encryption • **Optional WEP**—Wired Equivalent Privacy, not PCI compliant as of 2010 • **Require WEP**—Wired Equivalent Privacy, not PCI compliant as of 2010 • **Require 802.1x**—Based on the WEP algorithm • **Require Leap**—Lightweight Extensible Authentication Protocol • **802.1x+WEP**—Combines the two encryption types shown • **802.1x+LEAP**—Combines the two encryption types shown • **LEAP+WEP**—Combines the two encryption types shown • **Static CKIP**—Cisco Key Integrity Protocol • **WPA**—Wi-Fi Protected Access protocol • **WPA/PSK**—Combines WPA with Pre-Shared Key encryption • **WPA2**—Wi-Fi Protected Access 2 encryption • **WPA2/PSK**—Combines the two encryption methods shown • **xSec**—FIPS-compliant encryption including Layer 2 header info

6. Locate the **EAP Options** area on the **Groups > SSIDs** page, and complete the settings. Table 55 describes the settings and default values.

Table 55 ***Groups > SSIDs > EAP Options*** *Section Fields and Default Values*

Setting	Default	Description
WEP Key Rotation Interval	120	Time (in seconds) between WEP key rotation on the AP.
Cisco TKIP	No	If enabled, Cisco Temporal Key Integrity Protocol (TKIP) provides per-packet key mixing, a message integrity check and a re-keying mechanism, thus fixing the flaws of WEP. **NOTE:** TKIP can only be enabled when EAP-based security is used.
Cisco MIC	Disabled	If enabled, Cisco Message Integrity Check (MIC) adds several bytes per packet to make it more difficult to tamper with the packets.

7. Locate the **RADIUS Authentication Servers** area on the **Groups > SSIDs** configuration page and define the settings. Table 56 describes the settings and default values.

Table 56 ***Groups > SSIDs > RADIUS Authentication Servers*** *Fields and Default Values*

Setting	Default	Description
RADIUS Authentication Server 1-3 (ProCurve420, Proxim only)	None	Drop-down menu to select RADIUS Authentication servers previously entered on the **Groups > RADIUS** configuration page. These RADIUS servers dictate how wireless clients authenticate onto the network.
Authentication Profile Name (Proxim Only)	None	Sets the Authentication Profile Name for Proxim AP-600, AP-700, AP-2000, AP-4000.
Authentication Profile Index (Proxim Only)	None	Sets the Authentication Profile Index for Proxim AP-600, AP-700, AP-2000, AP-4000.

8. Select **Save** when the security settings and configurations in this procedure are complete.

NOTE: You may need to return to the **Groups > Security** configuration page to configure or reconfigure RADIUS servers.

9. Locate the **RADIUS Accounting Servers** area on the **Groups > SSIDs** configuration page and define the settings. Table 57 describes the settings and default values.

Table 57 ***Groups > SSIDs > Radius Accounting Servers*** *Fields and Default Values*

Setting	Default	Description
RADIUS Accounting Server 1-3 (Proxim Only)	None	Pull-down menu selects RADIUS Accounting servers previously entered on the **Groups > RADIUS** configuration page. These RADIUS servers dictate where the AP sends RADIUS Accounting packets for this SSID/VLAN.
Accounting Profile Name (Proxim Only)	None	Sets the Accounting Profile Name for Proxim AP-600, AP-700, AP-2000, AP-4000.
Accounting Profile Index (Proxim Only)	None	Sets the Accounting Profile Index for Proxim AP-600, AP-700, AP-2000, AP-4000.

10. Select **Save** to retain these **Security** configurations for the group, select **Save and Apply** to make the changes permanent, or select **Revert** to discard all unapplied changes.
11. Continue with additional security-related procedures in this document for additional RADIUS, and SSID settings for device groups, as required.

Configuring Radio Settings for Device Groups

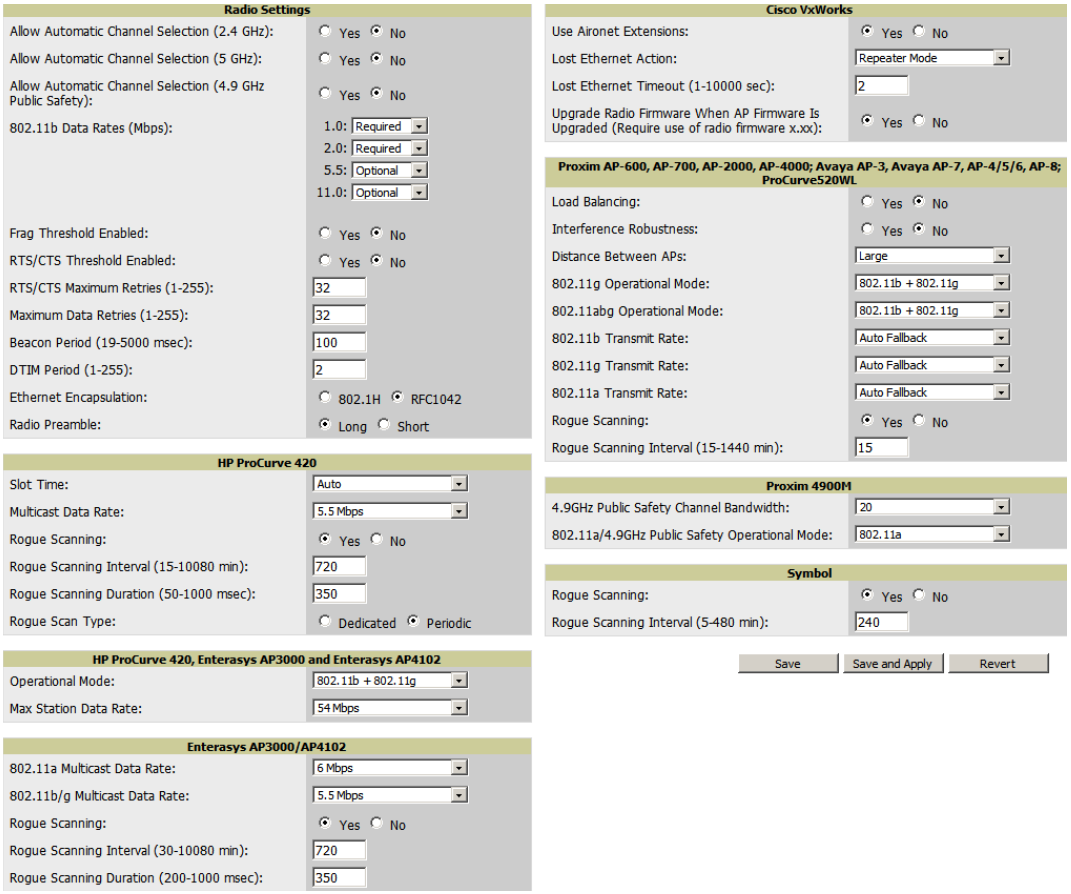
The **Groups > Radio** configuration page allows you to specify detailed RF-related settings for devices in a particular group.

NOTE: If you have existing deployed devices, you may want to use the current RF settings on those devices as a guide for configuring the settings in your default Group.

Perform the following steps to define RF-related radio settings for groups.

1. Go to the **Groups > List** page and select the group for which to define radio settings by selecting the group name. Alternatively, select **Add** from the **Groups > List** page to create a new group, define a group name. In either case, the **Monitor** page appears.
2. Go to the **Groups > Radio** page. Figure 42 illustrates this page.

Figure 42 ***Groups > Radio*** *Page Illustration*



3. Locate the **Radio Settings** area and adjust these settings as required. Table 58 describes the settings and default values.

Table 58 ***Groups > Radio > Radio Settings*** *Fields and Default Values*

Setting	Default	Description
Allow Automatic Channel Selection (2.4, 5, and 4.9GHz Public Safety)	No	If enabled, whenever the AP is rebooted it uses its radio to scan the airspace and select its optimal RF channel based on observed signal strength from other radios. **NOTE:** If you enable this feature, AWMS automatically reboots the APs in the group when the change is implemented.
802.11b Data Rates (Mbps)	Required: • 1.0 • 2.0 Optional: • 5.5 • 11.0	Displays pull-down menus for various data rates for transmitting data. **NOTE:** This setting does not apply to Cisco LWAPP devices. The three values in each of the pull-down menus are as follows: • *Required*—The AP transmits only unicast packets at the specified data rate; multicast packets are sent at a higher data rate set to optional. (Corresponds to a setting of **yes** on Cisco devices.) • *Optional*—The AP transmits both unicast and multicast at the specified data rate. (Corresponds to a setting of **basic** on Cisco devices.) • *Not Used*—The AP does not transmit data at the specified data rate. (Corresponds to a setting of **no** on Cisco devices.)
Frag Threshold Enabled	No	If enabled, this setting enables packets to be sent as several pieces instead of as one block. In most cases, leave this option disabled.
Threshold Value	2337	If Fragmentation Threshold is enabled, this specifies the size (in bytes) at which packets are fragmented. A lower **Fragmentation Threshold** setting might be required if there is a great deal of radio interference.
RTS/CTS Threshold Enabled	No	If enabled, this setting configures the AP to issue a RTS (Request to Send) before sending a packet. In most cases, leave this option disabled.
RTS/CTS Threshold Value	2338	If RTS/CTS is enabled, this specifies the size of the packet (in bytes) at which the AP sends the RTS before sending the packet.
RTS/CTS Maximum Retries	32	If RTS/CTS is enabled, this specifies the maximum number of times the AP issues an RTS before stopping the attempt to send the packet through the radio. Acceptable values range from **1** to **128**.
Maximum Data Retries	32	The maximum number of attempts the AP makes to send a packet before giving up and dropping the packet. Acceptable values range from **1** to **255.**
Beacon Period (19-5000 msec)	100	Time between beacons (in microseconds).
DTIM Period (1-255)	2	DTIM alerts power-save devices that a packet is waiting for them. This setting configures DTIM packet frequency as a multiple of the number of beacon packets. The DTIM Interval indicates how many beacons equal one cycle.
Ethernet Encapsulation	RFC1042	This setting selects either the RFC1042 or 802.1h Ethernet encapsulation standard for use by the group.
Radio Preamble	Long	This setting determines whether the APs uses a **short** or **long** preamble. The preamble is generated by the AP and attached to the packet prior to transmission. The short preamble is 50 percent shorter than the long preamble and thus may improve wireless network performance. **NOTE:** Because older WLAN hardware may not support the "short" preamble, the "long" preamble is recommended as a default setting in most environments.

4. Certain APs offer proprietary settings or advanced functionality that differ from prevailing industry standards. If you use these APs in the device group, you may wish to take advantage of this proprietary functionality.

To configure these settings, locate the proprietary settings areas on the **Groups > Radio** page and continue with the additional steps in this procedure.

NOTE: Proprietary settings are only applied to devices in the group from the specific vendor and are not configured on devices from vendors that do not support the functionality.

5. To configure HP ProCurve 420 settings exclusively, locate the **HP ProCurve 420** section and adjust these settings as required. Table 59 describes the settings and default values.

Table 59 ***Groups > Radio > HP ProCurve 420*** *Fields and Default Values*

Setting	Default	Description
Slot Time	Auto	Short-slot-time mechanism, if used on a pure 802.11g deployment, improves WLAN throughput by reducing wait time for transmitter to assure clear channel assessment.
Multicast Data Rate	5.5Mbps	Sets the maximum data rate of the multicast data packets.
Rogue Scanning	Enabled	If enabled the 420 APs in the group will scan for rogues.
Rogue Scanning Interval (15-10080 min)	720	If rogue scanning is enabled, this setting controls the frequency with which scans are conducted (in minutes). Frequent scans provide the greatest security, but AP performance and throughput available to user devices may be impacted modestly during a rogue scan. **NOTE:** This setting only applies to Periodic scans.
Rogue Scanning Duration (50-1000 msec)	350	Specifies the amount of time, in milliseconds, the AP should spend performing the rogue scan. If the duration is set too high users may start to experience connectivity issues. **NOTE:** This setting only applies to periodic scans.
Rogue Scan Type	Periodic	Specifies the Rogue Scanning mode. When set to **Dedicated**, users are unable to associate to the AP.

6. Locate the **HP ProCurve 240, Enterasys AP 3000** and **AP 4102** section and define the settings. Table 60 describes the settings and default values of this page.

Table 60 ***Groups > Radio > HP ProCurve 240, Enterasys AP 3000 and AP 4102*** *Fields and Default Values*

Setting	Default	Description
Operational Mode	802.11b + 802.11g	Sets the radio operational mode for all of the ProCurve 420s, Enterasys 3000s and 4102sin the group to either b only, g only, or b + g.
Max Station Data Rate	54 Mbps	The maximum data rate at which a user can connect to the AP.

7. Locate the **Enterasys AP3000** and **Enterasys AP4102** section and define the settings. Table 61 describes the settings and default values of this page.

Table 61 ***Groups > Radio > Enterasys AP3000 and Enterasys AP4102*** *Fields and Default Values*

Setting	Default	Description
802.11a Multicast Data Rate	6 Mbps	Drop-down menu that specifies the a radio multicast data rate.
802.11b/g Multicast Data Rate	5.5 Mbps	Drop-down menu that specifies the b/g multicast data rate.
Rogue Scanning	Enabled	If enabled AP 3000s and 4102s in the group with firmware 3.1.20 or newer will passively scan for rogue APs at the specified interval for the specified amount of time. This rogue scan will not break users' association to the network.

Table 61 *Groups > Radio > Enterasys AP3000 and Enterasys AP4102 Fields and Default Values (Continued)*

Setting	Default	Description
Rogue Scan Interval (30-10080 min)	720	Specifies the time, in minutes, between rogue scans.
Rogue Scan Duration (200-1000 msec)	350	Specifies the amount of time, in milliseconds, the AP listens to rogues before returning to normal operation.

8. Locate the **Groups > VxWorks** section and adjust these settings as required. Table 62 describes the settings and default values of this page.

Table 62 *Groups > Radio > VxWorks Fields and Default Values*

Setting	Default	Description
Use Aironet Extensions	Yes	When enabled, this option allows Cisco devices to provide functionality not supported by 802.11 IEEE standards, including the following: • **Load balancing**—Allows the access point to direct Aironet clients to the optimum access point. • **Message Integrity Check (MIC)**—Protects against bit-flip attacks. • **Temporal Key Integrity Protocol (TKIP)**—Key hashing algorithm that protects against IV attacks.
Lost Ethernet Action	Repeater Mode	Pull-down menu that specifies the action to take when the Lost Ethernet Timeout threshold is exceeded: • **No Action**—No action taken by the AP. • **Repeater Mode**—The AP converts to a repeater, disassociating all its clients while the backbone is unavailable. If the AP can communicate with another root AP on the same SSID, its clients will be able to re-associate and connect to the backbone. If the AP cannot communicate with another root AP, clients are not allowed to re-associate. • **Disable Radio**—The AP disassociates its clients and disables the radio until it can establish communication with the backbone. • **Restrict SSID**—The AP disassociates all clients and then allows clients to re-associate with current SSID.
Lost Ethernet Timeout (1-1000 secs)	2	Specifies the time (in seconds) the AP waits prior to taking action when its backbone connectivity is down. Actions are defined in the **Lost Ethernet Action** field.
Upgrade Radio Firmware When AP Firmware Is Upgraded	Yes	If enabled, this setting mandates that the radio firmware be upgraded to a firmware version compatible with the current version of AP firmware.

9. To configure settings specific to the Proxim AP-600, AP-700, AP-2000, AP-4000; Avaya AP-3/4/5/6//7/8, and ProCurve 520WL, locate the appropriate section of **Groups > Radio** page and define the required fields. Table 63 describes the settings and default values.

Table 63 *Groups > Radio > Proxim/Avaya/Procurve APs Fields and Default Values*

Setting	Default	Description
Load Balancing	No	If enabled, this setting allows client devices associating to an AP with two radio cards to determine which card to associate with, based on the load (number of clients) on each card. **NOTE:** This feature is only available when two 802.11b wireless cards are used in an AP-2000.
Interference Robustness	No	If enabled, this option will fragment packets greater than 500 bytes in size to reduce the impact of radio frequency interference on wireless data throughput.

Table 63 ***Groups > Radio > Proxim/Avaya/Procurve APs*** *Fields and Default Values (Continued)*

Setting	Default	Description
Distance Between APs	Large	This setting adjusts the receiver sensitivity. Reducing receiver sensitivity from its maximum may help reduce the amount of crosstalk between wireless stations to better support roaming users. Reducing the receiver sensitivity, user stations will be more likely to connect with the nearest access point.
802.11g Operational Mode	802.11b +802.11g	This setting sets the operational mode of all g radios in the group to either b only, g only or b + g.
802.11abg Operational Mode	802.11b +802.11g	This setting sets the operational mode of all a/b/g radios in the group to either a only, b only, g only or b + g.
802.11b Transmit Rate	Auto Fallback	This setting specifies the minimum transmit rate required for the AP to permit a user device to associate.
802.11g Transmit Rate	Auto Fallback	This setting specifies the minimum transmit rate required for the AP to permit a user device to associate.
802.11a Transmit Rate	Auto Fallback	This setting specifies the minimum transmit rate required for the AP to permit a user device to associate.
Rogue Scanning	Yes	If enabled, any ORiNOCO or Avaya APs in the group (with the appropriate firmware) will passively scan for rogue APs at the specified interval. This rogue scan will not break users' association to the network. **NOTE:** This feature can affect the data performance of the access point.
Rogue Scan Interval	15 minutes	If rogue scanning is enabled, this setting controls the frequency with which scans are conducted (in minutes). Frequent scans provide the greatest security, but AP performance and throughput available to user devices may be impacted modestly during a rogue scan.

10. Locate the **Proxim 4900M** section and define the required fields. Table 64 describes the settings and default values.

Table 64 ***Groups > Radio > Proxim 4900*** *Fields and Default Values*

Setting	Default	Description
4.9GHz Public Safety Channel Bandwidth	20	This setting specifies the channel bandwidth for the 4.9 GHz radio. It is only applicable if you are running the 802.11a/4.9GHz radio in 4.9GHz mode.
802.11a/4.9GHz Public Safety Operational Mode	802.11a	This setting specifies if the AP will run the 802.11a/4.9GHz radio in 802.11a mode or in 4.9 GHz mode. Please note that 4.9 GHz is a licensed frequency used for public safety.

11. Locate the **Symbol** section and define the required fields. Table 65 describes the settings and default values.

Table 65 ***Groups > Radio > Symbol*** *Fields and Default Values*

Setting	Default	Description
Rogue Scanning	Yes	If enabled, Symbol APs with 3.9.2 or later firmware in the group will passively scan for rogue APs at the specified interval. This rogue scan will not break a user's association to the network.
Rogue Scanning Interval (5-480 min)	240	If rogue scanning is enabled, this setting controls the frequency with which scans are conducted (in minutes). Frequent scans provide the greatest security, but AP performance and throughput available to user devices may be impacted modestly during a rogue scan.

12. Select **Save** when radio configurations as described above are complete, select **Save and Apply** to make the changes permanent, or select **Revert** to discard all unapplied changes.

An Overview of Cisco WLC Configuration

The **Groups > Cisco WLC Config** page consolidates the settings for Cisco WLC devices from all group pages. The **Groups > SSIDs** subtab applies to all device types except for Cisco WLC, which have WLANs configured on the **Cisco WLC Config** page. It is not recommended to have HP Procurve 420s, Symbol 4131 and Proxim APs in the same group as Cisco devices. Also, it is recommended that users set device preferences to **Only devices in this group**. This topic describes how to access and navigate the **Groups > Cisco WLC Config** page.

Accessing Cisco WLC Configuration

Go to the **Cisco WLC Config** page in one of these two ways:

1. In **Groups > List**, select a group that has been defined to support Cisco devices and the **Cisco WLC Config** option appears in the subtabs.
2. In **Groups > List,** create a new group to support Cisco devices with these steps:
   - Select **Add** from the **Groups > List** page to create a new group, enter a group name, and select **Add**.
   - Once AWMS prompts you with the **Groups > Basic** page, ensure that you enable device-specific settings for **Cisco WLC**.
   - Once you select **Save** or **Save and Apply**, then the **Groups > Cisco WLC Config** subtab appears in the navigation pane at the top in association with that group.

Navigating Cisco WLC Configuration

The navigation pane on the left side of the **Groups > Cisco WLC Config** page is expandable, and displays the Cisco configurations supported and deployed. Figure 43 and Figure 44 illustrate this navigation pane.

You can pre-populate the group WLC settings from a controller in the same group by performing an import on the controller's **Audit** page.

Figure 43 ***Groups > Cisco WLC Config*** *Page Illustration, collapsed view*

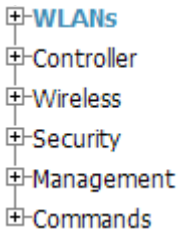
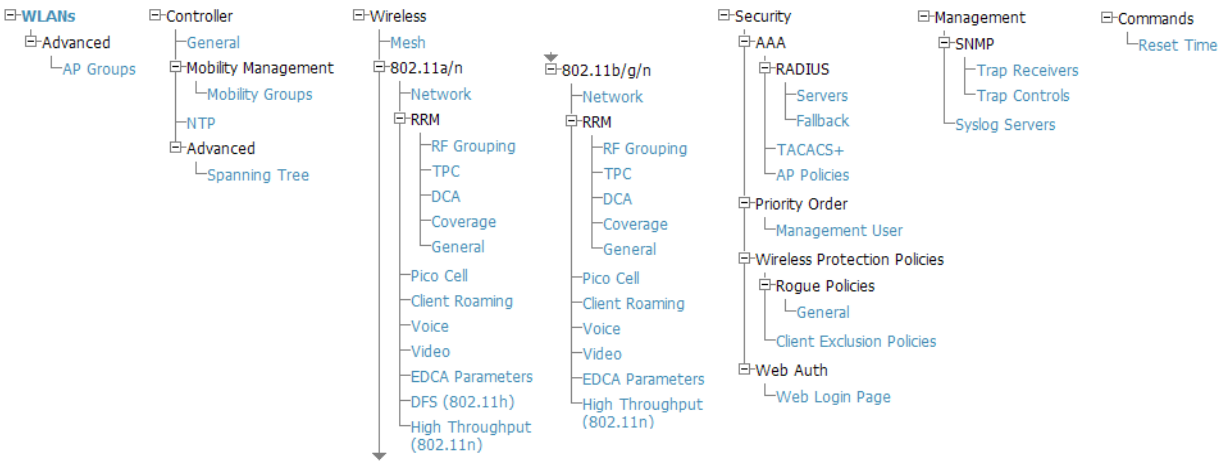


Figure 44 ***Groups > Cisco WLC Config*** *Page Illustration, expanded view*

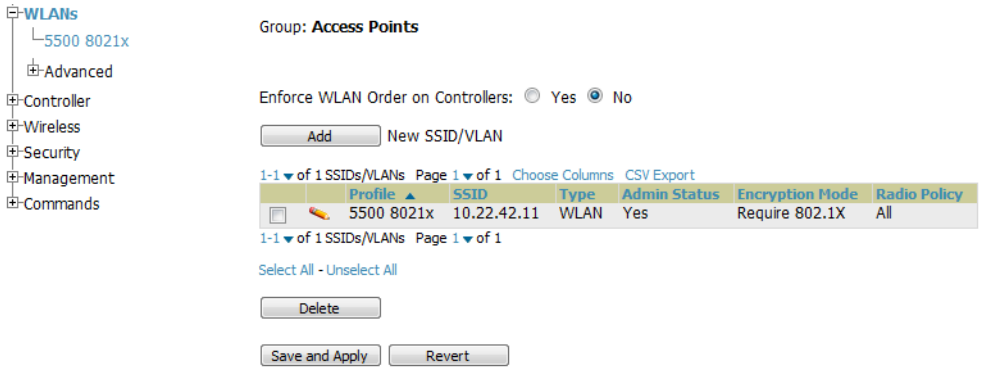


Configuring WLANs for Cisco WLC Devices

In **Cisco WLC Config**, WLANs are based on SSIDs or VLANs that are dedicated to Cisco WLC controllers. Perform the following steps to define and configure WLANs for Cisco WLC controllers.

1. Go to the **Groups > Cisco WLC Config** page, and select **WLANs** in the navigation pane at left. This page displays the SSIDs or VLANs that are available for use with Cisco WLC devices, and enables you to define new SSIDs or VLANs. Figure 45 illustrates this page.
2. To change the ID/position of a WLAN on the controller by dragging and dropping, set the toggle to **yes**. Note that the by setting this flag to **yes**, AMP will display a mismatch if the WLANs in the desired and device config differ only on the order.

Figure 45 ***Groups > Cisco WLC Config > WLANS*** *page illustration*



3. To add or edit SSIDs or VLANs that are dedicated to Cisco WLC devices, either select the **Add New SSID/VLAN** button, or select the pencil icon for an existing SSID/VLAN. A new page appears comprised of four tabs, as follows:
   - **General**—Defines general administrative parameters for the Cisco WLC WLAN.
   - **Security**—Defines encryption and RADIUS servers.
   - **QoS**—Defines quality of service (QoS) parameters for the Cisco WLC WLAN.
   - **Advanced**—Defines advanced settings that are available only with Cisco WLC devices, for example, AAA override, coverage, DHCP and DTIM period.

NOTE: Refer to Cisco documentation for additional information about Cisco WLC devices and related features.

Figure 46 ***Groups > Cisco WLC Config > WLANs > Add New SSID/VLAN > General*** *Tab Illustration*

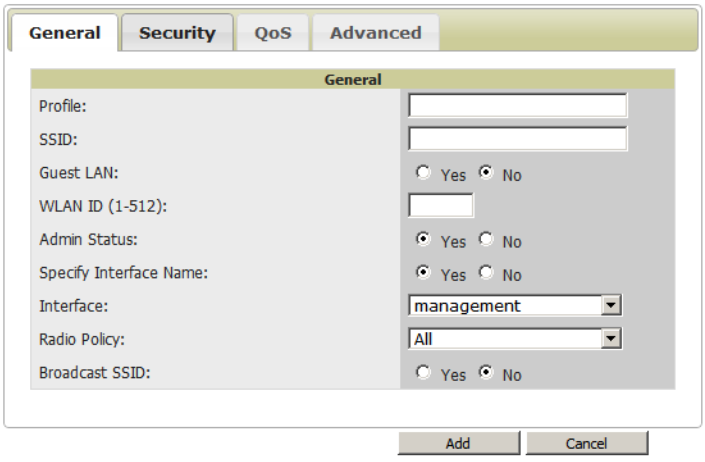


Figure 47 ***Groups > Cisco WLC Config > WLANs > Add New SSID/VLAN > Security*** *Tab Illustration*

Figure 48 ***Groups > Cisco WLC Config > WLANs > Add New SSID/VLAN > QoS*** *Tab Illustration*

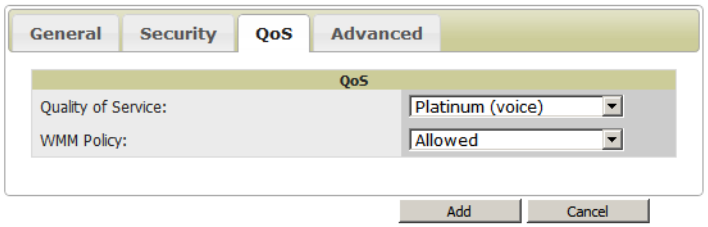
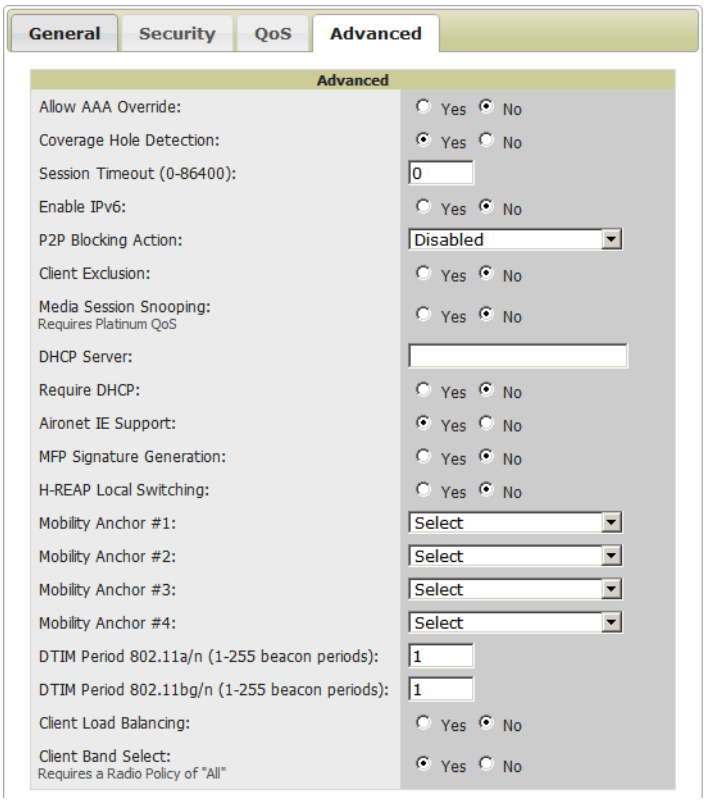


Figure 49 ***Groups > Cisco WLC Config > WLANs > Add New SSID/VLAN > Advanced*** *Tab Illustration*



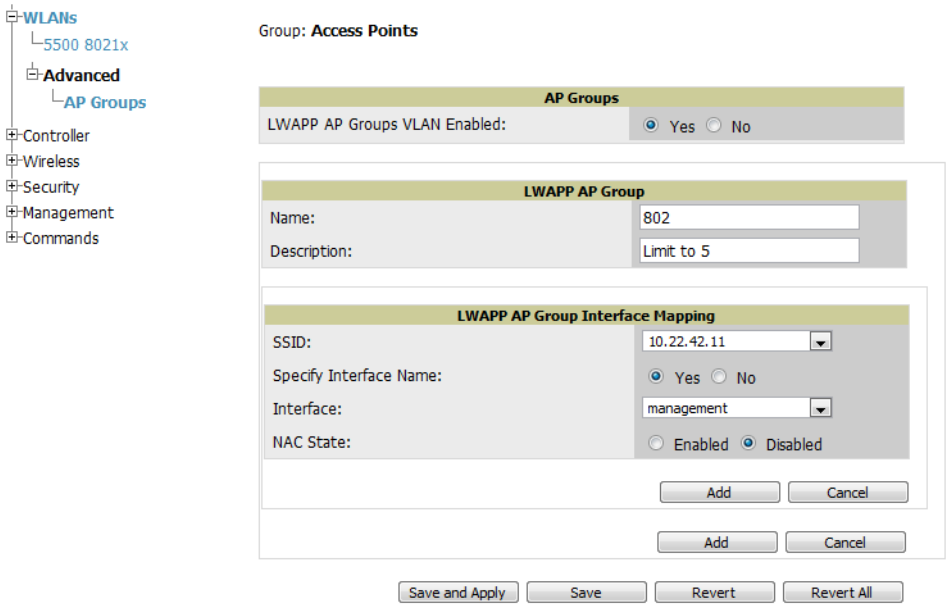
Defining and Configuring LWAPP AP Groups for Cisco Devices

The **Groups > Cisco WLC Config > WLANs > Advanced > AP Groups** page allows you to add/edit/delete AP Groups on the Cisco WLC. LWAPP AP Groups are used to limit the WLANs available on each AP. Cisco thin APs are assigned to LWAPP AP Groups.

Viewing and Creating AP Groups

1. Go to the **Groups > Cisco WLC Config** page, and select **WLANs > Advanced > AP Groups** in the navigation pane at left. This page displays the configured LWAPP APs. Figure 50 illustrates this page.

Figure 50 ***Groups > Cisco WLC Config > WLANS > Advanced > AP Groups*** *Page Illustration*



2. To add a new LWAPP AP group, select **Yes** in the **AP Groups** section. Additional controls appear.
3. Select **Add** to create a new LWAPP AP group. To edit an existing LWAPP AP group, select the pencil icon next to that group. Add one or more SSIDs and the interface/VLAN ID mapping on the **Add/Edit** page of the LWAPP AP Group.
4. Select **Save and Apply** to make these changes permanent, or select **Save** to retain these changes to be pushed to controllers at a later time.

Configuring Cisco Controller Settings

The **Groups > Cisco WLC Config > Controller** page defines general Cisco WLC settings, Multicast settings, Cisco mobility groups to be supported on Cisco controllers, Network Transfer Protocol (NTP), and Spanning Tree Protocol settings.

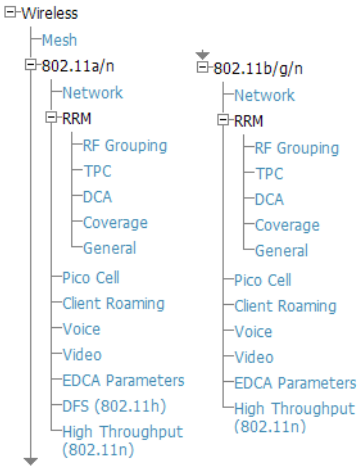
Go to the **Groups > Cisco WLC Config > Controller** page. This navigation is illustrated in Figure 51.

Figure 51 ***Groups > Cisco WLC Config > Controller*** *Navigation*

Configuring Wireless Parameters for Cisco Controllers

This section illustrates the configuration of **Wireless** settings in support of Cisco WLC controllers. The navigation for Wireless settings is illustrated in Figure 52.

Figure 52 ***Groups > Cisco WLC Config > Wireless*** *Navigation Illustration*



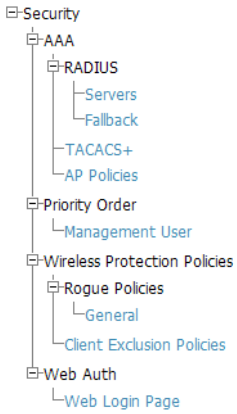
Configuring Security Parameters and Functions

AWMS enables you to configure many security settings that are specific to Cisco WLC controllers. This section supports four overriding types of configuration, as follows:

- **AAA**, to cover both RADIUS and TACACS+ server configuration
- **Priority Order**
- **Wireless Protection Policies**
- **Web Auth**

Figure 53 illustrates these components and this navigation:

Figure 53 ***Groups > Cisco WLC Config > Security*** *Navigation Illustration*



Configuring Management Settings for Cisco

AWMS allows you to configure of SNMP and Syslog Server settings for Cisco WLC controllers. Users should be able to configure up to four trap receivers on the Cisco WLC including the AMP IP that can be used in Global Groups. To define SNMP and server settings, go to the **Groups > Cisco WLC Config > Management** page, illustrated in Figure 54.

Figure 54 ***Groups > Cisco WLC Config > Management*** *Navigation Illustration*

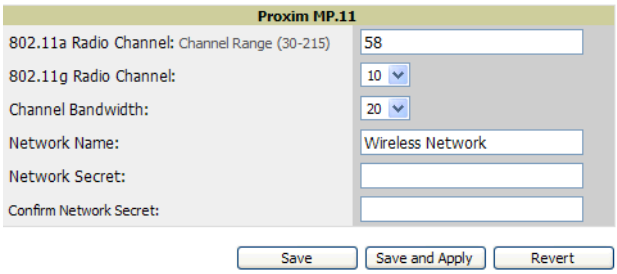
Configuring Group PTMP Settings

The **Groups > PTMP** configuration page configures Point-to-Multipoint (PTMP) for all subscriber and base stations in the device group. Subscriber stations must be in the same group as all base stations with which they might connect.

Perform the following steps to configure these functions.

1. Go to the **Groups > List** page and select the group for which to define PTMP settings by selecting the group name. Alternatively, select **Add** from the **Groups > List** page to create a new group, define a group name. In either case, the **Monitor** page appears.
2. Select the PTMP tab in the AWMS navigation menu. Figure 55 illustrates this page.

Figure 55 ***Groups > PTMP*** *Page Illustration*



3. Define the settings on this page. Table 66 describes the settings and default values.

Table 66 ***Groups > PTMP*** *Fields and Default Values*

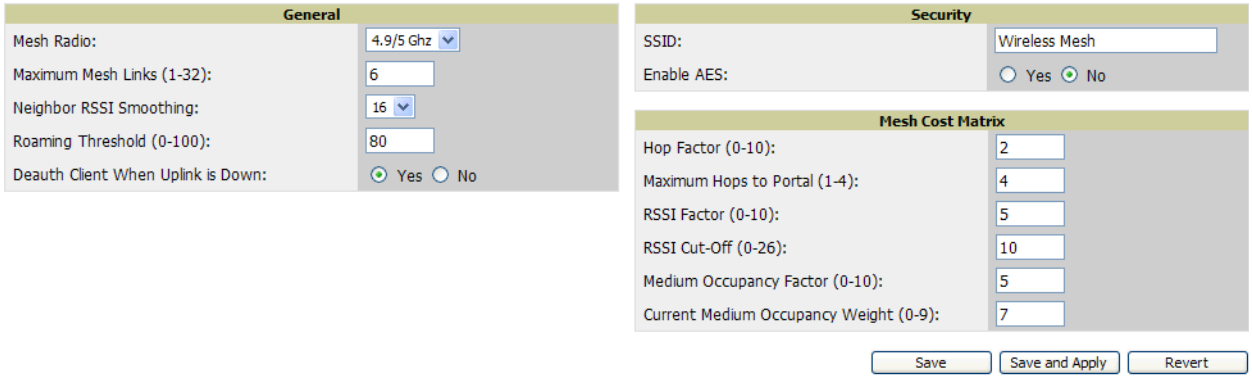
Setting	Default	Description
802.11a Radio Channel	58	Selects the channel used for 802.11a radios by the devices in this group.
802.11g Radio Channel	10	Selects the channel used for 802.11g radios by the devices in this group.
Channel Bandwidth	20	Defines the channel bandwidth used by the devices in this group.
Network Name	Wireless Network	Sets the Network name with a range of length supported from two to 32 alphanumeric characters.
Network Secret	None	Sets a shared password to authenticate clients to the network.

4. Select **Save and Apply** when configurations are complete to make them permanent, or select **Save** to retain these settings prior to pushing to controllers at a later time.

Configuring Proxim Mesh Radio Settings

1. Go to the **Groups > Proxim Mesh** configuration page to configure Mesh-specific radio settings.
2. Define the settings as required for your network. Figure 56 illustrates this page. Table 67 and Table 68 describe the settings and default values.

Figure 56 ***Groups > Proxim Mesh*** *Page Illustration*



The **General** section contains settings for mesh radio, number of mesh links, RSSI smoothing, roaming threshold and de-auth client.

Table 67 ***Groups > Proxim Mesh > General*** *Fields and Default Values*

Setting	Default	Description
Mesh Radio	4.9/5Ghz	Drop-down selects the radio that acts as the backhaul to the network.
Max Number of Mesh Links	6	Sets the maximum number of mesh links allowed on an AP. This number includes the uplink to the portal as well as downlinks to other mesh APs.
Neighbor RSSI Smoothing	16	Specifies the number of beacons to wait before switching to a new link.
Roaming Threshold	80	Specifies the difference in cost between two paths that must be exceeded before the AP roams. To switch to a new path it must have a cost that is less by at least the roaming threshold. A high threshold results in fewer mesh roams.
Deauth Client when Uplink is Down	Yes	With **Yes** selected, clients have authentication removed (are deauthenticated) if the uplink is lost.

The **Security** section contains settings for SSID and enabling AES encryption.

Table 68 ***Groups > Proxim Mesh > Security*** *Fields and Default Values*

Setting	Default	Description
SSID	None	Sets the SSID used by the Mesh Radio to connect to the mesh network.
Enable AES	No	Enable or disable AES encryption.

3. The **Mesh Cost Matrix** configuration section contains settings for hop factor and maximum hops to portal, RSSI factor and cut-off, medium occupancy factor and current medium occupancy weight. Adjust these settings as required for your network. Table 69 describes these settings and default values.

Table 69 ***Groups > Proxim Mesh > Mesh Cost Matrix*** *Fields and Default Values*

Setting	Default	Description
Hop Factor	5	Sets the factor associated with each hop when calculating the best path to the portal AP. Higher factors will have more impact when deciding the best uplink.
Maximum Hops to Portal	4	Set the maximum number of hops for the AP to reach the Portal AP.
RSSI Factor	5	Sets the factor associated with the RSSI values used when calculating the best path to the portal AP. Higher factors will have more impact when deciding the best uplink.
RSSI Cutoff	10	Specifies the minimum RSSI needed to become a mesh neighbor.

Table 69 ***Groups > Proxim Mesh > Mesh Cost Matrix*** *Fields and Default Values (Continued)*

Setting	Default	Description
Medium Occupancy Factor	5	Sets the factor associated with Medium Occupancy when calculating the best path to the portal AP. Higher factors will have more impact when deciding the best uplink.
Current Medium Occupancy Weight	7	Specifies the importance given to the most recently observed Medium Occupancy against all of the previously viewed medium occupancies. Lower values place more importance on previously observed Medium Occupancies.

4. Select **Save** when configurations are complete to retain these settings. Select **Save and Apply** to make the changes permanent, or select **Revert** to discard all unapplied changes.

Configuring Group MAC Access Control Lists

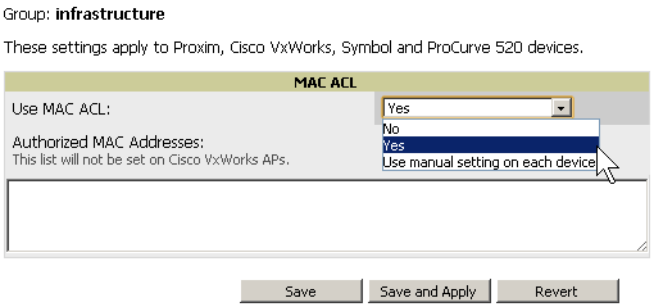
This configuration is optional. If you use Symbol, Proxim, Cisco VxWorks, or ProCurve 520WL wireless APs, AWMS enables you to specify the MAC addresses of devices that are permitted to associate with APs in the Group. Other devices are not able to associate to APs in the Group, even if the users of those devices are authorized users on the network.

NOTE: If **Use MAC ACL** is enabled for Cisco VxWorks, AWMS does not disable this feature on the AP; but the MAC list entered is not populated on the AP. The individual MAC addresses must be entered manually on the AP. If you have APs from other vendors in the Group, the ACL restrictions do not apply to those APs.

Perform the following steps to use the MAC ACL function.

1. Browse to the **Groups > MAC ACL** configuration page. Figure 57 illustrates this page.

Figure 57 ***Groups > MAC ACL*** *Page Illustration*



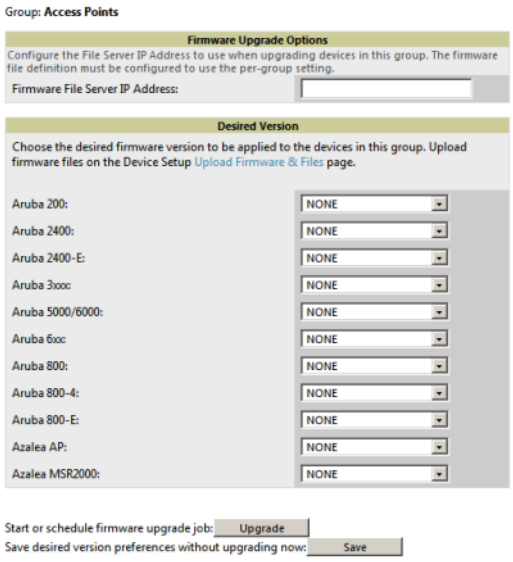
2. Select **Yes** on the **Use MAC ACL** drop-down menu. Enter all authorized MAC addresses, separated by white spaces.
3. Select **Save** when configurations are complete to retain these settings. Select **Save and Apply** to make the changes permanent, or select **Revert** to discard all unapplied changes.

Specifying Minimum Firmware Versions for APs in a Group

This configuration is optional. AWMS allows you the option of defining the minimum firmware version for each AP type in a group on the **Groups > Firmware** configuration page. At the time that you define the minimum version, AWMS automatically upgrades all eligible APs. When you add APs into the group in the future, you will be able to upgrade APs in manual fashion. The firmware for an AP is not upgraded automatically when it is added to a group. Perform the following steps to make this firmware configuration.

1. Browse to the **Groups > Firmware** configuration page. Figure 58 illustrates this page.

Figure 58 ***Groups > Firmware*** *Page Illustration*



2. For each device type in the group, specify the minimum acceptable firmware version. If no firmware versions are listed, go to the **Device Setup > Firmware** configuration page to upload the firmware files to AWMS.
3. Select **Upgrade** to apply firmware preferences to devices in the group. Refer to the firmware upgrade help under **APs/Devices > Manage** configuration page for detailed help on Firmware job options.
4. Select **Save** to save the firmware file as the desired version for the group.
5. If you have opted to assign an external TFTP server on a per-group basis on the **Device Setup > Firmware** configuration page, you can enter the IP address in the **Firmware Upgrade Options** field on the top of this configuration page.
6. Once you have defined your first group, you can configure that group to be the **default** group on your network. When AWMS discovers new devices that need to be assigned to a management group, the default group appears at the top of all drop-down menus and lists. Newly discovered devices are place automatically in the default group if AWMS is set to **Automatically Monitor/Manage New Devices** on the AWMS configuration page.
7. Browse to the **Groups > List** configuration page.
8. From the list of groups, check the **Default** radio button next to the desired default group to make it the default.

Comparing Device Groups

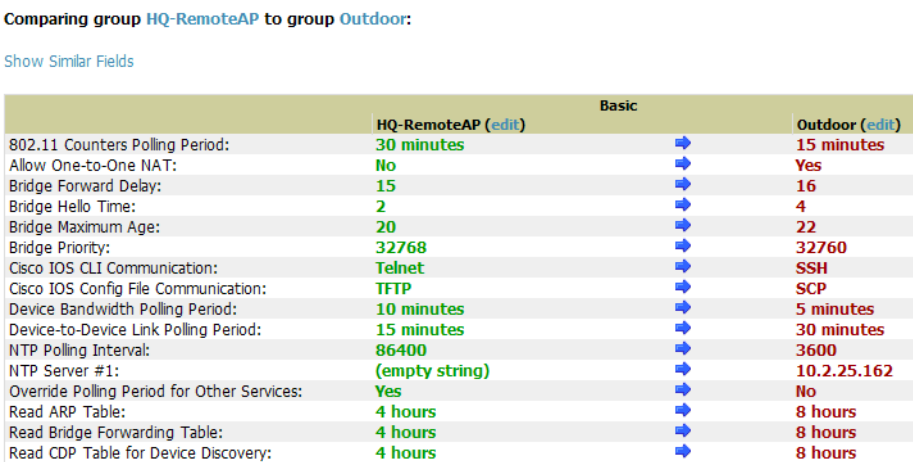
You can compare two existing device groups with a detailed line-item comparison. Group comparison allows several levels of analysis to include the following:

- compare performance, bandwidth consumption, or troubleshooting metrics between two groups
- debug one device group against the settings of a similar and better performing device group
- use one group as a model by which to fine-tune configurations for additional device groups

This topic presumes that at least two device groups are at least partly configured in AWMS, each with saved configurations. Perform the following steps to compare two existing device groups:

1. From the **Groups > List** page, select **Compare two groups**. Two drop-down menus appear.
2. Select the two groups to compare to each other in the drop-down menus, and select **Compare**. The **Compare** page appears, displaying some or many configuration categories. Figure 59 illustrates this page.

Figure 59 *Comparing Two Devices Groups on the* ***Groups > List > Compare*** *Page (Partial View)*



Comparing group HQ-RemoteAP to group Outdoor:

Show Similar Fields

	Basic		
	HQ-RemoteAP (edit)		Outdoor (edit)
802.11 Counters Polling Period:	30 minutes	→	15 minutes
Allow One-to-One NAT:	No	→	Yes
Bridge Forward Delay:	15	→	16
Bridge Hello Time:	2	→	4
Bridge Maximum Age:	20	→	22
Bridge Priority:	32768	→	32760
Cisco IOS CLI Communication:	Telnet	→	SSH
Cisco IOS Config File Communication:	TFTP	→	SCP
Device Bandwidth Polling Period:	10 minutes	→	5 minutes
Device-to-Device Link Polling Period:	15 minutes	→	30 minutes
NTP Polling Interval:	86400	→	3600
NTP Server #1:	(empty string)	→	10.2.25.162
Override Polling Period for Other Services:	Yes	→	No
Read ARP Table:	4 hours	→	8 hours
Read Bridge Forwarding Table:	4 hours	→	8 hours
Read CDP Table for Device Discovery:	4 hours	→	8 hours

3. Note the following factors when using the **Compare** page:
   - The **Compare** page can be very long or very abbreviated, depending on how many configurations the device groups share or do not share.
   - When a configuration differs between two groups, the setting is flagged in red text for the group on the right.
   - The default setting of the **Compare** page is to highlight settings that differ between two groups.
     - To display settings that are similar or identical between two device groups, select **Show Similar Fields** at the top left of the page. The result may be a high volume of information.
     - Select **Hide Similar Fields** to return to the default display, emphasizing configuration settings that differ between two groups.
   - You can change the configuration for either or both groups by selecting **Edit** in the corresponding column heading. The appropriate configuration page appears.
   - If you make and save changes to either or both groups, go back to the **Groups > List** page and select **Compare two groups**. Select the same two groups again for updated information.
   - Additional topics in this document describe the many fields that can appear on the **Groups > List > Compare** page.

Deleting a Group

Perform the following steps to delete an existing Group from the AWMS database:

1. Browse to the **Groups > List** configuration page.
2. Ensure that the Group you wish to delete is not marked as the **default** group. AWMS does not permit you to delete the current default Group.
3. Ensure that there are no devices in the Group you wish to delete. AWMS does not permit you to delete a Group that still contains managed devices. You must move all devices to other Groups before deleting a Group.
4. Ensure that the Group is not a Global Group which has Subscriber Groups, and is not a Group that was pushed from a Master Console. AWMS will not delete a Group in which either of those is true.
5. Select the checkbox and select **Delete**.

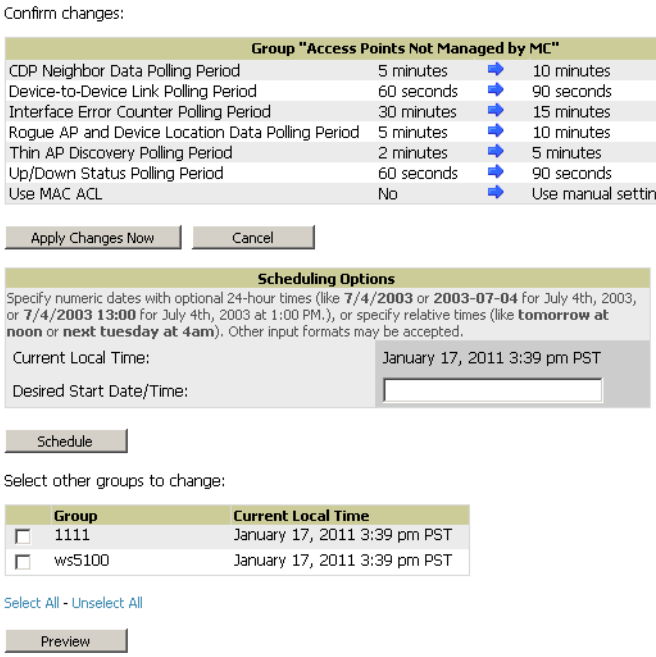
Changing Multiple Group Configurations

Perform the following steps to make any changes to an existing group's configuration:

1. Browse to the **Groups > List** configuration page.

2. Select the **Manage** link (the pencil icon) for the group you wish to edit. The **Groups > Basic** configuration page appears.
3. Select the fields to be edited on the **Basic** configuration page or go to **Radio**, **Security**, **VLANs**, or **MAC ACL** configuration page and edit the fields. Use the **Save** button to store the changes prior to applying them.
4. When all changes for the group are complete select the **Save and Apply** button to make the changes permanent. Figure 60 illustrates the confirmation message that appears.

Figure 60 ***Groups > Basic*** *Configuration Change Confirmation Page Illustration*



5. AWMS displays a **Configuration Change** screen confirming the changes that will be applied to the group's settings.
6. There are several action possibilities from within this confirmation configuration page.
   - **Apply Changes Now** — Applies the changes immediately to APs within the group. If you wish to edit multiple groups, you must use the **Preview** button.

NOTE: You cannot apply Dell PowerConnect W Config changes to other groups. If the only changes on the configuration page are to Dell PowerConnect W devices, the list of groups and the preview button will not appear.

   - **Schedule** — Schedules the changes to be applied to this group in the future. Enter the desired change date in the **Start Date/Time field**. AWMS takes the time zone into account for the group if a time zone other than **AWMS System Time** has been configured on the **Groups > Basic** configuration page.
   - **Cancel** — Cancels the application of changes (immediately or scheduled).

NOTE: To completely nullify the change request, select **Revert** on one of the group configuration pages after you have selected **Cancel**.

7. Apply changes to multiple groups by selecting the appropriate group or groups and selecting **Preview**.

Modifying Multiple Devices

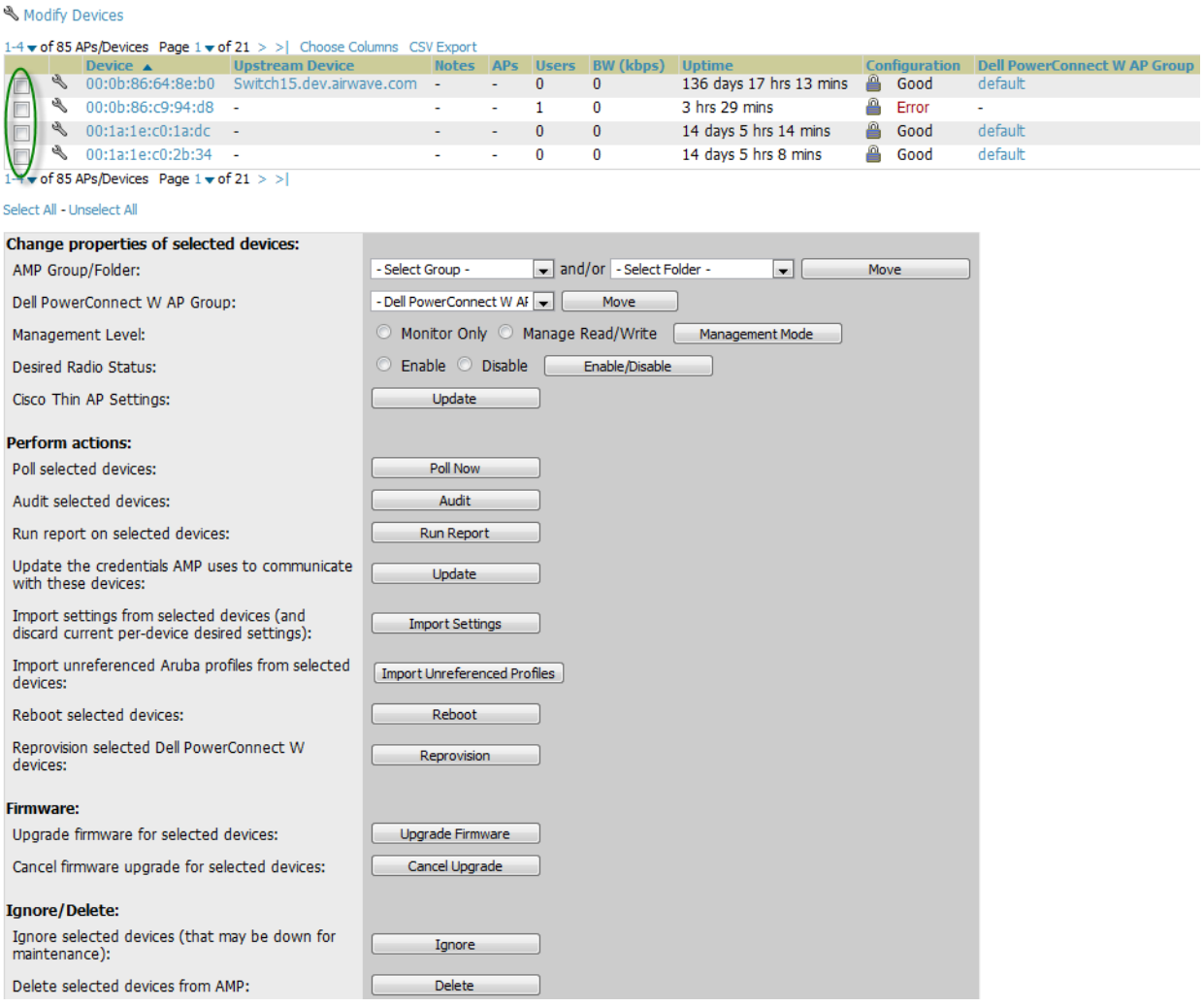
AWMS provides a very powerful utility that modifies all or a subset of devices unrelated to the typical AWMS group construct. This utility provides the ability to delete simultaneously multiple devices, migrate multiple

devices to another group and/or folder, update credentials, and optimize channels. Perform these steps to modify multiple devices.

1. To modify multiple devices, go to one of the following pages with a device list:
   - **APs/Devices > List**
   - **APs/Devices > Up**
   - **APs/Devices > Down**
   - **APs/Devices > Mismatched**
   - **Groups > Monitor** configuration pages

   Each of these pages displays a list of devices. Controller monitoring pages also have lists of their thin APs which can be modified using **Modify Devices**.
2. Select **Modify Devices** to make the checkboxes at the left of all devices appear. In addition, a new section appears in this page location to display various settings that can be configured for multiple devices at one time (some operations cannot be performed on the selected devices). Figure 61 illustrates this page.

Figure 61 ***Modify Multiple Devices*** *Section Illustration*



3. Select one or more devices that are to share the configurations. Select the checkbox for each device to modify.
4. In the **Modify Multiple Devices** section, select any button or use any drop-down menu for the supported changes. Any action you take applies to all selected devices. Each action you take will direct you to a new configuration page, or prompt you with a confirmation page to confirm your changes.
5. You are taken to a confirmation configuration page that allows you to schedule the change for a time in the future. Enter a start date and time in the scheduling field and select when the change should occur from the

drop-down menu (one time is the default, but you may select recurring options for many of the actions). Scheduled jobs can be viewed and edited in the **System > Configuration Change Jobs** tab.

6. Using the neighbor lists, AWMS is able to optimize channel selection for APs. Select the APs to optimize and AWMS minimizes the channel interference while giving channel priority to the most heavily used APs. Table 70 describes these action and controls.

Table 70 ***Modify Multiple Devices*** *Section Fields and Default Values*

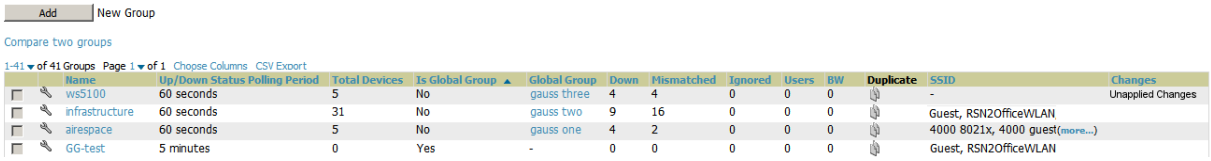
Action	Description
AMP Group/Folder	Move the selected devices to a new group or folder. If the AP is in managed mode when it is moved to a new group, it will be reconfigured.
Dell PowerConnect W AP Group	Moves the selected APs to a new Dell PowerConnect W AP Group. If the AP is in managed mode when it is moved to a new group it will be reconfigured.
Desired Radio Status	Enables or disables the radios on the selected device. Does *not* apply Cisco IOS APs.
Cisco Thin AP Settings	Bulk configuration for per-thin AP settings, previously configured on the **Group LWAPP AP** tab, can be performed from **Modify Devices** on the **APs/Devices List** page. Make changes to LWAPP AP groups, including the option that was under Modify Devices.
Poll now	Polls selected devices for current user count and bandwidth data; overrides default poll settings for the group. Polling numerous devices may create a temporary performance load on your AWMS server.
Audit selected devices	Fetches the current configuration from the device and compares it to the desired AWMS configuration. The audit action updates the Configuration Status.
Run report on selected devices	Takes you to the **Reports > Definitions** page where you can define or run a custom report for selected devices. For more details and a procedure, see "Using Custom Reports" on page 222.
Update the credentials AMP uses to communicate with these devices	**Update** changes the credentials AWMS uses to communicate with the device. It does *not* change the credentials on the AP.
Import settings from selected devices (and discard current pre-device desired settings)	Audit updates a number of the AP specific settings AWMS initially read off of the AP including channel, power, antenna settings and SSL certifications. AWMS recommends using this setting if APs have been updated outside of AWMS. Most settings on the **APs/Devices Manage** configuration page are set to the values currently read off of the devices.
Reboot selected devices	Reboots the selected devices. Use caution when rebooting devices because this can disrupt wireless users.
Reprovision selected Dell PowerConnect W devices	Configures the controller to send provisioning parameters such as radio, antenna, and IP address settings to the selected APs. Please note that APs will be rebooted as part of reprovisioning.
Upgrade firmware for selected devices	Upgrades firmware for the selected devices. Refer to the firmware upgrade help under **APs/Devices > Manage** configuration page for detailed help on Firmware job options.
Cancel firmware upgrade for selected devices	Cancels any firmware upgrades that are scheduled or in progress for the selected APs.
Ignore selected devices (that may be down for maintenance)	Ignores selected APs, preventing AWMS from generating any alerts or including the AP in an up/down count. The device's history is preserved but it will not be polled. Ignored devices can be seen and taken out of ignore status by navigating to the **New Devices** configuration page and selecting **View Ignored Devices** link at the bottom.
Delete selected devices from AMP	Removes the selected APs from AWMS. The deletes will be performed in the background and may take a minute to be removed from the list.

Using Global Groups for Group Configuration

To apply group configurations using the AWMS Global Groups feature, first go to the **Groups > List** configuration page. Select **Add** to add a new group, or select the name of the group to edit settings for an existing group. Select the **Duplicate** icon to create a new group with identical configuration to an existing group.

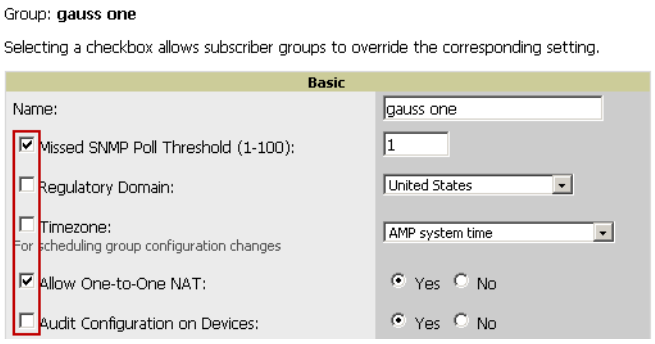
- To have Global Group status, a group must contain no devices; accordingly, access points can never be added to a Global Group. Global groups are visible to users of all roles, so they may not contain devices, which can be made visible only to certain roles. Figure 62 illustrates the **Groups > List** page.

Figure 62 ***Groups > List*** *Page Illustration*



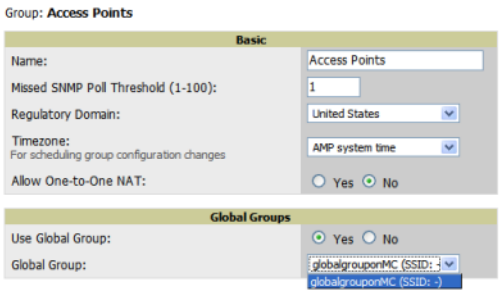
- To set a group as a Global Group, go to the **Groups > Basic** configuration page for an existing or a newly created group. Select **Yes** for the **Is Global Group** field under the Global Group section.
- When the change is saved and applied, the group will have a checkbox next to fields. Figure 63 illustrates this configuration page.

Figure 63 ***Groups > Basic Page*** *for a Global Group (partial view)*



- When a Global Group configuration is pushed to Subscriber Groups, all settings are static except for settings with the checkbox selected; for fields with checkboxes selected, the value or setting can be changed on the corresponding tab for each managed group. In the case of the **Groups > SSIDs** configuration page, override options are available only on the **Add** configuration page (go to the **Groups > SSIDs** configuration page and select **Add**). Global templates are also configurable as part of Global Groups; see "Creating and Using Templates" on page 149 for more information.
- Once Global Groups have been configured, groups may be created or configured to subscribe to a particular Global Group. Go to the **Groups > Basic** configuration page of a group and locate the **Use Global Groups** section. Select the **Yes** radio button and select the name of the Global Group from the drop-down menu. Then select **Save and Apply** to make the changes permanent. Figure 64 illustrates this page.

Figure 64 ***Groups > Basic > Managed*** *Page Illustration*



- Once the configuration is pushed, the unchecked fields from the Global Group appears on the Subscriber Group as static values and settings. Only fields that had the override checkbox selected in the Global Group

appear as fields that can be set at the level of the Subscriber Group. Any changes to a static field must be made on the Global Group.

- If a Global Group has Subscriber Groups, it cannot be changed to a non-Global Group. A Global Group without Subscriber Groups can be changed to a regular Group by updating the setting on the **Groups > Basic** configuration interface. The Global Groups feature can also be used with the **Master Console**. For more information about this feature, refer to "Supporting AWMS Servers with the Master Console" on page 211.

Chapter 5

Discovering, Adding, and Managing Devices

This chapter describes how to add, configure and monitor devices, both wired and wireless, and contains the following sections, corresponding to features of the **Device Setup** and **APs/Devices** tabs:

- "Device Discovery Overview" on page 107
- "Discovering and Adding Devices" on page 107
- "Monitoring Devices" on page 116
- "Configuring and Managing Devices" on page 132
- "Troubleshooting a Newly Discovered Device with Down Status" on page 143
- "Setting up Dell Spectrum Analysis in AWMS" on page 144

Device Discovery Overview

Once you have deployed AWMS on the network, the next step is to discover all existing devices connected to your network.

AWMS allows device discovery in the following ways, all of which are described in this chapter:

- **SNMP/HTTP discovery scanning**—This is the primary method to discover devices on your network, configured in the **Device Setup > Discovery** page. See "SNMP/HTTP Scanning" on page 107.
- **Cisco Discovery Protocol (CDP)**—AWMS enhances support for CDP by discovering a Cisco device's CDP neighbors. See "Enabling Cisco Discovery Protocol (CDP)" on page 111.
- **Manual device entry**—This admin-supported method of discovery applies when you know of devices that are already on your network. See the following sections for information and procedures:
  - "Manually Adding Individual Devices" on page 112
  - "Adding Multiple Devices from a CSV File" on page 114
  - "Adding Universal Devices" on page 115
- **Controller-driven device discovery**—Thin APs will automatically be discovered in the network and added to the **New Devices** list when you add their controller to AWMS. To add the thin APs, refer to "Authorizing Devices to AWMS from APs/Devices > New Page" on page 111.

Discovering and Adding Devices

This section describes the following topics:

- SNMP/HTTP Scanning
- Enabling Cisco Discovery Protocol (CDP)
- Authorizing Devices to AWMS from APs/Devices > New Page
- Manually Adding Individual Devices

SNMP/HTTP Scanning

SNMP/HTTP discovery scanning is the primary method for discovering devices on your network, including rogue devices. Enable this scanning method from the **Device Setup > Discover** page.

SNMP/HTTP scanning information is provided in these sections:

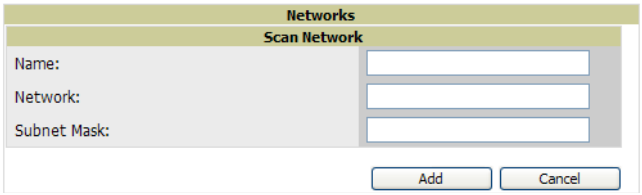
- Adding Networks for SNMP/HTTP Scanning—explains how to enable networks that have been defined for scanning.
- Adding Credentials for SNMP/HTTP Scanning—explains how to define network credentials for scanning. Credentials must be defined before using them in scan sets.
- Defining a SNMP/HTTP Scan Set—explains how to create a scan set by combining networks and credentials when scanning for devices.
- Running a Scan Set—provides a procedure for running a scan set.

Adding Networks for SNMP/HTTP Scanning

The first step when enabling SNMP/HTTP scanning for devices is to define the network segments to be scanned. Perform these steps.

1. Go to the **Device Setup > Discover** page, and locate the **Networks** section.
2. In the **Networks** section, select **Add New Scan Network**. The **Scan Network** page appears, as shown in Figure 65. Alternatively, you can edit an existing scan network by selecting the corresponding pencil icon. The **New/Edit Networks** page also appears in this instance.

Figure 65 ***Device Setup > Discover > New Network*** *Section Illustration*



3. In the **Name** field, provide a name for the network to be scanned (for example, **Accounting Network**).
4. In the **Network** field, define the IP network range, or the first IP address on the network, to be scanned. One example would be 10.52.0.0.
5. Enter the **Subnet Mask** for the network to be scanned (for example, 255.255.252.0). The largest subnet AWMS supports is 255.255.0.0.
6. Select **Add**.
7. Repeat these steps to add as many networks for which to enable device scanning. All network segments configured in this way appear in the **Network** section of the **Device Setup > Discover** page.
8. Complete the configuration of scan credentials, then combine scan networks and scan credentials to create scan sets. The next two procedures in this section describe these tasks.

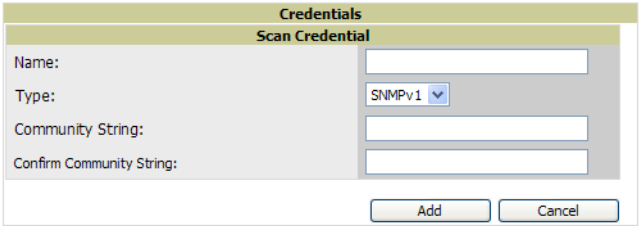
Adding Credentials for SNMP/HTTP Scanning

The next step in SNMP/HTTP device discovery is to define the scan credentials that govern scanning of a given network. New APs inherit scan credentials from the System Credentials that you configure on the **Device Setup > Communications** page.

Perform these steps to define scan credentials for SNMP/HTTP scanning:

1. Locate the **Credentials** section on the **Device Setup > Discover** page. This page displays scan sets, networks, and credentials that have been configured so far, and allows you to define new elements for device scanning.
2. To create a new scan credential, select **Add New Scan Credential**. Figure 66 illustrates this page.

Figure 66 ***Device Setup > Discover > Add/Edit New Scan Credential*** *Section Illustration*



3. Enter a name for the credential in the **Name** field (for example, **Default**). This field supports alphanumeric characters, both upper and lower case, blank spaces, hyphens, and underscore characters.
4. Choose the type of scan to be completed (**SNMPv1, SNMPv2,** or **HTTP**). In most cases, perform scans using SNMP for device discovery, but consider the following factors in your decision:
   - SNMPv1 and SNMP v2 differ between in their supported traps, supported MIBs, and network query elements used in device scanning.
   - HTTP discovers devices using the HyperText Transfer Protocol in communications between servers and additional network components. HTTP is not as robust in processing network events as is SNMP, but HTTP may be sufficient, simpler, or preferable in certain scenarios.
5. Define and confirm the **Community String** to be used during scanning. In this section, the community string used can be either **read-only** or **read/write**, as AWMS only uses it for discovering APs. To bring APs under management, AWMS uses the credentials supplied in the **Device Setup > Communication SNMP** section.

NOTE: AWMS automatically appends the type of scan (SNMP or HTTP) to the Label.

Once the device is authorized, it will use the non-scanning credentials.

6. Select **Add**. The **Device Setup > Discover** page displays the new scan credential or credentials just created or edited.
7. Repeat these steps to add as many credentials as you require.
8. Once scan networks and scan credentials are defined, combine them by creating scan sets using the next procedure: "Defining a SNMP/HTTP Scan Set" on page 109.

Defining a SNMP/HTTP Scan Set

Once you have defined at least one network and one scan credential, you can create a scan set that combines the two for device discovery. Perform these steps to create a scan set.

1. Locate the **Scan Set** area at the top of the **Device Setup > Discover** page.
2. Select **Add New Scan Set** to see all scan components configured so far. If you wish to create a new network, or new scanning credentials, you can select **Add** in either of these fields to create new components prior to creating a scan set.
3. Select the **Network**(s) to be scanned and the **Credential(s)** to be used. AWMS defines a unique scan for each **Network-Credential** combination.
4. Select **Add** to create the selected scans, which then appear in a list at the top of the **Device Setup > Discover** page.
5. To edit an existing scan, select the pencil icon next to the scan on the **Device Setup > Discover** page.
6. When ready, proceed to the next task, "Running a Scan Set" on page 110.

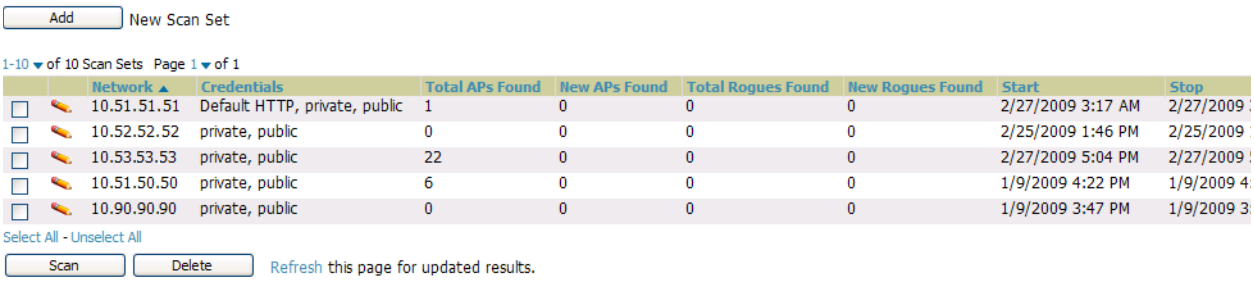
NOTE: Scheduling an HTTP scan to run daily on your network can help you to discover rogues. Some consumer APs, like most D-Link, Linksys, and NetGear models, do not support SNMP and are found only on the wired side with an HTTP scan. These devices are discovered only if they have a valid IP address. Proper credentials are not required to discover these APs. Wireless scans and the AMC discover these rogues without any special changes.

Running a Scan Set

Once a scan has been defined on the **Device Setup > Discover** page, AWMS can now scan for devices. Perform these steps.

1. Browse to the **Device Setup > Discover** page and locate the list of all scan sets that have been defined so far. Figure 67 illustrates this page.

Figure 67 ***Device Setup > Discover*** *Executing a Scan Illustration*



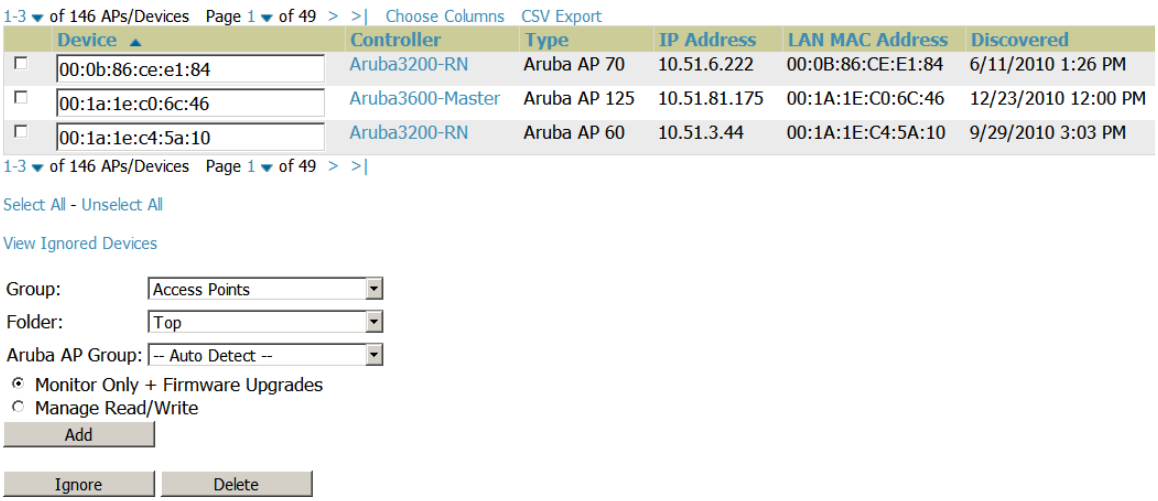
2. Check the box next to the scan(s) that you would like to execute.
3. Select **Scan** to execute the selected scans, and the scan immediately begins. The last column indicates the scan is **In Progress**.
4. For future scans, select **Show Scheduling Options** and enter the desired date and time.
5. After several minutes have passed, refresh the browser page and view the results of the scan. When the **Start** and **Stop** columns display date and time information, the scan is available to display the results.
6. Select the pencil icon for the scan to display the results. Table 71 describes the scan results and related information.

Table 71 ***Device Setup > Discover > Discovery Execution*** *Fields*

Column	Description
Network	Displays the network to be scanned.
Credentials	Displays the credentials used in the scan.
Total Devices Found	Displays the total number of APs detected during the scan that AWMS can configure and monitor. **Total** includes both APs that are currently being managed by AWMS as well as newly discovered APs that are not yet being managed.
New Devices Found	Displays the number of discovered APs that are not yet managed, but are available.
Total Rogues Found	Displays the total number of APs detected during the scan that AWMS could not configure or monitor. **Total** includes both APs that have been discovered in earlier scans as well as newly discovered APs from the most recent scan.
New Rogues Found	Displays the number of rogue APs discovered on the most recent scan.
Start	Displays the date and time the most recent scan was started.
Stop	Displays the date and time the scan most recently completed.
Scheduled	Displays the scheduled date and time for scans that are scheduled to be run.

7. Go to the **APs/Devices > New** page to see a full list of the newly discovered devices that the scan detected. Figure 68 illustrates this page.

Figure 68 ***APs/Devices > New*** *Page Illustration*



What Next?

- To authorize one or more devices to a group, see "Authorizing Devices to AWMS from APs/Devices > New Page" on page 111.
- To delete a device altogether from AWMS, select the corresponding check box for each device, and select **Delete**.
- Dell PowerConnect W thin APs can have a Dell PowerConnect W AP Group specified and Cisco thin APs can have LWAPP AP Group specified when they are authorized.

Enabling Cisco Discovery Protocol (CDP)

CDP uses the polling interval configured for each individual Cisco switch or router on the **Groups > List** page. AWMS requires read-only access to a router or switch for all subnets that contain wired or wireless devices. The polling interval is specified on the **Group > Basic** page.

Authorizing Devices to AWMS from APs/Devices > New Page

Once you have discovered devices on your network, add these devices to a group and specify whether the device is to be placed in **Manage Read/Write** or **Monitor Only** mode. To configure a new group, refer to Chapter 4, "Configuring and Using Device Groups in AWMS" on page 69.

In **Manage Read/Write** mode, AWMS compares the device's current configuration settings with the Group configuration settings and automatically updates the device's configuration to match the Group policy.

In **Monitor Only** mode, AWMS updates the firmware, compares the current configuration with the policy, and displays any discrepancies on the **APs/Devices > Audit** page, but does not change the configuration of the device.

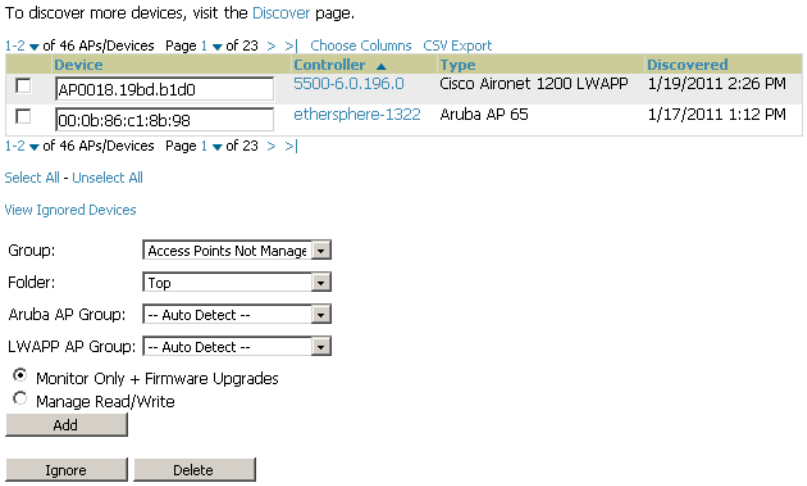
△ **CAUTION: Put devices in Monitor Only mode when they are added to a newly established device group. This avoids overwriting any important existing configuration settings.**

Once you have added several devices to the Group, and verified that no unexpected or undesired configuration changes will be made to the devices, you can begin to put the devices in **Manage Read/Write** mode using the **APs/Devices > Manage** or the **Modify these devices** link on any list page.

Perform the following steps to add a newly discovered device to a group:

1. Browse to the **APs/Devices > New** page. The **APs/Devices > New** page displays all newly discovered devices, the related controller (when known/applicable) and the device vendor, model, LAN MAC Address, IP Address, and the date/time of discovery. Figure 69 illustrates this page.

Figure 69 ***APs/Devices > New*** *Page Illustration*



2. Select the group and folder to which the device will be added from the drop-down menu (the default group appears at the top of the **Group** listing). Devices cannot be added to a Global Group; groups designated as Global Groups cannot contain access points.
3. Select either the **Monitor Only** or the **Manage Read/Write** radio button and select **Add**.

   At this point, you can go to the **APs/Devices > List** page and select the folder(s) to which you have assigned one or more devices to verify that your device has been properly assigned. If you wish to assign a device to the **Ignored** page, or delete it entirely from AWMS, go to step 4.

NOTE: If you select **Manage Select Devices**, AWMS automatically overwrites existing device settings with the specified Group settings. Dell PowerConnect W strongly recommends placing newly discovered devices in Monitor mode until you can confirm that all group configuration settings are appropriate for that device.

4. If you do not wish to manage or monitor a discovered device, you may select the device(s) from the list and select either **Ignore Selected Devices** or **Delete Selected Devices**. If you choose to **Ignore** the devices, they will not be displayed in the **APs/Devices > New** list, even if they are discovered in subsequent scans. You can view a list of all Ignored devices on the **APs/Devices > Ignored** page. If you choose to **Delete** the device, it will be listed on the **APs/Devices > New** list if discovered by AWMS in a subsequent scan. Refer to "Assigning Devices to the Ignored Page" on page 116.

Manually Adding Individual Devices

Some deployment situations may require that you manually add devices to AWMS. You can add devices manually by uploading a CSV file, or from the **Device Setup > Add** page.

This section describes the following procedures:

- Adding Devices with the Device Setup > Add Page
- Adding Multiple Devices from a CSV File
- Adding Universal Devices

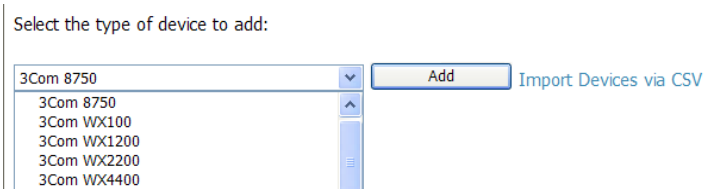
Adding Devices with the Device Setup > Add Page

Manually adding devices from the **Device Setup > Add** page to AWMS is an option for adding all device types. You only need to select device vendor information from a dropdown menu for Cisco and Dell PowerConnect W devices, and AWMS automatically finds and adds specific make and model information into its database.

Perform these steps to manually add devices to AWMS:

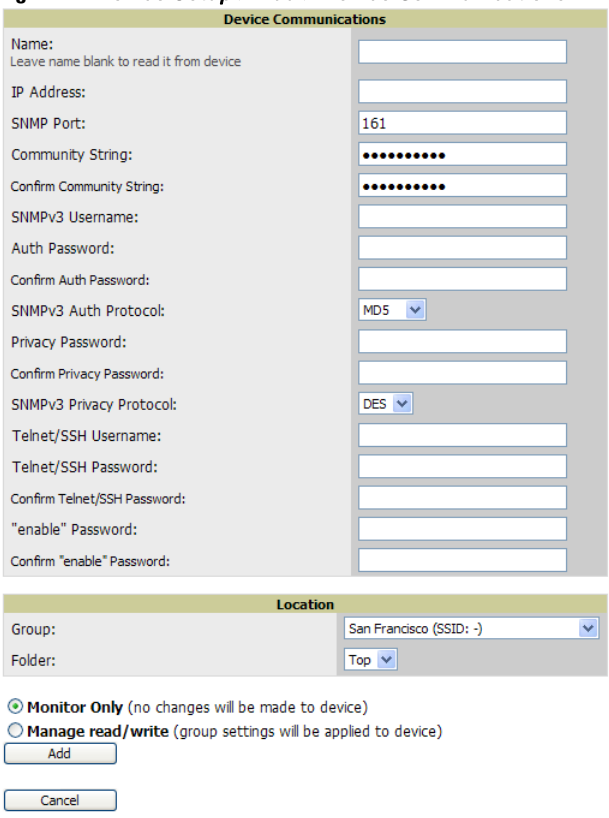
1. The first step to add a device manually is to select the vendor and model. Browse to the **Device Setup > Add** page and select the vendor and model of the device to add. Figure 70 illustrates this page.

Figure 70 ***Device Setup > Add*** *Page Illustration*



2. Select **Add**, and the **Device Communications** and **Location** sections appear, illustrated in Figure 71.

Figure 71 ***Device Setup > Add > Device Communications*** *and* ***Location*** *Sections*



3. Complete these **Device Communications** and **Location** settings for the new device. Table 72 further describes the contents of this page. Settings may differ from device to device. In several cases, the default values from any given device derive from the **Device Setup > Communication** page.

Table 72 ***Device Communication*** *and* ***Location*** *Fields and Default Values*

Setting	Default	Description
Name	None	User-configurable name for the AP (maximum of 20 characters).
IP Address	None	IP address of the device. This field is required.
SNMP Port	161	Port AWMS uses to communicate with the AP using SNMP.
Community String (Confirm)	Taken from **Device Setup > Communication**	Community string used to communicate with the AP. **NOTE:** The **Community String** should have RW (Read-Write) capability. New, out-of-the-box Cisco devices typically have SNMP disabled and a blank username and password combination for HTTP and Telnet. Cisco supports multiple community strings per AP.
SNMPv3 Username	Taken from **Device Setup > Communication**	If you are going to manage configuration for the device, this field provides a read-write user account (SNMP, HTTP, and Telnet) within the Cisco Security System for access to existing APs. AWMS initially uses this username and password combination to control the Cisco AP. AWMS creates a user-specified account with which to manage the AP if the **User Creation Options** are set to **Create** and user Specified as User.
Auth Password (Confirm)		

Table 72 ***Device Communication*** *and* ***Location*** *Fields and Default Values (Continued)*

Setting	Default	Description
Privacy Password (Confirm)	Taken from **Device Setup > Communication**	SNMPv3 privacy password.
SNMPv3 Auth Protocol	Taken from **Device Setup > Communication**	Drop-down menu that allows you to enable the SNMPv3 authentication protocol to the device being added.
SNMPv3 Privacy Protocol	Taken from **Device Setup > Communication**	Drop-down menu that allows you to enable SNMPv3 privacy protocol to the device being added.
Telnet/SSH Username & Password (Confirm)	Taken from **Device Setup > Communication**	Telnet username and password for existing Cisco IOS APs. AWMS uses the Telnet username/password combination to manage the AP and to enable SNMP if desired. **NOTE:** New, out-of-the-box Cisco IOS-based APs typically have SNMP disabled with a default telnet username of **Cisco** and default password of **Cisco**. This value is required for management of any existing Cisco IOS-based APs.
"enable" Password (Confirm)	Taken from **Device Setup > Communication**	Password that allows AWMS to enter **enable** mode on the device.
HTTP Username & Password	Taken from **Device Setup > Communication**	HTTP password used to manage the device initially, and to enable SNMP if desired.
Auth Password	Taken from **Device Setup > Communication**	SNMPv3 authentication password. **NOTE:** SNMPv3 supports three security levels: (1) no authentication and no encryption, (2) authentication and no encryption, and (3) authentication and encryption. AWMS currently only supports authentication and encryption.
Privacy Password	Taken from **Device Setup > Communication**	SNMPv3 privacy password. **NOTE:** SNMPv3 supports three security levels: (1) no authentication and no encryption, (2) authentication and no encryption, and (3) authentication and encryption. AWMS currently only supports authentication and encryption.

4. In the **Location** field, select the appropriate group and folder for the device.
5. At the bottom of the page, select either the **Monitor Only** or **Management read/write** radio button. The choice depends on whether or not you wish to overwrite the **Group** settings for the device being added. For more information and a detailed procedure, see "Authorizing Devices to AWMS from APs/Devices > New Page" on page 111.

NOTE: If you select **Manage read/write**, AWMS overwrites existing device settings with the **Group** settings. Dell PowerConnect W recommends placing newly discovered devices in **Monitor read/only** mode to enable auditing of actual settings instead of Group Policy settings.

6. Select **Add** to finish adding the devices to the network.

Adding Multiple Devices from a CSV File

You can add devices in bulk from a CSV file to AWMS. Here you also have the option of specifying vendor name only, and AWMS will automatically determine the correct type while bringing up the device. If your CSV file includes make and model information, AWMS will add the information provided in the CSV file as it did before. It will not override what you have specified in this file in any way.

The CSV list must contain the following columns:

- IP Address

- SNMP Community String
- Name
- Type
- Auth Password
- SNMPv3 Auth Protocol
- Privacy Password
- SNMPv3 Username
- Telnet Username
- Telnet Password
- Enable Password
- SNMP Port

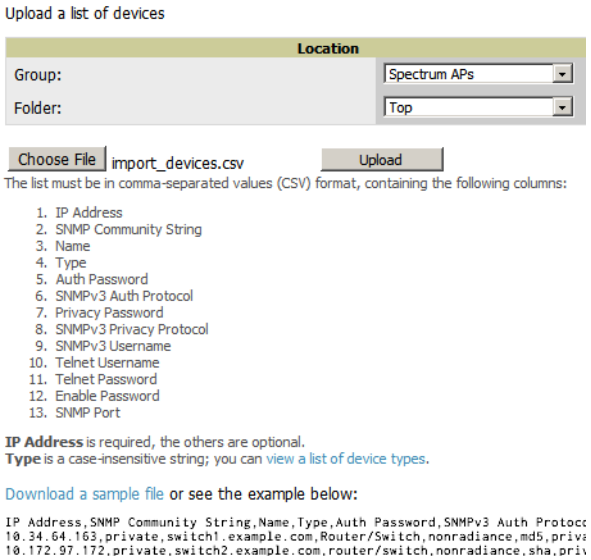
You can download a CSV file and customize it as you like. A sample CSV file is illustrated in Figure 72.

Figure 72 *Sample CSV File*

```
IP Address,SNMP Community String,Name,Type,Auth Password,SNMPv3 Auth Protocol,Privacy Password,SNMPv3 Privacy Protocol,SNMPv3 Username,Tel
10.34.64.163,private,switch1.example.com,Router/Switch,nonradiance,md5,privacy123,aes,sv3user,telnetuser,telnetpwd,enable,161
10.172.97.172,private,switch2.example.com,router/switch,nonradiance,sha,privacy123,des,user
10.70.36.172,public,Cisco-WLC-4012-3,Cisco 4000 WLC,
10.46.111.48,,
```

1. To import a CSV file, go to the **Device Setup > Add** page.
2. Select the **Import Devices via CSV** link. The **Upload a list of devices** page displays; see Figure 73.

Figure 73 ***Device Setup > Add > Import Devices via CSV*** *Page Illustration*



3. Select a group and folder into which to import the list of devices.
4. Select **Choose File** and select the CSV list file on your computer.
5. Select **Upload** to add the list of devices into AWMS.

Adding Universal Devices

AWMS gets basic monitoring information from any device including switches, routers and APs whether or not they are supported devices. Entering SNMP credentials is optional. If no SNMP credentials are entered, AWMS will provide ICMP monitoring of universal devices. This allows you to monitor key elements of the wired network infrastructure, including upstream switches, RADIUS servers and other devices. While AWMS can manage most leading brands and models of wireless infrastructure, universal device support also enables basic monitoring of many of the less commonly used devices.

Perform the same steps to add universal devices to AWMS that were detailed in "Adding Devices with the Device Setup > Add Page" on page 112.

AWMS collects basic information about universal devices including name, contact, uptime and location. Once you have added a universal device, you can view a list of its interfaces on **APs/Devices > Manage**.

By selecting the pencil icon next to an interface, you can assign it to be non-monitored or monitored as Interface 1 or 2. AWMS collects this information and displays it on the **APs/Devices > Monitor page** in the **Interface** section. AWMS supports MIB-II interfaces and polls in/out byte counts for up to two interfaces. AWMS also monitors sysUptime.

Assigning Devices to the Ignored Page

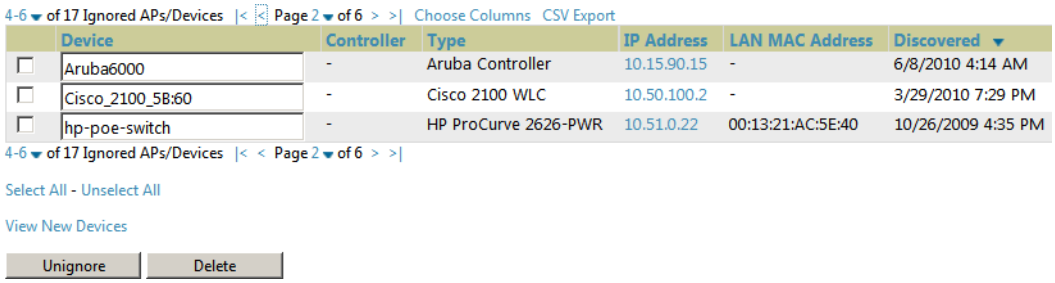
There are two ways a device can be assigned to the **Ignored** page: from the **APs/Devices > New** page, or from the **APs/Devices > Manage** page. The advantage of having the device be designated in this way, as in the case of a device that is temporarily down for a known reason, is that when you take it off the ignored list, it returns immediately to the location in AMP where it had resided before it was marked **Ignored**.

- Ignored devices are *not* displayed in **APs/Devices > New** if discovered in subsequent scans.
- Deleted devices *will* be listed on the **APs/Devices > New** if discovered in subsequent scans.

Perform these steps to further process or return an ignored device to a managed status.

1. To view all devices that are ignored, go to the **APs/Devices > Ignored** page, illustrated in Figure 74.

Figure 74 ***APs/Devices > Ignored*** *Page Illustration*



This page provides the following information for any ignored device:

- device name or MAC address, when known
- controller associated with that device
- device type
- device IP address
- LAN MAC address for the LAN on which the device is located
- date and time of device discovery

2. To change the device parameters for a given device, select its checkbox and adjust group, folder, monitor, and manage settings as desired.
3. Select **Add** to add the device to AWMS so that it appears on the **APs/Devices > New** list.
4. The **Unignore** button will either return the device to its regular folder or group, or send it to the **APs/Devices > New** page.

Monitoring Devices

This section discusses various device monitoring options and includes the following sections:

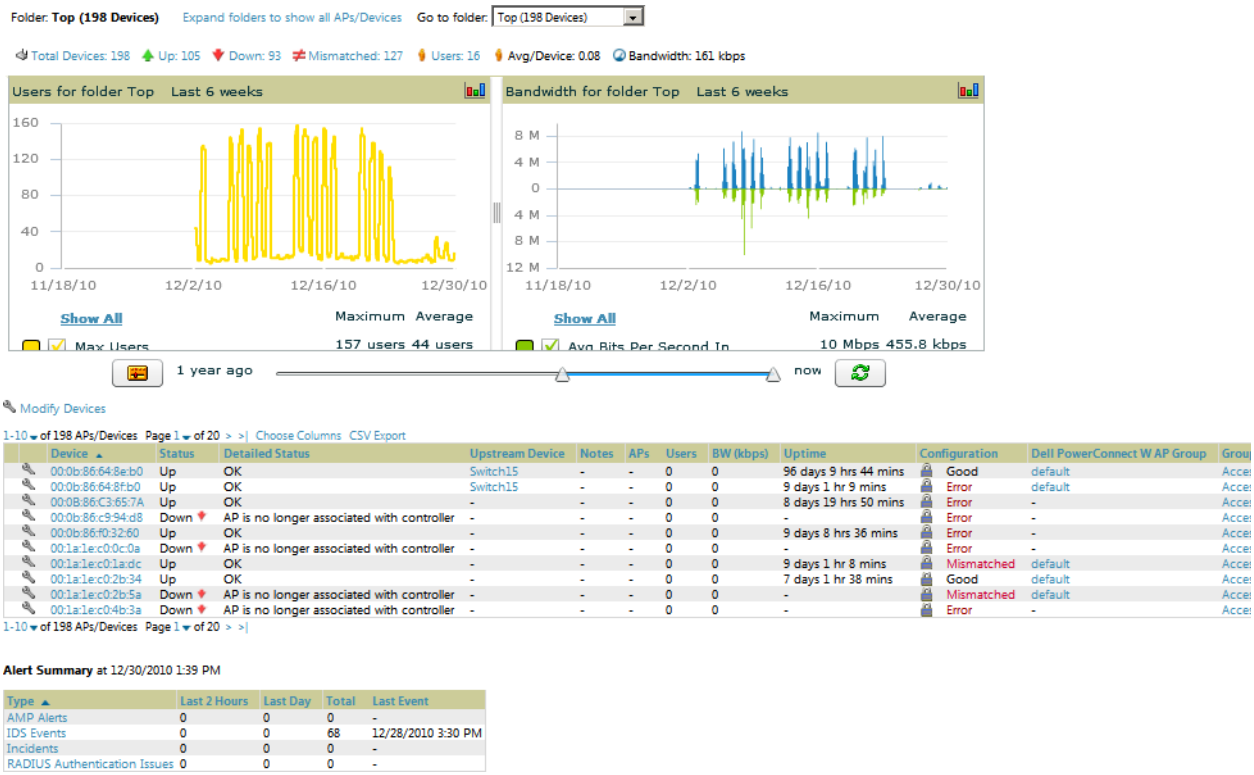
- Viewing Device Monitoring Statistics
- Auditing Device Configuration

Viewing Device Monitoring Statistics

You can view many useful device monitoring statistics in the **APs/Devices > List** page.

1. Go to the **APs/Devices > List** page, which lists all devices that are managed or monitored by AWMS. Using the **Go to folder** field, you can determine whether to view all devices or only the devices from a specified folder. A lock icon in the **Configuration** column indicates that the device is in **Monitor only** mode. Figure 75 illustrates this page.

Figure 75 ***APs/Devices > List*** *(partial view)*



2. Verify that the devices you added are now appearing in the devices list with a Status of **Up**.

NOTE: Newly added devices will be status **Down** until they have been polled the first time. They will be configuration **Unknown** until they have finished verification. The **Up** status is not contingent on verification.

The same section also appears on the **Groups > Monitor** page, and is hyperlinked from a controller's monitoring interface.

3. Go to the **Alert Summary** section of **APs/Devices > List**, which cites the number of events that have occurred in the last two hours, the last 24 hours, and total. There are four categories of alerts as listed below:
   - AMP Alerts
   - IDS Events
   - Incidents
   - RADIUS Authentication Issues

NOTE: The **Alerts Summary** table is also a feature of the **Home > Overview** page, and has the same links in that location.

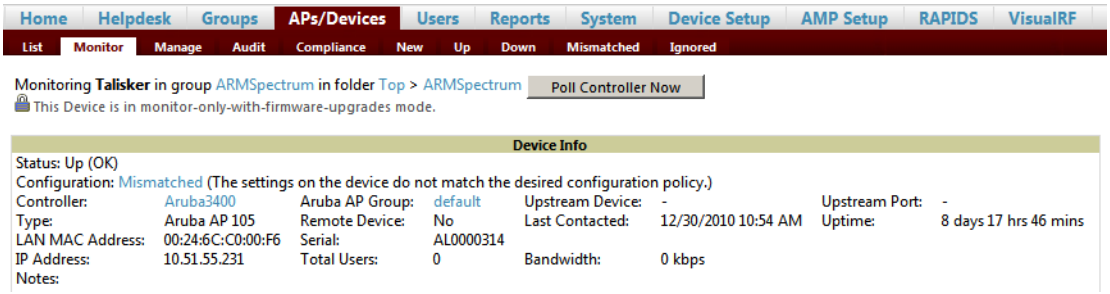
For more information on the **Alert Summary** table, refer to "Viewing Alerts" on page 187.

Understanding the APs/Devices > Monitor Pages for All Device Types

You can quickly go to any device's monitoring page once you go to its specific folder or group on the **APs/Devices > List** page, by selecting its hyperlinked name in the **Device** column.

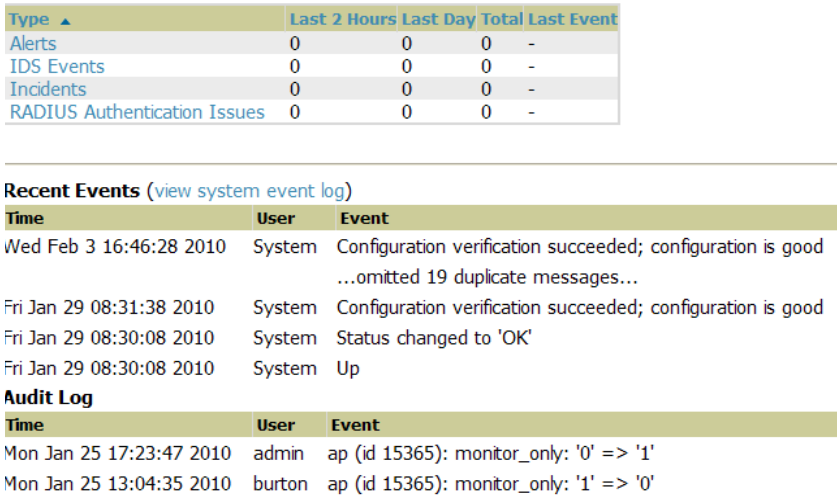
All **Monitor** pages include a section at the top displaying information such as monitoring/configuration status, serial number, total users, firmware version and so on, as shown in Figure 76.

Figure 76 ***Monitoring*** *Page Top Level Data Common to All Device Types*



The alert summary, events and audit log sections are also the same regardless of device type and these sections appear at the bottom of these pages, a portion of which is shown in Figure 77.

Figure 77 ***Monitoring*** *Page Bottom Level Data Common to All Device Types*



Monitoring pages vary slightly according to whether they are wired routers/switches or controllers/WLAN switches, or thin or fat APs. These differences are discussed in the sections that follow.

Monitoring Data Specific to Wireless Devices

The **APs/Devices > Monitor** page for controllers and APs include a graph for users and bandwidth. The controller graph lists the APs connected to it, while the APs include a list of users it has connected.

When available, lists of CDP and RF neighbors are also listed.

A sample monitoring page for wireless devices is shown in Figure 78.

Figure 78 ***APs/Devices > Monitor*** *Page for Wireless Devices (partial view of an AP)*

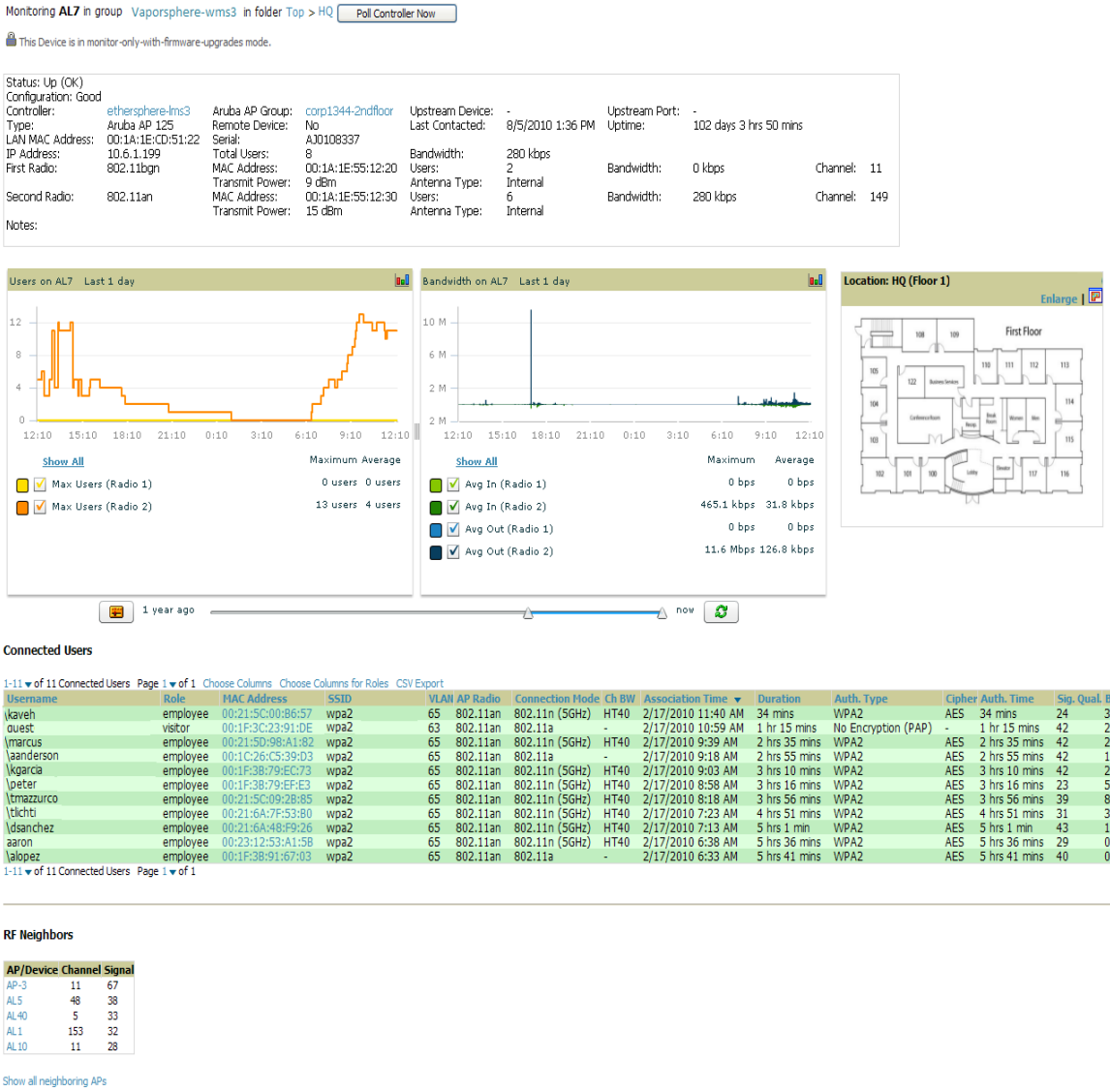


Table 73 describes the fields and information displayed in the **Device Info** section. The displayed fields vary from device to device.

Table 73 ***APs/Devices > Monitor > Device Info*** *Fields and Default Values*

Field	Description
Poll Now	Button immediately polls the individual AP or the controller for a thin AP; this overrides the group's preset polling intervals to force an immediate update of all data except for rogue information. Shows "attempt" status and last polling times.
Status	Displays ability of AWMS to connect to the AP. **Up** (no issue) means everything is working as it should. **Down** (SNMP "get" failed) means AWMS can get to the device but not speak with it using SNMP. Check the SNMP credentials AWMS is using the view secrets link on the **APs/Devices > Manage** page and verify SNMP is enabled on the AP. Many APs ship with SNMP disabled. **Down** (ICMP ping failed after SNMP get failed) means AWMS is unable to connect to the AP using SNMP and is unable to ping the AP. This usually means AWMS is blocked from connecting to the AP or the AP needs to be rebooted or reset.
Configuration	**Good** means all the settings on the AP agree with the settings AWMS wants them to have. **Mismatched** means there is a configuration mismatch between what is on the AP and what AWMS wants to push to the AP. The **Mismatched** link directs you to this specific **APs/Devices > Audit** page where each mismatch is highlighted. **Unknown** means the device configuration has not yet been fetched (possible issue with credentials). **Verifying** means it's fetching configuration to be compared to desired settings.
Firmware	Displays the firmware version running on the AP.

Table 73 ***APs/Devices > Monitor > Device Info*** *Fields and Default Values (Continued)*

Field	Description
Licenses	Appears for Dell controllers. Selecting this link opens a pop-up window that lists the licenses installed for this device, and whether they have expired.
Controller	Appears for APs. Displays the controller for the associated AP device. Select the controller name hyperlink to display the **APs/Devices > Monitor** page, which contains detailed controller information. Controller information includes **Status**, operational metrics, **Controller Client Count by SSID**, **Thin APs**, **Controller Bandwidth by SSID**, **CPU Utilization**, **Memory Utilization**, **APs Managed by this Controller**, **Alerts**, and **Recent Events**. Figure 78 illustrates the **Controller** page.
Portal *	Specifies the mesh AP acting as the wired connection to the network.
Mesh Mode *	Specifies whether the AP is a portal device or a mesh AP. The portal device is connected to the network over a wired connection. A mesh AP is a device downstream of the portal that uses wireless connections to reach the portal device.
Hop Count *	Displays the number of mesh links between this AP and the portal.
Type	Displays the make and model of the device.
Last Contacted	Displays the most recent time AWMS has polled the AP for information. The polling interval can be set on the **Groups > Basic** page.
Uptime	Displays the amount of time since the AP has been rebooted. This is the amount of time the AP reports and is not based on any connectivity with AWMS.
LAN MAC Address	Displays the MAC address of the Ethernet interface on the device.
Serial	Displays the serial number of the device.
Radio Serial	Displays the serial number of the radios in the device. This field is not available for all APs.
Location	Displays the SNMP location of the device.
Contact	Displays the SNMP contact of the device.
IP Address	Displays the IP address that AWMS uses to communicate to the device. This number is also a link to the AP web interface. When the link is moused over a pop-up menu will appear allowing you to http, https, telnet or SSH to the device.
SSIDs	Appears for some APs. Displays the SSID(s) of the radio(s).
Total Users	Displays the total number of users associated to the AP regardless of which radio they are associated to, at the time of the last polling.

*This field is only available for mesh APs.

Table 74 describes the information in the **Interfaces** table for APs.

Table 74 ***APs/Devices > Monitor > Interface*** *Page Illustration*

Field	Description
First Radio	Displays the Radio type of the first radio (802.11a, 802.11b or 802.11g).
Second Radio	Displays the Radio type of the second radio (802.11a, 802.11b or 802.11g.
Transmit Power	Some devices report transmit power reduction rather than transmit power; no value is reported for those devices.
Antenna Type	Indicates internal or external radio. For devices where antenna type is defined per AP, including Dell PowerConnect W devices, the same antenna type will be listed for each radio.
Channel	Displays the channel of the corresponding radio.
Users	Displays the number of users associated to the corresponding radio at the time of the last polling.
Bridge Links	Displays the number of bridge links for devices that are point-to-multi-point (see the **Groups > PTMP** page for more details).
Mesh Links *	Displays the total number of mesh links to the device including uplinks and downlinks.
Bandwidth	Displays the amount of bandwidth being pushed through the corresponding radio interface or device at the time of the last polling.
MAC Address *	Displays the MAC address of the corresponding radio in the AP.
Last RAD Scan	Displays the last time the device performed a wireless rogue scan and the number of devices discovered during the scan.
Notes	A free-form text field for entering fixed asset numbers or other device information. This information is printed on the nightly inventory report. Notes can be entered on the **APs/Devices > Manage** page.

*This field is only available for mesh APs.

Table 75 describes graph information displayed in the **Graphical Data** section.

Table 75 ***APs/Devices > Monitor > Graphical Data*** *Fields and Default Values*

Graph	Description
User	Shows the max and average user count reported by the device radios for a configurable period of time. User count for controllers are the sum of the user count on the associated APs. Checkboxes below the graph can be used to limit the data displayed.
Bandwidth	Shows the bandwidth in and out reported by the device for a configurable period of time. Bandwidth for controllers is the sum of the associated APs. Checkboxes below the graph can be used to limit the data displayed.
CPU Utilization (controllers only)	Reports overall CPU utilization (not on a per-CPU basis) of the controller.
Memory Utilization (controllers only)	Reports average used and free memory and average max memory for the controller.
Channel Utilization (Dell PowerConnect W and Cisco WLC thin APs on supported firmware versions only)	Displays max and average percentages per-radio for busy, interfering receiving and transmitting signals. Special configuration on the controller is required to enable this data; consult the *Best Practices Guide* in **Home > Documentation** for details.

Table 76 describes the fields and information displayed for the **Connected Users** display.

Table 76 ***APs/Devices > Monitor > Connected Users*** *Fields and Default Values*

Field	Description
User	Provides the name of the User associated to the AP. AWMS gathers this data in a variety of ways. It can be taken from RADIUS accounting data or traps.
MAC Address	Displays the Radio MAC address of the user associated to the AP. Also provides a link that redirects to the **Users > Detail** page.
Radio	Displays the radio to which the user is associated.
Association Time	Displays the first time AWMS recorded the MAC address as being associated.
Duration	Displays the length of time the MAC address has been associated.
Auth. Type	Displays the type of authentication employed by the user. Supported auth types are as follows: • **EAP**—Extensible Authentication Protocol, only reported by Cisco VxWorks using SNMP traps. • **RADIUS accounting**—RADIUS accounting servers integrated with AWMS provide the RADIUS Accounting Auth type. • **Authenticated**—a general category supporting additional authentication types. AWMS considers all other types as not authenticated. The information AWMS displays in **Auth Type** and **Cipher** columns depends on what information the server receives from the devices it is monitoring. The client devices may all be similar, but if the APs to which they are associated are of different models, or if security is set up differently between them, then different **Auth Type** or **Cipher** values may be reported to AWMS. If all APs are the same model and all are set up the same way, then another reason for differing **Auth Types** might be the use of multiple VLANs or SSIDs. One client device might authenticate on one SSID using one **Auth Type** and another client device might authenticate on a second SSID using a different **Auth Type**.
Cipher	Displays the encryption or decryption cipher supporting the user, when this information is available. The client devices may all be similar, but if the APs to which they are associated are of different models, or if security is set up differently between them, then different **Auth Type** or **Cipher** values may be reported to the AWMS server.
Auth. Time	Shows when the user authenticated.
Signal Quality	Displays the average signal quality the user experienced.
BW	Displays the average bandwidth consumed by the MAC address.
Location	Displays the QuickView box allows users to view features including heatmap for a device and location history for a user.
LAN IP	Displays the IP assigned to the user MAC. This information is not always available. AWMS can gather it from the ARP cache of switches discovered by AWMS.
VPN IP	Displays the VPN IP of the user MAC. This information can be obtained from VPN servers that send RADIUS accounting packets to AWMS.

The **Recent Events** area lists the most recent events specific to the AP. This information also appears on the **System > Events Log** page. Table 77 describes the fields in this page that display.

Table 77 ***APs/Devices > Monitor > Recent Events*** *Fields and Default Values*

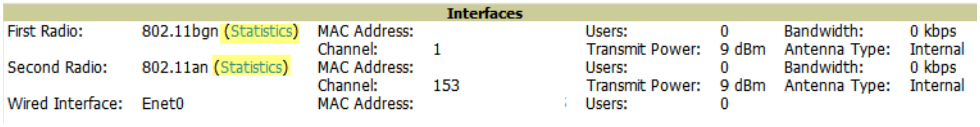
Field	Description
Time	Displays the day and time the event was recorded.
User	Displays the user that triggered the event. Configuration changes are logged as the AWMS user that submitted them. Automated AWMS events are logged as the System user.
Event	Displays a short text description of the event.

Evaluating Radio Statistics for an AP

The **APs/Devices > Monitor > Radio Statistics** page contains useful data for pinpointing network issues at the AP radio level for Dell APs and Cisco WLC thin APs (firmware 4.2 or greater).

To see radio statistics details, navigate to the **APs/Devices > Monitoring** page for a supported AP and select the **Statistics** link in the **Interfaces** section, as illustrated in Figure 79.

Figure 79 *Statistics link on **APs/Devices > Monitoring** for an AP*



Overview of the Radio Statistics Page

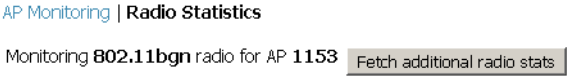
The Radio Statistics page displays transmit and receive statistics about the communication quality of individual radios. Depending on the AP, assigned group profiles, and recent activity on this radio, this data gives visibility into recent and historical changes in the network, fetches real-time statistics from the AP's controller, indicates actively interfering devices (requires Dell APs set to Spectrum mode), and summarizes major issues.

Viewing Real-Time ARM Statistics

Dell AP Groups that have the **Adaptive Radio Management** (**ARM**) feature enabled continuously optimize each AP to use the best channel and transmission power settings available. An AP configured with ARM will automatically adjust to a better channel if it reaches a configured threshold for noise, MAC errors, or PHY errors; additionally, it can attenuate transmit power and switch between radio modes as needed. See the ARM chapter in the *ArubaOS User Guide* from support.dell.com/manuals for more information.

Complete ARM statistics from Dell controllers can be retrieved from the Radio Statistics page by selecting the new **Fetch additional radio stats** button, as illustrated in Figure 80.

Figure 80 ***Fetch additional radio stats** button*



When this button is selected, a new browser window launches with the statistics in plain text. Other ARM-tracked metrics are visible in the **Radio Statistics** page for Dell APs.

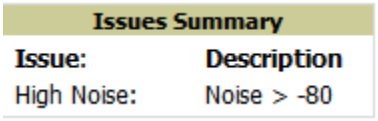
Issues Summary section

The **Issues Summary** section only displays when noise, user count, non-802.11 interfering devices, channel utilization, bandwidth, and MAC and PHY errors reach a certain threshold of concern, as described in and illustrated in Figure 81:

Table 78 *Issues Summary labels and thresholds*

Issue	Triggering Threshold
High Noise	> -80
High Number of Users	> 15
High Channel Utilization	> 75%
High Bandwidth	> 75% of max
Interfering Devices Detected	Detected within the last 5 minutes
High MAC/Phy Errors	> 1000 frames/sec

Figure 81 *Issues Summary Section Illustration*



Issues Summary	
Issue:	**Description**
High Noise:	Noise > -80

These issues highlighted in this section can be examined in detail using the corresponding interactive graphs on the same page. See the Radio Statistics Interactive graphs section of this chapter for details.

802.11 Radio Counters Summary

This table appears for radios with 802.11 counters and summarizes the number of times an expected acknowledgement frame was not received, the number of duplicate frames, the number of frames containing Frame Check Sequence (FCS) errors, and the number of frame/packet transmission retries and failures. These aggregate error counts are broken down by Current, Last Hour, Last Day, and Last Week time frames, as illustrated in Figure 82.

Figure 82 *802.11 Radio Counters Summary table*

802.11 Radio Counters Summary (frames/sec)

	Current	Last Hour	Last Day	Last Week
Unacked	0	0	0	1
Retries	0	0	0	0
Failures	0	0	0	1
Dup Frames	0	0	0	0
FCS Errors	380	380	386	464

The frame- per-second rate of these and other 802.11 errors over time are tracked and compared in the **802.11 Counters** graph on the same page.

Radio Statistics Interactive graphs

Time-series graphs for the radio are displayed across a tabbed, dual-pane interface to show changes recorded at every polling interval over time. Users and Bandwidth data are polled based on the AP's group's User Data Polling Period. Channel, Noise, and Power are based on AP Interface Polling Period. 802.11 Counters data are based on the AP's group's 802.11 Counters Polling Period.

You can adjust the attributes of these graphs as follows:

- Drag the horizontal slider under the graphs to move the scope of all graphs between one year ago and the current time.
- Drag the vertical slider between graphs to change the relative width of each.
- The **Show All** link displays all of the available data series.
- The bar-graph icon on the upper right-hand corner of each graph opens a new window and displays all data series for the selected graph over the last two hours, last day, last week, last month, and last year in one page. The graphs that display depend on the AP and/or its controller.

The two graph panes enable simultaneous display of two different information sets, as detailed in :s

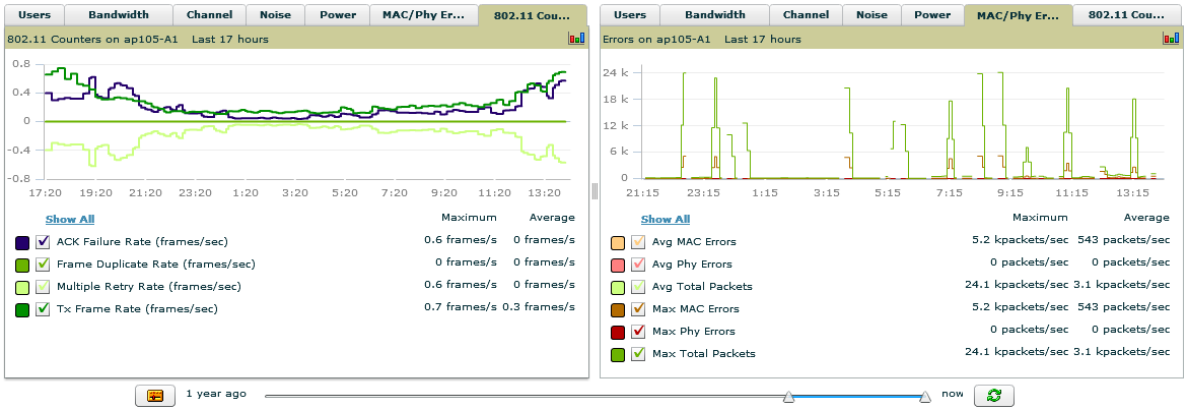
Table 79 *Radio Statistics Interactive Graphs Descriptions*

Graph Title	Description
Users	A line graph that displays the maximum users associated to the corresponding radio at polling intervals over the time range set in the slider. Select **Show All** for other metrics such as average users and max users for various individual devices.
Bandwidth	An area graph displaying the average bandwidth in each direction for the radio. Select **Show All** for other metrics such as max bandwidth in and out, average and max mesh/overhead or overhead bandwidth, and average/max Enet0.

Table 79 *Radio Statistics Interactive Graphs Descriptions (Continued)*

Graph Title	Description
Channel	An area graph that displays the channel changes (if any) of the radio over time. Frequent, regular channel changes on an Dell or Cisco WLC AP radio usually indicate that the Adaptive Radio Management feature (ARM) in AOS is compensating for high noise levels from interfering devices.
Noise	An area graph that displays signal interference (noise floor) levels in units of dBm. Noise from interfering devices above your AP's noise threshold can result in dropped packets. For ARM-enabled Dell APs, crossing the noise threshold triggers an automatic channel change.
Power	A line graph that displays the average and maximum radio transmit power, between 0 and 30 dBm, over the time range set in the slider. You can adjust the transmit power manually in the **APs/Devices > Manage** page for this radio's AP, or enable ARM on Dell APs to dynamically adjust the power toward your acceptable Coverage Index as needed. See the "Adaptive Radio Management" chapter of the *ArubaOS User Guide* in **support.dell.com/manuals** for more information.
MAC/Phy Errors	A line graph displaying the frame reception rate, physical layer error rate (resulting from poor signal reception or broken antennas), and the data link (MAC) layer (corrupt frames, driver decoding issues) for the radio.
802.11 Counters	A line graph that displays statistics such as frame rate, fragment rate, retry rate, duplicate frame rate, and other metrics tracked by 802.11 counters. Select the checkbox next to any metric to remove its data from the graph. Select **Collapse** to remove unchecked metrics from the legend, and **Show All** to restore them.

Figure 83 *Radio Statistics Interactive Graphs Illustration – Bandwidth and 802.11 Counters displayed*



Recent ARM Events Log

If this radio references an active and enabled ARM profile, and if your AMP is enabled as a trap host (see *Best Practices Guide* in **Home > Documentation** for instructions), ARM-initiated events such as automatic channel changes, power changes, and mode changes are displayed in the ARM Events table with the original and modified values; these values can be selected for filtering the results. You can export the table in CSV format. The columns and values are described in Table 80Figure 84, and illustrated in Figure 84.

Figure 84 *ARM Events Table Illustration*

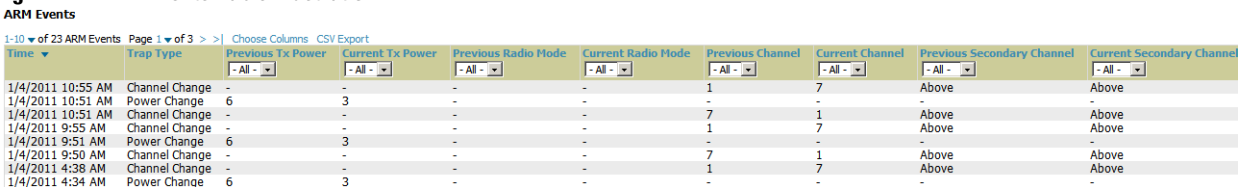


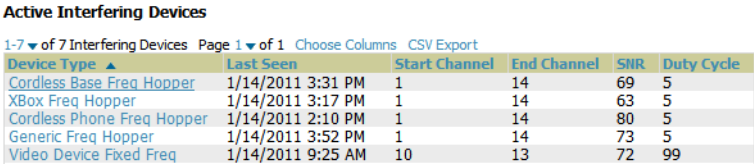
Table 80 *ARM Events table Columns and Values*

Column	Description
Time	The time of the ARM event.
Trap Type	The type of trap that delivered the change information. Current ARM trap types that display in AWMS are: • Power Change • Mode Change • Channel Change Values that display in the following columns depend on the Trap Type.
Previous Tx Power	Old value for transmit power before the Power Change event took place.
Current Tx Power	New transmit power value after the change.
Previous Radio Mode	Old value for radio mode before the Mode Change event took place.
Current Radio Mode	New radio mode value after the change.
Previous Channel	Old primary channel value before the Channel Change event took place.
Current Channel	New primary channel value after the change.
Previous Secondary Channel	Old secondary channel value (for 40Mhz channels on 802.11n devices) before the Channel Change event took place.
Current Secondary Channel	New secondary channel value after the change.
Change Reason	If the noise and interference cause for the change can be determined, they will be displayed here. Mode change reasons are not yet tracked.

Active Interfering Devices Table

For Dell APs running in Spectrum mode, the same non-802.11 interfering devices identified in the **Issues Summary** section are classified in the Active Interfering Devices table along with the timestamp of its last detection, the start and end channels of the interference, the signal to noise ratio, and the percentage of time the interference takes place, as illustrated in Figure 85. This table can be exported to CSV format, and the displayed columns can be moved or hidden as needed.

Figure 85 ***Active Interfering Devices*** *Table Illustration*



Possible device types for the Active Interfering Devices table are:

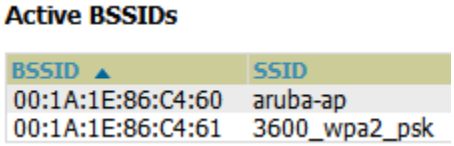
- Wi-Fi
- Microwave
- Bluetooth
- Generic Fixed Freq

- Cordless Phone Fixed Freq
- Video Device Fixed Freq
- Audio Device Fixed Freq
- Generic Freq Hopper
- Cordless Phone Freq Hopper
- XBox Freq Hopper
- Microwave Inverter
- Cordless Base Freq Hopper
- Unknown

Active BSSIDs

The Active BSSIDs table maps the BSSIDs on a radio with the SSID it broadcasts to the network, as illustrated in Figure 86. This table appears only for Dell AP radios.

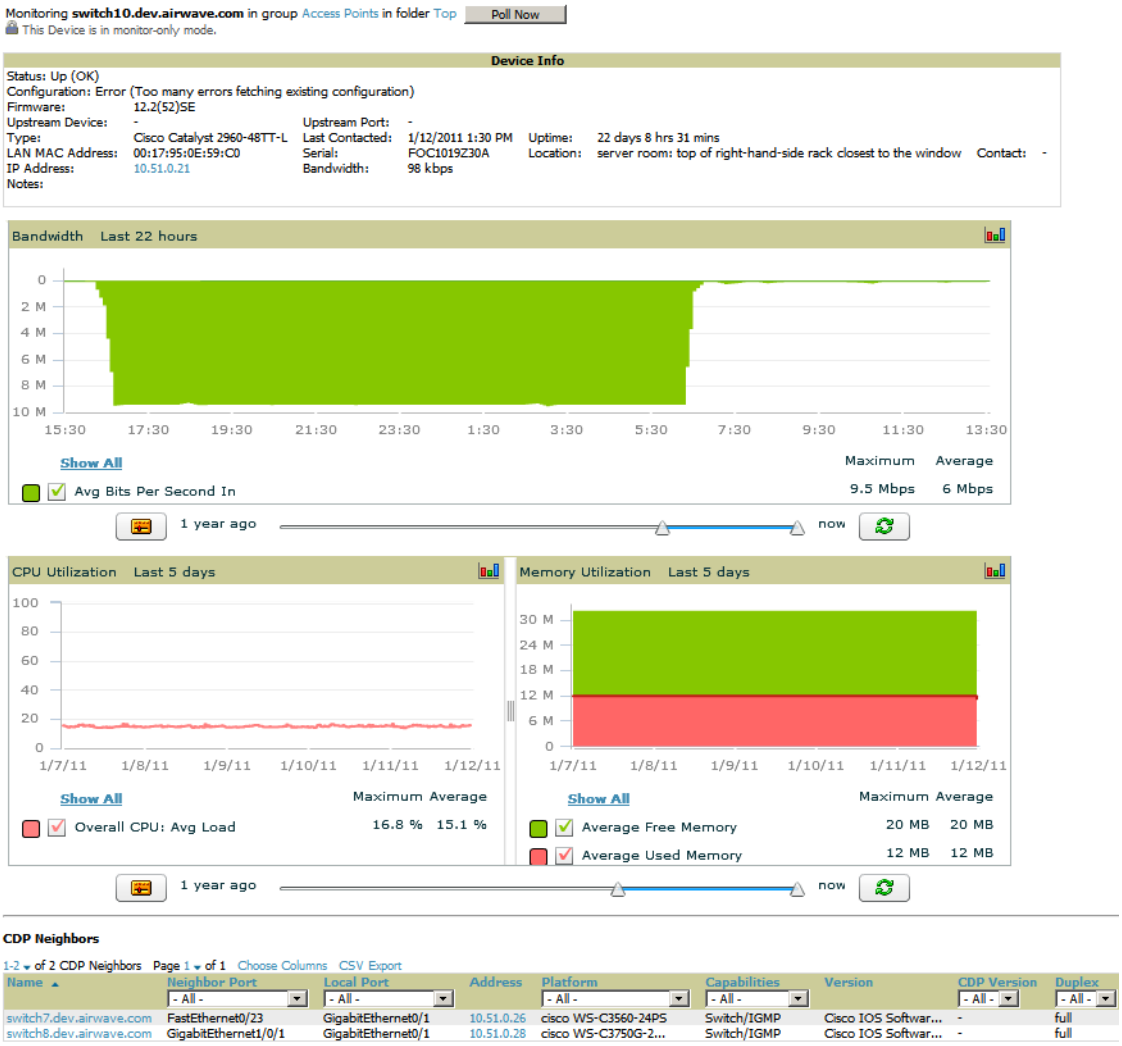
Figure 86 ***Active BSSIDs*** *Table Illustration*



Monitoring Data for Wired Devices (Routers and Switches)

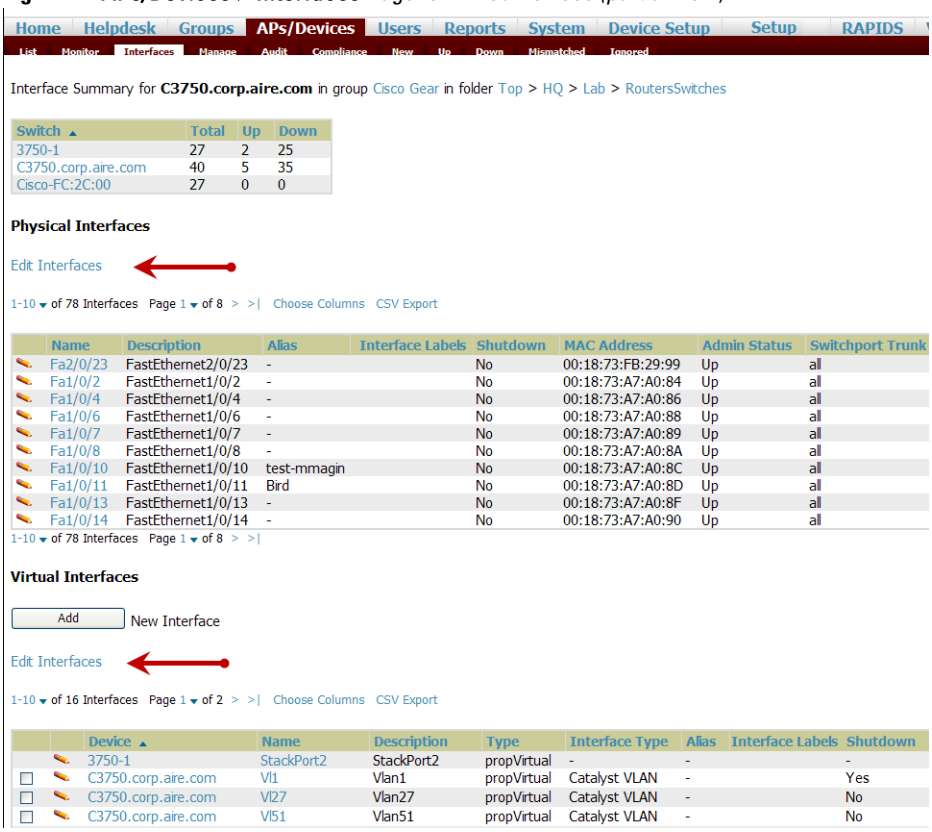
The monitoring page for routers and switches includes basic device information at the top, a bandwidth graph depicting the sum of all the physical interfaces, and beneath that, CPU/Memory usage graphs as shown in Figure 87.

Figure 87 ***APs/Devices > Monitor*** *Page for Wired Devices*



All managed wired devices also include an **Interfaces** subtab, as shown in Figure 88.

Figure 88 ***APs/Devices > Interfaces*** *Page for Wired Devices (partial view).*



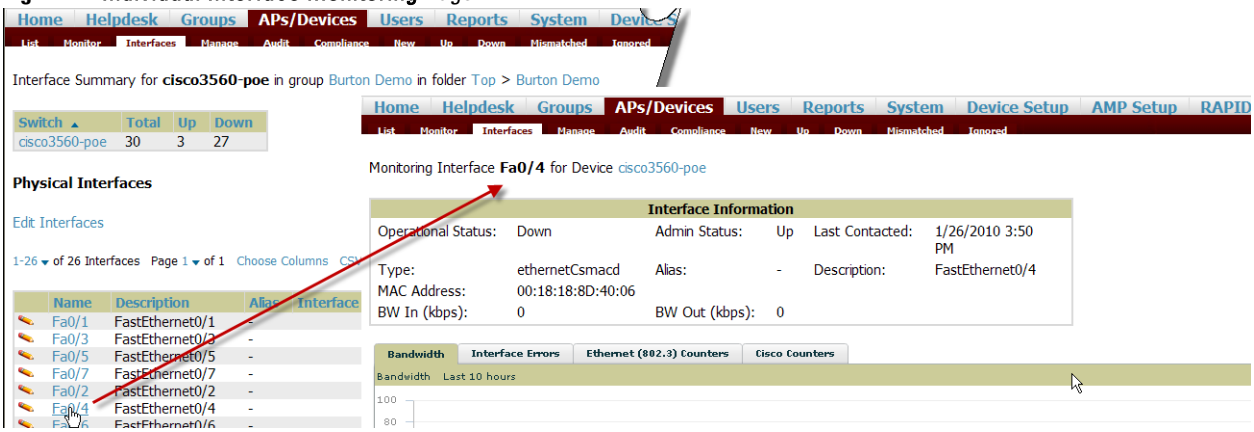
The **Interfaces** page includes a summary of all the interfaces at the top. In case of the stacked switches, the master includes the interfaces of all the members including its own. The physical and the virtual interfaces are displayed in separate tables, labeled **Physical** and **Virtual**.

AWMS monitors **Up/Down** status and bandwidth information on all interfaces. You can edit multiple interfaces concurrently by selecting one of the two **Edit Interfaces** hyperlinks as shown using red arrows in Figure 88 above. Interface labels are used to group one or more interfaces for the purpose of defining interface bandwidth triggers. For more information on interface bandwidth triggers, see ""Monitoring and Supporting AWMS with the System Pages" on page 205" on page 181.

Understanding the APs/Devices > Interfaces Page

"Monitoring Data for Wired Devices (Routers and Switches)" on page 127 showed you how to view high level interface information for all physical and virtual interfaces on an entire router or switch. Select any interface hotlink in the **Name** column of the Physical or Virtual Interfaces tables on the stacked switches to go to an **Interfaces** page displaying data relevant to that specific interface, as shown Figure 89.

Figure 89 *Individual Interface Monitoring Page.*



An individual **Interface** monitoring page includes is comprised of 2 sections. Specifics of the interface are in the upper section, as depicted in Figure 90.

Figure 90 *Individual **Interface Information** Section.*

Interface Information					
Operational Status:	Down	Admin Status:	Up	Last Contacted:	1/26/2010 3:50 PM
Type:	ethernetCsmacd	Alias:	-	Description:	FastEthernet0/4
MAC Address:	00:18:18:8D:40:06				
BW In (kbps):	0	BW Out (kbps):	0		

Bandwidth, and various standard and enterprise specific error counting information is displayed in the lower section in a tabbed graph.

What Next?

All device lists in AWMS act as portals to management pages if you have the proper read/write privileges. Selecting the wrench or pencil icon next to a device table entry, or selecting **Modify Devices** where appropriate above a device table, will take you to the appropriate Management page (**APs/Devices > Manage**). See "Configuring and Managing Devices" on page 132 for more information.

Auditing Device Configuration

When you have added a newly discovered device successfully to a Group in **Monitor** mode, the next step is to verify device configuration status. Determine whether any changes will be applied to that device when you convert it to **Managed read/write** mode.

AWMS uses SNMP or Telnet to read a device's configuration. SNMP is used for Cisco controllers. Dell PowerConnect W devices and wired routers and switches use Telnet/SSH to read device configuration. See "Individual Device Support and Firmware Upgrades" on page 141 for more details.

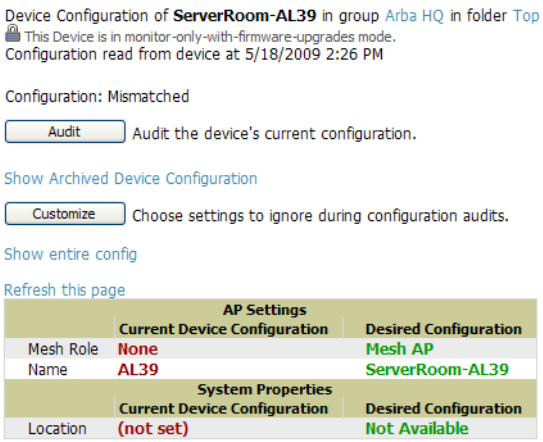
Perform these steps to verify the device configuration status:

1. Browse to the **APs/Devices > List** page.
2. Locate the device in the list and check the information in the **Configuration** column.
3. If the device is in **Monitor** mode, the **lock** symbol appears in the **Configuration** column, indicating that the device is locked and will not be configured by AWMS.
4. Verify the additional information in the **Configuration** column for that device.
   - A status of **Good** indicates that all of the device's current settings match the group policy settings, and that no changes will be applied when the device is shifted to **Manage** mode.
   - A status of **Mismatched** indicates that at least one of the device's current configuration settings do not match the group policy, and will be changed when the device is shifted to **Manage** mode.

5. If the device configuration is **Mismatched**, select the **Mismatched** link to go to the **APs/Devices > Audit** page. The **APs/Devices > Audit** page lists detailed information on all existing configuration parameters and settings for an individual device.

   The group configuration settings are displayed on the right side of the page. If the device is moved from **Monitor** to **Manage** mode, the settings on the right side of the page overwrite the settings on the left. Figure 91 illustrates this page.

Figure 91 *APs/Devices > Audit Page Illustration*



6. Review the list of changes to be applied to the device to determine whether the changes are appropriate. If not, you need to change the Group settings or reassign the device to another Group.

Using Device Folders (Optional)

The devices on the **APs/Devices List** pages include **List, Up, Down,** and **Mismatched** fields. These devices are arranged in groups called folders. Folders provide a logical organization of devices unrelated to the configuration groups of the devices. Using folders, you can quickly view basic statistics about devices. You *must* use folders if you want to limit the APs and devices AWMS users can see.

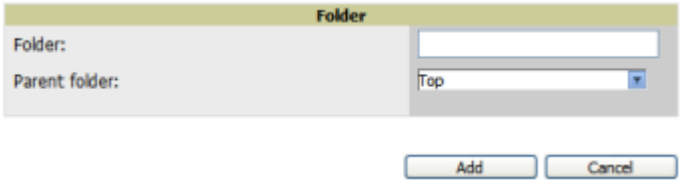
Folder views are persistent in AWMS. If you select the **Top** folder and then select the **Down** link at the top of the page, you are taken to all of the down devices in the folder.

If you want to see every down device, select the **Expand folders to show all devices** link. When the folders are expanded, you see all of the devices on AWMS that satisfy the criteria of the page. You also see an additional column that lists the folder containing the AP.

Perform the following steps to add a device folder to AWMS.

1. To add a folder, select the **Add New Folder** link in **APs/Devices > List**. Figure 92 illustrates the page.

Figure 92 *Folder Creation Page Illustration*



2. Enter the name of the new folder.
3. Select the **Parent** folder.
4. Select **Add**.

Once a new folder has been created, devices can be moved into it using the **Modify Devices** link or when **New Devices** are added into AWMS.

Configuring and Managing Devices

This section contains the following topics describing individual device configuration within device groups:

- "Moving a Device from Monitor Only to Manage Read/Write Mode" on page 132
- "Configuring AP Settings" on page 133
- "Configuring Device Interfaces for Cisco Catalyst Switches" on page 138
- "Individual Device Support and Firmware Upgrades" on page 141

While most device configuration settings can be efficiently managed by AWMS at a Group level, certain settings must be managed at the individual device level. For example, because devices within a Group are often contiguous with one another, and have overlapping coverage areas, it makes sense to manage these devices individually to avoid RF interference.

NOTE: Any changes made at an individual device level will automatically override Group level settings.

AWMS automatically saves the last 10 device configurations for reference and compliance purposes. Archived device configurations are linked on the **APs/Devices > Audit** page and identified by name. By default, configuration is tracked by the date and time it was created; device configurations are also archived by date.

It is not possible to push archived configurations to devices, but archived configurations can be compared to the current configuration, the desired configuration, or to other archived configurations using the drop-down menus on the **APs/Devices > Audit** page. This applies to startup or to running configuration files.

Compare two configurations to highlight the specific lines that are mismatched. The Audit page provides links to the AWMS pages where any mismatched settings can be configured.

NOTE: These procedures assume you are familiar with the function buttons available to save, apply, revert, and so on. For details on button functions, see "Buttons and Icons" on page 25.

Moving a Device from Monitor Only to Manage Read/Write Mode

Once the device configuration status is **Good** on the **APs/Devices > List** page, or once you have verified all changes that will be applied to the device on the **APs/Devices > Audit** page, you can safely shift the device from **Monitor Only** mode to **Manage Read/Write** mode.

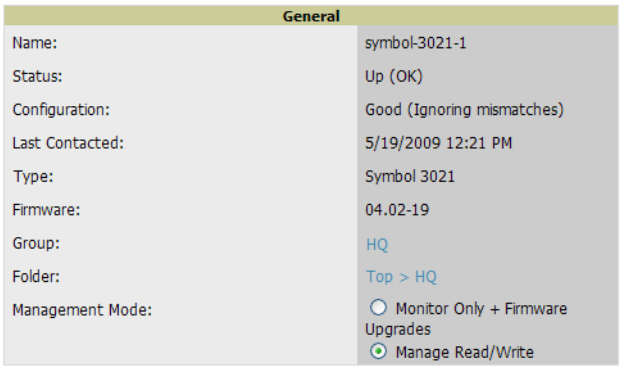
NOTE: Once a device is in Manage mode, AWMS will push a new configuration to the device in the event that the actual device configuration does not match the AMP configuration for that device.

To move a device from **Monitor Only** to **Manage Read/Write** mode, perform the following steps.

1. Go to the **APs/Devices > List** page and select the wrench icon next to the name of the AP to be shifted from **Monitor Only** mode to **Manage Read/Write** mode. This directs you to the **APs/Devices > Manage** page.

2. Locate the **General** area as shown in Figure 93.

Figure 93 ***APs/Devices > Manage > General*** *Section Illustration*

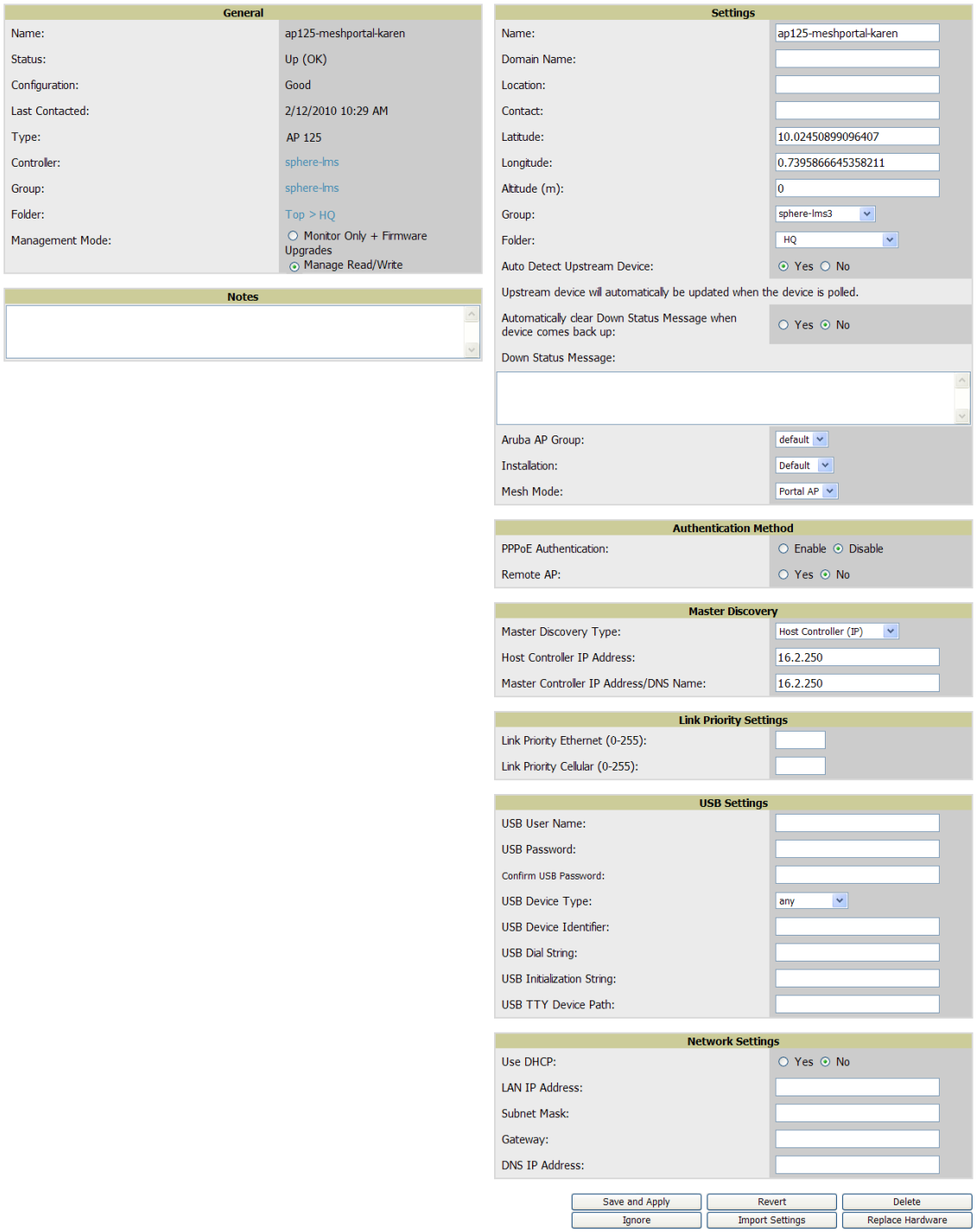


3. Select **Manage Read/Write** on the **Management Mode** field.
4. Select **Save and Apply**, then **Confirm Edit** on the confirmation page to retain these settings and to push configuration to the device.
5. For device configuration changes that require the device to reboot, use the **Schedule** function to push the changes at a time when WLAN users will not be affected.
6. To move multiple devices into managed mode at once, use the **Modify these devices** link. Refer to "Modifying Multiple Devices" on page 102 for more information.

Configuring AP Settings

1. Browse to the **APs/Devices > List** page and select the wrench icon next to the device whose AP settings you want to edit. This directs you to the **Manage** page for that device. Figure 94 illustrates this page.

Figure 94 ***APs/Devices > Manage*** *Page Illustration*



If any changes are scheduled for this AP, they appear in a **Scheduled Changes** section at the top of the page above the other fields. The linked name of the job takes you to its **System > Configuration Change Job Detail** page.

2. Locate the **General** section for information about the APs current status. Table 81 describes the fields, information, and settings.

Table 81 ***APs/Devices > Manage > General*** *Fields and Descriptions*

Field	Description
Name	Displays the name currently set on the device.

Table 81 ***APs/Devices > Manage > General*** *Fields and Descriptions (Continued)*

Field	Description
Status	Displays the current status of an AP. If an AP is **Up**, then AWMS is able to ping it and fetch SNMP information from the AP. If the AP is listed **Down** then AWMS is either unable to ping the AP or unable to read the necessary SNMP information from the device.
Configuration	Displays the current configuration status of the AP. To update the status, select **Audit** on the **APs/ Devices > Audit** page.
Last Contacted	Displays the last time AWMS successfully contacted the AP.
Type	Displays the type of AP.
Firmware	Displays the version of firmware running on the AP.
Group	Links to the **Group > Monitoring** page for the AP.
Template	Displays the name of the group template currently configuring the AP. Also displays a link to the **Groups > Template** page. This is only visible for APs that are managed by templates.
Folder	Displays the name of the folder containing the AP. Also displays a link to the **APs/Devices > List** page for the folder.
Management Mode	Displays the current management mode of the AP. No changes are made to the AP when it is in **Monitor Only** mode. AWMS pushes configurations and makes changes to an AP when it is in **Manage Read/Write** mode.
Notes	Provides a free-form text field to describe device information.

3. Review and provide the following information in the **Settings** area. Devices with dual radios display radio-specific settings in the Slot A and Slot B area. If a device is dual-radio capable but only has one device installed, AWMS manages that device as if it were a single slot device.

NOTE: Devices from different vendors have different RF settings and capabilities. The fields in the **Settings** section of the **APs/ Devices > Manage** page are context-sensitive and only present the information relevant for the particular device vendor and model.

Table 82 describes field settings, default values, and information for the **Settings** section of this page.

Table 82 ***APs/Devices > Manage > Settings*** *Fields and Default Values*

Setting	Default	Device Type	Description
Name	None	All	User-configurable name for the device (max. 20 characters)
Domain Name	None	IOS	Field populated upon initial device discovery or upon refreshing settings. Enable this option from **AMP Setup > Network** page to display this field on the **APs/Devices > Manage** page, with fully-qualified domain names for IOS APs. This field is used in conjunction with **Domain** variable in IOS templates.
Location	Read from the device	All	The SNMP location set on the device.
Latitude	None	All	Text field for entering the latitude of the device. The latitude is used with the Google Earth integration.
Longitude	None	All	Text field for entering the longitude of the device. The longitude is used with the Google Earth integration.
Altitude (meters)	None	All	Text field for entering the altitude of the device when known. This setting is used with the Google Earth integration. Specify altitude in meters.

Table 82 ***APs/Devices > Manage > Settings*** *Fields and Default Values (Continued)*

Setting	Default	Device Type	Description
Group	Default Group	All	Drop-down menu that can be used to assign the device to another Group.
Folder	Top	All	Drop-down menu that can be used to assign the device to another Group.
Auto Detect Upstream Device	Yes	All	Selecting **Yes** enables automatic detection of upstream device, which is automatically updated when the device is polled. Selecting **No** displays a drop-down menu of upstream devices.
Down Status Message	None	All	Enter a text message that provides information to be conveyed if the device goes down.
Administrative Status	Enable	All	Enables or disables administrative mode for the device.
Mode	Local	All	Designates the mode in which the device should operate. Options include the following: • Local • H-REAP • Monitor • Rogue Detector • Sniffer

4. Complete additional settings on the **APs/Devices > Manage** page, to include H-REAP, certificates, radio settings, and network settings. Table 83 describes many of the possible fields.

NOTE: For complete listing and discussion of settings applicable only to Dell PowerConnect W devices, see the *Dell PowerConnect W AirWave Configuration Guide* in **Home > Documentation**.

Table 83 ***APs/Devices > Manage*** *Page Illustration, Additional Settings*

Setting	Default	Device Type	Description
Mesh Role	Mesh AP	Mesh Devices	Drop-down menu specifies the mesh role for the AP as shown: • **Mesh AP** —The AP will act like a mesh client. It will use other APs as its uplink to the network. • **Portal AP** —The AP will become a portal AP. It will use a wired connection as its uplink to the network and serve it over the radio to other APs. • **None** —The AP will act like a standard AP. It will not perform meshing functions
Mesh Mobility	Static	Mesh Devices	Select **Static** if the AP is static, as in the case of a device mounted on a light pole or in the ceiling. Select **Roaming** if the AP is mobile. Two examples would be an AP mounted in a police car or utility truck.
Receive Antenna	Diversity	Cisco	Drop-down menu for the receive antenna provides three options: **Diversity** —Device will use the antenna that receives the best signal. If the device has two fixed (non-removable) antennas, the **Diversity** setting should be used for both receive and transmit antennas. **Right** —If your device has removable antennas and you install a high-gain antenna on the device's right connector (the connector on the right side when viewing the back panel of the device), use this setting for receive and transmit. **Left** —If your device has removable antennas and you install a high-gain antenna on the device's left connector, use this setting for both receive and transmit.
Transmit Antenna	Diversity	Cisco	See description in **Receive Antenna** above.

Table 83 ***APs/Devices > Manage*** *Page Illustration, Additional Settings (Continued)*

Setting	Default	Device Type	Description
Antenna Diversity	Primary Only	Symbol 4131	Drop-down menu provides the following options: **Full Diversity**—The AP receives information on the antenna with the best signal strength and quality. The AP transmits on the antenna from which it last received information. **Primary Only**—The AP transmits and receives on the primary antenna only. Secondary Only: The AP transmits and receives on the secondary antenna only. **Rx Diversity**—The AP receives information on the antenna with the best signal strength and quality. The AP transmits information on the primary antenna only.
Transmit Power Reduction	0	Proxim	Transmit Power Reduction determines the APs transmit power. The max transmit power is reduced by the number of decibels specified.
Channel	6	All	Represents the AP's current RF channel setting. The number relates to the center frequency output by the AP's RF synthesizer. Contiguous APs should be set to different channels to minimize "crosstalk," which occurs when the signals from APs overlap and interfere with each other. This RF interference negatively influences WLAN performance. 802.11b's 2.4-GHz range has a total bandwidth of 80-MHz, separated into 11 center channels. Of these channels, only 3 are non-overlapping (1, 6, and 11). In the United States, most organizations use only these non-overlapping channels.
Transmit Power Level	Highest power level supported by the radio in the regulatory domain (country)	Cisco, Symbol, Proxim AP-600, AP-700, AP-2000 (802.11g)	Determines the power level of radio transmission. Government regulations define the highest allowable power level for radio devices. This setting must conform to established standards for the country in which you use the device. You can increase the coverage radius of the access point by increasing the Transmit Power Level. However, while this increases the zone of coverage, it also makes it more likely that the AP will interfere with neighboring APs. Supported values are: **Cisco (100mW, 50mW, 30mW, 20mW, 5mW, 1mW) Symbol (Full or 50mW, 30mW, 15mW, 5mW, 1mW)**
Radio (Enable/ Disable)	Enable	All	The Radio option allows you to disable the radio's ability to transmit or receive data while still maintaining Ethernet connectivity to the network. AWMS will still monitor the Ethernet page and ensure the AP stays online. Customers typically use this option to temporarily disable wireless access in particular locations. This setting can be scheduled at an AP-Level or Group-Level.
DHCP	Yes	All	If enabled, the AP will be assigned a new IP address using DHCP. If disabled, the AP will use a static IP address. For improved security and manageability, Dell PowerConnect W recommends disabling DHCP and using static IP addresses.
LAN IP	None	All	The IP Address of the AP Ethernet interface. If One-to-One NAT is enabled, AWMS will communicate with the AP on a different address (the IP Address defined in the "Device Communication" area). If DHCP is enabled, the current assigned address will appear grayed out and the field cannot be updated in this area.
Subnet Mask	None	All	Provides the IP subnet mask to identify the sub-network so the IP address can be recognized on the LAN. If DHCP is enabled, the current assigned address will appear grayed out and the field cannot be updated in this area.
Gateway	None	All	The IP address of the default internet gateway. If DHCP is enabled, the current assigned address will appear grayed out and the field cannot be updated in this area.

5. Locate the **Template Options** area on the **APs/Devices > Manage** page.

NOTE: This field only appears for IOS APs, Symbol and Dell PowerConnect W controllers in groups with Dell PowerConnect W GUI Config disabled.

Table 84 describes field settings, default values, and additional information for this page.

Table 84 ***APs/Devices > Manage > IOS Template Options*** *Fields and Default Values*

Setting	Default	Device Type	Description
WDS Role	Client	Cisco IOS Wireless LAN Controllers only	Set the WDS role for this AP. Select Master for the WDS master APs and Client for the WDS Client. Once this is done you can use the %if wds_role= % to push the client, master, or backup lines to appropriate WDS APs.
SSL Certificate	None	Cisco IOS	AWMS will read the SSL Certificate off of the AP when it comes UP in AWMS. The information in this field will defines what will be used in place of %certificate%.
Extra Device Commands	None	Cisco IOS	Defines the lines that will replace the %ap_include_1% variable in the IOS template. This field allows for unique commands to be run on individual APs. If you have any settings that are unique per AP like a MOTD you can set them here.
switch_command	None	Cisco Catalyst switches	Defines lines included for each of the members in the stack. This field appears only on the master's **Manage** page. The information in this field will determine what is used in place of the %switch_command% variable.

6. For Cisco WLC devices, go to the interfaces section of the **AP > Manage** page. Select **Add new Interface** to add another controller interface, or select the pencil icon to edit an existing controller interface. Table 85 describes the settings and default values. For detailed descriptions of Cisco WLC devices supported by AWMS, refer to the Cisco WLC product documentation.

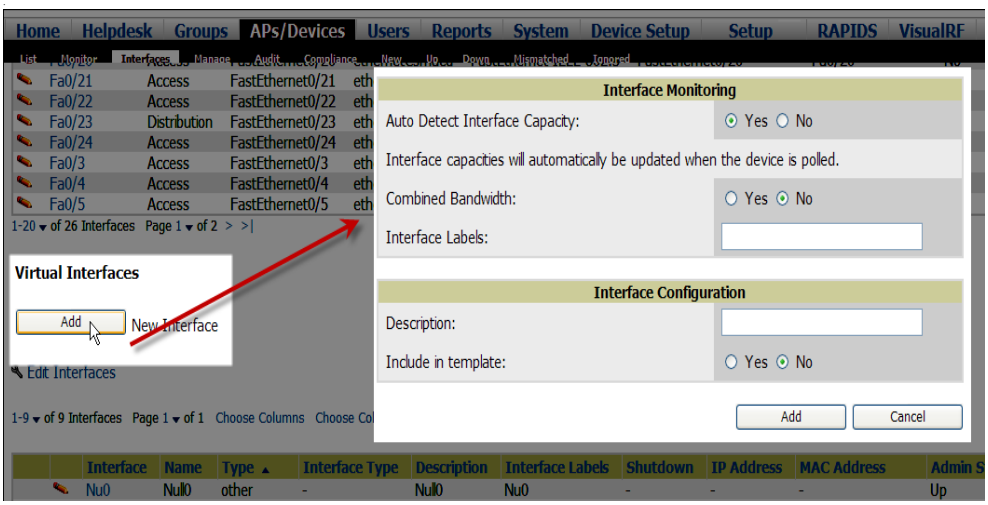
Table 85 ***APs/Devices > Manage > Interface*** *Fields and Descriptions for Cisco WLC Devices*

Field	Default	Description
Name	None	The name of the interface on the controller.
VLAN ID	None	The VLAN ID for the interface on the controller.
Port	None	The port on the controller to access the interface.
IP Address	None	The IP address of the controller.
Subnet Mask	None	The subnet mask for the controller.
Gateway	None	The controller's gateway.
Primary and Secondary DHCP Servers	None	The DHCP servers for the controller.
Guest LAN	Disabled	Indicates a guest LAN.
Quarantine VLAN ID	Disabled	Enabled indicates it is a quarantine VLAN; used only for H-REAP-associated clients.
Dynamic Device Management	Enabled	When enabled, makes the interface an AP-manager interface. Cisco calls this feature Dynamic AP Management.

Configuring Device Interfaces for Cisco Catalyst Switches

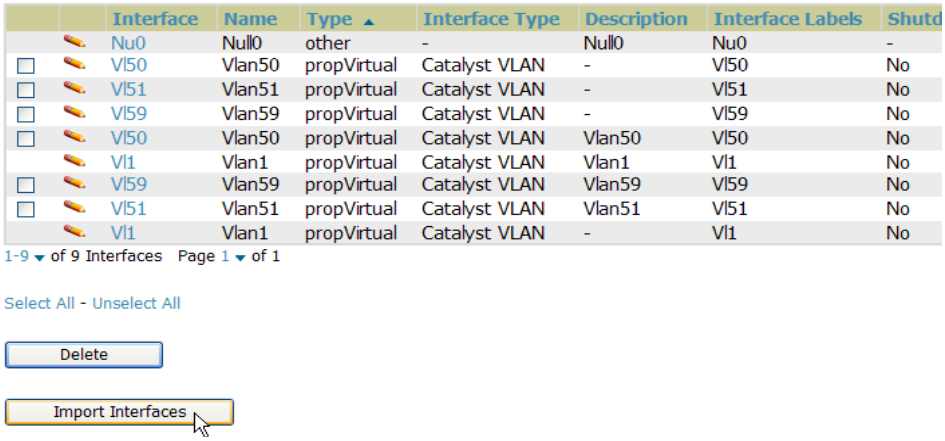
When you go to the APs/Devices > Interfaces page for a Cisco Catalyst switch, you can add a Virtual interface by selecting **Add** and entering the appropriate information in the page that then appears, as shown in Figure 95.

Figure 95 ***Add Virtual Interfaces*** *Page for Wired Devices*



New physical and virtual interfaces are discovered using SNMP polling as described in "SNMP/HTTP Scanning" on page 107. To refresh and reload all current interface information from a device, select **Import Interfaces** on the bottom of the page as shown in Figure 96.

Figure 96 ***Import Interfaces*** *for Refresh and Reload (lower portion of page)*



You can view details for each interface on a wired device from its individual interface page as well. For details, see "Understanding the APs/Devices > Interfaces Page" on page 129.

You can configure interface settings individually or in groups. For individual settings, select the pencil icon next the interface name in **AP/Devices > Interfaces**.

This takes you to the **Interfaces Monitoring and Configuration** window which has a slightly different appearance depending on whether you are configuring a physical or virtual interface, as shown in Figure 97 and Figure 98.

Figure 97 *Physical Interfaces Monitoring and Configuration Sections*

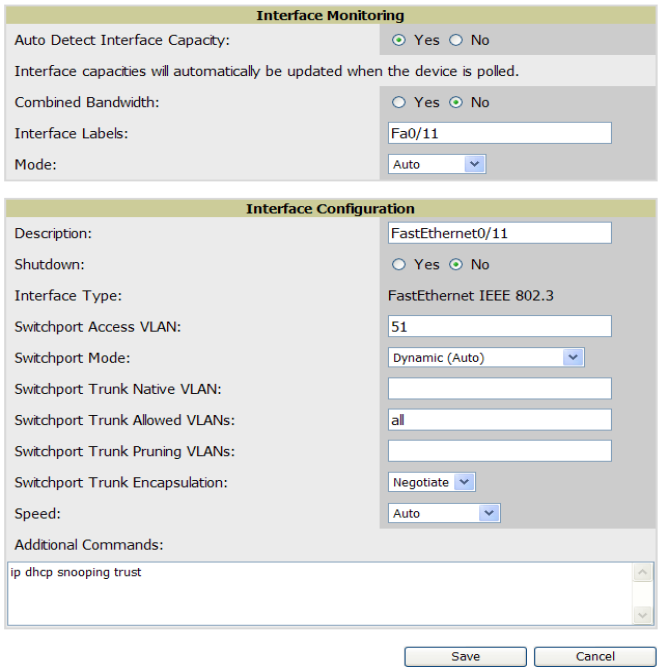
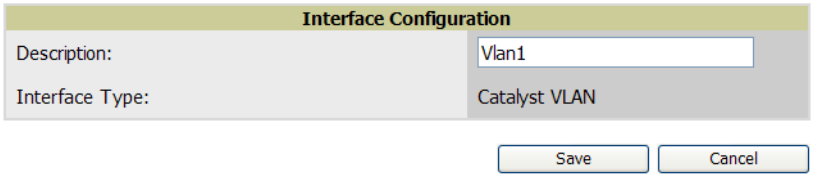
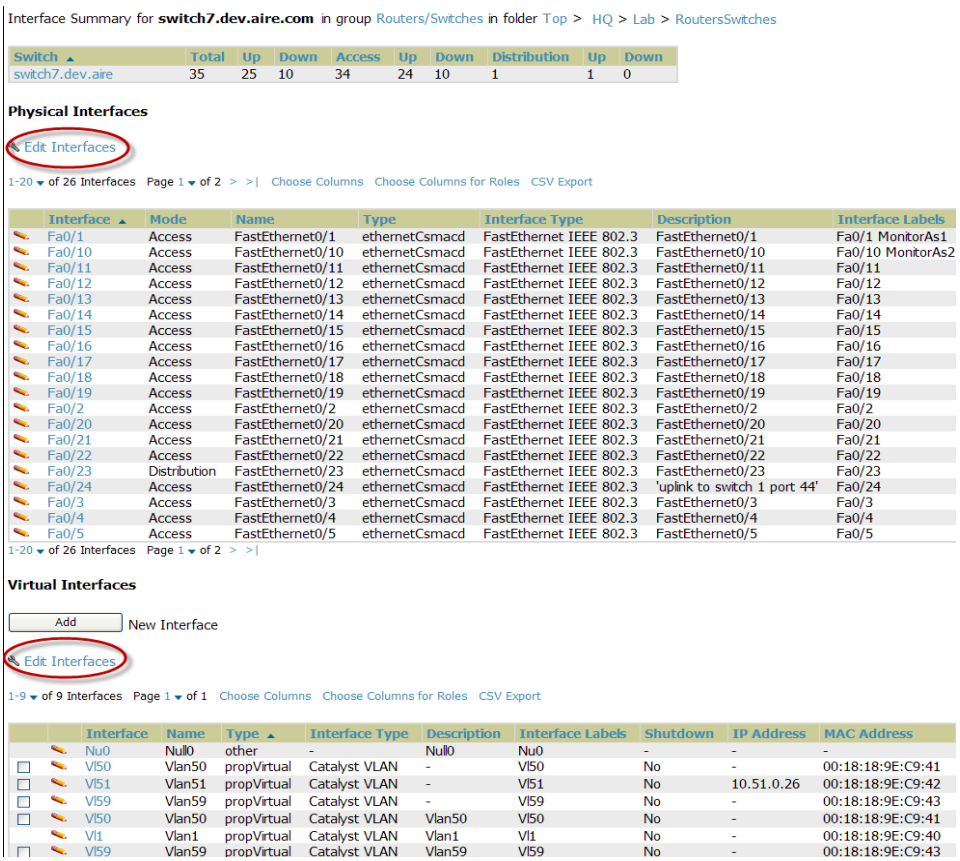


Figure 98 *Virtual Individual Interfaces Configuration Section*



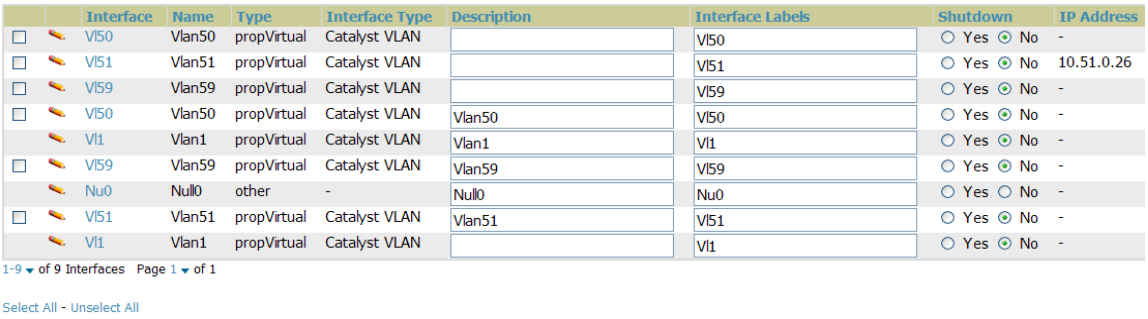
To configure interfaces as a group, select **Edit Interfaces** above the Physical or Virtual Interfaces table as shown in Figure 99.

Figure 99 *Edit Multiple Interfaces*



You will remain on the same page, but will have the option to make changes to the most commonly edited settings in batch mode, as shown in Figure 100.

Figure 100 *Multiple Interface Editing Page Illustration*



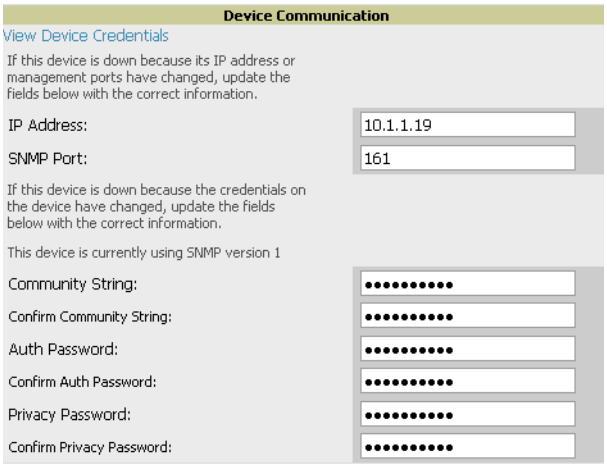
AWMS assembles the entire running configuration using templates and your modifications to these pages. For a more detailed discussion on templates, see Chapter 6, "Creating and Using Templates" on page 149.

Individual Device Support and Firmware Upgrades

Perform the following steps to configure AP communication settings for individual device types.

1. Locate the **Device Communication** area on the **APs/Devices > Manage** page.
2. Specify the credentials to be used to manage the AP. Figure 101 illustrates this page.

Figure 101 *APs/Devices > Manage > Device Communication*



NOTE: The **Device Communication** area may appear slightly different depending on the particular vendor and model of the APs being used.

3. Enter and confirm the appropriate **Auth Password** and **Privacy Password**.
4. You can disable the **View AP Credentials** link in AWMS by the root user. Contact Dell support for detailed instructions to disable the link.
5. (Optional.) Enter the appropriate SSH and Telnet credentials if you are configuring Dell, Aruba Networks, Alcatel-Lucent or any Cisco device except Cisco WLAN controllers.
6. Select **Apply**, then **Confirm Edit** to apply the changes to the AP immediately, **Schedule** to schedule the changes during a specific time, or **Cancel** to return to **APs/Devices > Manage**.

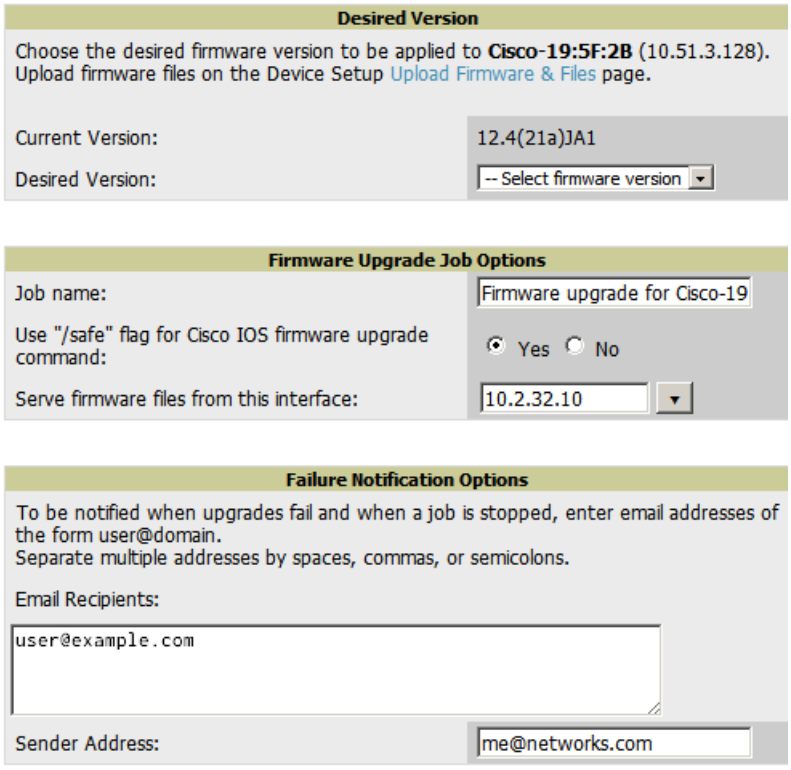
NOTE: Some AP configuration changes may require the AP to be rebooted. Use the **Schedule** function to schedule these changes to occur at a time when WLAN users will not be affected.

Select **Update Firmware** to upgrade the device's firmware. Figure 102 illustrates this page and Table 86 describes the settings and default values.

Table 86 *APs/Devices > Manage Firmware Upgrades Fields and Default Values*

Setting	Default	Description
Desired Version	None	Specifies the firmware to be used in the upgrade. Firmware can be added to this drop-down menu on the **Device Setup > Firmware Files** page.
Job Name	None	Sets a user-defined name for the upgrade job. Dell PowerConnect W recommends using a meaningful and descriptive name.
Use "/safe" flag for Cisco IOS firmware upgrade command	No	Enables or disables the /safe flag when upgrading IOS APs. The **/safe** flag must be disabled on older APs for the firmware file to fit in flash memory.
Email Recipients	None	Displays a list of email addresses that should receive alert emails if a firmware upgrade fails.
Sender Address	None	Displays the **From** address in the alert email.

Figure 102 *APs/Devices > Manage Firmware Upgrades*



Troubleshooting a Newly Discovered Device with Down Status

If the device status on the **APs/Devices > List** page remains **Down** after it has been added to a group, the most likely source of the problem is an error in the SNMP community string being used to manage the device. Perform the following steps to troubleshoot this scenario.

1. Select the **Name** of the down device in the list of devices on the **APs/Devices > List** page. This automatically directs you to the **APs/Device > Monitor** page for that device.
2. Locate the **Status** field in the **Device Info** section. If the Status is **Down**, it includes a description of the cause of the problem. Some of the common system messages are as follows in Table 87:

Table 87 *Common System Messages for Down Status*

Message	Meaning
SNMP Get Failed	An incorrect SNMP community string or incorrect SNMP port is specified. If SNMP is not enabled on the device, you will also receive this message. Some APs, including Cisco and Dell PowerConnect W devices, do not have SNMP enabled by default.
Telnet Error: command timed out	Telnet username and password specified for that device is incorrect, or an incorrect telnet port is specified.
ICMP Ping Failed (after SNMP Get Failed)	The device is not responding on the network and is likely non-operational.

3. If the **SNMP Get Failed** message appears, select the **APs/Devices > Manage** tab to go to the management page for that device.
4. If visible, select the **View device credentials** link in the **Device Communications** section. This displays the credentials AWMS is using unsuccessfully to communicate with the device. This link can be removed from AWMS for security reasons by setting a flag in AWMS. Only users with root access to the AMP command line can show or hide this link. To disable this feature, please contact Dell support. Figure 103 illustrates this page.

Figure 103 *View device credentials Window*

NOTE: The **View AP Credentials** message may appear slightly different depending on the vendor and model.

5. If the credentials are incorrect, return to the **Device Communications** area on **APs/Devices > Manage**.
6. Enter the appropriate credentials, and select **Apply**.
7. Return to the **APs/Devices > List** page to see if the device appears with a Status of **Up**.

Setting up Dell Spectrum Analysis in AWMS

The spectrum analysis software modules on AP models Dell PowerConnect W-AP105, the Dell PowerConnect W-AP120 Access Point Series and the Dell PowerConnect W-AP90 Access Point Series can examine the radio frequency (RF) environment in which the Wi-Fi network is operating, identify interference, and classify its sources.

The spectrum analyzer is used in conjunction with Adaptive Radio Management (ARM) technology. While the spectrum analyzer identifies and classifies Wi-Fi and non-Wi-Fi sources of interference, ARM automatically ensures that APs serving clients will stay clear of interference.

Individual APs or groups of APs can be converted to dedicated spectrum monitors through the dot11a and dot11g radio profiles of that AP or AP group, or through a special spectrum override profile.

Each 802.11a and 802.11g radio profile references a spectrum profile, which identifies the spectrum band the radio will monitor and analyze, and defines the default ageout times for each monitored device type. By default, an 802.11a radio profile references a spectrum profile named **default-a** (which configures the radio to monitor the upper channels of the 5 GHz radio band), and an 802.11g radio profile references a spectrum profile named **default-g** (which configures the radio to monitor all channels the 2.4 GHz radio band).

Most interference will occur in the 2.4 GHz radio band.

For more information about Spectrum analysis and ARM technology, refer to the *ArubaOS 6.0 User Guide* from support.dell.com/manuals.

Spectrum Configurations and Prerequisites

The following prerequisites must be in place to configure an AP to run in spectrum mode in AWMS:

- The AP must be in **Manage Read/Write** mode.
- The AP's associated controller must have an RFprotect license, and must run ArubaOS 6.0 or later.
- Dell GUI Config must be enabled for that AP's group in the **Groups > Basic** page.

There are three main situations in which you would set one or more devices to Spectrum mode in AWMS:

- Dell PowerConnect W AP Groups running permanently with the default Spectrum profile
- Individual APs running temporarily in Spectrum mode while part of an Dell AP Group set to ap-mode

- Controller-level Spectrum Overrides (an alternative to creating new Dell AP groups or new radio profiles for temporary changes)

Setting up a Permanent Spectrum Dell AP Group

If you have multiple supported Dell APs in multiple controllers that you want to run in Spectrum mode over the long run, you create a special Dell AP group and set up a profile that is set to **spectrum-mode** and references the default **Spectrum** profile. Set up more than one profile if you want to utilize both radio bands in Spectrum mode.

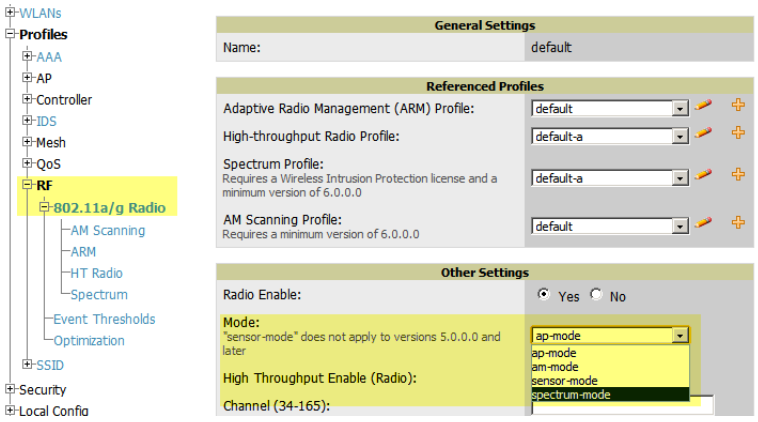
If you use an 802.11a or 802.11g radio profile to create a group of spectrum monitors, all APs in any AP group referencing that radio profile will be set to spectrum mode. Therefore, best practices are to create a new 802.11a or 802.11g radio profile just for spectrum monitors.

If you have Global Dell PowerConnect W Configuration enabled in **AMP Setup > General**, create the configuration below, then go to the controller's group's **Dell PowerConnect W Config** page and select the newly created Dell PowerConnect W AP Group.

Perform these steps to set the AP group to use the default Spectrum profile settings:

1. In **Groups > Dell Config**, select **Add New Dell AP Group**.
2. Give the new Group a name (like "Spectrum APs") and select the plus sign next to the **802.11a Radio Profile** to create a new radio profile.
3. Enter a name under the General Settings section of **Profiles > RF > 802.11a/g Radio**.
4. In the **Other Settings** section, change the **Mode** field from ap-mode to **spectrum-mode**, as illustrated in Figure 104. Then select **Save**.

Figure 104 *Spectrum mode in Dell Config*



The above steps will use the defaults in the referenced **Spectrum Profile**. To change the defaults, navigate to **Groups > Dell Config > Profiles > RF > 802.11a/g Radio > Spectrum** and create a new Spectrum profile with non-default settings. In most cases, you should not change the settings in the default profile.

If all of the devices in this Dell AP Group are managed by the same controller and you want to temporarily override one or more profile settings in your spectrum-mode APs, you can set up a controller override.

To disable spectrum mode in this group, change the referenced radio profile back to **default**.

Configuring an Individual AP to run in Spectrum Mode

If you want to temporarily set an individual radio in an AP to run in Spectrum mode without creating or changing Dell AP Groups or radio profiles, perform these steps to set up a Spectrum Override on a supported Dell PowerConnect W AP:

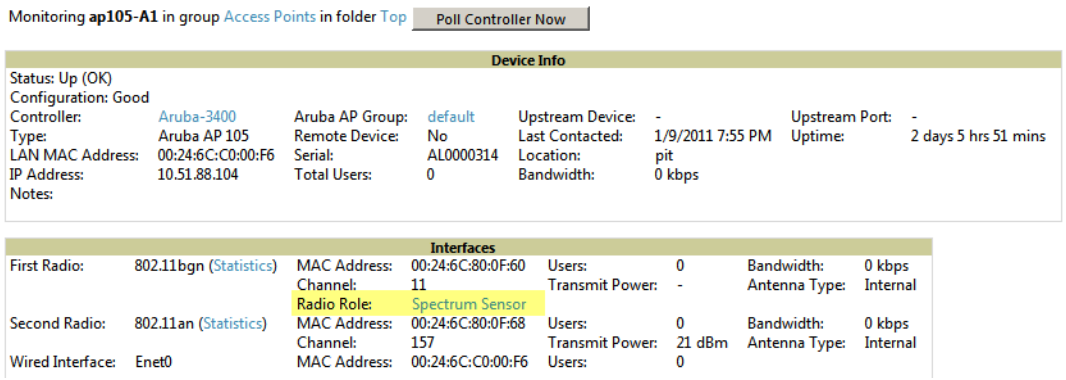
1. Go to the **APs/Devices > Manage** page for a Spectrum-supported Dell PowerConnect W AP.
2. After checking the Audit page, set the AP to **Manage Read/Write** mode.

3. Select **Yes** on the **Spectrum Override** field for one or both radios, depending on the band and channels you want it to analyze.
4. Select the band that should run in spectrum. If you selected the 5GHz band in the 802.11an Radio section, choose the lower, middle, or upper range of channels that you want to be analyzed by this radio.
5. Select **Save and Apply** and confirm your edit.

This overrides the current **Mode** setting for that AP (ap-mode or am-mode).

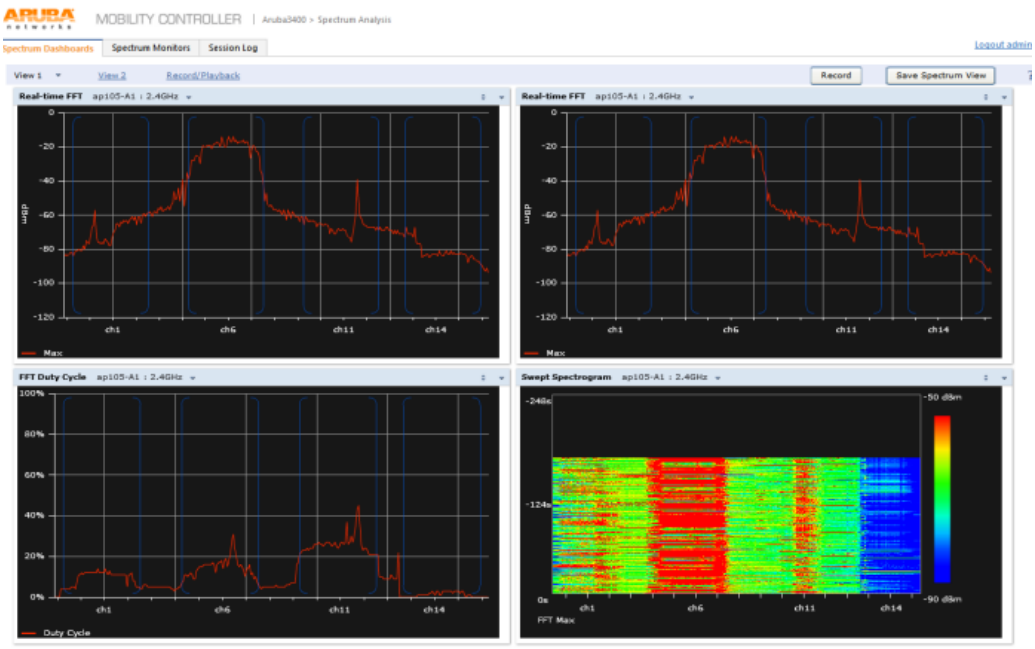
After making this change, you can view the new **Radio Role** field that will appear in the **Interfaces** section of the **APs/Devices > Monitor** page, as illustrated in Figure 105.

Figure 105 *Spectrum Sensor Link in Interfaces Section of an AP*



The new role, Spectrum Sensor, is a link to the Spectrum Analysis page for the controller that manages this AP, as illustrated in Figure 106.

Figure 106 *Spectrum Analysis on Controller Dashboard*

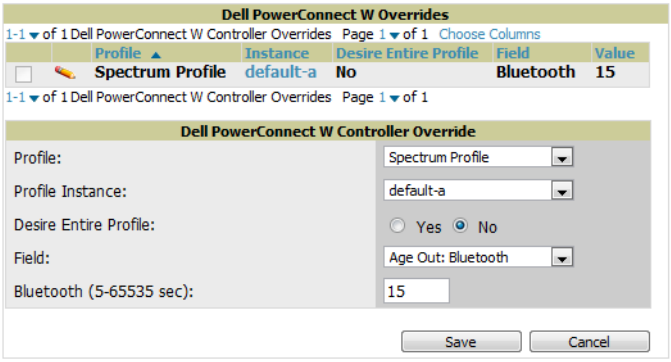


To disable Spectrum mode on this individual AP after it has collected data, return to the **APs/Devices > Manage** page for this AP and set the **Spectrum Override** field back to **No**.

Configuring a Controller to use the Spectrum Profile

You can use AWMS to customize individual fields in the profile instance used by a particular controller without having to create a new Dell AP groups and new radio profiles. To do this, you can set a controller-level override for its referenced Spectrum profile, as illustrated in Figure 107. This will affect all Spectrum-supported APs managed by this controller.

Figure 107 *Override Section of a Supported Controller's* ***Manage*** *Page*



Perform these steps to override individual profile settings for an Dell controller that is part of a spectrum-mode Dell AP group:

1. Select a Spectrum-supported Dell controller that is referencing a Spectrum profile, and go to its **APs/Devices > Manage** page. Set it to **Manage Read/Write** mode.
2. Under the **Dell Overrides** section, select **Add New Dell Controller Override**.
3. In the **Profile** drop-down menu, select the **Spectrum Profile** type.
4. In the **Profile Instance** drop-down menu, select the instance of the Spectrum profile used by the controller.
5. In the **Field** drop-down menu, select the setting you would like to change (such as an Age-Out setting or a Spectrum Band), and enter the overriding value below it.
6. Select **Add** to save your changes.
7. To create additional overrides for this controller, select **Add New Dell Controller Override** again.
8. When you have finished, select **Save and Apply**.

You can also use the above procedure to turn on Spectrum mode for radio profiles on one particular controller, or use the overrides to point your radio profile to a non-default Spectrum profile for just this controller.

Chapter 6

Creating and Using Templates

This chapter provides an overview and several tasks supporting the use of device configuration templates in AWMS, and contains the following topics:

- "Group Templates" on page 149
- "Viewing and Adding Templates" on page 150
- "Configuring General Template Files and Variables" on page 153
- "Configuring Cisco IOS Templates" on page 158
- "Configuring Cisco Catalyst Switch Templates" on page 160
- "Configuring Symbol Controller / HP WESM Templates" on page 161
- "Configuring a Global Template" on page 162

Group Templates

Templates are helpful configuration tools that allow AWMS to manage virtually all device settings. A template uses variables to adjust for minor configuration differences between devices.

Supported Device Templates

The **Groups > Templates** configuration page allows you to create configuration templates for the following types of devices:

- Dell PowerConnect W

NOTE: Dell recommends using the graphical Dell Config feature in support of Dell PowerConnect W devices. Refer to the *Dell PowerConnect W Configuration Guide* in **Home > Documentation** for additional information.

- Aruba
- Alcatel-Lucent
- Cisco Aironet IOS autonomous APs
- Cisco Catalyst switches
- HP ProCurve 530 and WeSM controllers
- Nomadix
- Symbol
- Trapeze
  - 3Com
  - Nortel
  - Enterasys

Template Variables

Variables in templates configure device-specific properties, such as name, IP address and channel. Variables can also be used to configure group-level properties, such as SSID and RADIUS server, which may differ from one group to the next. The AWMS template understands many variables including the following:

- `%ap_include_1% through %ap_include_10%`
- `%channel%`
- `%hostname%`
- `%ip_address%`
- `%ofdmpower%`

The variable settings correspond to device-specific values on the **APs/Devices > Manage** configuration page for the specific AP that is getting configured.

NOTE: Changes made on the other **Group** pages (Radio, Security, VLANs, SSIDs, and so forth) are not applied to any APs that are configured by templates.

Viewing and Adding Templates

Perform these steps to display, add, or edit templates.

1. Go to the **Groups > List** page, and select a group for which to add or edit templates. This can be a new group, created with the **Add** button, or you can edit an existing group by selecting the corresponding pencil icon. The **Groups > Basic** page for that group appears.Additional information about adding and editing groups is described in "Configuring and Using Device Groups in AWMS" on page 69.
2. From the AWMS navigation pane, select **Templates**. The **Templates** page appears. Figure 108 illustrates the **Groups > Templates** configuration page, and Table 88 describes the columns.

Figure 108 *Groups > Templates Page Illustration for a Sample Device Group*

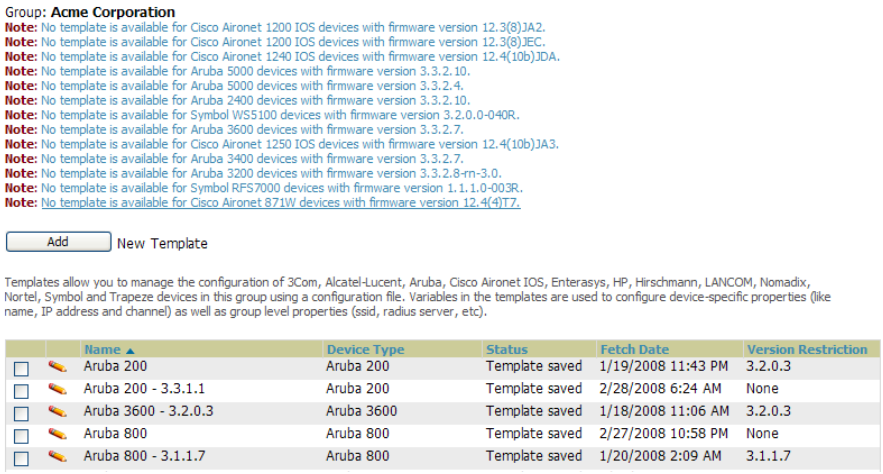


Table 88 *Groups > Templates Fields and Default Values*

Setting	Description
Notes	When applicable, this section lists devices that are active on the network with no template available for the respective firmware. Select the link from such a note to launch the **Add Template** configuration page for that device.
Name	Displays the template name.
Device Type	Displays the template that applies to APs or devices of the specified type. If **vendor (Any Model)** is selected, the template applies to all models from that vendor that do not have a version specific template defined. If there are two templates that might apply to a device, the template with the most restrictions takes precedence.
Status	Displays the status of the template.
Fetch Date	Sets the date that the template was originally fetched from a device.

Table 88 ***Groups > Templates*** *Fields and Default Values (Continued)*

Setting	Description
Version Restriction	Designates that the template only applies to APs running the version of firmware specified. If the restriction is **None**, then the template applies to all the devices of the specified type in the group. If there are two templates that might apply to a device the template with the most restrictions takes precedence. If there is a template that matches a devices firmware it will be used instead of a template that does not have a version restriction.

3. To create a new template and add it to the AWMS template inventory, go to the **Groups > List** page, and select the group name, and the **Details** page appears. Select **Templates**, then **Add**.
4. Complete the configurations illustrated in Figure 109, and the settings described in Table 89.

Figure 109 *Groups > Templates > Add Template Page Illustration*

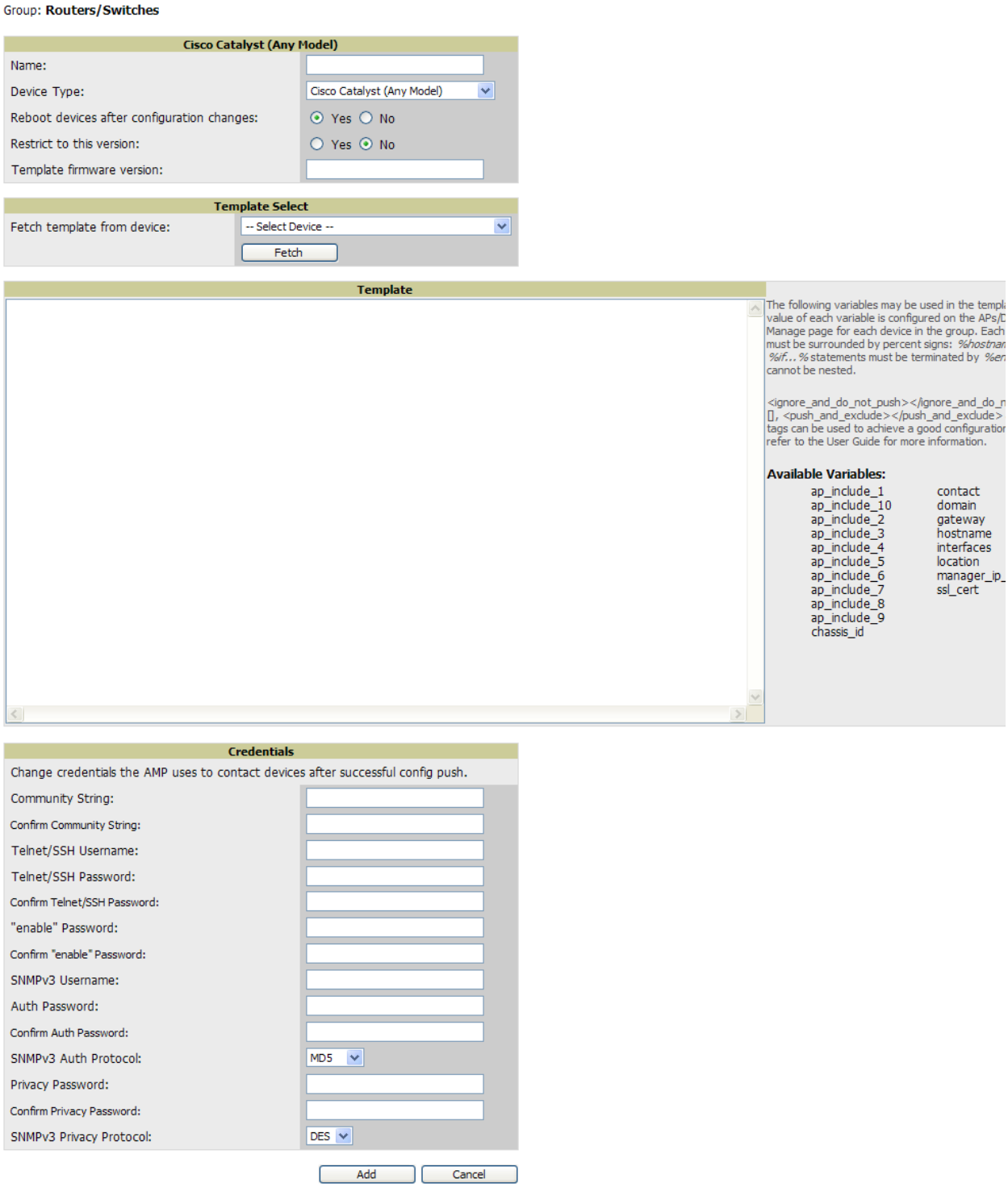


Table 89 *Groups > Templates > Add Template Fields and Default Values*

Setting	Default	Description
Use Global Template	No	Uses a global template that has been previously configured on the **Groups > Templates** configuration page. Available templates will appear in the drop-down menu. If **Yes** is selected you can also configure global template variables. For Symbol devices you can select the groups of thin APs to which the template should be applied. For more information about global templates, see the **Groups > Templates** section of the *User Guide*.

Table 89 ***Groups > Templates > Add Template*** *Fields and Default Values (Continued)*

Setting	Default	Description
Fetch	None	Selects an AP from which to fetch a configuration. The configuration will be turned into a template with basic AP specific settings like channel and power turned into variables. The variables are filled with the data on the **APs/Devices > Manage** page for each AP.
Name	None	Defines the template display name.
AP Type	Cisco IOS (Any Model)	Determines that the template applies to APs or devices of the specified type. If **Cisco IOS (Any Model)** is selected, the template applies to all IOS APs that do not have a version specific template specified.
Reboot APs After Configuration Changes	No	Determines reboot when AWMS applies the template, copied from the new configuration file to the startup configuration file on the AP. If **No** is selected, AWMS uses the AP to merge the startup and running configurations. If **Yes** is selected, the configuration is copied to the startup configuration file and the AP is rebooted. This field is only visible for some devices.
Restrict to this version	No	Restricts the template to APs of the specified firmware version. If **Yes** is selected, the template only applies to APs on the version of firmware specified in the **Template Firmware Version** field.
Template firmware version	None	Designates that the template only applies to APs running the version of firmware specified.
Community String	None	If the template is updating the community strings on the AP, enter the new community string AWMS should use here. AWMS updates the credentials it is using to communicate to the device after the device has been managed.
Telnet/SSH Username	None	If the template is updating the **Telnet/SSH Username** on the AP, enter the new username AWMS should use here. AWMS updates the credentials it is using to communicate to the device after the device has been managed.
Telnet/SSH Password	None	If the template is updating the **Telnet/SSH password** on the AP, enter the new Telnet/SSH password AWMS should use here. AWMS updates the credentials it is using to communicate to the device after the device has been managed.
"enable" Password	None	If the template is updating the enable password on the AP, enter the new enable password AWMS should use here. AWMS updates the credentials it is using to communicate to the device after the device has been managed.
SNMPv3 Username	None	If the template is updating the **SNMP v3 Username** password on the AP, enter the new SNMP Username password here. AWMS updates the credentials it is using to communicate to the device after the device has been managed.
Auth Password	None	If the template is updating the **SNMP v3 Auth** password on the AP, enter the new SNMP Username password here. AWMS updates the credentials it is using to communicate to the device after the device has been managed.
Privacy Password	None	If the template is updating the **SNMP v3 Privacy** password on the AP, enter the new SNMP Username password here. AWMS updates the credentials it is using to communicate to the device after the device has been managed.
SNMPv3 Auth Protocol	MD5	Specifies the **SNMPv3 Auth** protocol, either **MD5 or SHA-1**.
SNMPv3 Privacy Protocol	DES	Specifies the **SNMPv3 Privacy** protocol, either **DES or AES**.

Configuring General Template Files and Variables

This section describes the most general aspects of configuring AP device templates and the most common variables:

- Configuring General Templates
- Using Template Syntax
- Using Directives to Eliminate Reporting of Configuration Mismatches

- Using Conditional Variables in Templates
- Using Substitution Variables in Templates
- Using AP-Specific Variables

Configuring General Templates

Perform the following steps to configure Templates within a Group.

1. Select a Group to configure.

NOTE: Dell recommends starting with a small group of access points and placing these APs in Monitor Only mode, which is read-only. Do this using the **Modify Devices** link until you are fully familiar with the template configuration process. This prevents configuration changes from being applied to the APs until you are sure you have the correct configuration specified.

2. Select an AP from the Group to serve as a *model* AP for the others in the Group. You should select a device that is configured currently with all the desired settings. If any APs in the group have two radios, make sure to select a model AP that has two radios and that both are configured in proper and operational fashion.
3. Go to the **Groups > Templates** configuration page. Select **Add** to add a new template.
4. Select the type of device that will be configured by this template.
5. Select the model AP from the drop-down list, and select **Fetch**.
6. AWMS automatically attempts to replace some values from the configuration of that AP with *variables* to enable AP-specific options to be set on an AP-by-AP basis. Refer to "Using Template Syntax" on page 155.

   These variables are always encapsulated between % signs. On the right side of the configuration page is the **Additional Variables** section. This section lists all available variables for your template. Variables that are in use in a template are green, while variables that are not yet in use are black. Verify these substitutions to ensure that all of the settings that you believe should be managed on an AP-by-AP basis are labeled as variables in this fashion. If you believe that any AP-level settings are not marked correctly, please contact Dell support before proceeding.
7. Specify the device types for the template. The templates only apply to devices of the specified type.
   - Specify whether AWMS should reboot the devices after a configuration push. If the **Reboot Devices after Configuration Changes** option is selected, then AWMS instructs the AP to copy the configuration from AWMS to the startup configuration file of the AP and reboot the AP.
   - If the **Reboot Devices after Configuration Changes** option is not selected, then AWMS instructs the AP to copy the configuration to the startup configuration file and then tell the AP to copy the startup configuration file to the running configuration file.
   - Dell PowerConnect W recommends using the **reboot** option when there are changes requiring reboot to take effect, for example, removing a new SSID from a Cisco IOS device. Copying the configuration from startup configuration file to running configuration file merges the two configurations and can cause undesired configuration lines to remain active on the AP.
8. Restrict the template to apply only to the specified version of firmware. If the template should only apply to a specific version of firmware, select **Yes** and enter the firmware version in the **Template Firmware Version** text field.
9. Select **Save and Apply** to push the configuration to all of the devices in the group. If the devices are in monitor-only mode (which is recommended while you are crafting changes to a template or creating a new one), then AWMS will audit the devices and compare their current configuration to the one defined in the template.

NOTE: If you set the reboot flag to **No**, then some changes could result in configuration mismatches until the AP is rebooted.

For example, changing the SSID on Cisco IOS APs requires the AP to be rebooted. Two other settings that require the AP to be rebooted for configuration change are Logging and NTP. A configuration mismatch results if the AP is not rebooted.

If logging and NTP service are not required according to the Group configuration, but are enabled on the AP, you would see a configuration file mismatch as follows if the AP is not rebooted:

IOS Configuration File Template:

```
…
(no logging queue-limit)
…
```

Device Configuration File on APs/Devices > Audit Configuration Page

```
…
    line con 0
    line vty 5 15
actual logging 10.51.2.1
actual logging 10.51.2.5
actual logging facility local6
actual logging queue-limit 100
actual logging trap debugging
    no service pad
actual ntp clock-period 2861929
actual ntp server 209.172.117.194
    radius-server attribute 32 include-in-access-req format %h
…
```

10. Once the template is correct and all mismatches are verified on the **AP Audit** configuration page, use the **Modify Devices** link on the **Groups > Monitor** configuration page to place the desired devices into **Management** mode. This removes the APs from Monitor mode (read-only) and instructs the AP to pull down its new startup configuration file from AWMS.

NOTE: Devices can be placed into Management mode individually from the **APs/Devices > Manage** configuration page.

Using Template Syntax

Template syntax is comprised of the following components, described in this section:

- "Using Directives to Eliminate Reporting of Configuration Mismatches" on page 155
- "Using Conditional Variables in Templates" on page 156
- "Using Substitution Variables in Templates" on page 157
- "Using AP-Specific Variables" on page 158

Using Directives to Eliminate Reporting of Configuration Mismatches

AWMS is designed to audit AP configurations to ensure that the actual configuration of the access point exactly matches the Group template. When a configuration mismatch is detected, AWMS generates an automatic alert and flags the AP as having a **Mismatched** configuration status on the user page.

However, when using the templates configuration function, there will be times when the running-config file and the startup-config file do not match under normal circumstances. For example, the `ntp clock-period` setting is almost never identical in the running-config file and the startup-config file. You can use directives such as `<ignore_and_do_not_push>` to customize the template to keep AWMS from reporting mismatches for this type of variance.

AWMS provides two types of directives that can be used within a template to control how AWMS constructs the startup-config file to send to each AP and whether it reports variances between the running-config file and the startup-config file as "configuration mismatches." Lines enclosed in **<push_and_exclude>** are included in the AP

startup-config file but AWMS ignores them when verifying configurations. Lines enclosed in **<ignore_and_do_not_push>** cause AWMS to ignore those lines during configuration verification.

Ignore_and_do_not_push Command

The `ignore and do not push` directive should typically be used when a value cannot be configured on the device, but always appears in the running-config file. Lines enclosed in the ignore and do not push directive will not be included in the startup-config file that is copied to each AP.

When AWMS is comparing the running-config file to the startup-config file for configuration verification, it will ignore any lines in the running-config file that start with the text within the directive. Lines belonging to an ignored and unpushed line, the lines immediately below the line and indented, are ignored as well. In the example below, if you were to bracket NTP server, the NTP clock period would behave as if it were bracketed because it belongs or is associated with the NTP server line.

NOTE: The line <ignore_and_do_not_push>ntp clock-period</ignore_and_do_not_push> will cause lines starting with "ntp clock-period" to be ignored. However, the line <ignore_and_do_not_push>ntp </ignore_and_do_not_push> causes all lines starting with "ntp" to be ignored, so it is important to be as specific as possible.

Push_and_exclude Command

Instead of using the full tags you may use the parenthesis shorthand, (substring). The push and exclude directive is used to push commands to the AP that will not appear in the running-config file. For example, some **no** commands that are used to remove SSIDs or remove configuration parameters do not appear in the running-config file of a device. A command inside the push and exclude directive are included in the startup-config file pushed to a device, but AWMS excludes them when calculating and reporting configuration mismatches.

NOTE: The opening tag may have leading spaces.

Below are some examples of using directives:

```
…
line con 0
 </push_and_exclude>no stopbits</push_and_exclude>
line vty 5 15
!
ntp server 209.172.117.194
<ignore_and_do_not_push>ntp clock-period</ignore_and_do_not_push>
end
```

Using Conditional Variables in Templates

Conditional variables allow lines in the template to be applied only to access points where the enclosed commands will be applicable and not to any other access points within the Group. For example, if a group of APs consists of dual-radio Cisco 1200 devices (802.11a/b) and single-radio Cisco 1100 (802.11b) devices, it is necessary to make commands related to the 802.11a device in the 1200 APs conditional. Conditional variables are listed in the table below.

The syntax for conditional variables is as follows, and syntax components are described in Table 90:

```
%if variable=value%
…
%endif%
```

Table 90 *Conditional Variable Syntax Components*

Variable	Values	Meaning
interface	Dot11Radio0	2.4GHz radio module is installed
	Dot11Radio1	5GHz external radio module is installed
radio_type	a	Installed 5GHz radio module is 802.11a
	b	Installed 2.4GHz radio module is 802.11b only
	g	Installed 2.4GHz radio module is 802.11g capable
wds_role	backup	The WDS role of the AP is the value selected in the dropdown menu on the **APs/Devices > Manage** configuration page for the device.
	client	
	master	
IP	Static	IP address of the device is set statically on the AP Manage configuration page.
	DHCP	IP address of the device is set dynamically using DHCP

Using Substitution Variables in Templates

Substitution variables are used to set AP-specific values on each AP in the group. It is obviously not desirable to set the IP address, hostname, and channel to the same values on every AP within a Group. The variables in Table 91 are substituted with values specified on each access point's **APs/Devices > Manage** configuration page within the **AWMS User** page.

Sometimes, the running-config file on the AP does not include the command for one of these variables because the value is set to the default. For example, when the "transmission power" is set to maximum (the default), the line "power local maximum" will not appear in the AP running-config file, although it will appear in the startup-config file. AWMS would typically detect and flag this variance between the running-config file and startup-config file as a configuration mismatch. To prevent AWMS from reporting a configuration mismatch between the desired startup-config file and the running-config file on the AP, AWMS suppresses the lines in the desired configuration when auditing the AP configuration (similar to the way AWMS suppresses lines enclosed in parentheses, which is explained below). A list of the default values that causes lines to be suppressed when reporting configuration mismatches is shown in Table 91.

Table 91 *Substitution Variables in Templates*

Variable	Meaning	Command	Suppressed Default
hostname	Name	hostname %hostname%	-
channel	Channel	channel %channel%	-
ip_address netmask	IP address Subnet mask	ip address %ip_address% %netmask% or ip address dhcp …	
gateway	Gateway	ip default-gateway %gateway%	-
antenna_ receive	Receive antenna	antenna receive %antenna_receive%	diversity
antenna_transmit	Transmit antenna	antenna transmit %antenna_transmit%	diversity
cck_power	802.11g radio module CCK power level	power local cck %cck_power%	maximum
ofdm_power	802.11g radio module OFDM power level	power local ofdm %ofdm_power%	maximum

Table 91 *Substitution Variables in Templates (Continued)*

Variable	Meaning	Command	Suppressed Default
power	802.11a and 802.11b radio module power level	power local %power%	maximum
location	The location of the SNMP server.	snmp-server location %location%	-
contact	The SNMP server contact.	snmp-server contact %contact%	
certificate	The SSL Certificate used by the AP	%certificate%	-
ap include	The AP include fields allow for configurable variables. Any lines placed in the AP Include field on the **APs/Devices > Manage** configuration page replace this variable.	%ap_include_1% through %ap_include_10%	-
`chassis id`			
`domain`			
`interfaces`			
`location`			

Using AP-Specific Variables

When a template is applied to an AP all variables are replaced with the corresponding settings from the **APs/Devices > Manage** configuration page. This enables AP-specific settings (such as Channel) to be managed effectively on an AP-by-AP basis. The list of used and available variables appears on the template detail configuration page. Variables are always encapsulated between % signs. The following example illustrates this usage:

```
hostname %hostname%
…
interface Dot11Radio0
…
 power local cck %CCK_POWER%
 power local ofdm %OFDM_POWER%
 channel %CHANNEL%
…
```

The `hostname` line sets the AP hostname to the hostname stored in AWMS.

The `power` lines set the power local `cck` and `ofdm` values to the numerical values that are stored in AWMS.

Configuring Cisco IOS Templates

Cisco IOS access points have hundreds of configurable settings. AWMS enables you to control them via the **Groups > Templates** configuration page. This page defines the startup-config file of the devices rather than using the AWMS normal **Group** configuration pages. AWMS no longer supports making changes for these devices via the browser-based page, but rather uses templates to configure all settings, including settings that were controlled formerly on the AWMS **Group** configuration pages. Perform these steps to configure a Cisco IOS Template for use with one or more groups, and the associated devices.

This section includes the following topics:

- Applying Startup-config Files
- WDS Settings in Templates
- SCP Required Settings in Templates

- Supporting Multiple Radio Types via a Single IOS Template
- Configuring Single and Dual-Radio APs via a Single IOS Template

Applying Startup-config Files

Each of the APs in the Group copies its unique startup-config file from AWMS via TFTP or SCP.

- If the **Reboot Devices after Configuration Changes** option is selected, then AWMS instructs the AP to copy the configuration from AWMS to the startup-config file of the AP and reboot the AP.
- If the **Reboot Devices after Configuration Changes** option is not selected, then AWMS instructs the AP to copy the configuration to the startup-config file and then tell the AP to copy the startup config file to the running-config file. Use the reboot option when possible. Copying the configuration from startup to running merges the two configurations and can cause undesired configuration lines to remain active on the AP.

For additional information, refer to "Access Point Notes" on page 261 for a full Cisco IOS template.

NOTE: Changes made on the standard AWMS Group configuration pages, to include Basic, Radio, Security, VLANs, and so forth, are not applied to any template-based APs.

WDS Settings in Templates

A group template supports Cisco WDS settings. APs functioning in a WDS environment communicate with the Cisco WLSE via a WDS master. IOS APs can function in Master or Slave mode. Slave APs report their rogue findings to the WDS Master (AP or WLSM which reports the data back to the WLSE. On the **APs/Devices > Manage** configuration page, select the proper role for the AP in the WDS Role dropdown menu.

The following example sets an AP as a WDS Slave with the following lines:

```
%if wds_role=client%
wlccp ap username wlse password 7 XXXXXXXXXX
%endif%
```

The following example sets an AP as a WDS Master with the following lines:

```
%if wds_role=master%
aaa authentication login method_wds group wds
aaa group server radius wds server
10.2.25.162 auth-port 1645 acct-port 1646
wlccp authentication-server infrastructure method_wds
wlccp wds priority 200 interface BVI1
wlccp ap username wlse password 7 095B421A1C
%endif%
```

The following example sets an AP as a WDS Master Backup with the following lines:

```
%if wds_role=backup%
aaa authentication login method_wds group wds
aaa group server radius wds server
10.2.25.162 auth-port 1645 acct-port 1646
wlccp authentication-server infrastructure method_wds
wlccp wds priority 250 interface BVI1
wlccp ap username wlse password 7 095B421A1C
%endif%
```

SCP Required Settings in Templates

A few things must be set up before enabling SCP on the **Groups > Basic** configuration page. The credentials used by AWMS to login to the AP must have level 15 privileges. Without them AWMS is not able to communicate with the AP via SCP. The line "`aaa authorization exec default local`" must be in the APs configuration file and the AP must have the SCP server enabled. These three settings correspond to the following lines in the AP's configuration file:

- `username Cisco privilege 15 password 7 0802455D0A16`
- `aaa authorization exec default local`
- `ip scp server enable`

The `username` line is a guideline and will vary based on the username being set, in this case Cisco, and the password and encoding type, in this case 0802455D0A16 and 7 respectively.

These values can be set on a group wide level using Templates and TFTP. Once these lines are set, SCP can be enabled on the **Groups > Basic** configuration page without problems.

Supporting Multiple Radio Types via a Single IOS Template

Some lines in an IOS configuration file should only apply to 802.11g vs. 802.11b. For instance, lines related to speed rates that mention rates above 11.0Mb/s do not work for 802.11b radios that cannot support these data rates.Use the "`%IF variable=value% … %ENDIF%`" construct to allow a single IOS configuration template to configure APs with different radio types within the same Group as illustrated below:

```
interface Dot11Radio0
…
%IF radio_type=g%
speed basic-1.0 basic-2.0 basic-5.5 6.0 9.0 11.0 12.0 18.0 24.0 36.0 48.0 54.0
%ENDIF%
%IF radio_type=b%
speed basic-1.0 2.0 5.5 11.0
%ENDIF%
%IF radio_type=g%
power local cck %CCK_POWER%
power local ofdm %OFDM_POWER%
%ENDIF%
…
```

Configuring Single and Dual-Radio APs via a Single IOS Template

To configure single and dual-radio APs using the same IOS config template, you can use the interface variable within the %IF…% construct. The below example illustrates this usage:

```
%IF interface=Dot11Radio1%
interface Dot11Radio1
 bridge-group 1
 bridge-group 1 block-unknown-source
 bridge-group 1 spanning-disabled
 bridge-group 1 subscriber-loop-control
 no bridge-group 1 source-learning
 no bridge-group 1 unicast-flooding
 no ip address
 no ip route-cache
 rts threshold 2312
 speed basic-6.0 basic-9.0 basic-12.0 basic-18.0 basic-24.0 36.0 48.0 54.0
 ssid decibel-ios-a
   authentication open
   guest-mode
   station-role root
      %ENDIF%
```

Configuring Cisco Catalyst Switch Templates

Cisco Catalyst Switch templates are configured much like Cisco IOS templates with the addition of the `interfaces` and `switch_command` (for stacked switches) variables. Interfaces can be configured on the Device Interface pages, as shown in "Configuring Device Interfaces for Cisco Catalyst Switches" on page 138. You can import interface information as described in this section or by fetching a template from that device, as described in "Configuring General Templates" on page 154.

NOTE: Just one template is used for any type of Cisco IOS device, and another is used for any type of Catalyst Switch regardless of individual model.

Configuring Symbol Controller / HP WESM Templates

This section describes the configuration of templates for Symbol controllers and HP WESM devices.

Symbol controllers (RFS x000, 5100 and 2000) can be configured in AWMS using templates. AWMS supports Symbol thin AP firmware upgrades from the controller's manage page.

A sample running-configuration file template is provided in this topic for reference. A template can be fetched from a model device using the Cisco IOS device procedure described in "Configuring Cisco IOS Templates" on page 158. Cisco IOS template directives such as `ignore_and_do_not_push` can also be applied to Symbol templates.

Certain parameters such as `hostname` and `location` are turned into variables with the `%` tags so that device-specific values can be read from the individual manage pages and inserted into the template. They are listed in Available Variable boxes on the right-hand side of the template fields.

Certain settings have integrated variables, including `ap-license` and `adoption-preference-id`. The radio preamble has been template-integrated as well. An option on the **Group > Templates** page reboots the device after pushing a configuration to it.

A sample Symbol controller partial template is included below for reference.

```
!
! configuration of RFS4000 version 4.2.1.0-005R
!
version 1.4
!
!
aaa authentication login default local none
service prompt crash-info
!
network-element-id RFS4000
!
username admin password 1 5baa61e4c9b93f3f0682250b6cf8331b7ee68fd8
username admin privilege  superuser
username operator password 1 fe96dd39756ac41b74283a9292652d366d73931f
!
!
access-list 100 permit ip 192.168.0.0/24 any rule-precedence 10
!
spanning-tree mst cisco-interoperability enable
spanning-tree mst configuration
 name My Name
!
ip dns-server-forward
wwan auth-type chap
no bridge multiple-spanning-tree enable bridge-forward
country-code us
aap-ipfilter-list no port 3333 plz
aap-ipfilter-list no port 3333 tcp plz
 deny tcp src-start-ip 0.0.0.0 src-end-ip 255.255.255.255 dst-start-ip 0.0.0.0 dst-end-ip
255.255.255.255 dst-start-port 3333 dst-end-port 3334 rule 1
%redundancy_config%
logging buffered 4
logging console 4
snmp-server engineid netsnmp 6b8b45674b30f176
snmp-server location %location%
snmp-server contact %contact%
snmp-server sysname %hostname%
snmp-server manager v2
snmp-server manager v3
snmp-server user snmptrap v3 encrypted auth md5 0x1aa491f4ca7c55df0f57801bece9044c
snmp-server user snmpmanager v3 encrypted auth md5 0x1aa491f4ca7c55df0f57801bece9044c
snmp-server user snmpoperator v3 encrypted auth md5 0xb03b1ebfa0e3d02f50e2b1c092ab7c9f
```

A sample Symbol Smart RF template is provided below for reference:

```
radio %radio_index% radio-mac %radio_mac%
%if radio_type=11a%
  radio %radio_index% coverage-rate  18
```

```
%endif%
%if radio_type=11an%
  radio %radio_index% coverage-rate  18
%endif%
%if radio_type=11b%
  radio %radio_index% coverage-rate  5p5
%endif%
%if radio_type=11bg%
  radio %radio_index% coverage-rate  6
%endif%
%if radio_type=11bgn%
  radio %radio_index% coverage-rate  18
%endif%
```

A sample Symbol thin AP template is provided below for reference and for the formatting of **if** statements.

```
 radio add %radio_index% %lan_mac% %radio_type% %ap_type%
  radio %radio_index% radio-number %radio_number%
  radio %radio_index% description %description%
  %if radio_type=11a%
  radio %radio_index% speed  basic6 9 basic12 18 basic24 36 48 54
  radio %radio_index% antenna-mode primary
  radio %radio_index% self-heal-offset 1
  radio %radio_index% beacon-interval 99
  radio %radio_index% rts-threshold 2345
  radio %radio_index% max-mobile-units 25
  radio %radio_index% admission-control voice max-perc 76
  radio %radio_index% admission-control voice res-roam-perc 11
  radio %radio_index% admission-control voice max-mus 101
  radio %radio_index% admission-control voice max-roamed-mus 11
  %endif%
  %if radio_type=11an%
  radio %radio_index% speed  basic11a 9 18 36 48 54 mcs
0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
  %endif%
  %if radio_type=11b%
  radio %radio_index% speed  basic1 basic2 basic5p5 basic11
  %endif%
  %if radio_type=11bg%
  radio %radio_index% speed  basic1 basic2 basic5p5 6 9 basic11 12 18 24 36 48 54
  radio %radio_index% on-channel-scan
  radio %radio_index% adoption-pref-id 7
  radio %radio_index% enhanced-beacon-table
  radio %radio_index% enhanced-probe-table
  %endif%
  %if radio_type=11bgn%
  radio %radio_index% speed  basic11b2 6 9 12 18 24 36 48 54 mcs
0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
  %endif%
  radio %radio_index% channel-power indoor %channel% %transmit_power% %channel_attribute%
  %detector%
%adoption_pref_id%
  radio %radio_index% enhanced-beacon-table
  radio %radio_index% on-channel-scan
%ap_include_4%
```

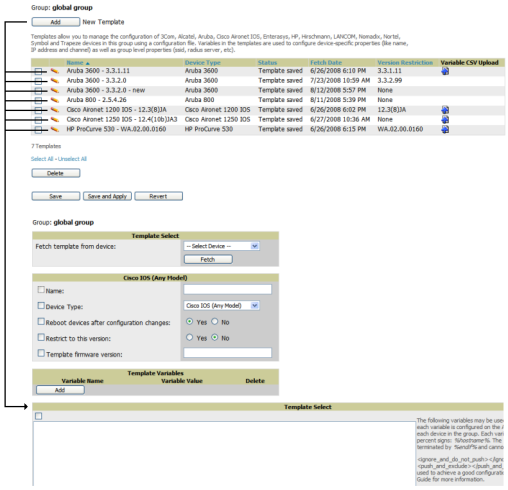
Configuring a Global Template

Global templates allow AWMS users to define a single template in a global group that can be used to manage APs in subscriber groups. They turn settings like group RADIUS servers and encryption keys into variables that can be configured on a per-group basis.

Perform the following steps to create a global template, or to view or edit an existing global template:

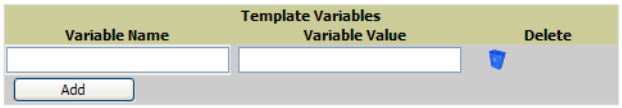
1. Go to the **Group > Templates** configuration page for the global group that owns it.
2. Select **Add** to add a new template, or select the **pencil** icon next to an existing template to edit it.
3. Examine the configurations illustrated in Figure 110.

Figure 110 *Group > Templates > Add Page Illustration*



4. Use the drop-down menu to select a device from which to build the global template and select **Fetch**. The menus are populated with all devices that are contained in any group that subscribes to the global group. The fetched configuration populates the template field. Global template variables can be configured with the **Add** button in the **Template Variables** box, illustrated in Figure 111.

Figure 111 *Template Variables Illustration*



The variable name cannot have any spaces or non-alphanumeric characters. The initial variable value entered is the default value, but can be changed on a per-group basis later. You can also populate global template variables by uploading a CSV file (see below).

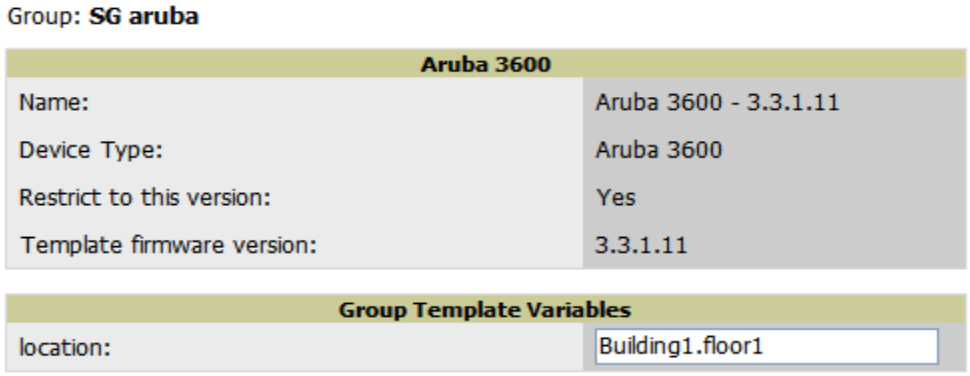
5. Once you have configured your global template, select **Add**. You are taken to a confirmation configuration page where you can review your changes.
6. If you want to add the global template, select **Apply Changes Now**. If you do not want to add the template, select **Cancel and Discard Changes**. Canceling from the confirmation configuration page causes the template and all of the template variables to be lost.
7. Once you have added a new global template, you can use a CSV upload option to configure global template variables. Go to the **Groups > Templates** configuration page and select the **CSV** upload icon for the template. The CSV file must contain columns for **Group Name** and **Variable Name**. All fields must be completed.
   - **Group Name**—the name of the subscriber group that you wish to update.
   - **Variable Name**—the name of the group template variable you wish to update.
   - **Variable Value**—the value to set.

   For example, for a global template with a variable called "ssid_1", the CSV file might resemble what follows:

```
Group Name, ssid_1
Subscriber 1, Value 0
```

8. Once you have defined and saved a global template, it is available for use by any local group that subscribes to the global group. Go to the **Groups > Template** configuration page for the local group and select the pencil icon next to the global template in the list. Figure 112 illustrates this page.

Figure 112 *Groups > Templates Edit, Upper Portion*



9. To make template changes, go to the **Groups > Template** configuration page for the global group and select the **pencil** icon next to the template you wish to edit. Note that you cannot edit the template itself from the subscriber group's **Groups > Templates** tab.
10. If group template variables have been defined, you are able to edit the value for the group on the **Groups > Templates, Add** configuration page in the **Group Template Variables** box. For Symbol devices, you are also able to define the template per group of APs.

For more information on using templates in AWMS, see the previous section of this chapter. It is also possible to create local templates in a subscriber group—using global groups does not mean that global templates are mandatory.

Chapter 7

Using RAPIDS and Rogue Classification

This chapter provides an overview to rogue device and IDS event detection, alerting, and analysis using RAPIDS, and contains the following sections:

- "Introduction to RAPIDS" on page 165
- "Viewing Rogues on the RAPIDS > List Page" on page 174
- "Setting Up RAPIDS" on page 167
- "Defining RAPIDS Rules" on page 169
- "Score Override" on page 177
- "Audit Log" on page 178
- "Additional Security Resources" on page 179

Introduction to RAPIDS

Rogue device detection is a core component of wireless security. With RAPIDS rules engine and containment options, you can create a detailed definition of what constitutes a rogue device, and quickly act on a rogue AP for investigation, restrictive action, or both. Once rogue devices are discovered, RAPIDS alerts your security team of the possible threat and provides essential information needed to locate and manage the threat.

RAPIDS discovers unauthorized devices in your WLAN network in the following ways:

- Over the Air
  - Using your existing enterprise APs
  - Optional AirWave Management Client (AMC)
- On the Wire
  - Polling routers and switches to identify, classify, and locate unknown APs
  - Using HTTP and SNMP scanning

NOTE: To set up a scan, refer to "Discovering and Adding Devices" on page 107.

  - Using the controller's wired discovery information

Furthermore, RAPIDS integrates with external intrusion detection systems (IDS), as follows:

- **Dell WIP**—ADell's Wireless Intrusion Protection (WIP) module integrates wireless intrusion protection into the mobile edge infrastructure. The WIP module provides wired and wireless AP detection, classification and containment; detects DoS and impersonation attacks; and prevents client and network intrusions.
- **Cisco WLSE** (1100 and 1200 IOS)—AWMS fetches rogue information from the HTTP interface and gets new AP information from SOAP API. This system provides wireless discovery information rather than rogue detection information.
- **AirMagnet Enterprise**—Retrieves a list of managed APs from AWMS.
- **AirDefense**—Uses the AWMS XML API to keep its list of managed devices up to date.
- **WildPackets OmniPeek**—Retrieves a list of managed APs from AWMS.

Viewing Overall Network Health on the RAPIDS > Overview Page

The **RAPIDS > Overview** page displays a page of RAPIDS summary information (see Figure 113). Table 92 defines the summary information that appears on the page.

Figure 113 ***RAPIDS > Overview*** *Page Illustration*

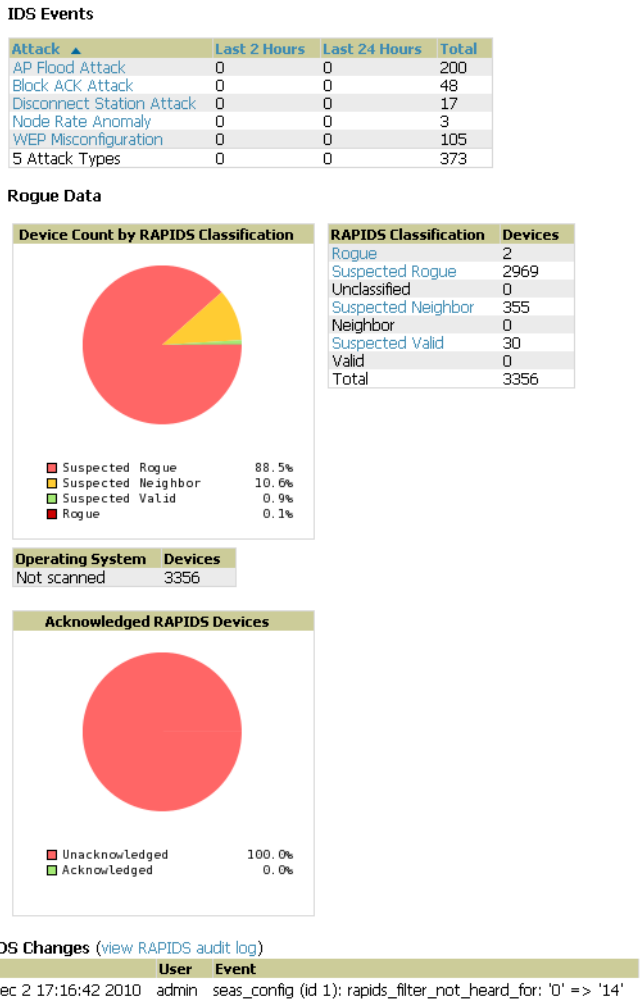


Table 92 ***Overview*** *Fields*

Summary	Description
IDS Events	Displays a list of IDS events for the designated folder and subfolders. Field displays events from the past two hours, the past 24 hours, and total IDS events. Names of attacks link to summary pages with more details. **Note:** AMP should be configured as the SNMP trap receiver on the controllers to receive IDS traps. See the *Dell Best Practices Guide* in **Home > Documentation** for details.
Rogue Data	A pie chart of rogue device percentages by RAPIDS classification. Select a classification from the **RAPIDS Classification** table to be taken to a **RAPIDS > List** page, filtered by that classification.
Operating System	Detected operating systems represented in both a color coded pie chart and a summary listing. OS scans can be run manually or enabled to run automatically on the **RAPIDS > Setup** page.
Acknowledged RAPIDS Devices	A color coded pie chart comparing the number of acknowledged devices to the unacknowledged devices.
RAPIDS Changes	Tracks every change made to RAPIDS including changes to rules, manual classification, and components on the **RAPIDS > Setup** page.

Setting Up RAPIDS

The **RAPIDS > Setup** page allows you to configure your AMP server for RAPIDS. Complete the settings on this page as desired, and select **Save**. Most of the settings are internal to how AMP will process rogues.

Basic Configuration

On the **RAPIDS > Setup** page, the **Basic Configuration** section allows you to define RAPIDS behavior settings. Figure 114 illustrates this page.

Figure 114 ***RAPIDS > Setup*** *Page Illustration*

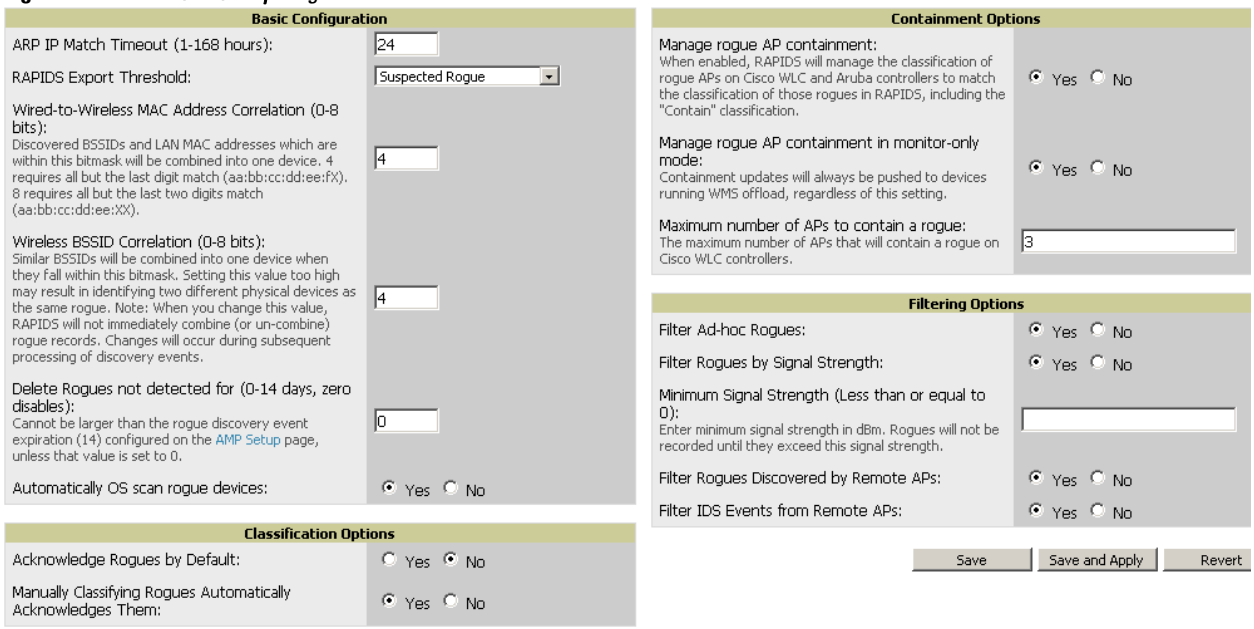


Table 93 ***RAPIDS > Setup > Basic Configuration*** *Fields*

Field	Default	Description
ARP IP Match Timeout	24	If you have routers and switches on the AMP, and it's scanning them for ARP tables, this can assign a rogue IP address information. This timeout specifies how recent that information needs to be for the IP address to be considered valid. Note that the default ARP poll period is long (several hours).
RAPIDS Export Threshold	Suspected Rogue	Exported rogues will be sent to VisualRF for location calculation.
Wired-to-Wireless MAC Address Correlation	4	Discovered BSSIDs and LAN MAC addresses which are within this bitmask will be combined into one device. 4 requires all but the last digit match (aa:bb:cc:dd:ee:fX). 8 requires all but the last two digits match (aa:bb:cc:dd:ee:XX).
Wireless BSSID Correlation	4	Similar BSSIDs will be combined into one device when they fall within this bitmask. Setting this value too high may result in identifying two different physical devices as the same rogue. **Note:** When you change this value, RAPIDS will not immediately combine (or un-combine) rogue records. Changes will occur during subsequent processing of discovery events.
Delete Rogues not detected for (0-14 days, zero disables):	0	This value cannot be larger than the rogue discovery event expiration (14) configured on the **AMP Setup** page, unless that value is set to **0**.
Automatically OS scan rogue devices	No	Whether to scan the operating system of rogues. Enabling this feature will cause RAPIDS to perform an OS scan when it gets in IP address for a rogue device. The OS scan will be run when a rogue gets an IP address for the first time or if the IP address changes.

Table 94 ***RAPIDS > Setup > Classification Options*** *Fields*

Field	Default	Description
Acknowledge Rogues by Default	No	Sets RAPIDS to acknowledge rogue devices upon initial detection, prior to their classification.
Manually Classifying Rogues Automatically Acknowledges them	Yes	Defines whether acknowledgement happens automatically whenever a rogue device receives a manual classification.

Filtered rogues are dropped from the system before they are processed through the rules engine. This can speed up overall performance but will eliminate all visibility into these types of devices.

Table 95 ***RAPIDS > Setup > Filtering*** *Options*

Field	Default	Description
Filter Ad-hoc rogues	No	Filters rogues according to ad-hoc status.
Filter Rogues by Signal Strength	No	Filters rogues according to signal strength. Since anything below the established threshold will be ignored and possibly dangerous, we do not recommend enabling this setting. Instead, we recommend you incorporate signal strength into the classification rules on the **RAPIDS > Rules** page.
Filter Rogues Discovered by Remote APs	No	Filters rogues according to the remote AP that discovers them. Enabling this option causes AWMS to drop all rogue discovery information coming from remote APs.
Filter IDS Events from Remote APs	No	Filters IDS Events discovered by remote APs.

Rogue Containment Options

Using RAPIDS, AMP can shield rogue devices from associating to Cisco WLC controllers (versions 4.2.114 and later), and Dell PowerConnect W controllers (running AOS versions 3.x and later). AMP will alert you to the appearance of the rogue device and identify any mismatch between controller configuration and the desired configuration.

NOTE: WMS Offload is not required to manage containment in AMP.

Table 96 shows the Containment Options section of the **RAPIDS > Setup** page.

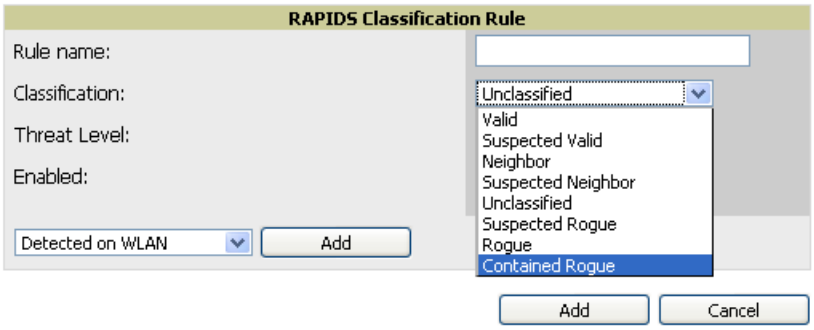
Table 96 ***RAPIDS > Setup > Containment Options*** *Fields and Default Values*

Field	Default	Description
Manage rogue AP Containment	Yes	Rogue APs on Cisco WLC and Dell PowerConnect W controllers as defined by the Rules engine will be classified as a Contained Rogue. AMP pushes the containment status of a rogue device to the controller and the controller takes the appropriate action. For the rogue device to be contained, you may need to configure containment on the controller.
Manage rogue AP containment in monitor-only mode	No	If disabled, AMP will display the desired containment settings but will not push them to devices. This may result in mismatches in device classifications. This can be useful for administrators that want to see what RAPIDS would push to the controller without making any changes to their network. If enabled, AMP will push the desired containment settings to the controllers in Monitor-Only mode, as well as the devices in **Managed** mode.
Maximum number of APs to contain a rogue	3	Sets the maximum number of APs that will contain a rogue on Cisco WLC controllers.

1. Navigate to the **RAPIDS > Setup** page.
2. From the **Containment Options** section, select **Yes** to manage rogue AP containment. Once this is done, the Contained Rogue classification will appear as an option in the classification dropdown menu as shown in Figure 115.

   Additionally, once this option been enabled, the option to manage contained APs in **Monitor-Only** mode becomes available. Containment in Monitor-Only mode means configuration changes will still be pushed to the controller, even though it is in monitor-only mode.

Figure 115 ***RAPIDS > Classification Rule*** *Menu with Containment*



From the **APs/Devices > Rogues Contained** page, you can see the containment status information, as shown in Figure 116.

NOTE: The Rogue Containment device tab is only present for devices that support containment.

Figure 116 *Rogue Containment Status Page*

Rogue Containment Status

1-5 of 5 Rogue BSSIDs Page 1 of 1 Choose Columns Export to CSV

Rogue	BSSID	Containment State	Desired Containment State	Classifying Rule	Location
Cisco-9F:75:90	00:1D:45:9F:75:90	Not Contained	Contained	Manual Classification Override	-
Enterasys-36:5C:18	00:01:F4:36:5C:18	Contained	Not Contained	Signal strength > -75 dBm	-
Enterasys-37:4A:C3	00:01:F4:37:4A:C3	Contained	Not Contained	Signal strength > -75 dBm	-
Locally Ad-71:BA:90	02:20:A6:71:BA:90	Contained	Not Contained	Signal strength > -75 dBm	-
Locally Ad-71:BA:90	02:20:A6:71:BA:91	Contained	Not Contained	Signal strength > -75 dBm	-

1-5 of 5 Rogue BSSIDs Page 1 of 1

Additional Settings

Additional RAPIDS settings such as role filtering and performance tuning are available in the following locations:

- Use the **AMP Setup > Roles > Add/Edit Role Page** to define the ability to use RAPIDS by user role. Refer to "Creating AWMS User Roles" on page 44.
- Use the **AMP Setup > General > Performance Tuning** page to define the processing priority of RAPIDS in relation to AWMS as a whole (see Table 15 on page 40).

Defining RAPIDS Rules

The **RAPIDS > Rules** page is one of the core components of RAPIDS. This feature allows you to define rules by which any detected device on the network is classified.

This section describes how to define, use, and monitor RAPIDS rules, provides examples of such rules, and demonstrates how they are helpful.

This section contains the following topics:

- "Controller Classification with WMS Offload" on page 170
- "Device OUI Score" on page 170

- "Rogue Device Threat Level" on page 171
- "Viewing and Configuring RAPIDS Rules" on page 171
- "Recommended RAPIDS Rules" on page 173
- "Using RAPIDS Rules with Additional AWMS Functions" on page 174

Controller Classification with WMS Offload

This classification method is supported only when WMS offload is enabled on Dell WLAN controllers. Controller classification of this type remains distinct from RAPIDS classification. WLAN switches feed wireless device information to AWMS, which AWMS then processes. AWMS then pushes the WMS classification to all of the ArubaOS controllers that are WMS offload enabled.

WMS Offload ensures that a particular BSSID has the same classification on all of the controllers. WMS Offload removes some load from master controllers and feeds 'connected-to-lan' information to the RAPIDS classification engine. RAPIDS classifications and controller classifications are separate and often are not synchronized.

NOTE: RAPIDS classification is not pushed to the devices.

The following table compares how default classification may differ between AWMS and ArubaOS for scenarios involving WMS Offload.

Table 97 *Rogue Device Classification Matrix*

AWMS	AOS (ARM)
Unclassified (default state)	Unknown
Rogue	Rogue
Suspected Neighbor	Interfering
Neighbor	Known Interfering
Valid	Valid
Contained Rogue	DOS

For additional information about WMS Offload, refer to the *Best Practices Guide* in **Home > Documentation**.

Device OUI Score

The Organizationally Unique Identifier (OUI) score is based on the LAN MAC address of a device. RAPIDS can be configured to poll your routers and switches for the bridge forwarding tables. RAPIDS then takes the MAC addresses from those tables and runs them through a proprietary database to derive the OUI score. The OUI score of each device is viewable from each rogue's detail page. Table 98 provides list the OUI scores definitions.

Table 98 *Device OUI Scores*

Score	Description
Score of 1	Indicates any device on the network; this is the lowest threat level on the network.
Score of 2	Indicates any device in which the OUI belongs to a manufacturer that produces wireless (802.11) equipment.
Score of 3	Indicates that the OUI matches a block that contains APs from vendors in the Enterprise and small office/ small home market.
Score of 4	Indicates that the OUI matches a block that belonged to a manufacturer that produces small office/ small home access points.

Rogue Device Threat Level

The threat level classification adds granularity for each general RAPIDS classification. Devices of the same classification can have differing threat scores based on the classifying rule, ranging from 1 to 10 with a default value of 5. This classification process can help identify the greater threat. Alerts can be defined and sorted by threat level.

Threat level and classification are both assigned to a device when a device matches a rule. Once classified, a device's classification and threat level change only if it is classified by a new rule or is manually changed. Threats levels can be manually defined on the **RAPIDS > Detail** page when the RAPIDS classification is manually overridden or you can edit the rule to have a higher threat level.

Viewing and Configuring RAPIDS Rules

To view the RAPIDS rules that are currently configured on AWMS, navigate to the **RAPIDS > Rules** page (Figure 117).

Figure 117 ***RAPIDS > Rules*** *Page Illustration*

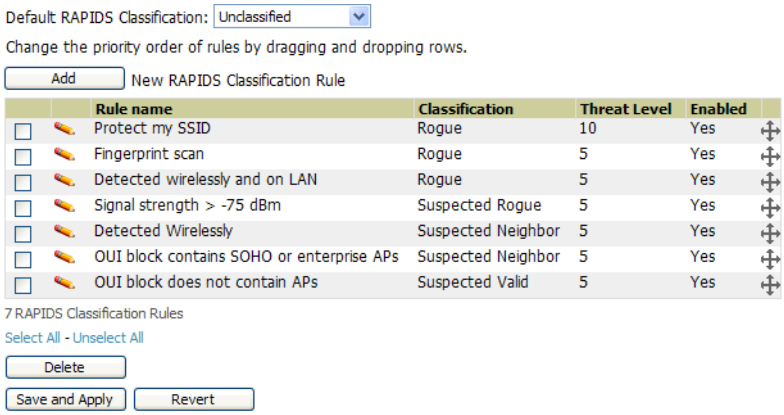


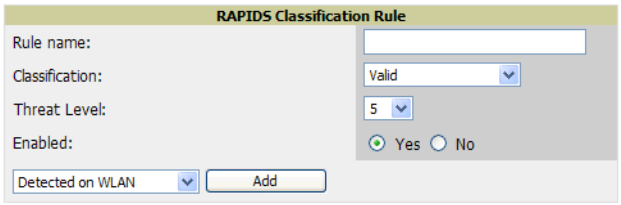
Table 99 defines the fields in the **RAPIDS > Rules** page.

Table 99 ***RAPIDS > Rules*** *Page*

Field	Description
Default Classification	Sets the classification that a rogue device receives when it does not match any rules.
Add New RAPIDS Classification Rule	Select this button to create a RAPIDS classification rule.
Rule Name	Displays the name of any rule that has been configured. Rule names should be descriptive and should convey the core purpose for which it was created.
Classification	Displays the classification that devices receive if they meeting the rule criteria.
Threat Level	Displays the numeric threat level for the rogue device that pertains to the rule. Refer to "Rogue Device Threat Level" on page 171 for additional information.
Enabled	Displays the status of the rule, whether enabled or disabled.
Reorder Drag and Drop Icon 	Changes the sequence of rules in relation to each other. Select, then drag and drop, the icon for any rule to move it up or down in relation to other rules. A revised sequence of rules must be saved before rogues are classified in the revised sequence. **NOTE:** The sequence of rules is very important for proper rogue classification. A device gets classified by the first rule to which it complies, even if it conforms to additional rules later in the sequence.

To create a new rule, select the **Add** button next to **New RAPIDS Classification Rule** to launch the **RAPIDS Classification Rule** page (see Figure 118).

Figure 118 *Classification Rule Page*



Fill in the settings described in Table 99 then select an option from the dropdown menu.

Table 100 defines the dropdown menu options that are at the bottom left of the RAPIDS Classification Rule dialog box (see Figure 118). Once all rule settings are defined, select **Add**. The new rule automatically appears in the **RAPIDS > Rules** page.

Table 100 *Properties Drop Down Menu*

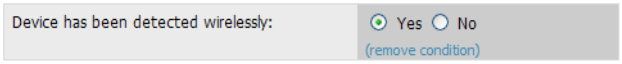
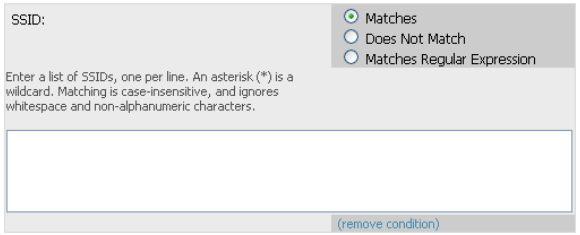
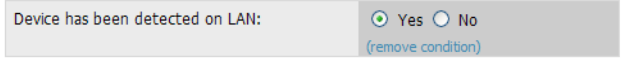
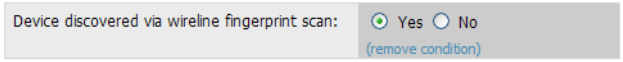
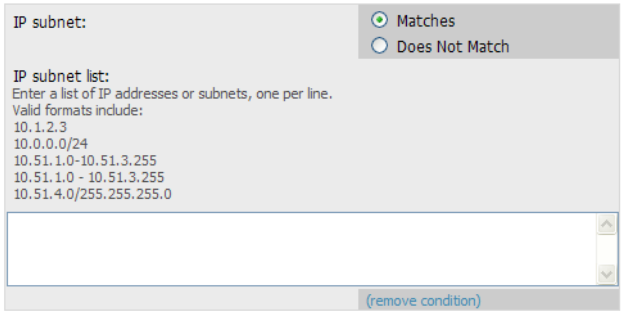
Option	Description
Wireless Properties	
Detected on WLAN	Classifies based on how the rogue is detected on the wireless LAN. 
Detecting AP Count	Classifies based on the number of managed devices that can hear the rogue. Enter a numeric value and select **At Least** or **At Most**.
Encryption	Classifies based on the rogue matching a specified encryption method. Note that you can select for 'no encryption' with a rule that says "Encryption does not match WEP or better". 
Network type	Rogue is running on the selected network type, either **Ad-hoc** or **Infrastructure.**
Signal Strength	Rogue matches signal strength parameters. Specify a minimum and maximum value in dBm.
SSID	Classifies the rogue when it matches or does not match the specified string for the SSID or a specified regular expression.  **NOTE:** For SSID matching functions, AWMS processes only alpha-numeric characters and the asterisk wildcard character (*****). AWMS ignores all other non-alpha-numeric characters. For example, the string of **`ethersphere-*`** matches the SSID of **`ethersphere-wpa2`** but also the SSID of **`ethersphere_this_is_an_example`** (without any dashes).
Wireline Properties	
Detected on LAN	Rogue is detected on the wired network. Select **Yes** or **No**. 
Fingerprint Scan	Rogue matches fingerprint parameters. 

Table 100 ***Properties*** *Drop Down Menu (Continued)*

Option	Description
IP Address	Rogue matches a specified IP address or subnet. Enter IP address or subnet information as explained by the fields. 
OUI Score	Rogue matches manufacturer OUI criteria. You can specify minimum and maximum OUI score settings from two drop-down lists. Select **remove** to remove one or both criteria, as desired.
Operating System	Rogue matches OS criteria. Specify matching or non-matching OS criteria as prompted.
Wireless/Wireline Properties	
Manufacturer	Rogue matches the manufacturer information of the rogue device. Specify matching or non-matching manufacturer criteria.
MAC Address	Rogue matches the MAC address. Specify matching or non-matching address criteria, or use a wildcard (*) for partial matches.
Dell Controller Properties	
Controller Classification	Rogue matches the specified controller classification.
Confidence	Rogue falls within a specified minimum and maximum confidence level, ranging from 1 to 100.

After creating a new rule, select **Add** to return to the **RAPIDS > Rules** page. Select **Save and Apply** to have the new rule take effect.

Deleting or Editing a Rule

To delete a rule from the RAPIDS rules list, go to the **RAPIDS > Rules** page. Select the check box next to the rule you want to delete, and select **Delete**. The rule is automatically deleted from **RAPIDS > Rules**.

To edit any existing rule, select its pencil icon to launch the **RAPIDS Classification Rule** page (see Figure 118). Edit or revise the fields as necessary, then select **Save**.

To change the sequence in which rules apply to any rogue device, drag and drop the rule to a new position in the rules sequence.

Recommended RAPIDS Rules

- **If Any Device Has Your SSID, Then Classify as Rogue**

  The only devices broadcasting your corporate SSID should be devices that you are aware of and are managed by AWMS. Rogue devices often broadcast your official SSID in an attempt to get access to your users, or to trick your users into providing their authentication credentials. Devices with your SSID generally pose a severe threat. This rule helps to discover, flag, and emphasize such a device for prompt response on your part.

- **If Any Device Has Your SSID and is Not an Ad-Hoc Network Type, Then Classify as Rogue**

  This rule classifies a device as a rogue when the SSID for a given device is your SSID and is not an Ad-Hoc device. Windows XP automatically tries to create an Ad-hoc network if it can not find the SSID for which it is searching. This means that user's laptops on your network may appear as Ad-Hoc devices that are broadcasting your SSID. If this happens too frequently, restrict the rule to apply to non-ad-hoc devices.

- **If More Than Four APs Have Discovered a Device, Then Classify as Rogue**

  By default, AWMS tries to use Signal Strength to determine if a device is on your premises. Hearing device count is another metric that can be used.

  The important concept in this scenario is that legitimate neighboring devices are only heard by a few APs on the edge of your network. Devices that are heard by a large number of your APs are likely to be in the heart of your campus. This rule works best for scenarios in large campuses or that occupy an entire building. For additional rules that may help you in your specific network scenario, contact Dell support.

Using RAPIDS Rules with Additional AWMS Functions

Rules that you configure on the **RAPIDS > Rules** page establish an important way of processing rogue devices on your network, and flagging them for attention as required. Such devices appear on the following pages in AWMS, with additional information:

- **RAPIDS > List**—Lists rogue devices as classified by rules.
- **RAPIDS > Rules**—Displays the rules that classify rogue devices.
- **RAPIDS > Overview**—Displays general rogue device count and statistical information.
- **System > Triggers**—Displays triggers that are currently configured, including any triggers that have been defined for rogue events.
- **Reports > Definitions**—Allows you to run New Rogue Devices Report with custom settings.
- **VisualRF**—Displays physical location information for rogue devices.

Viewing Rogues on the RAPIDS > List Page

To view a rogue AP, select the **RAPIDS > List** tab and select a rogue device type from the **Minimum Classification** drop-down menu (see Figure 119). You can sort the table columns (up/down) by selecting the column head or filter data using the column head dropdown menus. The active links on this page launch additional pages for RAPIDS configuration or device processing.

Figure 119 ***RAPIDS > List Page*** *Illustration (partial view)*

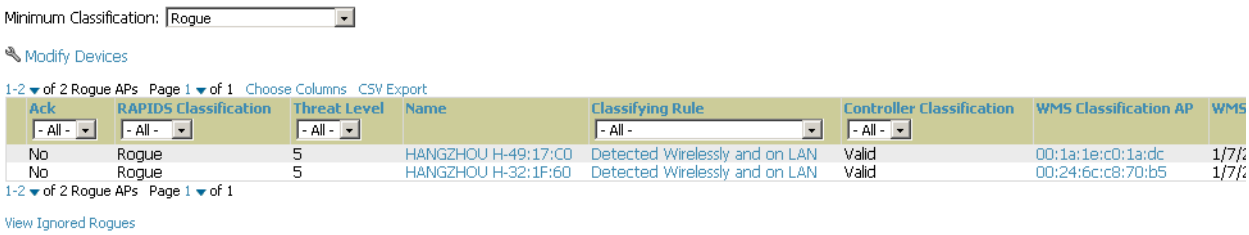


Table 101 details the column information displayed in Figure 119. For additional information about RAPIDS rules, refer to "Defining RAPIDS Rules" on page 169.

Table 101 ***RAPIDS > List*** *Column Definitions*

Column	Description
Ack	Displays whether or not the rogue device has been acknowledged. Devices can be acknowledged manually or you can configure RAPIDS so that manually classifying rogues will automatically acknowledges them. Additionally, devices can be acknowledged by using Modify Devices of the **List** page. Rogues should be acknowledged when the AWMS user has investigated them and determined that they are not a threat (see "Basic Configuration" on page 167).
RAPIDS Classification	Displays the current RAPIDS classification. This classification is determined by the rules defined on the **RAPIDS > Rules** page.

Table 101 *RAPIDS > List Column Definitions (Continued)*

Column	Description
Threat Level	This field displays the numeric threat level of the device, in a range from 1 to 10. The definition of threat level is configurable, as described in "Rogue Device Threat Level" on page 171. The threat level is also supported with Triggers (see "Monitoring and Supporting AWMS with the System Pages" on page 205).
Name	Displays the alpha-numeric name of the rogue device, as known. By default, AWMS assigns each rogue device a name derived from the OUI vendor and the final six digits of the MAC address.
Classifying Rule	Displays the RAPIDS Rule that classified the rogue device (see"Viewing and Configuring RAPIDS Rules" on page 171).
Controller Classification	Displays the classification of the device based on the controller's hard-coded rules. **NOTE:** This column is hidden unless **Offload WMS Database** is enabled by at least one group on the **Groups > Basic** page.
WMS Classification AP	The AP that provided the information used to classify the device.
WMS Classification Date	The date that WMS decided the classification
Confidence	The confidence level of the suspected rogue. How confidence is calculated varies based on the version of ArubaOS. When an ArubaOS controller sees evidence that a device might be on the wire it will up the confidence level. If ArubaOS is completely sure that it is on the wire, it gets classified as a rogue.
Wired	Displays whether the rogue device has been discovered on one of your wired networks by polling routers/switches, your SNMP/HTTP scans, or Dell WIP information. This column displays **Yes** or is blank if wired information was not detected.
Detecting APs	Displays the number of AP devices that have wirelessly detected the rogue device. A designation of heard implies the device was heard over the air.
Location	As with most **List** pages in AWMS, the **RAPIDS > List** page includes the **Location** column. If the rogue has been placed in VisualRF, this column will display the name of the floor plan the rogue is on. RAPIDS and VisualRF must be licensed on the AWMS for this functionality to be supported.
SSID	Displays the most recent SSID that was heard from the rogue device.
Signal	Displays the strongest signal strength detected for the rogue device.
RSSI	Displays Received Signal Strength Indication (RSSI) designation, a measure of the power present in a received radio signal.
Network Type	Displays the type of network in which the rogue is present, for example: • **Ad-hoc**—This type of network usually indicates that the rogue is a laptop that attempts to create a network with neighboring laptops, and is less likely to be a threat. • **AP**—This type of network usually indicates an infrastructure network, for example. This may be more of a threat. • **Unknown**—The network type is not known.
Encryption Type	Displays the encryption that is used by the device. Possible contents of this field include the following encryption types: • **Open**—No encryption • **WEP**—Wired Equivalent Privacy • **WPA**—Wi-Fi Protected Access Generally, this field alone does not provide enough information to determine if a device is a rogue, but it is a useful attribute. If a rogue is not running any encryption method, you have a wider security hole than with an AP that is using encryption.
Ch	Indicates the most recent RF channel on which the rogue was detected. **NOTE:** it may be detected on more than one channel if it contains more than one radio.
LAN MAC Address	The LAN MAC address of the rogue device.
LAN Vendor	Indicates the LAN vendor of the rogue device, when known.

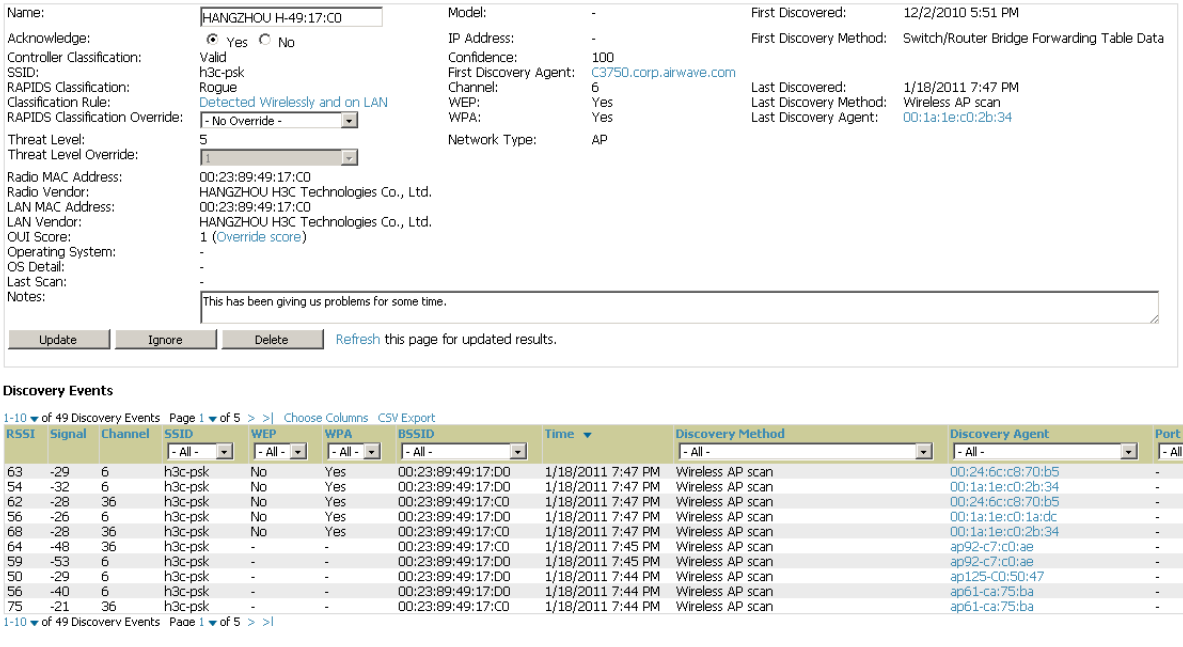
Table 101 *RAPIDS > List Column Definitions (Continued)*

Column	Description
Radio Vendor	Indicates the radio vendor of the rogue device, when known.
OS	This field displays the OS of the device, as known. OS is the result of a running an OS port scan on a device. An IP addresses is required to run an OS scan. The OS reported here is based on the results of the scan.
Model	Displays the model of rogue device, if known. This is determined with a fingerprint scan, and this information may not always be available.
IP Address	Displays the IP address of the rogue device. The IP address data comes from fingerprint scans or ARP polling of routers and switches.
Last Discovering AP	Displays the most recent AP to discover the rogue device. The device name in this column is taken from the device name in AWMS.
Switch/Router	Displays the switch or router where the device's LAN MAC address was last seen.
Port	Indicates the physical port of the switch or router where the rogue was last seen.
Last Seen	Indicates the date and time the rogue device was last seen.

Overview of the RAPIDS > Detail Page

Select a device **Name** in the **RAPIDS > List** page to view the **Detail** page (Figure 120).

Figure 120 *RAPIDS > Detail Page Illustration*



Important things to remember regarding the information in the device detail page are:

- Users with the role of **Admin** can see all rogue AP devices.
- Users with roles limited by folder can *see* a rogue AP if there is at least one discovering device it can see.
- The discovery events displayed are from APs that you can see on the network. There may be additional discovery events that remain hidden to certain user roles.
- Each rogue device frequently has multiple discovery methods, all of which are listed.
- As you work through the rogue devices, use the **Name** and **Notes** fields to identify and document its location.

- You can use the global filtering options on the **RAPIDS > Setup** page to filter rogue devices according to signal strength, ad-hoc status, and discovered by remote APs.
- VisualRF uses the heard signal information to calculate the physical location of the device.
- If the device is seen on the wire, RAPIDS reports the switch and port for easy isolation.
- If you find that the rogue belongs to a neighboring business, for example, you can override the classification to a neighbor and acknowledge the device. Otherwise, Dell strongly recommends that you extract the device from your building and delete the rogue device from your system. If you delete a rogue, you will be notified the next time it is discovered.

To update a rogue device:

1. Select the **Identify OS for Suspected Rogues** option if an IP address is available to obtain operating system information using an nmap scan. Note that if you are running wireline security software on your network, it may identify your AMP as a threat, which you can ignore.
2. Select the **Ignore** button if the rogue device is to be ignored. Ignored devices will not trigger alerts if they are rediscovered or reclassified.
3. Select the **Delete** button if the rogue device is to be removed from AWMS processing.

Viewing Ignored Rogue Devices

The **RAPIDS > List** page allows you to view ignored rogues—devices that have been removed from the rogue count displayed by AWMS. Such devices do not trigger alerts and do not display on lists of rogue devices. To display ignored rogue devices, select **View Ignored Rogues** (at the bottom left of the page).

Once a classification that has rogue devices is chosen from the drop-down menu, a detailed table displays all known information.

Using RAPIDS Workflow to Process Rogue Devices

One suggested workflow for using RAPIDS is as follows:

- Start from the **RAPIDS > List** page. Sort the devices on this page based on classification type. Begin with Rogue APs, working your way through the devices listed.
- Select **Modify Devices**, then select all devices that have an IP address and select **Identify OS**. AWMS performs a port scan on the device and attempts to determine the operating system (see "Setting Up RAPIDS" on page 167).

  You should investigate devices running an embedded Linux OS installation. The OS scan can help identify false positives and isolate some devices that should receive the most attention.
- Find the port and switch at which the device is located and shut down the port or follow wiring to the device.
- To manage the rogue, remove it from the network and acknowledge the rogue record. If you want to allow it on the network, classify the device as valid and update with notes that describe it.

NOTE: Not all rogue discovery methods will have all information required for resolution. For example, the switch/router information, port, or IP address are found only through switch or router polling. Furthermore, RSSI, signal, channel, SSID, WEP, or network type information only appear through wireless scanning. Such information can vary according to the device type that performs the scan.

Score Override

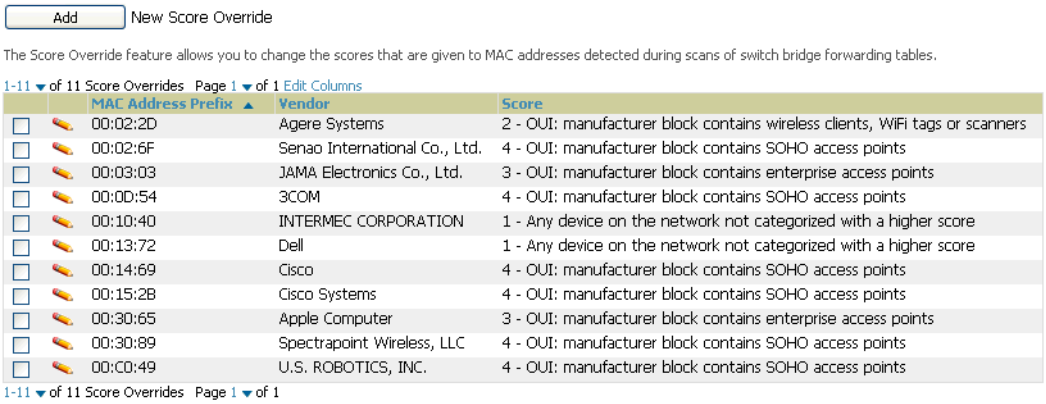
On **RAPIDS > Score Override** page you can change the OUI scores that are given to MAC addresses detected during scans of bridge forwarding tables on routers or switches. Figure 121, Figure 122, and Table 102 illustrate and describe RAPIDS Score Override. Perform these steps to create a score override.

Once a new score is assigned, all devices with the specified MAC address prefix receive the new score.

NOTE: Note that rescoring a MAC Address Prefix poses a security risk. The block has received its score for a reason. Any devices that fall within this block receive the new score.

1. Navigate to the **RAPIDS > Score Override** page. This page lists all existing overrides.

Figure 121 ***RAPIDS > Score Override*** *Page*



2. Select **Add** to create a new override or select the pencil icon next to an existing override to edit that override. The **Score Override** add or edit page appears (Figure 122).

Figure 122 ***Add/Edit Score Override*** *Page*

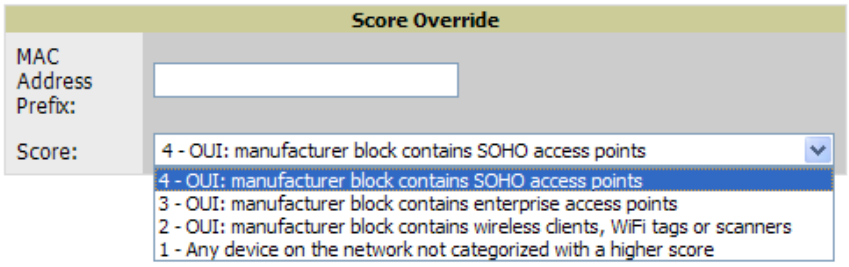


Table 102 ***RAPIDS > Add/Edit Score Override*** *Page Fields*

Field	Description
MAC Address Prefix	Use this field to define the OUI prefix to be re-scored.
Score	Use this field to set the score that a device, with the specified MAC address prefix, will receive.

3. Enter in the six-digit MAC prefix for which to define a score, and select the desired score. Once the new score has been saved, all detected devices with that prefix receive the new score.
4. Select **Add** to create the new override, or select **Save** to retain changes to an existing override. The new or revised override appears on the **RAPIDS > Score Override** page.
5. To remove any override, select that override in the checkbox and select **Delete**.

Audit Log

The Audit Log is a record of any changes made to the RAPIDS rules, setup page, and manual changes to specific rogues. This allows you to see how something is changes, when it changed, and who made the alteration. The Audit Log can be found at **RAPIDS > Audit Log**. See Figure 123 for more information.

Figure 123 *Audit Log*

RAPIDS Changes

Time	User	Event
Wed Feb 17 10:21:12 2010	admin	rapids_classification_rule (id 39): classification: '70' => '80'
Wed Feb 17 10:20:20 2010	admin	seas_config (id 1): rapids_manage_containment: '0' => '1'
Fri Feb 12 08:19:00 2010	jason	rapids_classification_rule (id 39): classification: '80' => '70'
Fri Feb 12 08:19:00 2010	jason	seas_config (id 1): rapids_manage_containment: '1' => '0'
Tue Feb 9 15:53:57 2010	admin	rapids_classification_rule (id 39): manufacturer: 'proxim*' => '3Com*', name: 'Contain Proxim' => 'Contain 3Com'
Tue Feb 9 15:53:03 2010	admin	rapids_classification_rule (id 39): classification: '70' => '80'
Thu Feb 4 15:59:12 2010	admin	seas_config (id 1): rapids_manage_containment: '0' => '1'
Mon Feb 1 13:55:36 2010	admin	rapids_classification_rule (id 39): classification: '80' => '70'
Mon Feb 1 13:55:36 2010	admin	seas_config (id 1): rapids_manage_containment: '1' => '0'
Thu Jan 28 15:48:54 2010	admin	rogue_ap (id 154880): Cisco-AD:61:FE: 'Identify Operating System'

Additional Security Resources

The following AWMS tools support RAPIDS:

- **System Triggers and Alerts**—Triggers and Alerts that are associated with rogue devices follow the classification-based system described in this chapter. For additional information about triggers that support rogue device detection, see to "Monitoring and Supporting AWMS with the System Pages" on page 205.
- **Reports**—The **Rogue Devices Report** displays summary and detail information about all rogues first discovered in a given time period. For more information, see "Defining Reports" on page 242.

For additional security-related features and functions, see the following topics in this guide.

- "Configuring Group Security Settings" on page 80
- "Configuring Security Parameters and Functions" on page 96
- "Configuring Group SSIDs and VLANs" on page 83
- "Monitoring and Supporting AWMS with the System Pages" on page 205
- Appendix B, "Third-Party Security Integration for AWMS" on page 257

Chapter 8

Performing Daily Administration in AWMS

Daily WLAN administration often entails network monitoring, supporting WLAN and AWMS users, and monitoring AWMS system operations.

This chapter contains the following administration procedures:

- "Overview of Triggers and Alerts" on page 181
- "Monitoring and Supporting WLAN Users" on page 188
- "Evaluating and Diagnosing User Status and Issues" on page 194
- "Managing Mobile Devices with SOTI MobiControl and AWMS" on page 198
- "Upgrading AWMS" on page 214
- "Backing Up AWMS" on page 214
- "Monitoring and Supporting AWMS with the System Pages" on page 205

Overview of Triggers and Alerts

This section describes triggers and alerts and contain the following topics:

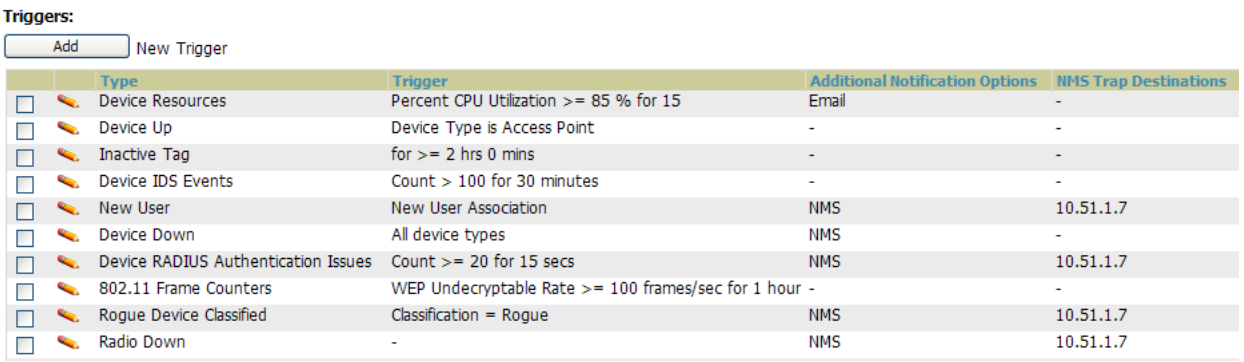
- Viewing Triggers
- Creating New Triggers
- Delivering Triggered Alerts
- Viewing Alerts
- Responding to Alerts

AWMS monitors key aspects of wireless LAN performance. When certain parameters or conditions arise that are outside normal bounds, AWMS generates (or triggers) alerts that enable you to address problems, frequently before users have a chance to report them. AWMS deploys two types of alerts:

Viewing Triggers

To view defined system triggers, navigate to the **System > Triggers** page. Figure 124 illustrates this page.

Figure 124 ***System > Triggers*** *Page Illustration (partial view)*

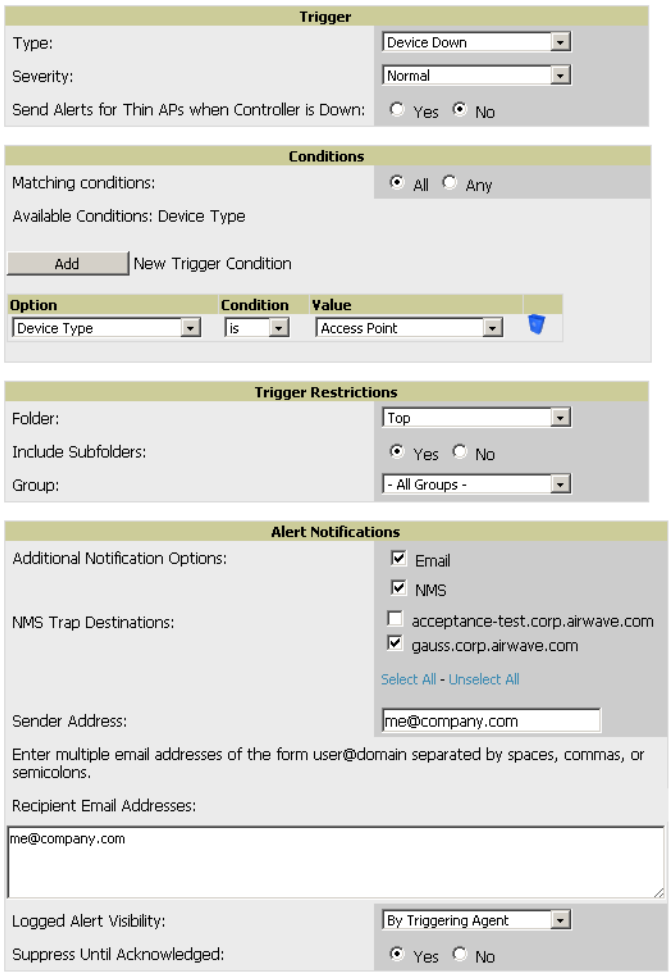


Creating New Triggers

Perform the following steps to create and configure one or more new triggers. These steps define settings that are required for any type of trigger.

1. To create a new trigger, select the **Add New Trigger** button from the **System > Triggers** page. The page that appears is illustrated in Figure 125.

Figure 125 ***Add New Trigger*** *Page Illustration*



2. Configure the **Trigger Restrictions** and **Alert Notifications**. This configuration is consistent regardless of the trigger type to be defined.
   a. The **Trigger Restrictions** settings establishes how widely or how narrowly the trigger applies. Define the folder, subfolder, and Group covered by this trigger. Table 103 describes the options for trigger restrictions.

Table 103 ***System > Trigger*** *Details Fields and Default Values*

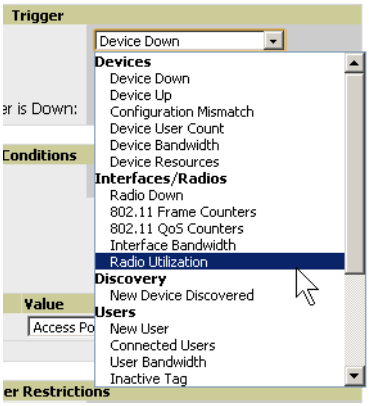
Notification Option	Description
Folder	Sets the trigger to apply only to APs/Devices in the specified folder or subfolders depending on the **Include Subfolders** option. **NOTE:** If the trigger is restricted by folder and group, it only applies to the intersection of the two—it only applies to APs in the group and in the folder.
Include Subfolders	Sets the trigger to apply to all devices in the specified folder and all of the devices in folders under the specified folder.
Group	Sets the trigger to apply only to APs/Devices in the specified group. **NOTE:** If the trigger is restricted by folder and group, it only applies to the intersection of the two—it only applies to APs in the group and in the folder.

   b. In addition to appearing on the **System > Alerts** page, the **Alert Notifications** settings can be configured to distribute to email or to a network management system (NMS), or to both.
      - If you select **Email**, you are prompted to set the sender and recipient email addresses.

- If you select **NMS**, you are prompted to choose one or more of the pre-defined trap destinations, which are configured on the **AMP Setup > NMS** page.
- Define the **Logged Alert Visibility**, in which you can choose how this trigger is distributed. The trigger can distribute according to how is it generated (**triggering agent**), or by the **role** with which it is associated.
- The **Suppress Until Acknowledged** setting defines whether the trigger requires manual and administrative acknowledgement to gain visibility. If **No**, a new alert will be created every time the trigger criteria are met. If **Yes**, an alert will only be received the first time the criteria is met. A new alert for the device is not created until the initial one is acknowledged.

3. In the **Trigger** section, choose the desired trigger **Type** and **Severity**. Figure 126 illustrates some of the supported trigger types. Severity levels are indicated in the email alerts. The alert summary information at the top of the AWMS screen can be configured to separately display severe alerts. Please see the **Home > User Info** section for more details.

Figure 126 ***System > Triggers > Add Trigger Type*** *Drop-down Menu*



Once you have selected a trigger type, the **Add Trigger** page changes. In many cases, you must configure at least one **Condition** setting. Conditions, settings, and default values vary according to trigger type. Triggers with conditions can be configured to fire if any criteria match as well as if all criteria match.

- Some trigger types share common settings, such as **Duration** (which can be expressed in hours, minutes, seconds, or a combination of these) and **Severity** (from Normal to Critical).
- After you select **Save**, the trigger appears on your next viewing of the **System > Triggers** page with all other active triggers.
- You can edit or delete any trigger as desired from the **System > Triggers** page.
  - To edit an existing trigger, select the **pencil** icon next to the respective trigger and edit settings in the **Trigger Detail** page described in Table 104.
  - To delete a trigger, check the box next to the trigger to remove, and select **Delete**.

Repeat this procedure for as many triggers and conditions as desired.

Complete the creation of your trigger type using one of the following procedures for each trigger:

- "Setting Triggers for Devices" on page 184
- "Setting Triggers for Radios" on page 184
- "Setting Triggers for Discovery" on page 185
- "Setting Triggers for Users" on page 185
- "Setting Triggers for RADIUS Authentication Issues" on page 185
- "Setting Triggers for IDS Events" on page 186
- "Setting Triggers for AWMS Health" on page 186

Setting Triggers for Devices

Perform the following steps to configure device-related triggers.

a. Choose a device type from the **Devices** listed in the **Type** drop-down menu. See Figure 126. Table 104 itemizes and describes device trigger options and condition settings.

Table 104 *Device Trigger Types*

Option	Description
Device Down	This is the default type whenever configuring a new trigger. This type of trigger activates when an authorized, monitored AP has failed to respond to SNMP queries from AWMS. To set the conditions for this trigger type, select **Add** in the **Conditions** section. Complete the conditions with the **Option**, **Condition**, and **Value** drop-down menus. The conditions establish the device type. Multiple conditions can apply to this type of trigger. The Device Down trigger can be configured to send alerts for thin APs when the controller is down; this behavior is turned off by default.
Device Up	This trigger type activates when an authorized, previously down AP is now responding to SNMP queries. To set the conditions for this trigger type, select **Add** in the **Conditions** section.
Configuration Mismatch	This trigger type activates when the actual configuration on the AP does not match the defined **Group** configuration policy. To set the conditions for this trigger type, select **Add** in the **Conditions** section.
Device User Count	Activates when a device reaches a user-count threshold for more than a specified period (such as more than 10 users associated for more than 60 seconds).
Device Bandwidth	Activates when the total bandwidth through the device has exceeded a predefined threshold for more than a specified period (such as more than 1500kbps for more than 120 seconds). You can also select bandwidth direction and page/radio. Selecting this type displays the following new fields in the **Type** section. Define these settings. • **Alert if Device Bandwidth >= (kbps)**—This threshold establishes a device-specific bandwidth policy, not a bandwidth policy on the network as a whole. • **Bandwidth Direction**—Choose **In**, **Out**, or **Combined**. This bandwidth is monitored on the device itself, not on the network as a whole.
Device Resources	This type of trigger indicates that the CPU or memory utilization for a device (including router or switch) has exceeded a defined percentage for a specified period of time.

b. Repeat this procedure for as many triggers and conditions as desired. Refer to the start of "Creating New Triggers" on page 181 to create a new trigger.

Setting Triggers for Radios

Perform the following steps to configure radio-related triggers.

a. Choose a trigger type from the **Radios** category, listed in the **Type** drop-down menu. Table 105 itemizes and describes the radio trigger types and condition settings.

Table 105 *Radio-Related Trigger Types*

Radio Trigger Options	Description
Radio Down	Indicates that a device's radio is down on the network. Once you choose this trigger type, select **Add New Trigger Condition** to create at least one condition. **This type** requires that a radio capability be set as a condition. The **Value** drop-down menu supports several condition options.
802.11 Frame Counters	Enables monitoring of traffic levels. There are multiple rate-related parameters for which you define conditions including ACK Failures, Retry Rate, and Rx Fragment Rate. See the **Option** drop-down menu in the **Conditions** section of the trigger page for a complete list of parameters. Select **Add New Trigger Condition** to access these settings. Define at least one condition for this trigger type.
802.11 QoS Counters	Enables monitoring of Quality of Service (QoS) parameters on the network, according to traffic type. The rate of different parameters includes ACK Failures, Duplicated Frames and Transmitted Fragments. See the drop-down field menu in the conditions section of the trigger page for a complete list of parameters. Select **Add New Trigger Condition** to access these settings. Define at least one condition for this trigger type.

Table 105 *Radio-Related Trigger Types (Continued)*

Radio Trigger Options	Description
Interface Bandwidth	Interface labels defined on the trigger page will be used to set up triggers on one or more interfaces and/or radios. Available conditions are **Device Type**, **Interface Description**, **Interface Label**, **Interface Mode**, **Interface Speed In (Mbps)**, **Interface Speed Out (Mbps)**, **Interface Type**, and **Radio Type**.
Radio Utilization	Indicates that channel utilization has crossed particular thresholds. Available conditions are **Interference (%)**, **Radio Type**, **Time Busy (%)**, **Time Receiving (%)**, and **Time Transmitting (%)**.

Setting Triggers for Discovery

Perform the following steps to configure triggers related to device discovery.

a. Choose a trigger type from the **Discovery** category, listed in the **Type** drop-down menu. See Figure 126. Table 106 itemizes and describes the Discovery-related trigger types, and condition settings for each discovery trigger type.

Table 106 ***Discovery*** *Trigger Types and Condition Settings*

Discovery Trigger Option	Description
New Devices Discovered	This trigger type flags the discovery of a new AP, router or switch connected to the network (an device that AWMS can monitor and configure). Once you choose this trigger type, select **Add New Trigger Condition** to specify a device type.

b. Repeat this procedure for as many triggers and conditions as desired. Refer to the start of "Creating New Triggers" on page 181 to create a new trigger.

Setting Triggers for Users

Perform the following steps to configure user-related triggers.

a. Choose a trigger type from the **Users** category, listed in the **Type** drop-down menu. See Figure 126. Table 107 itemizes and describes the User-related trigger types, and condition settings for each discovery trigger type.

Table 107 ***Users*** *Trigger Types and Condition Settings*

User Trigger Option	Description
New User	This trigger type indicates when a new user has associated to a device within a defined set of groups or folders. Note that the **New User** trigger type does not require the configuration of any condition settings, so the **Condition** section disappears.
Connected Users	This trigger type indicates when a device (based on an input list of MAC addresses) has associated to the wireless network. It is required to define one or more MAC addresses with the field that appears.
User Bandwidth	This trigger type indicates that the sustained rate of bandwidth used by an individual user has exceeded a predefined threshold for more than a specified period, in seconds (such as more than 1500kbps for more than 120 seconds). Once you choose this trigger type, select **Add New Trigger Condition** to specify the bandwidth characteristics that triggers an alert. You can apply multiple conditions to this type of trigger. The **Value** field requires that you input a numerical figure for kilobits per second (kbps).
Inactive Tag	This tags flags events in which an RFID tag has not been reported back to AWMS by a controller for more than a certain number of hours. This trigger can be used to help identify inventory that might be lost or stolen. Set the time duration for this trigger type if not already completed.

b. Repeat this procedure for as many triggers and conditions as desired. Refer to the start of "Creating New Triggers" on page 181 to create a new trigger.

Setting Triggers for RADIUS Authentication Issues

Perform the following steps to configure RADIUS-related triggers.

a. Choose a trigger type from the **RADIUS...** list in the drop-down **Type** menu. Table 108 itemizes and describes the condition settings for each **RADIUS Authentication** trigger type.

Table 108 ***RADIUS Authentication*** *Trigger Types and Condition Settings*

Option	Description
User RADIUS Authentication Issues	This trigger type sets the threshold for the maximum number of failures before an alert is issued for a user. Select **Add New Trigger Condition** to specify the count characteristics that trigger an alert. The **Option**, **Condition**, and **Value** fields allow you to define the numeric value of user issues.
Device RADIUS Authentication Issues	This trigger type sets the threshold for the maximum number of failures before an alert is issued for a device. The **Option**, **Condition**, and **Value** fields allow you to define the numeric value of user issues.
Total RADIUS Authentication Issues	This trigger sets the threshold for the maximum number of failures before an alert is issued for both users and devices.

b. Repeat this procedure for as many triggers and conditions as desired. Refer to the start of "Creating New Triggers" on page 181 to create a new trigger.

Setting Triggers for IDS Events

Perform the following steps to configure Intrusion Detection System (IDS)-related triggers.

a. Choose the **Device IDS Events** trigger type from the drop-down **Type** menu. See Figure 126. Table 109 describes condition settings for this trigger type.

Table 109 ***Device IDS Events*** *Authentication Trigger Types and Condition Settings*

IDS Trigger Options	Description
Device IDS Events	This trigger type is based on the number of IDS events has exceeded the threshold specified as Count in the Condition within the period of time specified in seconds in Duration. Alerts can also be generated for traps based on name, category or severity. Select **Add New Trigger Condition** to specify the count characteristics that trigger an IDS alert.
Rogue Device Classified	This trigger type indicates that a device has been discovered with the specified Rogue Score. Ad-hoc devices can be excluded automatically from this trigger by selecting **Yes**. See "Using RAPIDS and Rogue Classification" on page 165 for more information on score definitions and discovery methods. Once you choose this trigger type, select **Add New Trigger Condition** to create one or more conditions. A condition for this trigger enables you to specify the nature of the rogue device in multiple ways.

b. Repeat this procedure for as many triggers and conditions as desired. Refer to the start of "Creating New Triggers" on page 181 to create a new trigger.

Setting Triggers for AWMS Health

After completing steps 1-3 in "Creating New Triggers" on page 181, perform the following steps to configure IDS-related triggers.

a. Choose the **Disk Usage** trigger type from the drop-down **Type** menu. See Figure 126 for trigger types. Table 110 describes the condition settings for this trigger type.

Table 110 *Disk Usage Trigger and Condition Settings*

AWMS Health Trigger	Description
Disk Usage	This trigger type is based on the disk usage of AWMS. This type of trigger indicates that disk usage for the AWMS server has met or surpassed a defined threshold. Select **Add New Trigger Condition** to specify the disk usage characteristics that trigger an alert. Dell recommends setting one of these triggers at **90%**, so you receive a warning before AMP suffers performance degradation due to lack of disk space.

b. Repeat this procedure for as many triggers and conditions as desired. Refer to the start of "Creating New Triggers" on page 181 to create a new trigger.

Delivering Triggered Alerts

AWMS uses Postfix to deliver alerts and reports via email because it provides a high level of security and queues email locally until delivery. If AWMS is located behind a firewall, preventing it from sending email directly to a specified recipient, use the following procedures to forward email to a smarthost.

1. Add the following line to /etc/postfix/main.cf:

   ```
   relayhost = [mail.example.com]
   ```

   where mail.example.com is the IP address or hostname of your smarthost
2. Run **service postfix restart**.
3. Send a test message to an email address:

   ```
   Mail -v user@example.com
   Subject: test mail
   .
   CC:
   ```
4. Press **Enter**.
5. Check the mail log to ensure mail was sent:

   ```
   tail -f /var/log/maillog
   ```

Viewing Alerts

AWMS displays alerts and provides additional alert details in two ways, as follows:

1. The **Alerts Summary** table is one way to monitor and process AWMS alerts. The **Alert Summary** table is available on the following AWMS pages, and is illustrated in Figure 127:
   - **APs/Devices > List**
   - **Groups > Monitor**
   - **Home > Overview**
   - **Users > Connected or User Detail**

Figure 127 ***Alert Summary*** *Table Illustration*

Type ▲	Last 2 Hours	Last Day	Total	Last Event
AMP Alerts	0	0	0	-
IDS Events	2	3	116	1/10/2011 12:09 PM
Incidents	0	0	0	-
RADIUS Authentication Issues	0	0	11	1/7/2011 1:10 PM

This table displays alerts as follows; select the alert **Type** to display alert details:

- **AMP Alerts**—Displays details for all device alerts.
- **IDS Events**—Displays details of all Intrusion Detection System (IDS) events and attacks under the RAPIDS tab. You must have a RAPIDS license and be enabled as a RAPIDS user to see this page.
- **Incidents**—Displays recent helpdesk incidents in which the incidents are open and associated to an AP. For a complete listing of incidents, navigate to the **Helpdesk > Incidents** page.

NOTE: The **Incidents** portion of this **Alert Summary** table only increments the counter for incidents that are open and associated to a Device, Group, or Folder. Unassociated incidents are not are not counted in this **Alert Summary**. To view all incidents, including those not associated to an AP, navigate to the **Helpdesk > Incidents** page.

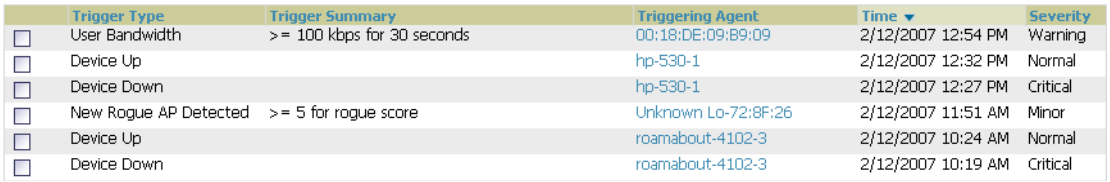
- **RADIUS Authentication Issues**—Displays RADIUS-related alerts for devices in the top viewable folder available to the AWMS user. The detailed list displays the MAC address, username, AP, radio, controller, RADIUS server, and time of each event. Alerts can be sorted by any column.

2. The second way to display and process alerts is to use the **Alerts** and **Severe Alerts** counters in the **Status** bar at the top of all AWMS pages, illustrated in Figure 128. The Severe Alert Threshold can be configured on the **Home > User Info** page.

Figure 128 *Alerts in the AWMS Status Bar*

Select the **Alerts** or the **Severe Alerts** counter or navigate to the **System > Alerts** page. Figure 129 illustrates this page.

Figure 129 ***System > Alerts*** *Page Illustration*



	Trigger Type	Trigger Summary	Triggering Agent	Time	Severity
☐	User Bandwidth	>= 100 kbps for 30 seconds	00:18:DE:09:B9:09	2/12/2007 12:54 PM	Warning
☐	Device Up		hp-530-1	2/12/2007 12:32 PM	Normal
☐	Device Down		hp-530-1	2/12/2007 12:27 PM	Critical
☐	New Rogue AP Detected	>= 5 for rogue score	Unknown Lo-72:8F:26	2/12/2007 11:51 AM	Minor
☐	Device Up		roamabout-4102-3	2/12/2007 10:24 AM	Normal
☐	Device Down		roamabout-4102-3	2/12/2007 10:19 AM	Critical

For each new alert, the **System > Alerts** page displays the items listed in Table 111.

Table 111 ***System > Alerts*** *Fields and Default Settings*

Field	Description
Trigger Type	Displays and sorts triggers by the type of trigger.
Trigger Summary	Provides an additional summary information related to the trigger.
Triggering Agent	Lists the name of the AP that generated the trigger. Select the name to display its **APs/Devices > Manage** page.
Time	Displays the date and time the trigger was generated.
Severity	Displays the severity code associated with that trigger.

Responding to Alerts

Once you have viewed an alert, you may take one of the following courses of action:

- Leave it in active status if it is unresolved. The alert remains on the **New Alerts** list until you acknowledge or delete it. If an alert already exists, the trigger for that AP or user does not create another alert until the existing alert has been acknowledged or deleted.
- Move the alert to the Alert Log by selecting it and selecting **Acknowledge**.
- You may see all logged alerts by selecting the **View logged alerts** link at the top of the **System > Alerts** page. Select the **New Alerts** link to return to the list of new alerts.
- Delete the alert by selecting it from the list and selecting **Delete**.

Monitoring and Supporting WLAN Users

The AWMS **Users** pages support WLAN users in AWMS. This section describes the **Users** pages as follows:

- Overview of the Users Pages
- Monitoring WLAN Users with the Users > Connected and Users > All Pages
- Supporting Guest WLAN Users With the Users > Guest Users Page
- Supporting RFID Tags With the Users > Tags Page
- See also Evaluating and Diagnosing User Status and Issues.

For information about creating AWMS users and AWMS user roles, refer to:

- "Creating AWMS Users" on page 43
- "Creating AWMS User Roles" on page 44

If you need to create an AWMS user account for frontline personnel who are to support Guest WLAN users, refer to "Supporting Guest WLAN Users With the Users > Guest Users Page" on page 191.

Overview of the Users Pages

The **Users** pages display multiple types of user data for existing WLAN users. The data comes from a number of locations, including data tables on the access points, information from RADIUS accounting servers, and AWMS-generated data. AWMS supports the following **Users** pages:

- **Users > Connected**—Displays active users that are currently connected to the WLAN. Refer to "Monitoring WLAN Users with the Users > Connected and Users > All Pages" on page 189.
- **Users > All**—Displays all users of which AWMS is aware, with related information. Non-active users are listed in gray text. For a description of the information supported on this page, refer to "Monitoring WLAN Users with the Users > Connected and Users > All Pages" on page 189.
- **Users > Guest Users**—Displays all guest users in AWMS and allows you to create, edit, or delete guest users. See "Supporting Guest WLAN Users With the Users > Guest Users Page" on page 191.
- **Users > User Detail**—Displays client device information, alerts, signal quality, bandwidth, and association history. This page appears when you select a user's MAC address from:
  - **Users > Connected**
  - **Users > All**
  - **Home > Search** page results or **Search** field results that display the user MAC address

  See "Evaluating and Diagnosing User Status and Issues" on page 194.
- **Users > Diagnostics**—Displays possible client device issues, diagnostic summary data, user counts, AP information, 802.11 counters summary, and additional information. This page appears when you select a user's MAC address from one of the following pages:
  - **Users > Connected**
  - **Users > All**
  - **Home > Search** page results or **Search** field results that display the user MAC address

  See "Evaluating and Diagnosing User Status and Issues" on page 194.
- **Users > Tags**—Displays a list of wireless tags, such as Aeroscout, PanGo and Newbury, that are heard by thin APs, and reported back to a controller that is monitored by AWMS. "Supporting RFID Tags With the Users > Tags Page" on page 193.

Monitoring WLAN Users with the Users > Connected and Users > All Pages

The **Users > Connected** page displays all users currently connected in AWMS, and is illustrated in Figure 130 and described in Table 112. The information on this page can be adjusted in the following ways:

- Drag the slider to pick the time range on the interactive graphs, and select **Show All** to select other options to display.
- The **Alerts** section displays custom configured alerts that were defined in the **System > Alerts** page.

In more recent versions of AWMS, the **Users > Connected** page includes SSID information for users, and can display wired users using remote Access Point (RAP) devices in tunnel and split-tunnel mode.

Figure 130 ***Users > Connected*** *Page Illustration*

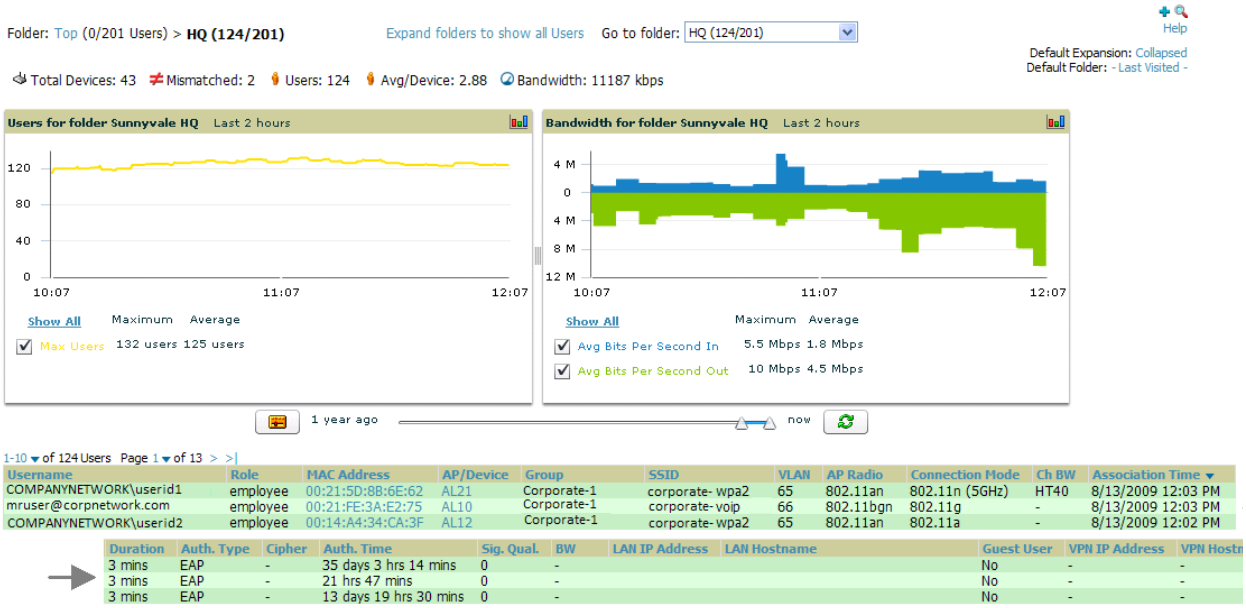


Table 112 ***Users > Connected*** *Table Columns and Links*

Field	Description
Username	Displays the name of the user associated to the AP. AWMS gathers this data from device traps, SNMP polling, or RADIUS accounting. Usernames appear in italics when a username for that MAC address has been stored in the database from a previous association, but AWMS is not getting a username for the current association. This may indicate that the user has not yet been authenticated for this session or AWMS may not be getting a username from an external source.
Role	Specifies the role by which the user is connected.
MAC Address	Displays the radio MAC address of the user associated to APs. Also displays a link that redirects to the **Users > Detail** page.
AP/Device	Displays the name of the AP to which the MAC address is associated Also displays a link that takes you to this **AP's AP Monitoring** page.
Group	Displays the group containing the AP that the user is associated with.
SSID	Displays the SSID with which the user is associated.
VLAN	Displays the VLAN assigned to the user, if available.
AP Radio	Displays the radio type of the radio that the user is associated with.
Connection Mode	Displays the 802.11 mode by which the user is connected.
Ch BW	Displays the channel bandwidth that currently supports 802.11n users.
Connection Mode	Displays the Radio mode used by the user to associate to the AP for 802.11n clients.
Association Time	Displays the first time AWMS recorded the user for this association.
Duration	Displays the length of time the MAC address has been associated.
Auth. Type	Displays the type of authentication employed by the user: • WPA2 (EAP-PEAP) is the standard setting. • EAP is reported by Dell PowerConnect W devices and Cisco VxWorks via SNMP traps. • RADIUS accounting servers integrated with AWMS will provide the RADIUS Accounting Auth type. • Web (PAP) - Captive Portal. • All others are considered to be not authenticated.
Cipher	Displays WEP with keys. This data is also displayed in the **User Session** report in the **Session Data By User** section.

Table 112 ***Users > Connected*** *Table Columns and Links (Continued)*

Field	Description
Auth. Time	Displays the how long ago the user authenticated. **NOTE:** This value displays as a negative number for unauthenticated users.
Sig. Qual.	Displays the average signal quality the user enjoyed.
BW	Displays the average bandwidth consumed by the MAC address.
Location	Displays the VisualRF QuickView box including heatmap for a device and user location history.
LAN IP Address	Displays the IP assigned to the user MAC. AWMS gathers it from the association table of APs.
LAN Hostname	Displays the LAN hostname of the user MAC.
Guest User	Specifies whether the user is a guest.
VPN IP Address	Displays the VPN IP of the user MAC. This information can be obtained from VPN servers that send RADIUS accounting packets to AWMS.
VPN Hostname	Displays the VPN hostname of the user MAC.

Supporting Guest WLAN Users With the Users > Guest Users Page

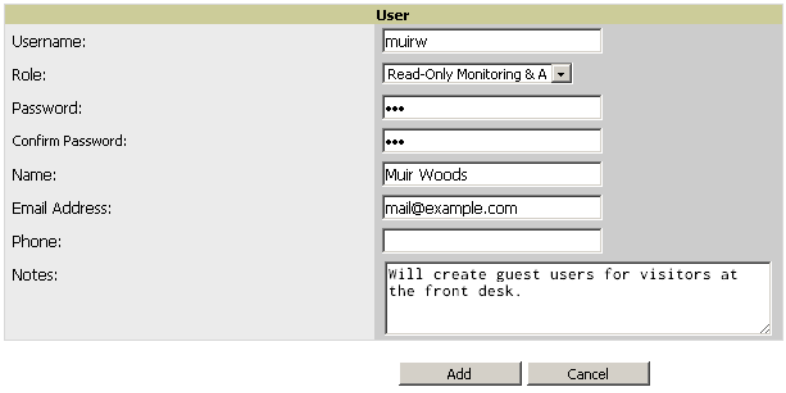
AWMS supports guest user provisioning for Dell PowerConnect W and Cisco WLC devices. This allows frontline staff such as receptionists or help desk technicians to grant wireless access to WLAN visitors or other temporary personnel.

NOTE: The Guest User Preferences section on **AMP Setup > Roles**. as well as the **Users > Guest Users** subtab, will not appear if **Guest User Configuration** is globally disabled in **AMP Setup > General**.

Perform the following steps in the pages described to configure these settings.

1. Navigate to the **AMP Setup > Roles** page and select the **Read-Only Monitoring & Auditing** role type. Under **Guest User Preferences**, enable **Allow creation of Guest Users**.
2. Next, navigate to the **AMP Setup > Users** page and create a new user with the role that was just created. Figure 131 illustrates this page.

Figure 131 ***AMP Setup > Users*** *Page Illustration*



3. The newly created login information should be provided to the person or people who will be responsible for creating guest access users.
4. The next step in creating a guest access user is to navigate to the **Users > Guest Users** tab. From this tab, you can add new guest users, you can edit existing users, and you can repair guest user errors.

   This page displays a list of guest users and data, to include the expiration date, the SSID (for Cisco WLC) and other information. Figure 132 illustrates this page and Table 113 describes the information.

Figure 132 *Users > Guest Users Page Illustration*

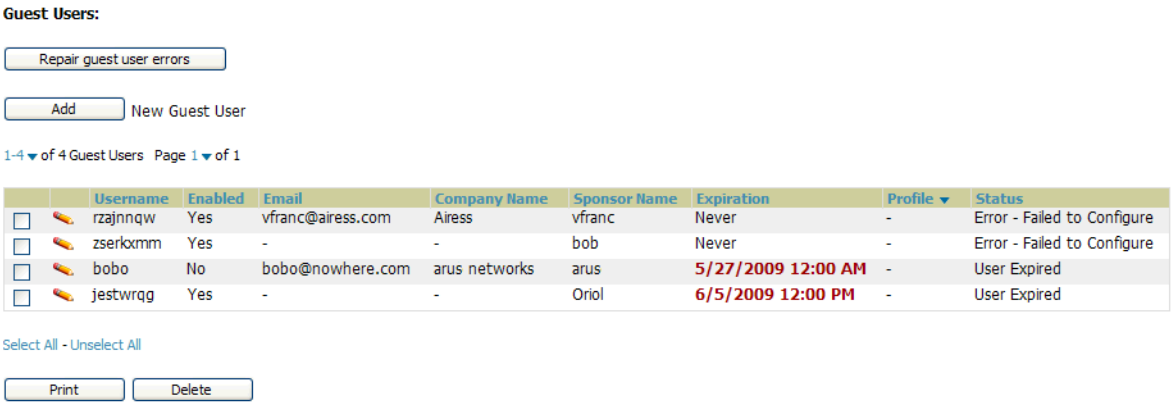


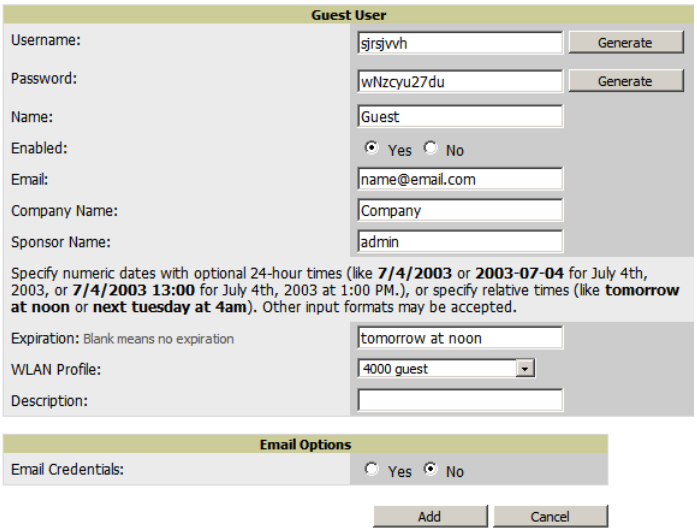
Table 113 *Users > Guest Users Fields*

Field	Description
Repair Guest User Errors	Sets AWMS to attempt to push the guest user again in an attempt to repair any errors in the **Status** column.
Add New Guest User	Adds a new guest user to a controller via AWMS.
Username	Randomly generates a user name for privacy protection. This name appears on the **Guest User** detail page.
Enabled	Enables or disables the user status. Set the status of the guest user as active (enabled) or expired (disabled).
Email	Displays the optional email address of the user.
Company Name	Displays the optional company name for the user.
Sponsor Name	Displays the name of the sponsor for the guest user. This setting is optional.
Expiration	Displays the date the guest user's access is to expire.
WLAN Profile	Sets the SSID that the guest user can access. This setting applies to Cisco WLC only.
Status	Reports current status by the controller. If error messages appear in this column, select the user with the checkbox at left, and select the **Repair guest user errors** button.

Guest users associated to the wireless network appear on the same list as other wireless users, but are identified as guest users in the **Guest User** column. The **User Detail** page for a guest user also contains a box with the same guest information that appears for each user on the **Users > Guest Users** list.

5. To add a new guest user, select **Add**, and complete the fields illustrated in Figure 133. Table 113 above describes most fields. The first three fields are required, and the remaining fields are optional.

Figure 133 ***Users > Guest Users > Add New Guest User*** *Page Illustration*



To make the **Username** or **Password** anonymous and to increase security, complete these fields then select **Generate**. The anonymous and secure **Username** and **Password** appear in the respective fields.

6. Select **Add** to complete the new guest user, or select **Cancel** to back out of new user creation. The **Users > Guest Users** page appears and displays results, as applicable.

Supporting RFID Tags With the Users > Tags Page

Radio Frequency Identification (RFID) supports identifying and tracking wireless devices with radio waves. RFID uses radio wave tags for these and additional functions. Active tags have a battery and transmit signals autonomously, and passive tags have no battery. RFID tags often support additional and proprietary improvements to network integration, battery life, and other functions.

NOTE: Guest users being pushed to large numbers of controllers may take a very long time to push.

The **Users > Tags** page displays a list of wireless tags, such as Aeroscout, PanGo and Newbury, that are heard by thin APs, and reported back to a controller that AWMS monitors. AWMS displays the information it receives from the controller in a table on this page. Figure 134 illustrates this page, and Table 114 describes fields and information displayed.

Figure 134 ***Users > Tags*** *Page Illustration*

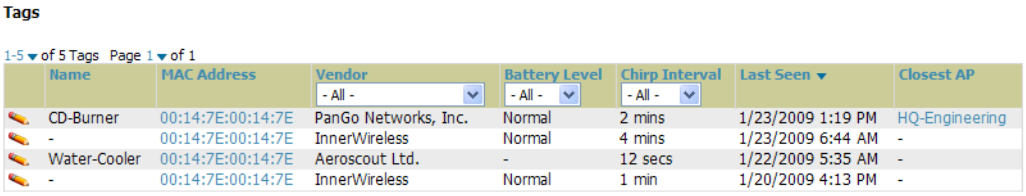


Table 114 ***Users > Tags*** *Fields*

Field	Description
Name	Displays the user-editable name associated with the tag.
MAC Address	Displays the MAC address of the AP that reported the tag.
Vendor	Displays the vendor of the tag (Aeroscout, PanGo and Newbury)—display all or filter by type.
Battery Level	Displays battery information—filterable in drop-down menu at the top of the column; is not displayed for Aeroscout tags.

Table 114 ***Users > Tags*** *Fields*

Field	Description
Chirp Interval	Displays the tag chirp frequency or interval, filterable from the drop-down menu at the top of the column. Note that the chirp interval from the RFID tag influences the battery life of active tags as well as search times. If a tag chirps with very long chirp interval, it may take longer time for the location engine to accurately measure x and y coordinates.
Last Seen	Date and time the tag was last reported to AWMS.
Closest AP	The AP that last reported the tag to the controller (linked to the AP monitoring page in AWMS).

- To edit the name of the tag, or to add notes to the tag's record, select the **pencil** icon next to the entry in the list. You can then add or change the name and add notes like "maternity ward inventory" or "Chicago warehouse," as two examples.
- There is also a **Tag Not Heard** trigger, which can be used to generate an alert if a tag is not reported to AWMS after a certain interval. This can help to identify lost or stolen inventory. For more information about enabling this trigger, refer to the section "Monitoring and Supporting AWMS with the System Pages" on page 205.

Evaluating and Diagnosing User Status and Issues

If a WLAN user reports difficulty with the wireless network, the administration or Helpdesk personnel can view and process related user information from the **User Detail** and **Diagnostic** pages. This section describes these two pages as follows:

- Evaluating User Status with the Users > User Detail Page
- Evaluating User Status with the Users > Diagnostics Page

Evaluating User Status with the Users > User Detail Page

The **Users > User Detail** page is a focused subtab that becomes visible when you select a specific user. Access the **Users > User Detail** page by selecting the MAC Address for a specific user from one of the following pages:

- **Users > Connected**
- **Users > All**

This page provides information for the wireless device, signal quality, and bandwidth consumption. This page also provides an AP association history and current association status. Finally, when VisualRF is licensed and enabled, this page provides a graphical map of the user location and facility information.

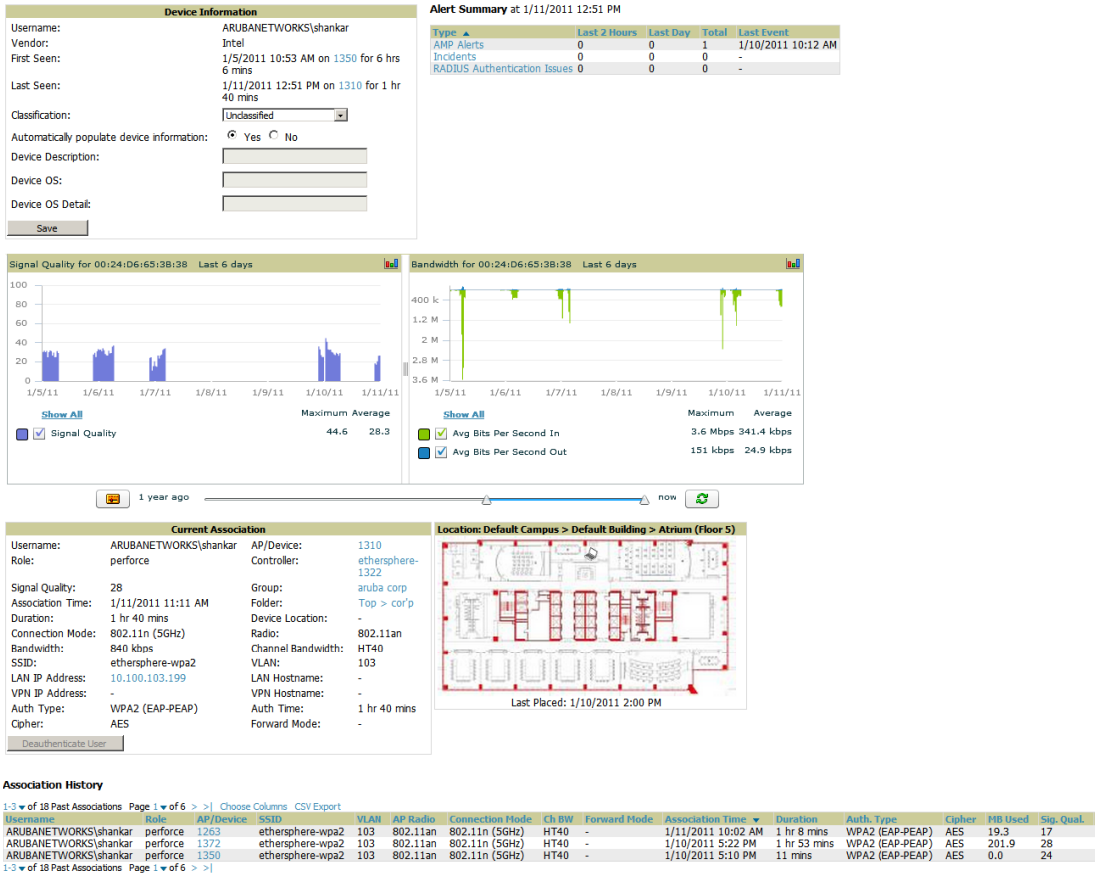
If you have deployed Dell PowerConnect W controllers and have WMS Offload enabled on the network, the **Users > User Detail** page allows you to classify the device in the **Device Information** section, and to push this configuration to the Dell PowerConnect W controllers that govern the devices. The classifications are as follows:

- **Unclassified**—Devices are unclassified by default.
- **Valid**—If the **Protect Valid Stations** option is enabled, this setting designates the device as a legitimate network device. Once this **Valid** setting is pushed, this setting prevents valid stations from connecting to a non-valid AP.
- **Contained**—When this status is pushed to the device, Dell PowerConnect W controllers will attempt to keep it contained from the network.

You can classify the user regardless of whether WMS Offload is enabled. If WMS Offload is enabled, the classification will get pushed up to the controller.

Figure 135 illustrates the contents of **Users > User Details** page.

Figure 135 *Users > User Detail Page Illustration*

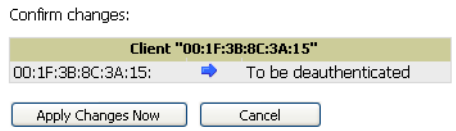


Using the Deauthenticate User Feature

Some displays of the **User > User Detail** page include the **Deauthenticate User** feature in the **Current Association** field. Specifically, those displays are for devices which support this operation, namely Dell and Cisco WLC with firmware version v4.0.0.0 or later.

Select **Deauthenticate User** to use this feature. Figure 136 illustrates the confirmation page after you select **Save and Apply**:

Figure 136 *Users > User Detail > Deauthenticate User Page*



Evaluating User Status with the Users > Diagnostics Page

The **Users > Diagnostics** page is accessible from the User Detail page. You can also search for a user and select the associated MAC address from the search results.

This page provides an overview of a user's general status and connectivity on the network.

Each section of the **Users > Diagnostics** page displays information by which to evaluate possible user issues. Refer to Table 115 for explanation and illustration of page components.

Table 115 ***Users > Diagnostics*** *Page Sections*

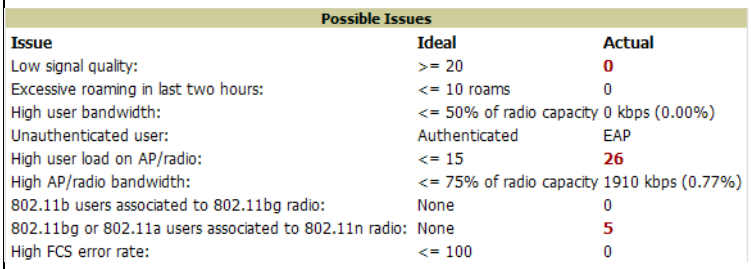
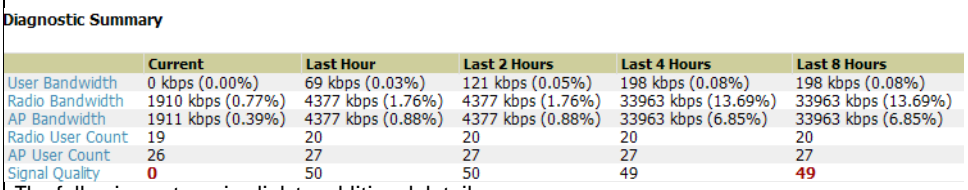
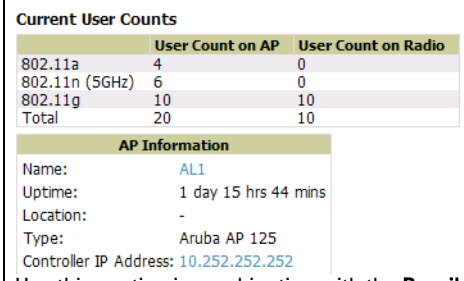
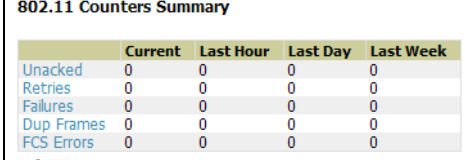
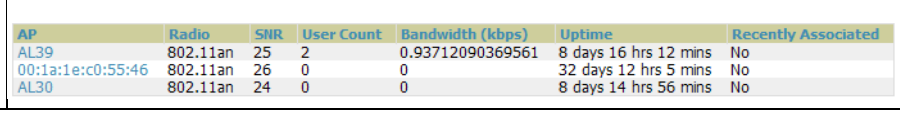
Section	Description
Possible Issues	This section summarizes the most likely items to create issues for a user on the network. Figure 137 illustrates this section. **NOTE**: Items in red are the values considered "out of spec." **Figure 137** ***Groups > Diagnostics > Possible Issues*** *Illustration*  Possible Issues Issue / Ideal / Actual Low signal quality: >= 20 0 Excessive roaming in last two hours: <= 10 roams 0 High user bandwidth: <= 50% of radio capacity 0 kbps (0.00%) Unauthenticated user: Authenticated EAP High user load on AP/radio: <= 15 26 High AP/radio bandwidth: <= 75% of radio capacity 1910 kbps (0.77%) 802.11b users associated to 802.11bg radio: None 0 802.11bg or 802.11a users associated to 802.11n radio: None 5 High FCS error rate: <= 100 0 • **Low signal quality**—If signal quality falls outside of ideal range, then possible resolution might be moving the client, adjusting client antennae, installing more or better antennas on the APs, adding APs, increasing the transmit power of the APs, investigating intermittent RF interference (such as the startup schedule of a nearby air conditioning unit), or evaluating the client settings. • **Excessive roaming in last two hours**—Excessive roaming means that a user's connection moves from one AP to another 10 or more roaming instances in the past two hours. If there is excessive roaming but the user has been stationary, then the user might be located where there is weak coverage from two overlapping APs. Adjusting the signal strength for one of those APs may resolve the issue. • **High User Bandwidth**—Network performance issues might mean excessive bandwidth consumption. Investigate user bandwidth consumption for all users on a given AP, not strictly the user who reports a problem. • **Unauthenticated User**—This section conveys the user's current authentication status and the actual authentication type. If a network deploys RADIUS, then the RADIUS server could be experiencing issues even if a user attempts to log in with valid credentials but shows as **Unauthenticated** on this page.
Possible Issues (Cont'd)	• **High user load on AP/radio**—This field indicates whether the number of users on a given AP has exceeded that AP's functional capacity. Excessive users on an AP could degrade performance for all users on that AP. Consider adding another AP in that area. Refer to the **Current User Counts** section on this page for more details. • **High AP radio bandwidth**—This figure derives from how groups of users share radio bandwidth on a shared AP. You may not need to add an additional AP to resolve this issue, but you would need to determine why neighboring APs are not functioning properly. • **802.11 radio parameters**—These two sections indicate the likelihood that a user's issues are derived from mismatched 802.11 deployment. That is, an 802.11ab or g user who is connected through an 802.11n radio might not benefit from full 802.11n functionality. These two fields indicate the likelihood of such an issue impacting a user's experience on the network, as well as a reduction of available bandwidth for other users. • **High FCS error rates**—Frame Check Sequence (FCS) errors are checksum errors in the 802.11 protocol and may indicate interference and congestion. One response is to assign a different channel to the AP manually or by using Adaptive Radio Management (ARM).

Table 115 ***Users > Diagnostics*** *Page Sections (Continued)*

Section	Description
Diagnostics Summary	This section summarizes bandwidth, user count, and signal quality parameters for specific windows of time. This section is useful when diagnosis or troubleshooting follows issues that had been observed a few or several hours prior. Figure 138 illustrates this section. **NOTE**: Large negative changes in value are displayed in red. **Figure 138** ***Diagnostics Summary*** *Illustration (Partial Display)*  Diagnostic Summary Current / Last Hour / Last 2 Hours / Last 4 Hours / Last 8 Hours User Bandwidth: 0 kbps (0.00%) / 69 kbps (0.03%) / 121 kbps (0.05%) / 198 kbps (0.08%) / 198 kbps (0.08%) Radio Bandwidth: 1910 kbps (0.77%) / 4377 kbps (1.76%) / 4377 kbps (1.76%) / 33963 kbps (13.69%) / 33963 kbps (13.69%) AP Bandwidth: 1911 kbps (0.39%) / 4377 kbps (0.88%) / 4377 kbps (0.88%) / 33963 kbps (6.85%) / 33963 kbps (6.85%) Radio User Count: 19 / 20 / 20 / 20 / 20 AP User Count: 26 / 27 / 27 / 27 / 27 Signal Quality: 0 / 50 / 50 / 49 / 49 The following categories link to additional details pages: • **User Bandwidth**—select this link to display flash graphs for user bandwidth metrics. • **Radio Bandwidth**—select this link to display flash graphs for radio bandwidth consumption. • **AP Bandwidth**—select this link to display flash graphs for AP bandwidth consumption. • **Radio User Count**—select this link to display flash graphs for user count metrics. • **AP User Count**—select this link to display flash graphs for user count metrics. • **Signal Quality**—select this link to display flash graphs for signal quality.
Current User Counts	The **Current User Counts** section displays user counts for APs and radios, and includes additional summary information for APs. Figure 139 illustrates this section: **Figure 139** ***Users > Diagnostics > Current User Counts*** *Illustration*  Current User Counts User Count on AP / User Count on Radio 802.11a: 4 / 0 802.11n (5GHz): 6 / 0 802.11g: 10 / 10 Total: 20 / 10 AP Information Name: AL1 Uptime: 1 day 15 hrs 44 mins Location: - Type: Aruba AP 125 Controller IP Address: 10.252.252.252 Use this section in combination with the **Possible Issues** section.
802.11 Counters Summary	The **802.11 Counters Summary** section conveys the same information that is available from the **Statistics** link from the **APs/Devices > Monitor** page. Figure 140 illustrates this section. **Figure 140** ***Users > Diagnostics > 802.11 Counters Summary*** *Illustration*  802.11 Counters Summary Current / Last Hour / Last Day / Last Week Unacked: 0 / 0 / 0 / 0 Retries: 0 / 0 / 0 / 0 Failures: 0 / 0 / 0 / 0 Dup Frames: 0 / 0 / 0 / 0 FCS Errors: 0 / 0 / 0 / 0 **NOTE:** This section is supported for Cisco and Dell PowerConnect W devices. For additional information, select the link to the device on this page.
Radios That Can Hear This User	The **Radios That Can Hear This User** section shows the radios that reported the signal from this client, and displays statistics. Figure 141 illustrates this section. **Figure 141** ***Users > Diagnostics > Radios That Can Hear This User*** *Illustration*  Radios That Can Hear This User AP / Radio / SNR / User Count / Bandwidth (kbps) / Uptime / Recently Associated AL39: 802.11an / 25 / 2 / 0.93712090369561 / 8 days 16 hrs 12 mins / No 00:1a:1e:c0:55:46: 802.11an / 26 / 0 / 0 / 32 days 12 hrs 5 mins / No AL30: 802.11an / 24 / 0 / 0 / 8 days 14 hrs 56 mins / No

Managing Mobile Devices with SOTI MobiControl and AWMS

Overview of SOTI MobiControl

SOTI MobiControl, the mobile device management platform for Windows Mobile, Blackberry, Apple, and Android devices, has been integrated into AWMS to provide direct access to the MobiControl Web Console.

MobiControl runs on your Mobile Device Manager (MDM) server. This server provisions mobile devices via HTTP to configure connectivity settings, enforce security policies, restore lost data, and other administrative services. Information gathered from mobile devices can include policy breaches, data consumption, and existing configuration settings.

Prerequisites for Using MobiControl with AWMS

In order to use the MobiControl integration in AWMS, the following is required:

- Your AMP must be running version 7.2
- An MDM server with SOTI MobiControl Console 8.50 Build 3989, Web Version 8.50 Build 5066
- A client device that is:
  - associated with WLAN infrastructure managed by the AMP server running 7.2
  - being actively managed by the SOTI MobiControl server running with proper build numbers

For more information about setting up MobiControl, please see www.soti.net/mc/help/.

In order to use SOTI MobiControl from within AWMS, you must first add your MDM server and designate it as a MobiControl.

Adding a Mobile Device Management Server for MobiControl

1. To add an MDM server to AWMS, navigate to **AMP Setup > MDM Server** and select **Add**. Complete the fields on this page. Table 116 describes the settings and default values:

Table 116 ***AMP Setup > MDM Server > Add*** *Fields and Descriptions*

Field	Description
Hostname/IP Address	The address or DNS hostname configured for your MDM server.
Protocol	Whether HTTP or HTTPS is to be used when polling the MDM server. The port on which to connect to the MDM server is inferred from the protocol: with HTTP, AWMS will connect to port 80 of the SOTI server; with HTTPS, AWMS will connect to port 443.
URL Context	The URL context appended to the server URL to build the URL when connecting with the SOTI server. Enter **MobiControl** in this space for SOTI support.
Enabled	Whether this server can be polled by AWMS. Make sure it is set to **Yes**.
Username/ Password	The login credentials for this MDM server.
Polling Period	The frequency in which AWMS polls the MDM server. The default is 5 minutes.

2. When finished, select **Add.**

The list page for the MDM server also displays:

- **Last Contacted –** The last time AWMS was able to contact the MDM server.
- **Errors** – Issues, if any, encountered during the last contact.

During each polling period, AMP will to obtain a list of all device IDs and their WLAN MAC addresses. The information about Device Type, OS, and OS version are retrieved from MobiControl and populated to the **Users > User Detail** page for supported mobile devices. A **View device in SOTI MobiControl** link provides direct

access to the MobiControl Web Console for additional details about the device. MobiControl information overrides data obtained by ArubaOS 6.0 controllers.

Accessing MobiControl from the Users > User Detail Page

In order to access the MobiControl web console for a SOTI-managed mobile device from within AWMS, follow these steps:

1. Navigate to a page that lists clients. This can include:
   - **Users > Connected** or **Users > All**
   - Search results that display user MAC address
2. Select the MAC address in the **Users** list table. The **Users > User Detail** page displays.
3. Under the Classification field, select the **View device in SOTI MobiControl** link. A new window will display the MobiControl Web Console for this device.

Monitoring and Supporting AWMS with the Home Pages

The **Home** tab of AWMS provides the most frequent starting point for monitoring network status and establishing primary AWMS functions once AWMS configuration is complete. Access the following pages :

- The **Home > Overview** page condenses a large amount of information about your AWMS. You can view the health and usage of your network and use shortcuts to view system information. Refer to Monitoring AWMS with the Home > Overview Page below.
- The **Home > Search** page provides a simple way to find users. managed devices, groups, and rogues. Refer to "Searching AWMS with the Home > Search Page" on page 202.
- The **Home > Documentation** page contains all relevant AWMS documentation. See "Accessing AWMS Documentation" on page 203.
- The **Home > License** page provides product licensing information. See "Viewing and Updating License Information" on page 201.
- The **Home > User Info** page displays information about the users logged in to AWMS, including the role, authentication type, and access level. See "Configuring Your Own User Information with the Home > User Info Page" on page 203.
- The **Customize link on the upper-right side of the page** allows you to customize the widgets on the **Home > Overview** page. See "Customizing the Overview Subtab Display" on page 32.

Monitoring AWMS with the Home > Overview Page

To view your overall network health, navigate to **Home > Overview** page. Figure 142 illustrates this page, and Table 117 describes the contents. The information that displays varies depending on your role.

Figure 142 ***Home > Overview*** *Page Illustration*

Table 117 ***Home > Overview*** *Sections and Charts*

Section	Description
Users	This chart is a graphical summary of the number of users on the network during a period of time. The time can be adjusted. Select **Show All** to display a list of data series that this graph can display, such as the user count by SSID. Clear the **Max Users** or **Avg Users** checkbox to change the display of the graph. The graph displays the maximum number of users by default. To view historical graphs in a new window, select the three-bar icon on the upper right of the chart.
Bandwidth	This adjustable chart displays bandwidth data over time. To remove bandwidth in or out from the graphical display, clear the check box for **Avg Bits Per Second In** or **Out**. To display details for specific devices, select **Show All** and select the devices to be included in the graphical bandwidth summary chart. To view historical graphs in a new window, select the three-bar icon on the upper right of the chart.
Monitoring Status	This pie chart shows the percentage of all devices that are up and down on the network. To review devices that are down, select **Down** in the legend or the chart, and the **APs/Devices > Down** page displays.
Configuration Compliance	The pie chart displays all known device configuration status on the network. Devices are classified as **Good**, **Unknown**, **Mismatched,** or **Audit Disabled**. Select the **Mismatched** link to see the **APs/Devices > Mismatched** page.
Alert Summary	This section displays all known and current alerts configured and enabled in the **System > Alerts** page. Alerts can be sorted using the column headers (**Type**, **Last 2 Hours**, **Last Day**, **Total**, or **Last Event**). The **Alert Summary** field displays four types of alerts, as follows: • **AMP Alerts** • **IDS Events** • **Incidents** • **RADIUS Authentication Issues** Select any alert type for more information. **NOTE:** The **Incidents** section only increments the counter for incidents that are open and associated to an AP. This is also the case if you select **Incidents** and view incident details. To view all incidents including those not associated to an AP, go to **Helpdesk > Incidents**.

Table 117 ***Home > Overview*** *Sections and Charts (Continued)*

Section	Description
Quick Links	The **Quick Links** section provides drop-down menus that enable you to move to the most common and frequently used pages in AWMS, as follows: • **Go to folder**—This menu lists all folders defined in AWMS from the **APs/Devices List** page. See "Using Device Folders (Optional)" on page 131. • **Go to group**—This menu lists all groups defined in AWMS, and enables you to display information for any or all of them. Use the **Groups** pages to edit, add, or delete groups that appear in this section. See "Configuring and Using Device Groups in AWMS" on page 69. • **View latest reports**—AWMS supports creating custom reports or viewing the latest daily version of any report. Select any report type to display the daily version. See "Creating, Running, and Emailing Reports" on page 219. • **Common Tasks**—This menu lists quick links to the most heavily used task-oriented pages in AWMS, to include the following: ▪ **Configure Alert Thresholds**—This link takes you to the **System > Triggers** page. See "Overview of Triggers and Alerts" on page 181. ▪ **Configure Default Credentials**—This link takes you to the **Device Setup > Communication** page. See "Configuring Communication Settings for Discovered Devices" on page 47. ▪ **Discover New Devices on Your Network**—This link takes you to the **Device Setup > Discover** page. See "Discovering, Adding, and Managing Devices" on page 107. ▪ **Supported Devices and Features**—This link displays a PDF that summarizes all supported devices and features in chart format for AWMS. ▪ **Upload Device Firmware**—This link displays the **Device Setup > Firmware & Files Upload** page. See "Overview of the Device Setup > Upload Firmware & Files Page" on page 49. ▪ **View Event Log**—This link displays the **System > Event Log** page. See "Using the System > Event Log Page" on page 207.

Viewing and Updating License Information

Navigate to the **Home > License** page using the standard AWMS menu. Figure 143 illustrates this page, and Table 118 describes the contents.

Please be aware that you cannot enter multiple licenses. To combine multiple license entitlements into one new license, contact Dell support.

Figure 143 ***Home > License*** *Page Illustration*

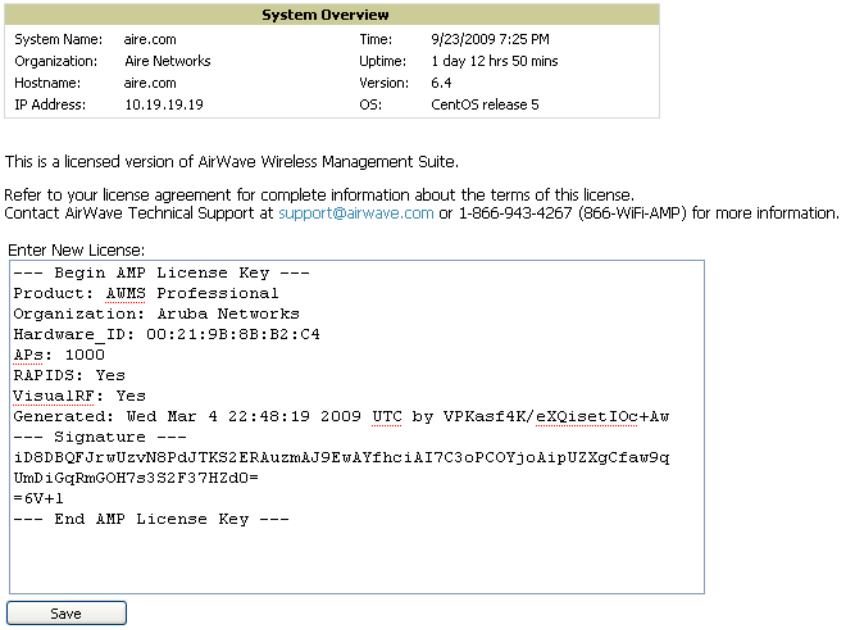


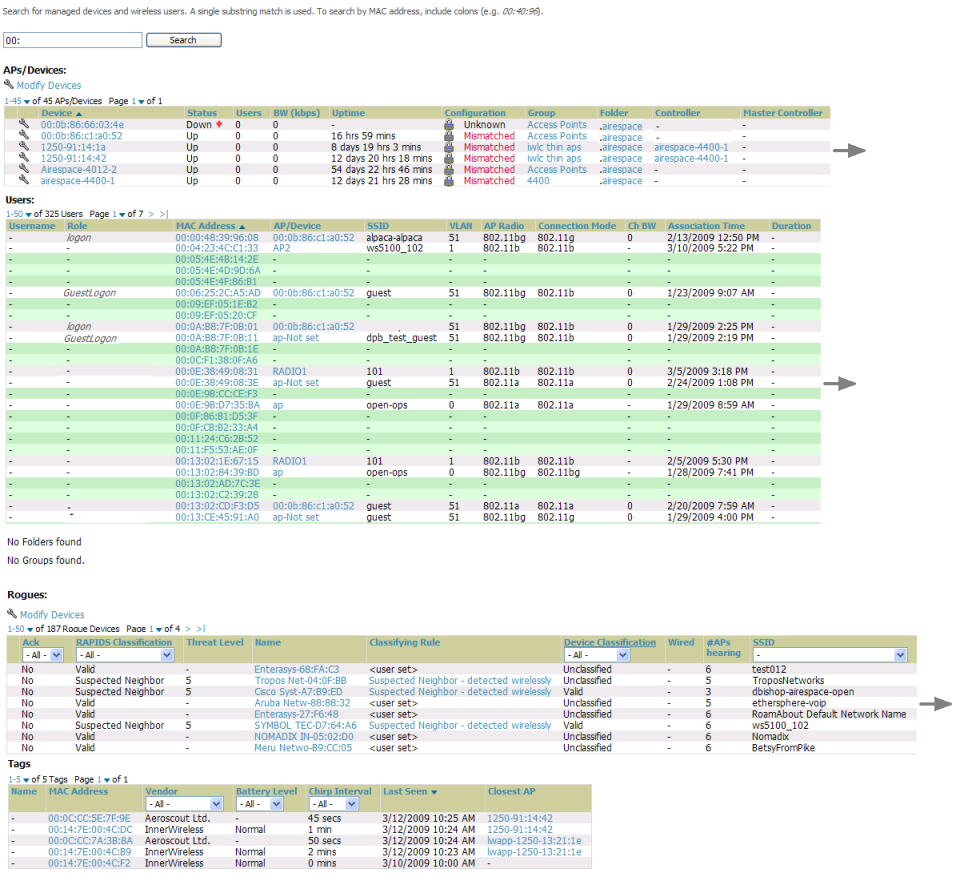
Table 118 ***Home > License*** *Fields and Descriptions*

Field	Description
System Name	Displays a user-definable name for AWMS. The System Name can be configured from the **AMP Setup > General** page.
Organization	Displays the organization listed on your license key.
Hostname	Displays the DNS name assigned to AWMS.
IP Address	Displays the static IP address assigned to AWMS. The IP Address can be configured from the **AMP Setup > Network** page.
Time	Displays the current date and time set on AWMS.
Uptime	Displays the amount of time since the operating system was last booted.
Version	Displays the version number of AWMS code currently running.
OS	Displays the version of Linux installed on the server.

Searching AWMS with the Home > Search Page

The **Home > Search** page provides a simple way to find connected and historical users, managed devices, rogue devices, groups, folders, and more. Search performs partial string searches on a large number of fields including the notes, version, secondary version, radio serial number, device serial number, LAN MAC, radio MAC and apparent IP address of all the APs, as well as the client MAC, VPN user, User, LAN IP and VPN IP fields. Figure 144 illustrates this page.

Figure 144 ***Home > Search*** *Page Illustration with Sample Hits on "00:"*



1. Enter the keyword or text with which to search. If searching for a MAC address, enter it in colon-delimited format.

NOTE: The AWMS Search utility is case-insensitive.

2. Select **Search**, and the results display after a short moment. Results support several hypertext links to additional pages, and drop-down menus allow for additional filtering of search returns.

   Search results are categorized in the following sequence. Categories of search results can be customized on the **Home > User Info** page to limit the scope of information returned. Not all categories below may offer returns for a given search:

   - **Devices**
   - **Users**
   - **Rogues**
   - **Tags**
   - **Folders and Groups**

Accessing AWMS Documentation

The **Home > Documentation** page provides easy access to all relevant AWMS documentation. All of the documents on this page are hosted locally by AWMS and can be viewed by any PDF viewer. Figure 145 illustrates this page.

Figure 145 ***Home > Documentation*** *Page Illustration*

If you have any questions that are not answered by the documentation, please contact Dell support.

Configuring Your Own User Information with the Home > User Info Page

The **Home > User Info** page displays information about the user that is logged into AWMS. This page includes the authentication type (local user, RADIUS, or TACACS+) and access level. This page enables customization some of the information displayed in AWMS, and is the place to change your password.

To create new users, navigate to the **AMP Setup > Users** page, and refer to "Creating AWMS Users" on page 43. Users can customize the information displayed in the AWMS header.

Figure 146 illustrates the **Home > User Info** page, and Table 119 lists the fields.

Figure 146 ***Home > User Info*** *Page Illustration*

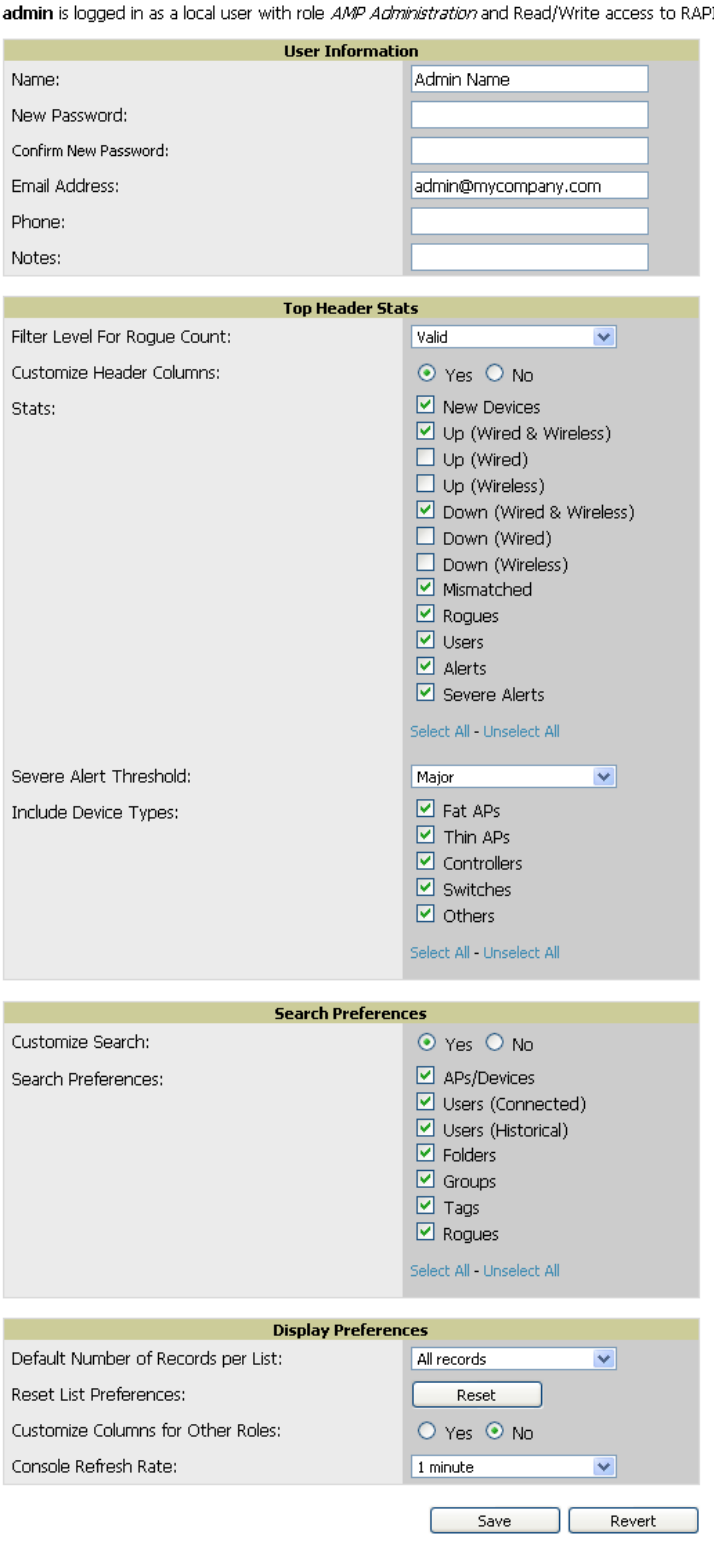


Table 119 ***Home > User Info*** *Fields*

Field	Description
Filter Level For Rogue Count	Specifies the minimum classification that will cause a device to be included in the rogue count header information.
Customize Header Columns	Enables/disables the ability to control which statistics hyperlinks are displayed at the top of every AWMS screen.

Table 119 ***Home > User Info*** *Fields (Continued)*

Field	Description
Stats	Select the specific data you would like to see in the header. **Note**: This field only appears if you selected **Yes** in the previous field.
Severe Alert Threshold	Configures the minimum severity of an alert to be included in the Severe Alerts count. Note: The severe alerts count header info will only be displayed if 'Severe Alerts' is selected in the Stats section above. **Note**: This field only appears if you selected **Yes** in the **Customize Header Columns** field.
Include Device Types	Configures the types of devices that should be included in the header stats. If a device type is not selected then it will not be included in the header stats. This field only appears if you selected **Yes** in **Customize Header Columns**.
Customize Search/Search Preferences	Set to **No** by default; when set to **Yes**, you can select which search categories to display when search results are returned.
Default Number of Records per List	Defines the number of rows to appear in any list by default. If a row count is manually set, it will override the default setting.
Reset List Preferences	Reset all list preferences including number of records per list, column order and hidden column information.
Customize Columns for Other Roles	Allows admin users to determine the columns that should be displayed and the order they should be displayed for specific user roles. To customize lists for other users, navigate to that list and select **Choose Columns for roles** above the list. Make the desired column changes; select the roles to update and **Save**.
Console Refresh Rate	The frequency in which lists and charts automatically refresh on a page.

Perform the following steps to configure your own user account with the **Home > User Info** page:

1. In the **User Information** section, enter the following information:
   - **Name**—Enter the ID by which you log into and operate in AWMS.
   - **Email Address**—Enter the email address to be used for alerts, triggers, and additional AWMS functions that support an email address.
   - **Phone**—Enter the area code and phone number, if desired.
   - **Notes**—Enter any additional text-based information that helps other AWMS users or administrators to understand the functions, roles, or other rights of the user being created.

Monitoring and Supporting AWMS with the System Pages

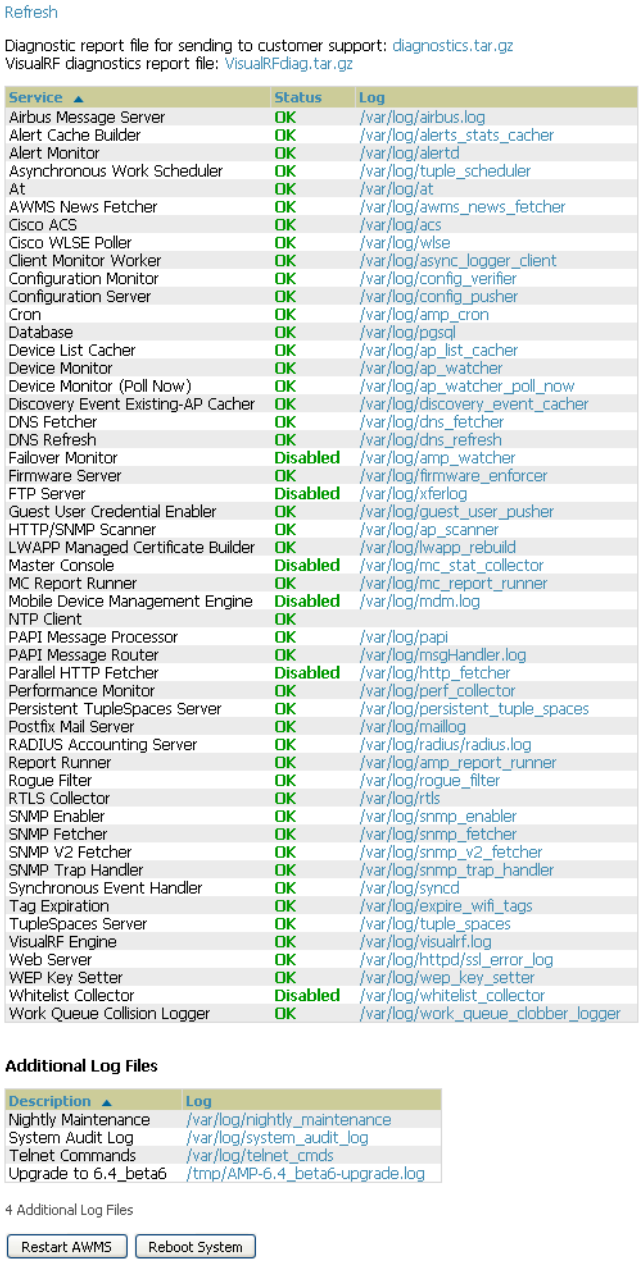
The **System** pages provide a centralized location for system-wide AWMS data and settings. Apart from **Triggers**, **Alerts**, and **Backups** pages that are described elsewhere in this chapter, the remaining pages of the **System** section are as follows:

- **System > Status**—Displays status of all AWMS services. Refer to "Using the System > Status Page" on page 206.
- **System > Event Log**—This useful debugging tool keeps a list of recent AWMS events, including APs coming up and down, services restarting, and most AWMS-related errors as well as the user that initiated the action. Refer to "Using the System > Event Log Page" on page 207.
- **System > Configuration Change Jobs**—Manages configuration changes in AWMS. Refer to "Using the System > Configuration Change Jobs Page" on page 207.
- **System > Firmware Upgrade Jobs**—Displays information about current and scheduled firmware upgrades. Refer to "Loading Firmware Files to AWMS" on page 50.
- **System > Performance**—Displays basic AWMS hardware information as well as resource usage over time. Refer to "Using the System > Performance Page" on page 208.

Using the System > Status Page

The **System > Status** page displays the status of all of AWMS services. Services will either be **OK**, **Disabled**, or **Down**. If any service is **Down** (displayed in red) please contact Dell support. The **Reboot System** button provides a graceful way to power cycle your AWMS remotely when it is needed. The **Restart AWMS** button will restart the AWMS services without power cycling the server or reloading the OS. Figure 147 illustrates this page.

Figure 147 ***System > Status*** *Page Illustration*



Refresh

Diagnostic report file for sending to customer support: diagnostics.tar.gz
VisualRF diagnostics report file: VisualRFdiag.tar.gz

Service ▲	Status	Log
Airbus Message Server	OK	/var/log/airbus.log
Alert Cache Builder	OK	/var/log/alerts_stats_cacher
Alert Monitor	OK	/var/log/alertd
Asynchronous Work Scheduler	OK	/var/log/tuple_scheduler
At	OK	/var/log/at
AWMS News Fetcher	OK	/var/log/awms_news_fetcher
Cisco ACS	OK	/var/log/acs
Cisco WLSE Poller	OK	/var/log/wlse
Client Monitor Worker	OK	/var/log/async_logger_client
Configuration Monitor	OK	/var/log/config_verifier
Configuration Server	OK	/var/log/config_pusher
Cron	OK	/var/log/amp_cron
Database	OK	/var/log/pgsql
Device List Cacher	OK	/var/log/ap_list_cacher
Device Monitor	OK	/var/log/ap_watcher
Device Monitor (Poll Now)	OK	/var/log/ap_watcher_poll_now
Discovery Event Existing-AP Cacher	OK	/var/log/discovery_event_cacher
DNS Fetcher	OK	/var/log/dns_fetcher
DNS Refresh	OK	/var/log/dns_refresh
Failover Monitor	Disabled	/var/log/amp_watcher
Firmware Server	OK	/var/log/firmware_enforcer
FTP Server	Disabled	/var/log/xferlog
Guest User Credential Enabler	OK	/var/log/guest_user_pusher
HTTP/SNMP Scanner	OK	/var/log/ap_scanner
LWAPP Managed Certificate Builder	OK	/var/log/lwapp_rebuild
Master Console	Disabled	/var/log/mc_stat_collector
MC Report Runner	OK	/var/log/mc_report_runner
Mobile Device Management Engine	Disabled	/var/log/mdm.log
NTP Client	OK	
PAPI Message Processor	OK	/var/log/papi
PAPI Message Router	OK	/var/log/msgHandler.log
Parallel HTTP Fetcher	Disabled	/var/log/http_fetcher
Performance Monitor	OK	/var/log/perf_collector
Persistent TupleSpaces Server	OK	/var/log/persistent_tuple_spaces
Postfix Mail Server	OK	/var/log/maillog
RADIUS Accounting Server	OK	/var/log/radius/radius.log
Report Runner	OK	/var/log/amp_report_runner
Rogue Filter	OK	/var/log/rogue_filter
RTLS Collector	OK	/var/log/rtls
SNMP Enabler	OK	/var/log/snmp_enabler
SNMP Fetcher	OK	/var/log/snmp_fetcher
SNMP V2 Fetcher	OK	/var/log/snmp_v2_fetcher
SNMP Trap Handler	OK	/var/log/snmp_trap_handler
Synchronous Event Handler	OK	/var/log/syncd
Tag Expiration	OK	/var/log/expire_wifi_tags
TupleSpaces Server	OK	/var/log/tuple_spaces
VisualRF Engine	OK	/var/log/visualrf.log
Web Server	OK	/var/log/httpd/ssl_error_log
WEP Key Setter	OK	/var/log/wep_key_setter
Whitelist Collector	Disabled	/var/log/whitelist_collector
Work Queue Collision Logger	OK	/var/log/work_queue_clobber_logger

Additional Log Files

Description ▲	Log
Nightly Maintenance	/var/log/nightly_maintenance
System Audit Log	/var/log/system_audit_log
Telnet Commands	/var/log/telnet_cmds
Upgrade to 6.4_beta6	/tmp/AMP-6.4_beta6-upgrade.log

4 Additional Log Files

Restart AWMS | Reboot System

- The link **diagnostics.tar.gz** contains reports and logs that are helpful to Dell support in troubleshooting and solving problems. Your Dell support representative may ask for this file along with other logs that are linked on this page.
- Similarly, the **VisualRFdiag.zip** link contains VisualRF diagnostic information that might be requested by AirWave support.
- A summary table lists logs that appear on the **System > Status** page. These are used to diagnose AWMS problems. Additional logs are available via SSH access in the /var/log and /tmp directories; AirWave support

engineers may request these logs for help in troubleshooting problems and will provide detailed instructions on how to retrieve them. Table 120 describes some of the most important logs:

Table 120 *A Sample of Important Status Logs*

Log	Description
pgsql	Logs database activity.
ssl_error_log	Reports problems with the web server. Also linked from the internal server error page that displays on the web page; please send this log to AirWave support whenever reporting an internal server error.
maillog	Applies in cases where emailed reports or alerts do not arrive at the intended recipient's address.
radius	Displays error messages associated with RADIUS accounting.
async_logger	Tracks many device monitoring processes, including user-AP association.
async_logger_client	Logs device configuration checks.
config_pusher	Logs errors in pushing configuration to devices.
visualrf.log	Details errors and messages associated with the VisualRF application.

Using the System > Event Log Page

The **System > Event Log** page is a very useful debugging tool containing a list of recent AWMS events including APs coming up and down, services restarting, and most AWMS-related errors as well as the user that initiated the action. Figure 148 illustrates this page, and Table 121 describes the page components.

Figure 148 ***System > Event Log*** *Page Illustration*

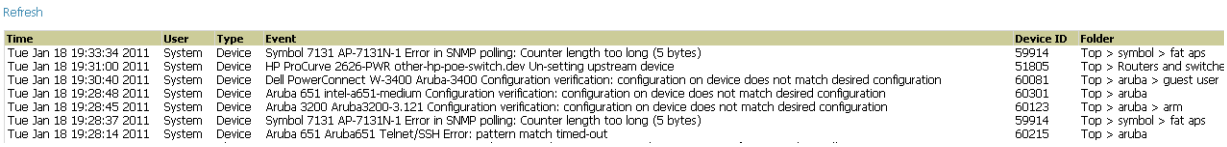


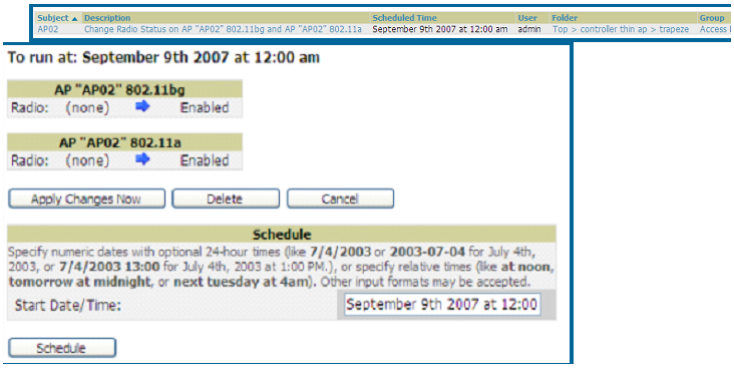
Table 121 *Event Log Fields*

Column	Description
Time	Date and time of the event.
User	The AWMS user that triggered the event. When AWMS itself is responsible, **System** is displayed.
Type	Displays the Type of event recorded, which is one of four types, as follows: • **Device**—An event localized to one specific device. • **Group**—A group-wide event. • **System**—A system-wide event. • **Alert**—If a trigger is configured to report to the log, an **Alert** type event will be logged here.
Event	The event AWMS observed; useful for debugging, user tracking, and change tracking.

Using the System > Configuration Change Jobs Page

Schedule configuration change jobs are summarized on the **System > Configuration Change Jobs** page. Perform the following steps to use this page, illustrated in Figure 149.

Figure 149 ***System > Configuration Change Jobs*** *Page Illustration*



1. To edit an existing configuration change job select on the linked description name. On the subsequent edit page you can choose to run the job immediately by selecting **Apply Changes Now**, reschedule the job by selecting **Schedule**, **Delete** the job, or **Cancel** the job edit.
2. Select the linked AP or group name under the **Subject** column to go to its monitoring page.
3. Select the linked group and folder names under **Folder** or **Group** to go to the AP's folder or group page.
4. Scheduled configuration change jobs will also appear on the **Manage** page for an AP or the **Monitoring** page for a group.

Using the System > Performance Page

The **System > Performance** page displays basic AWMS hardware information as well as resource usage over time. AWMS logs performance statistics such as load average, memory and swap data every minute. The historical logging is useful to determine the best usable polling period and track the health of AWMS over time.

The page is divided into four sections:

- System Information
- Performance Graphs
- Database Statistics
- Disk Usage

Figure 150 illustrates this page and Table 122 describes fields and information displayed.

Figure 150 ***System > Performance*** *Page Illustration (Partial Screen)*

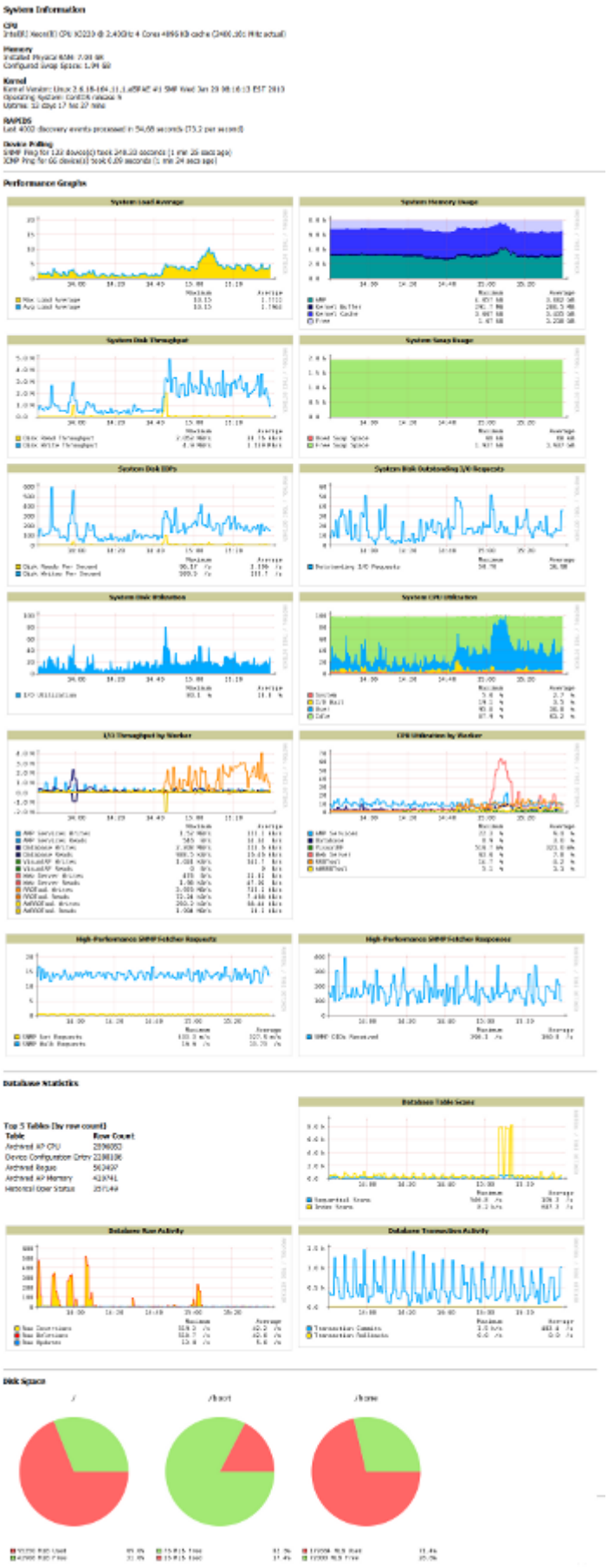


Table 122 ***System > Performance*** *Page Fields and Graphs*

Field	Description
System Information	
CPU(s)	Basic CPU information as reported by the operating system.
Memory	The amount of physical RAM and Swap space seen by the operating system. Refer to the *AWMS Server Hardware Guide* in **Home > Documentation** for hardware requirements.
Kernel	The version of the Linux kernel running on the box.
Device Polling	Displays some AP/Device polling statistics.
Performance Graphs	
System Load Average	The number of jobs currently waiting to be processed. Load is a rough metric that will tell you how busy a server is. A typical AWMS load is around 2-3 times the number of CPU cores you have in your system. A constant load of 4x to 5x is cause for concern. A load above 6x is a serious issue and will probably result in AWMS becoming unusable. To lower the load average, try increasing a few polling periods in the **Groups > Basic** page.
System Memory Usage	The amount of RAM that is currently used broken down by usage. It is normal for AWMS to have very little free RAM. Linux automatically allocates all free RAM as cache and buffer. If the kernel needs additional RAM for process it will dynamically take it from the cache and buffer.
System Disk Utilization	The amount of data read from the disk and written to the disk.
System Disk IOPs	The number of disk reads and writes per second.
System Disk Throughput	The rate of reading and writing from and to the disk in bytes per second.
System Disk Outstanding I/O Requests	The average number of outstanding I/O requests (queue depth). If it's high, it means that I/O requests (disk reads/writes) aren't being serviced as fast as they're being asked for.
System Swap Usage	The amount of Swap memory used by AWMS. Swap is used when the there is no more free physical RAM. A large performance penalty is paid when swap is used. If an AWMS consistently uses swap, you should consider installing additional RAM.
System CPU Utilization	The percentage of CPU that has been used by the user and the system as well as the amount that was idle.
I/O Throughput by Worker/by Service	Displays reads and writes for workers (AMP services, database, VisualRF, web server, RRD tool and AWRRD tool) and for services (AMP, VisualRF and web server).
CPU Utilization by Worker/by Service	Displays reads and writes for workers (AMP services, database, VisualRF, web server, RRD tool and AWRRD tool) and for services (AMP, VisualRF and web server).
System Network Bandwidth	All traffic in and out measured in bits per second of your primary network interface (Eth0 being the most common).
Bandwidth by Protocol	Displays the amount of traffic used by Telnet, HTTPS and SNMP used by your primary network interface (Eth0 being the most common).
Legacy SNMP Fetcher Requests	The number of SNMP get and walk requests per second performed by the legacy (v1 and v3) SNMP fetcher.
Legacy SNMP Fetcher Responses	The number of SNMP OIDs received per second performed by the legacy (v1 and v3) SNMP fetcher.
High Performance SNMP Fetcher Requests	The number of SNMP get and walk requests per second performed by the high performance SNMP (v2c) fetcher.
High Performance SNMP Fetcher Responses	The number of SNMP OIDs received per second performed by the high performance SNMP (v2c) fetcher.
Database Statistics	
Top 5 Tables (by row count)	The five largest tables in AWMS. Degraded performance has been noticed for in some cases for tables over 200,000 rows. Dell PowerConnect W recommends decreasing the length of time client data is stored on the AWMS page if a user/client table exceeds 250,000 rows.
Database Table Scans	The number of database table scans performed by the database.

Table 122 *System > Performance Page Fields and Graphs (Continued)*

Field	Description
Database Row Activity	The number of insertions, deletions and updates performed to the database.
Database Transaction Activity	The number of commits and rollbacks performed by the database.
Disk Space	
Disk Space	Pie charts that display the amount of used and free hard drive space for each partition. If a drive reaches over 80% full, you may want to lower the **Historical Data Retention** settings on the **AMP Setup > General** page or consider additional drive space.

There are several initial steps that you can take to troubleshoot AWMS performance problems, including slow page loads and timeout errors. Initial troubleshooting steps would include the following:

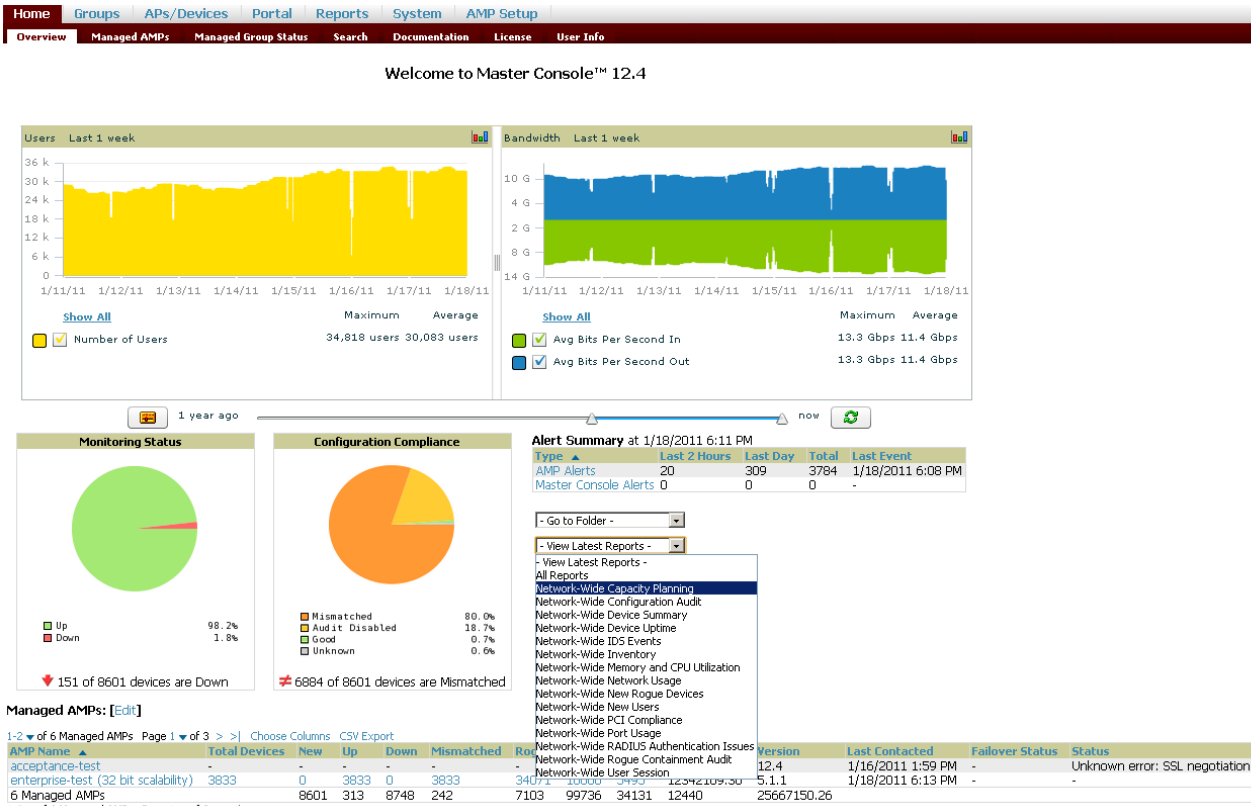
- Increasing the polling period settings on the **Groups > Basic** page.
- Increasing the polling period time for groups with routers and switches.
- Adding additional memory to the server. Please consult the sizing information in the latest edition of the *Dell PowerConnect W AirWave Sizing Guide* from support.dell.com/manuals or contact Dell support for the latest recommendations.

Supporting AWMS Servers with the Master Console

The Master Console (MC) is used to monitor multiple AWMS stations from one central location. The Master Console is designed for customers running multiple AWMS servers. Once an AWMS station has been added to the MC, it will be polled for basic AWMS information.

Much like the normal **Home > Overview** page, the **Master Console Home > Overview** page provides summary statistics for the entire network at a glance. Figure 151 illustrates the Overview page:

Figure 151 *Master Console **Home > Overview** Page Illustration*



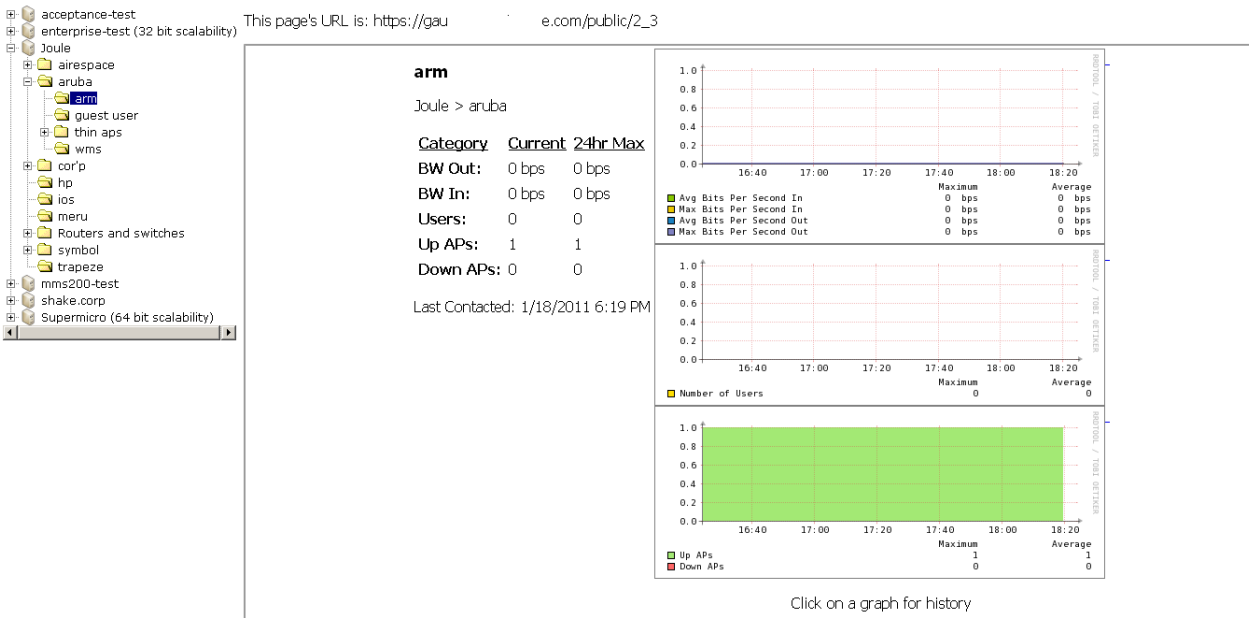
- Reports can be run from the Master Console to display information from multiple AWMS stations; because such reports can be extremely large, reports can also be run as **summary only** so that they generate more quickly and finish as a manageable file size.
- The Master Console can also be used to populate group-level configuration on managed AWMS installations using the Global Groups feature.
- The Master Console offers a display of devices that are in a **Down** or **Error** state anywhere on the network. This information is supported on Master Console pages that display device lists such as **Home > Overview** and **APs Devices > List**.
- The Master Console and Failover servers can be configured with a **Managed AMP Down** trigger that generates an alert if communication is lost to a managed or watched AWMS station. The Master Console or Failover server can also send email or NMS notifications about the event. See "Overview of Triggers and Alerts" on page 181.

NOTE: The license key determines if the server will behave as a Master Console or as a standard AWMS server.

Using the Public Portal on Master Console

The Master Console also contains an optional Public Portal which allows any user to view basic group-level data for each managed AWMS. This feature is disabled by default for security reasons; no AWMS or Master Console login is required to view the public portal. The Public Portal can be enabled in **AMP Setup > General** in the **Master Console** section. Once enabled, a new **Portal** tab will appear to the right of the **Groups** tab (refer to the navigation section in Figure 151 in the previous page). The URL of the public portal will be https://your.AMP.name/public. When you upgrade to the latest version of AWMS, the public portal is disabled by default, regardless of the type of license.

Figure 152 *Public Portal Page Illustration*



The **Public Portal** supports configuration of the iPhone interface. This can be configured using the **Master Console AWMS** page. See "Defining General AWMS Server Settings" on page 34.

Adding a Managed AMP with the Master Console

Perform the following steps to add a managed AWMS console.

1. Navigate to the **Home > Managed AMPs** page.

2. Select the **pencil icon** to edit or reconfigure an existing AWMS console, or select **Add New Managed AMP** to create a new AWMS console. The **Managed** AMP page appears. Complete the settings on this page as described in Table 123.

Table 123 *Managed AMP Fields and Default Values*

Field	Default	Description
Hostname / IP Address	N/A	Enter the IP address or Hostname of the AWMS server to be managed.
Polling Enabled	Yes	Enables or disables the Master Console polling of managed AWMS server.
Polling Period	5 minutes	Determines how frequently the Master Console polls the managed AWMS server.
Username	N/A	The username used by the Master Console to login to the managed AWMS server. The user needs to be an AP/Device Manager or AWMS Administrator.
Password (Confirm Password)	N/A	The password used by the Master Console to login to the managed AMP.
HTTP Timeout (5-1000 sec)	60	Defines the timeout period used when polling the managed AMP server.
Manage Group Configuration	No	Defines whether the Master Console can manage device groups on the managed AMP server.

3. When finished, select **Add** to return to the **Managed AMPs** list page.

Using Global Groups with Master Console

To push configurations to managed groups using the AWMS Global Groups feature, follow these steps:

1. Navigate to the Master Console's **Groups > List** page.
2. Select **Add** to add a new group, or select the name of the group to edit settings for an existing group.
3. Select the **Duplicate** icon to create a new group with identical configuration to an existing group. Groups created on the Master Console will act as Global Groups, or groups with master configurations that can be pushed out to subscriber groups on managed AMPs. Global groups are visible to all users, so they cannot contain APs (which can be restricted based on user role).
4. Selecting the name of an existing group on the Master Console loads the subtabs for **Basic, Security, SSIDs, AAA Servers, Templates, Radio, Cisco WLC Config, Proxim Mesh,** and **MAC ACL** pages, if such pages and configurations are active for the devices in that group.

   These subtabs contain the same fields as the group subtabs on a monitored AWMS, but each field also has a checkbox. The Master Console can also configure global templates that can be used in subscriber groups. The process is the same as described in the Chapter 6, "Creating and Using Templates" , except that there is no process by which templates can be fetched from devices in the subscriber group on managed AMPs. Instead, the template must be copied and pasted into the Master Console Global Group.

When a Global Group is pushed from the Master Console to subscriber groups on managed AMPs, all settings will be static except for settings with the checkbox selected; for fields with checkboxes selected, the value or setting can be changed on the corresponding tab for each managed group. For list pages, override options are available only on the **Add** page for each list. It will take several minutes for changes to Global Groups on the Master Console to be pushed to the managed AMPs; make sure that the **Manage Group Configuration** option is enabled for each managed AWMS.

Once Global Groups have been configured on the Master Console, groups must be created or configured on the managed AMPs to subscribe to a particular Global Group. To configure subscriber groups, enable **Use Global Groups** on the **Group > Basic** page of a group on a managed AWMS. Select the name of the Global Group from the drop-down menu, and then select **Save and Apply**. Note that the MC doesn't push anything when you create new subscriber groups; the copy of the Global Group already on the managed AMP provides the information.

Once the configuration is pushed, the non-overridden fields from the Global Group will appear on the subscriber group as static values and settings. Only fields that had the override checkbox selected in the Global Group will appear as fields that can be set at the level of the subscriber group. Any changes to a static field must be made on the Global Group.

The Global Groups feature can also be used without the Master Console. For more information about how this feature works, refer to "Configuring and Using Device Groups in AWMS" on page 69.

Upgrading AWMS

The AWMS upgrade process may change. Please contact support and consult the latest AWMS release announcement for detailed instructions and changes.

Upgrade Instructions

To upgrade your AWMS:

1. Log in to the AWMS server as the root user.
2. Run the following command (where x.x.x is equal to the latest AWMS version)

```
# start_amp_upgrade -v x.x.x
```

Upgrading Without Internet Access

If your AWMS cannot get to the Internet:

1. Download the latest AWMS version from our download page: support.dell.com
2. Copy the file to AWMS /root directory using WinSCP.
3. On the AWMS, run the following command:

```
# start_amp_upgrade -v x.x.x
```

The `start_amp_upgrade` script will check the `/root` directory for the latest update. If the update is not found, the script will attempt to download it from the AirWave support page. The script will then extract the version specific upgrade script. The version specific script will deploy all needed files, update the database, perform any data migrations and restart the AWMS services.

Backing Up AWMS

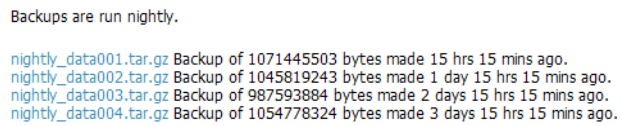
AWMS creates nightly archives of all relational data, statistical data, and log files. This occurs by default at 4:15 AM, but is configurable on the **AMP Setup > General** page under **Nightly Maintenance Time**.

Although AWMS only keeps the last four sets of archives, the archives can be downloaded manually or automatically off-site for more extensive backup strategies. AWMS creates one data backup file each night. The data backup file contains all of the device and group information as well as historical data and system files, including IP address, NTP information, mail relay hosts, and other AWMS settings.

Viewing and Downloading Backups

To view current AWMS backup files, go to the **System > Backups** page. Figure 153 illustrates this page.

Figure 153 ***System > Backups*** *Page Illustration*



To download a backup file, select the filename URL and the **File Download** popup page appears.

Regularly save the data backup file to another machine or media. This process can be automated easily with a nightly script.

NOTE: Nightly maintenance and amp_backup scripts back up the full AMP data and save the file as nightly_data00[1-4].tar.gz. In previous AWMS versions, the scripts created both config backup and data backup files. In order to restore the AMP data, it is only necessary to have most recent data backup file, and AWMS no longer uses or supports the config backup file, effective as of AWMS 6.3.2 and later AWMS versions.

Running Backup on Demand

To create an immediate backup:

1. Log into the AWMS system as **root**.
2. Run the backup script by typing **`amp_backup`**.

This creates a backup of the system located in /`alternative/databackup.tar.gz.`

Restoring from a Backup

To restore a backup file on a new machine:

1. Use your AWMS Installation CD to build a new machine. The new machine must be running the same version as the AWMS that created the backup file.
2. Copy the nightly_data00[1-4].tar.gz file to the **`/tmp`** directory in the new AWMS.

   A file transfer client that supports SFTP/SCP for Windows is WinSCP: winscp.sourceforge.net/eng/

   WinSCP allows you to transfer the nightly00[1-4].tar.gz file from your local PC to the new AWMS using the secure copy protocol (SCP).
3. Log onto the new server as **root**.
4. Change to the **scripts** directory by typing **`scripts`**.
5. Run the restore script by typing **`./amp_restore -d /tmp/nightly_data00[1-4].tar.gz`**.

NOTE: Network administrators can now use the nightly backup from a 32-bit AMP to restore AMP on a 64-bit installation, rather than having to create a special backup file or use the special restore script.

Using AWMS Failover for Backup

The failover version of AWMS provides a “many to one” hot backup server. The Failover AWMS polls the watched AMPs to verify that each is up and running. If the watched AWMS is unreachable for the specified number of polls, the Failover AWMS automatically restores the most recent saved backup from the watched AWMS and begins polling its APs.

Navigation Section of AWMS Failover

The **Navigation** section displays tabs to all main GUI pages within AWMS Failover. The top bar is a static navigation bar containing tabs for the main components of AWMS, while the lower bar is context-sensitive and displays the subtabs for the highlighted tab. Table 124 describes the contents of this page.

Table 124 *Contents of the Navigation Section of Failover*

Main Tab	Description	Subtabs
Home	The **Home** page provides basic AWMS Failover information including system name, hostname, IP address, current time, running time, software version, and watched AWMS information.	• Overview • User Info • Watched AMPs • License
System	The **System** page provides information related to AWMS operation and administration including overall system status, performance monitoring, and backups.	• Status • Triggers • Alerts • Event Log • Backups • Performance
AMP Setup	The **Setup** page provides all information relating to the configuration of AWMS itself and its connection to your network.	• General • Network • Users • TACACS+

Adding Watched AWMS Stations

Navigate to the **Home > Watched AMPs** page to begin backing up and monitoring AWMS stations. Once an AWMS installation has been added to the Watched AMP list, the Failover AMP will download the most recent backup and begin polling. The Failover AMP and the Watched AMP must be on the same version or else the watched AWMS will be unable to restore properly. If any of the watched AMPs are not on the same version of AWMS, you will need to upgrade. The Failover AMP will need HTTPS access (port 443) to the watched AMP to verify that the web page is active and to fetch downloads.

Once the Failover AMP determines that the Watched AMP is not up (based on the user-defined missed poll threshold) it will restore the data backup of the Watched AMP and begin monitoring the watched AMP APs and devices. There are many variables that affect how long this will take including how long client historical data is being retained, but for an AMP with 1,000 APs it might take up to 10 minutes. For an **AMP** with 2,500 APs, it might take as long as 20 minutes. The Failover AMP will retain its original IP address.

In summary, the Failover AMP could take over for the Watched AMP in as little as five minutes; it might take up to an additional 10-20 minutes to unpack the watched AMP data and begin monitoring APs. The most important factors are the missed poll threshold, which is defined by the user, and the size of the watched AMP backup, which is affected by the total number of APs and by the amount of data being saved, especially client historical data.

To restore the Watched AMP, run the backup script from the command line and copy the current data file and the old Watched AMP configuration file to the Watched AMP. Then run the restore script. More information about backups and restores can be found in "Backing Up AWMS" on page 214.

Table 125 ***Home > Watched*** *Page Fields and Default Values*

Setting	Default	Description
IP/Hostname	None	The IP address or Hostname of the watched AWMS. The Failover AWMS needs HTTPS access to the watched AMPs.
Username	None	A username with management rights on the watched AWMS.
Password	None	The password for the username with management rights specified above.

Table 125 ***Home > Watched*** *Page Fields and Default Values (Continued)*

Setting	Default	Description
HTTP Timeout (5-1000 Sec)	60	The amount of time before AWMS considers a polling attempt failed.
Polling Enabled	Yes	Enables or disables polling of the Watched AWMS. **NOTE:** You do not need to disable polling of the watched AWMS system if it is set to be down during nightly maintenance or is being upgraded.
Polling Period	5 minutes	The amount of time between polls of the Watched AWMS.
Missed Poll Threshold	None	The number of polls that can be missed before the failover AWMS will begin actively monitoring the Watched AWMS APs.

Chapter 9

Creating, Running, and Emailing Reports

This chapter describes AWMS reports including access, creation, scheduling, and distribution.

This chapter includes the following sections:

- "Overview of AWMS Reports" on page 219
- "Using Daily Reports" on page 222
- "Defining Reports" on page 242
- "Emailing and Exporting Reports" on page 245

AWMS ships with several reports enabled by default. Default reports may run nightly or weekly, depending on the AWMS release. Review the list of defined and scheduled reports with the **Reports > Generated** and **Reports > Definition** pages to determine if default reports are desired. If not, you can delete, disable, or reschedule them.

AWMS supports additional specialized reports as follows:

- **System > Status** page supports the diagnostic report file for sending to customer support: diagnostics.tar.gz.
- **System > Status** page supports the VisualRF diagnostics report file: VisualRFdiag.tar.gz.
- **VisualRF > Network View** supports the Bill of Materials (BOM) report. Refer to the *VisualRF User Guide* in **Home > Documentation**.

Overview of AWMS Reports

Reports are powerful tools in network analysis, user configuration, device optimization, and network monitoring on multiple levels. Among their benefits, reports provide an interface for multiple configurations.

AWMS reports have the following general parameters:

- AWMS runs daily versions of all reports during predefined windows of time. All reports can be scheduled to run in the background.
- The daily version of any report is available instantly in the **Reports > Generated** page.
- The **Inventory** and the **Configuration Audit** reports are the only reports that don't span a period of time. Instead, these two reports provide a snapshot of the current state of the network.
- Users can create all other reports over a custom time period on the **Reports > Definitions** page. All reports can be emailed or exported to XML format for easy data manipulation using a spreadsheet.

Reports > Definitions Page Overview

The **Reports > Definitions** page allows you to define new reports and see the reports already defined.

The **Definitions** page includes these sections:

- **Report definitions** section—The **Add** button allows you to define a custom report using the **Custom Options** drag and drop interface, or from any of the report types in the dropdown menu. The **Report Definitions** table has a complete list of all saved report definitions with an option to return to each definition's table to further customize your report.
  - **Add and Run** allows you to create a report definition and run that report immediately.
  - **Run Now** (visible from the expanded **Report Definitions** menu) allows immediate running of a custom report as soon as you set the parameters. You must save its definition separately, if you want to remember the parameters.

- **Report definitions for other roles** section—This section, supported for **admin** users, displays additional reports that have been scheduled for other roles. This section of the page adds the **Role** column, and other columns are the same.

Each pane includes a **Latest Report** column with the most recently run reports for each definition and role created. **Run** and **Delete** buttons allow you to select a report from the definitions table to run or delete. Once you define a report from the **Definition** page, it appears on the **Generated** page. The **Reports > Definition** page is shown in Figure 154, and Table 126 describes the fields available when you select a specific report definition.

Table 126 ***Reports > Definition*** *Page Fields and Descriptions*

Field	Description
Report Definition	Displays a field for entering report title and dropdown menu, shown in Figure 155, displaying all possible report types.
Report Restrictions	Displays dynamic fields that include spaces for selecting attributes and entering data relevant to your selected report type scope such as groups, folders, SSID, Device Search filter, report start and end times.
Scheduling Options	Reveals options for one time or regularly scheduled reporting by selecting **Yes**. Options include report frequency, start time, and current system time.
Report Visibility	Allows you to determine a report's visibility according to user role.
Email Options	Reveals email address preferences for sending reports by selecting **Yes**.
Add and Run	Allows you to create a report definition and run that report right then.
Run Now	Allows you to run any report that has been defined on the spot without saving settings or creating a new report definition.
Add	Saves report definition you just created.

Figure 154 ***Reports > Definition*** *Page Illustration (Split View)*

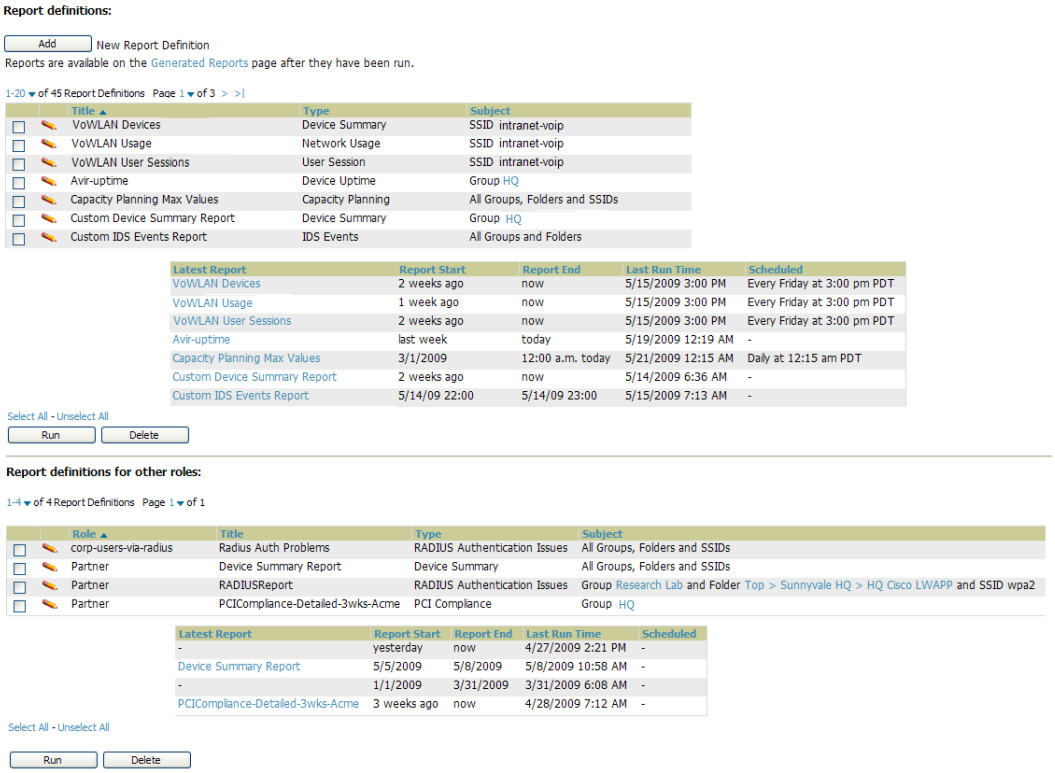
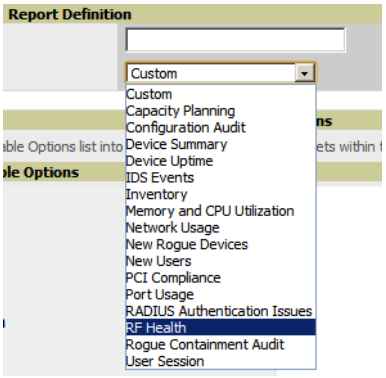


Figure 155 ***Report Type*** *Drop-down Menu in* ***Reports > Definitions*** *Illustration*



NOTE: Only **admin** users have complete access to all report information. The AWMS reports and online displays of information can vary with configuration, User Roles, and Folders.

Reports > Generated Page Overview

The **Reports > Generated** page displays reports that have been run, as well as the most recent daily version of any report. An **Admin** user can see and edit all report definitions in AWMS. Users with **Monitor Only** roles can see reports and definitions only if they have access to all devices in the reports.

The **Reports > Generated** page contains three primary sections, as follows:

- Generated reports configured for the current role and for additional roles
- Generated reports for other roles
- The latest daily reports for immediate online viewing

Figure 156 ***Reports > Generated*** *Page Example*

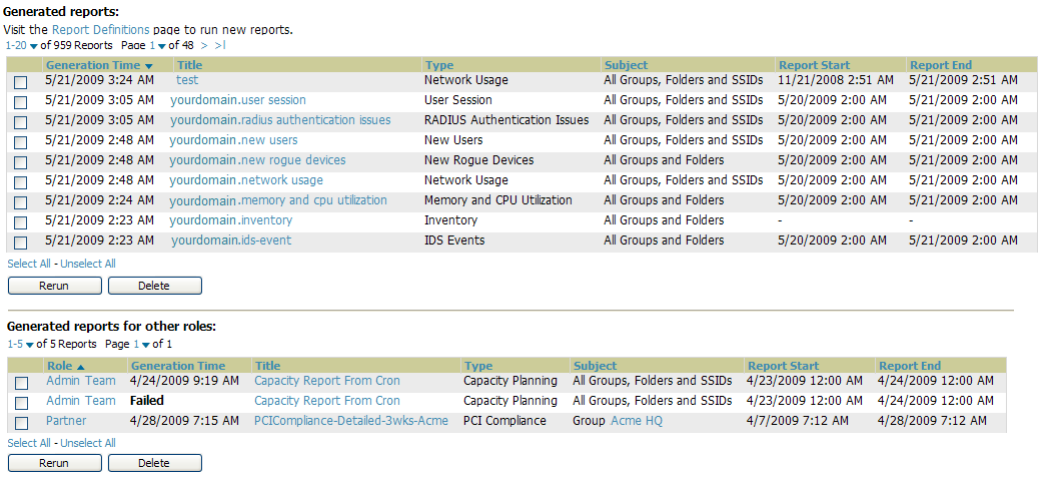


Figure 157 ***Reports > Generated*** *Page with Single-click Report Viewing Options*

Using Daily Reports

This section describes the default and custom-scheduled reports supported in AWMS. These reports can be accessed from the **Reports > Generated** page.

Viewing Generated Reports

The **Reports > Generated** page supports the following general viewing options:

- By default, the reports on the **Reports > Generated** page are sorted by **Generation Time**. You can sort reports by any other column header in sequential or reverse sequential order. You can also choose columns, export the Generated Reports list in CSV, and modify the pagination of this list.
- The **Reports > Detail** page launches when you select any report title from this page.

The **Generated Reports** page contains fewer columns and information than the **Definitions** page. Table 127 describes each column for the **Reports > Generated** page.

Table 127 ***Reports > Generated*** *Page Fields and Descriptions*

Field	Description
Generated Time	The date and time of the last time the report was run, or when the latest report is available. Selecting the link in this field displays the latest version of a given report. When the latest version of a given report is not available, this field is blank. In this case, a report can be run by selecting the report title and selecting **Run**.
Title	The title of the report. This is a user-configured field when creating the report.
Type	The type of the report.
Subject	The scope of the reportincluding groups, folders, SSIDs, or any combination of these that are included in the report.
Report Start	The beginning of the time period covered in the report.
Report End	The end of the time period covered in the report.
Role	In the **Report definitions for other roles** section, indicates the roles for which additional reports are defined.

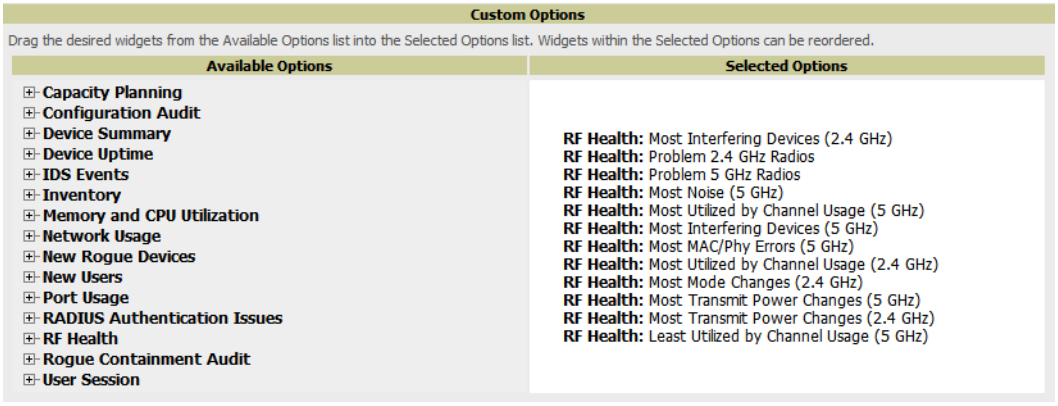
Using Custom Reports

Custom reports allow users to specify the data that should be included in a report.

Perform these steps to create a Custom Report.

1. Navigate to the **Reports > Definitions** page.
2. Select **Add**.
3. By default, the Custom option will be selected in the Type drop-down menu, and the **Custom Options** section appears below as shown in Figure 158.

Figure 158 ***Custom Options*** *Page Illustration*



The left pane of the **Custom Options** section lists all available data that can be included in the report. For example, if the data you want to include is in the RF Health report, select **RF Health** to view a list of all available radio frequency information. Then, simply drag the desired data from the **Available Options** list on the left to the **Selected Options** pane on the right. The order of the data in the **Selected Options** section is the order that it will appear in the report. The data can be reordered by dragging an item up or down the list.

4. Below the Custom Options panes are the **Report Restrictions**, **Scheduling Options**, **Report Visibility**, and **Email Options** sections. Choose the parameters as needed for your report, especially a **Report Start** and **Report End**.
5. When finished, select **Add and Run** to add the report to your list and run it immediately, **Run Now** to run without being added to the list, **Add** to add but not run the report, and **Cancel** to exit this page.

Using the Capacity Planning Report

The **Capacity Planning Report** tracks device bandwidth capacity and throughput in device groups, folders, and SSIDs. This report assists in analyzing device capacity and performance on the network, and such analysis can help to achieve network efficiency and improved experience for users.

This report is based on interface-level activity. The information in this report can be sorted by any column header in sequential or reverse-sequential order by selecting the column heading.

Refer also to the "Using the Network Usage Report" on page 232 for additional bandwidth information.

The following figures and Table 128 illustrate and describe the contents of the **Capacity Planning Report**.

Figure 159 *Capacity Planning Report Detail Page*

Daily Capacity Planning Report for All Groups, Folders and SSIDs

8% of Capacity for 1-100% of the time
1/10/2011 12:00 AM to 1/11/2011 12:00 AM
Generated on 1/11/2011 8:22 PM

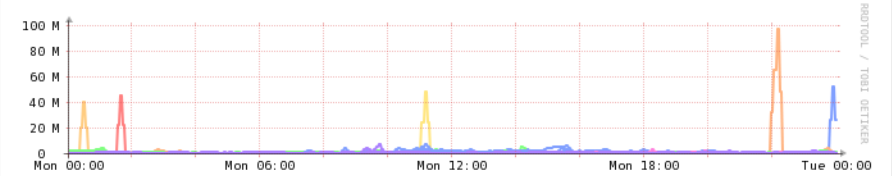
Interfaces

1-5 of 35 Interfaces Page 1 of 7 > >| CSV Export

Device	Interface	Group	Folder	Controller	Time Above 8% of Capacity	Capacity Combined (b/s)	Usage Wh
00:1a:1e:c0:1a:64	802.11bgn	aruba gui no wms	Top > aruba > thin aps	Aruba3200	15 hrs 50 mins (65.97%)	5000000	18.31%
1372	802.11an	aruba corp	Top > cor'p	ethersphere-1322	9 hrs 15 mins (38.54%)	5000000	21.80%
1249	802.11an	aruba corp	Top > cor'p	ethersphere-1322	6 hrs 40 mins (27.78%)	5000000	32.54%
AL27	802.11an	aruba corp	Top > cor'p	ethersphere-lms3	6 hrs 35 mins (27.43%)	5000000	19.12%
12C	802.11an	aruba corp	Top > cor'p	ethersphere-lms3	6 hrs 25 mins (26.74%)	5000000	26.17%

1-5 of 35 Interfaces Page 1 of 7 > >|

Interface Bandwidth



	Maximum	Average
Avg bps for Enet0 of mcollins-RAP2WG	51.75 Mbps	374.7 kbps
Avg bps for Enet0 of tharglin2-ap65	44.53 Mbps	322.9 kbps
Avg bps for Enet0 of mflynn-ap65	47.74 Mbps	345.7 kbps
Avg bps for Enet0 of kmorris-RAP-2WG	96.81 Mbps	947.4 kbps
Avg bps for Enet0 of hmclarnon-rap2wg	39.91 Mbps	299.4 kbps
Avg bps for Radio 2 on AL37	1.044 Mbps	29.81 kbps
Avg bps for Radio 2 on AL1	887.7 kbps	14.82 kbps
Avg bps for Radio 2 on AL27	4.342 Mbps	316.4 kbps
Avg bps for Radio 2 on 182C	2.954 Mbps	278.7 kbps
Avg bps for Radio 2 on 130C	4.303 Mbps	174.6 kbps
Avg bps for Radio 2 on 92C	3.459 Mbps	173.8 kbps
Avg bps for Radio 2 on 12C	6.52 Mbps	379.3 kbps
Avg bps for Radio 2 on 175C	1.664 Mbps	242.1 kbps
Avg bps for Radio 1 on ap124-c0:2b:32.dev.airwave.com	965.1 kbps	184.8 kbps
Avg bps for Radio 1 on mtsai-rap2wg	4.112 Mbps	79.98 kbps
Avg bps for Radio 1 on kperedia-ap125	584 kbps	35.28 kbps
Avg bps for Radio 1 on dpatil-ap65	2.091 Mbps	31.55 kbps
Avg bps for Radio 1 on jhrim-65	4.742 Mbps	50.89 kbps
Avg bps for Radio 1 on jbarry-ap65	2.875 Mbps	171.3 kbps
Avg bps for Radio 1 on gcheng-rap2wg	1.598 Mbps	78.18 kbps
Avg bps for Radio 1 on mbathina-rap2wg	1.957 Mbps	83.82 kbps
Avg bps for Radio 1 on thenu-rap5	807.5 kbps	20.12 kbps
Avg bps for Radio 2 on Fish-bowl	2.282 Mbps	49.81 kbps
Avg bps for Radio 2 on 1249	5.082 Mbps	498.9 kbps
Avg bps for Radio 2 on 1242-H	5.902 Mbps	297.9 kbps
Avg bps for Radio 2 on 1372	3.797 Mbps	442.4 kbps
Avg bps for Radio 2 on 1153	3.497 Mbps	311.3 kbps
Avg bps for Radio 2 on 1260	1.155 Mbps	74.91 kbps
Avg bps for Radio 1 on mchristensen-rap5wn	636.5 kbps	13.8 kbps
Avg bps for Radio 1 on marora-ap65	2.373 Mbps	58.72 kbps
Avg bps for Radio 1 on 00:1a:1e:c0:1a:64	1.146 Mbps	602.8 kbps
Avg bps for Radio 1 on gwright-rap2wg	6.722 Mbps	379.9 kbps
Avg bps for Radio 2 on damien-ap105	2.651 Mbps	101.5 kbps
Avg bps for Radio 1 on dfisken-rap5wn	1.243 Mbps	25 kbps
Avg bps for Radio 1 on pneelakantan-rap2wg	1.913 Mbps	85.28 kbps

Interfaces Vs. Percent of Time Above Threshold

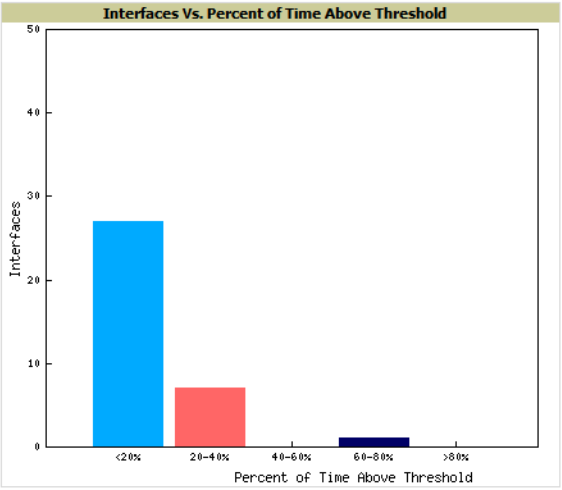


Table 128 *Capacity Planning Report Fields and Contents, Top Portion*

Field	Description
Device	The device type or name.
Interface	The type of 802.11 wireless service supported by the device.

Table 128 *Capacity Planning Report Fields and Contents, Top Portion (Continued)*

Field	Description
Group	The device group with which the device is associated.
Folder	The folder with which the device is associated.
Controller	The controller with which a device operates.
Time Above 1% of Capacity	The time duration in which the device has functioned above 0% of capacity. A low percentage of use in this field may indicate that a device is under-used or poorly configured in relation to its capacity, or in relation to user needs.
Capacity Combined (b/s)	The combined capacity in and out of the device, in bits-per-second.
Usage While > Threshold (Combined)	The time in which a device has functioned above defined threshold capacity, both in and out.
Overall Usage (Combined)	The overall usage of the device, both combined in and out traffic.
Usage While > Threshold (in)	The device usage that exceeds the defined and incoming threshold capacity.
Overall Usage (In)	Overall device usage for incoming data.
Usage While > Threshold (Out)	Device usage for outgoing data that exceeds defined thresholds.
Overall Usage (Out)	Device usage for outgoing data.

Using the Configuration Audit Report

The **Configuration Audit Report** provides an inventory of device configurations on the network, enabling you to display information one device at a time, one folder at a time, or one device group at a time. This report links to additional configuration pages.

Perform these steps to view the most recent version of the report, then to configure a given device using this report.

1. Navigate to the **Reports > Generated** page.
2. Scroll to the bottom, and select **Latest Configuration Audit Report** to display **Detail** device configuration information for all devices. The ensuing **Detail** report can be very large in size, and provides multiple links to additional device configuration or information display pages.
3. You can display device-specific configuration to reduce report size and to focus on a specific device. When viewing configured devices on the **Detail** page, select a device in the **Name** column. The device-specific configuration appears.
4. You can create or assign a template for a given device from the **Detail** page. Select **Add a Template** when viewing device-specific configuration information.
5. You can audit the current device configuration from the **Detail** page. Select **Audit** when viewing device-specific information.
6. You can display archived configuration about a given device from the **Detail** page. Select **Show Archived Device Configuration**.

Figure 160 and Table 129 illustrate and describe the general **Configuration Audit** report and related contents.

Figure 160 *Daily Configuration Audit Report Page, abbreviated example*

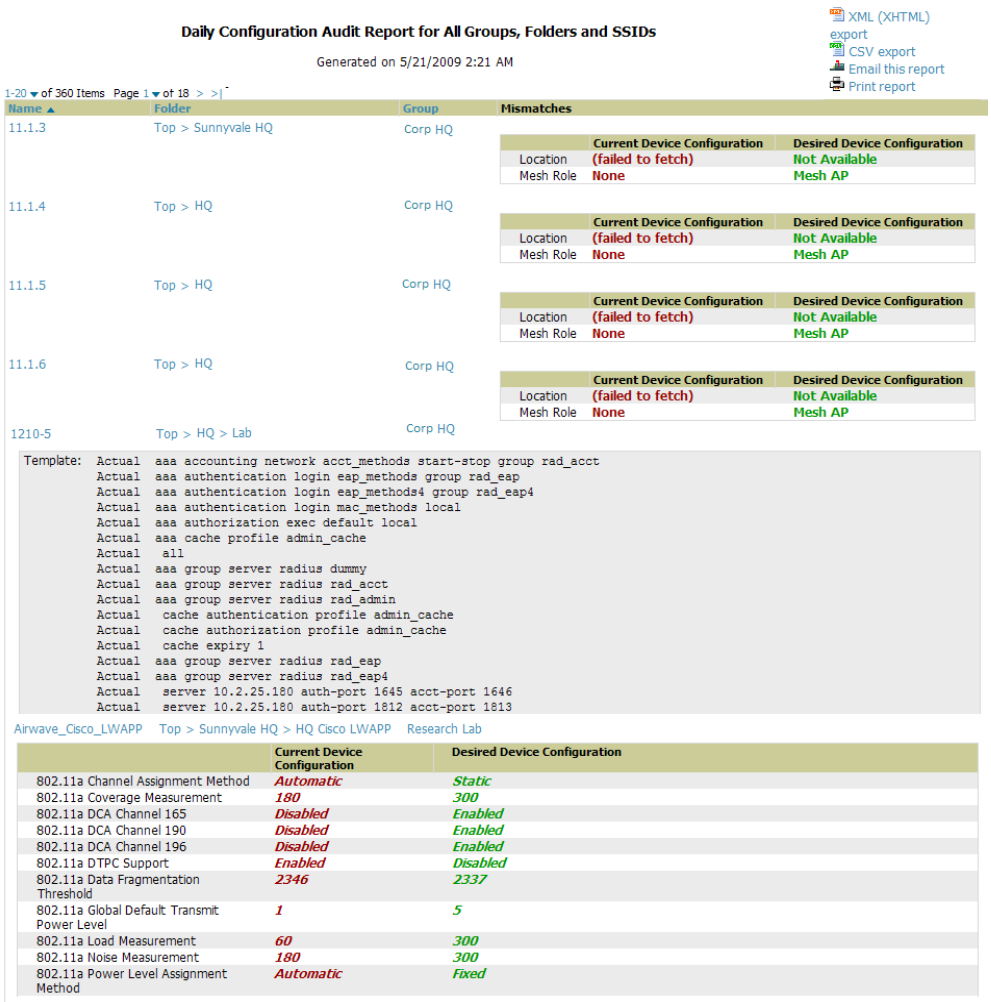


Table 129 *Daily Configuration Audit Report*

Field	Description
Name	The device name for every device on the network. Selecting a given device name in this column allows you to display device-specific configuration.
Folder	The folder in which the device is configured in AWMS. Selecting the folder name in this report displays the **APs/Devices > List** page for additional device, folder and configuration options.
Group	The group with which any given device associates. Selecting the group for a given device takes you to the **Groups > Monitor** page for that specific group, to display graphical group information, modification options, alerts, and an audit log for the related group.
Mismatches	This field displays configuration mismatch information. When a device configuration does not match ideal configuration, this field displays the ideal device settings compared to current settings.

Using the Device Summary Report

The **Device Summary Report** identifies devices that are the most or least used devices, and a comprehensive list of all devices. One potential use of this report is to establish more equal bandwidth distribution across multiple devices. This report contains the following five lists of devices.

- **Most Utilized by Maximum Number of Simultaneous Users**—By default, this list displays the 10 devices that support the highest numbers of users. This list provides links to additional information or configuration pages for each device to make adjustments, as desired.

- **Most Utilized by Bandwidth**—By default, this list displays the 10 devices that consistently have the highest bandwidth consumption during the time period defined for the report. This list provides links to additional information or configuration pages for each device.
- **Least Utilized by Maximum Number of Simultaneous Users**—By default, this list displays the 10 devices that are the least used, according to the number of users.
- **Least Utilized by Bandwidth**—By default, this list displays the 10 devices that are the least used, according to the bandwidth throughput.
- **Devices**—This list displays all devices in AWMS. By default it is sorted alphabetically by device name.

NOTE: You can specify the number of devices that appear in each of the first four categories in **Reports > Definitions > Add**.

Any section of this report can be sorted by any of the columns. For example, you can specify a location and then sort the **Devices** list by the **Location** column to see details by location, or you can see all of the APs associated with a particular controller by sorting on the **Controller** column. If the AP name contains information about the location of the AP, you can sort by AP name.

If sorting the **Devices** list does not provide you with sufficient detail, you can specify a **Group** or **Folder** in the report **Definition** of a custom report. If you create a separate Group or Folder for each set of master and local controllers, you can generate a separate report for each Group or Folder. With this method, the summary sections of each report contain only devices from that Group or Folder.

Figure 161 and Table 130 illustrate and describe the **Reports > Generated > Device Summary Detail** page.

Figure 161 *Daily Device Summary Report Illustration (partial view)*

Daily Device Summary Report for All Groups, Folders and SSIDs

1/11/2011 12:00 AM to 1/12/2011 12:00 AM
Generated on 1/12/2011 12:40 AM

XML (XHTML) expo
CSV export
Email this report
Print report

Most Utilized by Maximum Number of Simultaneous Users

Rank	AP/Device	Number of Users	Max Simultaneous Users	Total Bandwidth (MB)	Average Bandwidth (kbps)	Location	Controller
2	ethersphere-lms3	205	116	19610.24	1815.76	Aruba Networks	-
4	RAP-Local	99	45	6476.88	599.71	1344 Server Room	-
1	ethersphere-1322	231	126	26165.29	2422.71	1322	-
3	RAP-OPS-02	250	71	18975.59	1757.00	-	-
5	1310	41	23	5849.25	541.60	-	ethersphere-13
6	AL27	42	23	3368.82	311.93	-	ethersphere-lm
7	1153	46	23	6290.70	582.47	-	ethersphere-13
8	1242-H	50	19	1418.28	131.32	-	ethersphere-13
9	12C	41	19	4206.01	389.44	-	ethersphere-lm
10	1263	56	19	3181.33	294.57	-	ethersphere-13

Most Utilized by Bandwidth

Rank	AP/Device	Number of Users	Max Simultaneous Users	Total Bandwidth (MB)	Average Bandwidth (kbps)	Location
1	Switch15.dev.airwave.com	0	0	2154332.01	199475.19	"Server Room top of
2	10.51.3.110	0	0	1555354.77	144014.33	Sunnyvale
3	lab-distro-switch	0	0	753047.39	69726.61	AirWave AP Lab
4	sales-24poe.corp.airwave.com	0	0	611772.61	56645.61	server room: CORP r
5	switch7.dev.airwave.com	0	0	609536.36	56438.55	server room: rack on
6	10.51.0.11	0	0	507892.66	47027.10	Dev Lab
7	hp-zl-sw	0	0	394324.25	36511.50	-
8	cisco3560-poe	0	0	218693.02	20249.35	server room: CORP r
9	hp-poe-switch	0	0	216460.70	20042.66	server room: left side
10	xlwesm make me mismatch	0	0	87071.39	8062.17	-

Least Utilized by Maximum Number of Simultaneous Users

Rank	AP/Device	Number of Users	Max Simultaneous Users	Total Bandwidth (MB)	Average Bandwidth (kbps)	Location
1	Aruba200-Master-really	0	0	0.00	0.00	-
2	Aironet Wireless Communication-38:FB:BF	0	0	0.00	0.00	-
3	blyman-rap5wn	0	0	0.00	0.00	-
4	(id: 60293)	0	0	0.00	0.00	-
5	tforman-rap2wg	0	0	0.00	0.00	-
6	clukaszewski-rap5wn	0	0	0.00	0.00	-
7	bzeno-RAP-2WG	0	0	0.00	0.00	-
8	10.51.0.9	0	0	0.00	0.00	yy
9	joeb-rap2wg	0	0	0.00	0.00	-
10	ap125	0	0	0.00	0.00	-

Least Utilized by Bandwidth

Rank	AP/Device	Number of Users	Max Simultaneous Users	Total Bandwidth (MB)	Average Bandwidth (kbps)	Location
1	Aruba200-Master-really	0	0	0.00	0.00	-
2	khamilton-rap5wn	1	1	0.00	0.00	-
3	(id: 60293)	0	0	0.00	0.00	-
4	blyman-rap5wn	0	0	0.00	0.00	-
5	tforman-rap2wg	0	0	0.00	0.00	-
6	clukaszewski-rap5wn	0	0	0.00	0.00	-
7	bzeno-RAP-2WG	0	0	0.00	0.00	-
8	10.51.0.9	0	0	0.00	0.00	yy
9	joeb-rap2wg	0	0	0.00	0.00	-
10	Aironet Wireless Communication-38:FB:BF	0	0	0.00	0.00	-

Table 130 *Daily Device Summary Report Unique Fields and Descriptions*

Field	Description
Max Simultaneous Users	The maximum number of users that were active on the associated device during the period of time that the report covers.
Total Bandwidth (MB)	The bandwidth in megabytes that the device supported during the period of time covered by the report.
Average Bandwidth (kbps)	The average bandwidth throughput for the device during the period of time covered by the report.

Using the Device Uptime Report

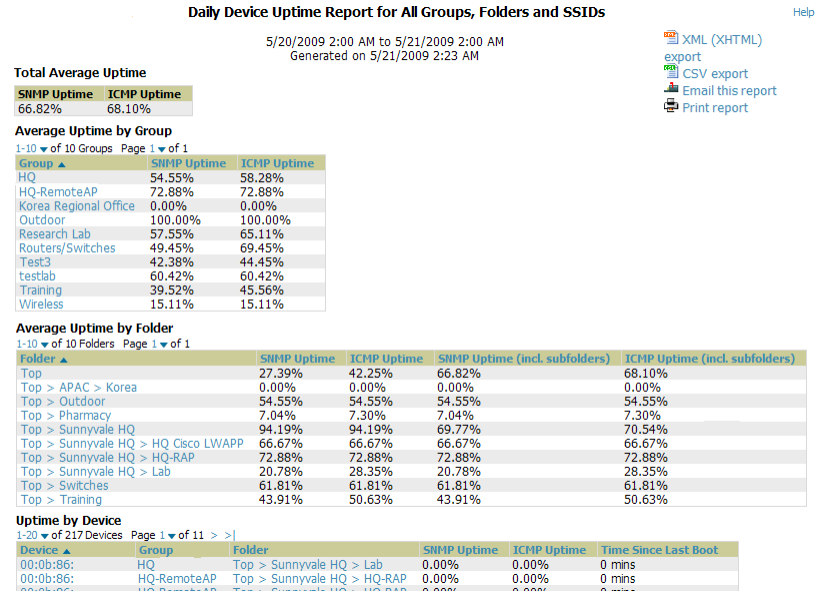
The **Device Uptime Report** monitors device performance and availability on the network, tracking uptime by multiple criteria to include the following:

- Total average uptime by SNMP and ICMP
- Average uptime by device group
- Average uptime by device folder

You can use this report as the central starting point to improve uptime by multiple criteria. This report covers protocol-oriented, device-oriented, or SSID-oriented information. This report can help to monitor and optimize the network in multiple ways. This report can demonstrate service parameters, can establish locations that have superior or problematic uptime availability, and can help with additional analysis in multiple ways. Locations, device groups, or other groupings within a network can be identified as needing attention or can be proven to have superior performance when using this report.

Figure 162 and Table 130 illustrate and describe the **Reports > Generated > Device Uptime Detail** report.

Figure 162 *Device Uptime Report Illustration*



Daily Device Uptime Report for All Groups, Folders and SSIDs

Help

5/20/2009 2:00 AM to 5/21/2009 2:00 AM
Generated on 5/21/2009 2:23 AM

XML (XHTML) export
CSV export
Email this report
Print report

Total Average Uptime

SNMP Uptime	ICMP Uptime
66.82%	68.10%

Average Uptime by Group

1-10 of 10 Groups Page 1 of 1

Group	SNMP Uptime	ICMP Uptime
HQ	54.55%	58.28%
HQ-RemoteAP	72.88%	72.88%
Korea Regional Office	0.00%	0.00%
Outdoor	100.00%	100.00%
Research Lab	57.55%	65.11%
Routers/Switches	49.45%	69.45%
Test3	42.38%	44.45%
testlab	60.42%	60.42%
Training	39.52%	45.56%
Wireless	15.11%	15.11%

Average Uptime by Folder

1-10 of 10 Folders Page 1 of 1

Folder	SNMP Uptime	ICMP Uptime	SNMP Uptime (incl. subfolders)	ICMP Uptime (incl. subfolders)
Top	27.39%	42.25%	66.82%	68.10%
Top > APAC > Korea	0.00%	0.00%	0.00%	0.00%
Top > Outdoor	54.55%	54.55%	54.55%	54.55%
Top > Pharmacy	7.04%	7.30%	7.04%	7.30%
Top > Sunnyvale HQ	94.19%	94.19%	69.77%	70.54%
Top > Sunnyvale HQ > HQ Cisco LWAPP	66.67%	66.67%	66.67%	66.67%
Top > Sunnyvale HQ > HQ-RAP	72.88%	72.88%	72.88%	72.88%
Top > Sunnyvale HQ > Lab	20.78%	28.35%	20.78%	28.35%
Top > Switches	61.81%	61.81%	61.81%	61.81%
Top > Training	43.91%	50.63%	43.91%	50.63%

Uptime by Device

1-20 of 217 Devices Page 1 of 11 > >|

Device	Group	Folder	SNMP Uptime	ICMP Uptime	Time Since Last Boot
00:0b:86:	HQ	Top > Sunnyvale HQ > Lab	0.00%	0.00%	0 mins
00:0b:86:	HQ-RemoteAP	Top > Sunnyvale HQ > HQ-RAP	0.00%	0.00%	0 mins

Table 131 *Device Uptime Report Unique Fields and Descriptions*

Field	Description
SNMP Uptime	The percentage of time the device was reachable via ICMP. AWMS polls the device via SNMP at the rate specified on the **Groups > Basic** page.
ICMP Uptime	The percentage of time the device was reachable via ICMP. If the device is reachable via SNMP it is assumed to be reachable via ICMP. AWMS only pings the device if SNMP fails and then it pings at the SNMP polling interval rate.
Time Since Last Boot	The uptime as reported by the device at the end of the time period covered by the report.

Using the IDS Events Report

The **IDS Events Report** lists and tracks IDS events on the network involving APs or controller devices. This 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.

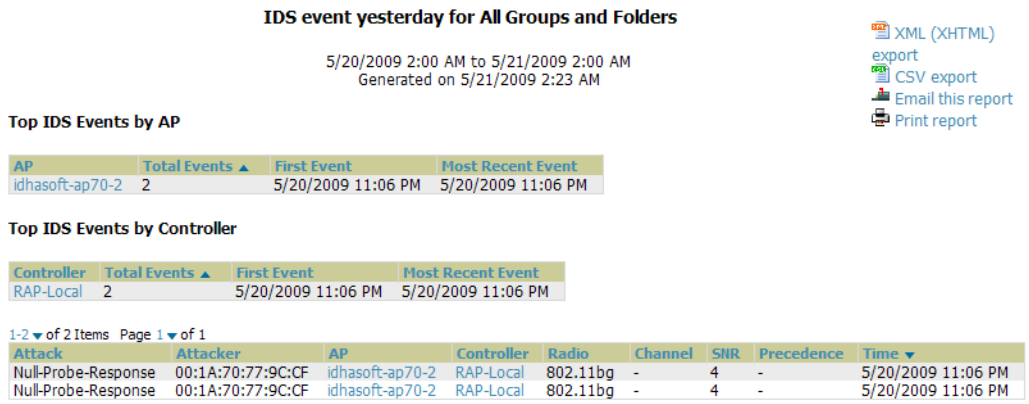
Your AMP must have a RAPIDS license, and your role must be enabled to view RAPIDS, to see this report.

The **Home > License** page also cites IDS events, and triggers can be configured for IDS events. Refer to "Setting Triggers for IDS Events" on page 186 for additional information.

Selecting the AP device or controller name takes you to the **APs/Devices > List** page.

Figure 163 and Table 132 illustrate and describe the **Reports > Generated > IDS Events Detail** page.

Figure 163 *IDS Events Report Illustration*



IDS event yesterday for All Groups and Folders

5/20/2009 2:00 AM to 5/21/2009 2:00 AM
Generated on 5/21/2009 2:23 AM

XML (XHTML) export
CSV export
Email this report
Print report

Top IDS Events by AP

AP	Total Events ▲	First Event	Most Recent Event
idhasoft-ap70-2	2	5/20/2009 11:06 PM	5/20/2009 11:06 PM

Top IDS Events by Controller

Controller	Total Events ▲	First Event	Most Recent Event
RAP-Local	2	5/20/2009 11:06 PM	5/20/2009 11:06 PM

1-2 ▼ of 2 Items Page 1 ▼ of 1

Attack	Attacker	AP	Controller	Radio	Channel	SNR	Precedence	Time ▼
Null-Probe-Response	00:1A:70:77:9C:CF	idhasoft-ap70-2	RAP-Local	802.11bg	-	4	-	5/20/2009 11:06 PM
Null-Probe-Response	00:1A:70:77:9C:CF	idhasoft-ap70-2	RAP-Local	802.11bg	-	4	-	5/20/2009 11:06 PM

Table 132 *IDS Events Detail Unique Fields and Descriptions*

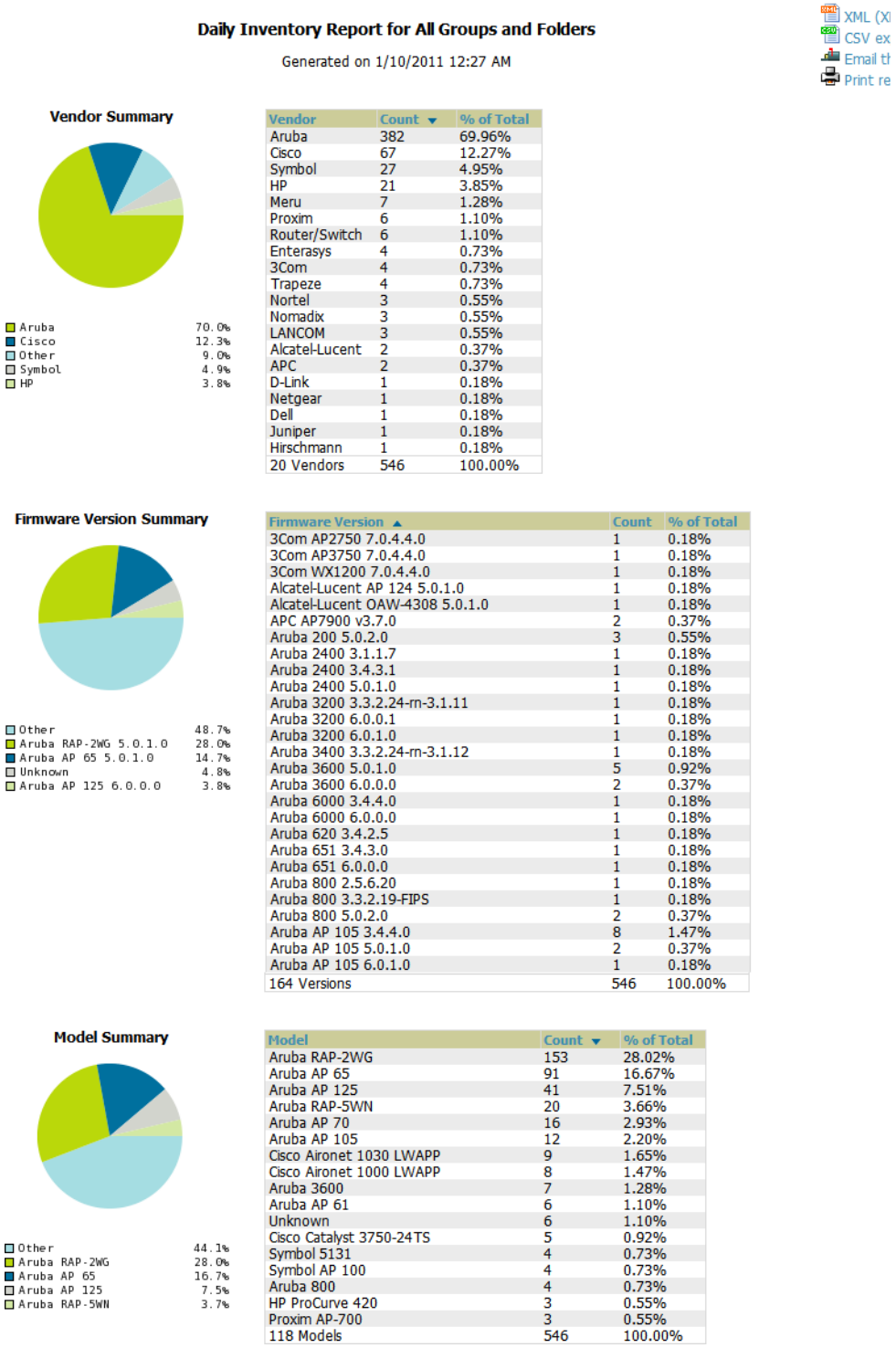
Field	Description
Attack	The name or label for the IDS event.
Controllers	Lists the controllers for which IDS events have occurred in the prior 24 hours, and links to its **APs/ Devices > Monitor** page.
Attacker	The MAC address of the device that generated the IDS event.
Radio	The 802.11 radio type associated with the IDS event.
Channel	The 802.11 radio channel associated with the IDS event, when known.
SNR	The signal-to-noise (SNR) radio associated with the IDS event.
Precedence	Precedence information associated with the IDS event, when known.
Time	The time of the IDS event.

Using the Inventory Report

The **Inventory Report** itemizes all devices and firmware versions on the networkincluding vendor information and graphical pie-chart summaries. The primary sections of this report are as follows:

- Vendor Summary—Lists the vendors for all devices or firmware on the network.
- Firmware Version Summary—Lists the firmware version for all firmware used on the network.
- Model Summary—Lists the model numbers for all devices or firmware on the network.

Figure 164 *Inventory Report Illustration (Edited View)*



Daily Inventory Report for All Groups and Folders

Generated on 1/10/2011 12:27 AM

XML (X
CSV ex
Email th
Print re

Vendor Summary

Aruba 70.0%
Cisco 12.3%
Other 9.0%
Symbol 4.9%
HP 3.8%

Vendor	Count	% of Total
Aruba	382	69.96%
Cisco	67	12.27%
Symbol	27	4.95%
HP	21	3.85%
Meru	7	1.28%
Proxim	6	1.10%
Router/Switch	6	1.10%
Enterasys	4	0.73%
3Com	4	0.73%
Trapeze	4	0.73%
Nortel	3	0.55%
Nomadix	3	0.55%
LANCOM	3	0.55%
Alcatel-Lucent	2	0.37%
APC	2	0.37%
D-Link	1	0.18%
Netgear	1	0.18%
Dell	1	0.18%
Juniper	1	0.18%
Hirschmann	1	0.18%
20 Vendors	546	100.00%

Firmware Version Summary

Other 48.7%
Aruba RAP-2WG 5.0.1.0 28.0%
Aruba AP 65 5.0.1.0 14.7%
Unknown 4.8%
Aruba AP 125 6.0.0.0 3.8%

Firmware Version	Count	% of Total
3Com AP2750 7.0.4.4.0	1	0.18%
3Com AP3750 7.0.4.4.0	1	0.18%
3Com WX1200 7.0.4.4.0	1	0.18%
Alcatel-Lucent AP 124 5.0.1.0	1	0.18%
Alcatel-Lucent OAW-4308 5.0.1.0	1	0.18%
APC AP7900 v3.7.0	2	0.37%
Aruba 200 5.0.2.0	3	0.55%
Aruba 2400 3.1.1.7	1	0.18%
Aruba 2400 3.4.3.1	1	0.18%
Aruba 2400 5.0.1.0	1	0.18%
Aruba 3200 3.3.2.24-rn-3.1.11	1	0.18%
Aruba 3200 6.0.0.1	1	0.18%
Aruba 3200 6.0.1.0	1	0.18%
Aruba 3400 3.3.2.24-rn-3.1.12	1	0.18%
Aruba 3600 5.0.1.0	5	0.92%
Aruba 3600 6.0.0.0	2	0.37%
Aruba 6000 3.4.4.0	1	0.18%
Aruba 6000 6.0.0.0	1	0.18%
Aruba 620 3.4.2.5	1	0.18%
Aruba 651 3.4.3.0	1	0.18%
Aruba 651 6.0.0.0	1	0.18%
Aruba 800 2.5.6.20	1	0.18%
Aruba 800 3.3.2.19-FIPS	1	0.18%
Aruba 800 5.0.2.0	2	0.37%
Aruba AP 105 3.4.4.0	8	1.47%
Aruba AP 105 5.0.1.0	2	0.37%
Aruba AP 105 6.0.1.0	1	0.18%
164 Versions	546	100.00%

Model Summary

Other 44.1%
Aruba RAP-2WG 28.0%
Aruba AP 65 16.7%
Aruba AP 125 7.5%
Aruba RAP-5WN 3.7%

Model	Count	% of Total
Aruba RAP-2WG	153	28.02%
Aruba AP 65	91	16.67%
Aruba AP 125	41	7.51%
Aruba RAP-5WN	20	3.66%
Aruba AP 70	16	2.93%
Aruba AP 105	12	2.20%
Cisco Aironet 1030 LWAPP	9	1.65%
Cisco Aironet 1000 LWAPP	8	1.47%
Aruba 3600	7	1.28%
Aruba AP 61	6	1.10%
Unknown	6	1.10%
Cisco Catalyst 3750-24TS	5	0.92%
Symbol 5131	4	0.73%
Symbol AP 100	4	0.73%
Aruba 800	4	0.73%
HP ProCurve 420	3	0.55%
Proxim AP-700	3	0.55%
118 Models	546	100.00%

Using the Memory and CPU Utilization Report

The **Memory and CPU Utilization Report** displays the top memory usage by device, and CPU usage on the network by device. Both are by percentage.

To create a scheduled and generated report of this type, refer to "Using Daily Reports" on page 222.

Figure 165 illustrates the **Reports > Detail** page for this report.

Figure 165 *Daily Memory and CPU Usage Report Illustration (Contents Rearranged for Space)*

Daily Memory and CPU Utilization Report for All Groups and Folders

1/13/2011 12:00 AM to 1/14/2011 12:00 AM
Generated on 1/14/2011 12:34 AM

XML (XHTML) export
CSV export
Email this report
Print report

Top CPU Utilization by Device

Device	Utilization
K132-00150	81.14%
Aruba200-Master-really	52.49%
Aruba200-Master-really	52.48%
Aruba200-Master-really	52.48%
Aruba200-Master-really	52.48%
Aruba200-Master-really	52.45%
Aruba200-Master-really	52.42%
Aruba200-Master-really	52.40%
Aruba200-Master-really	52.39%
Aruba200-Master-really	52.37%

Top Memory Usage by Device

Device	Usage
Aruba3200-3.121	94.89%
K132-00150	92.71%
Airespace-15:CB:60	89.92%
Aruba3400	84.11%
devpit651	83.95%
Aruba651	83.77%
alpha-gren-swarea	83.60%
Dell PowerConnect W-651 Controller	83.12%
Aruba3200-RN	83.02%
Alcatel-Lucent-4308	82.55%

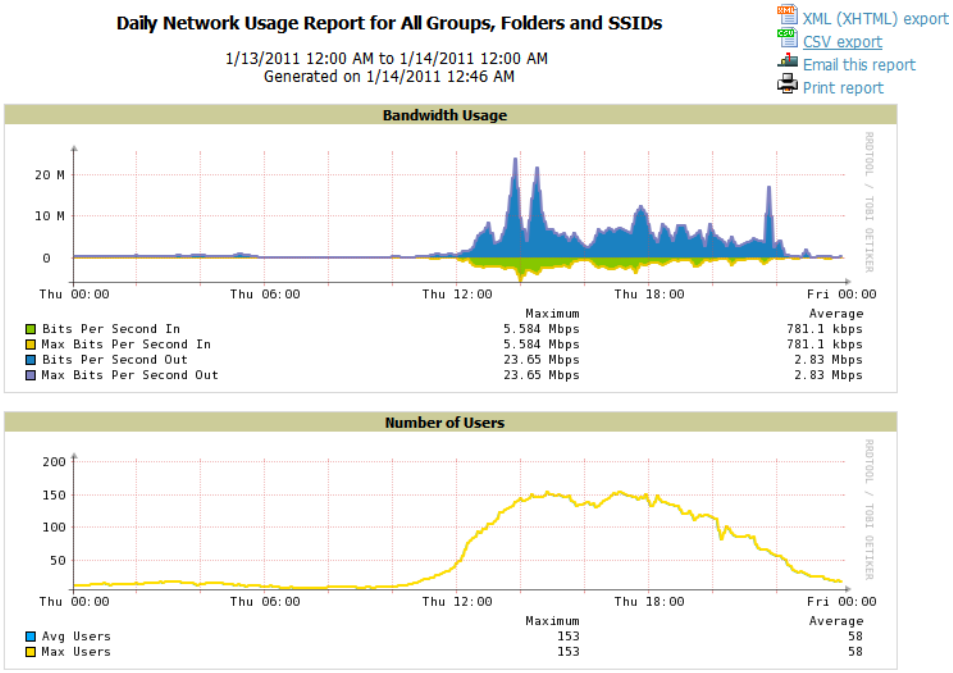
Using the Network Usage Report

The **Network Usage Report** contains network-wide information in two categories:

- **Bandwidth usage by device**—maximum and average bandwidth in kbps
- **Number of users by time period**—average bandwidth in and out

Figure 166 illustrates the **Reports > Detail** page for the Daily Network Usage.

Figure 166 *Network Usage Report Illustration*



Using the New Rogue Devices Report

The **New Rogue Devices Report** summarizes rogue device information including the following categories of information:

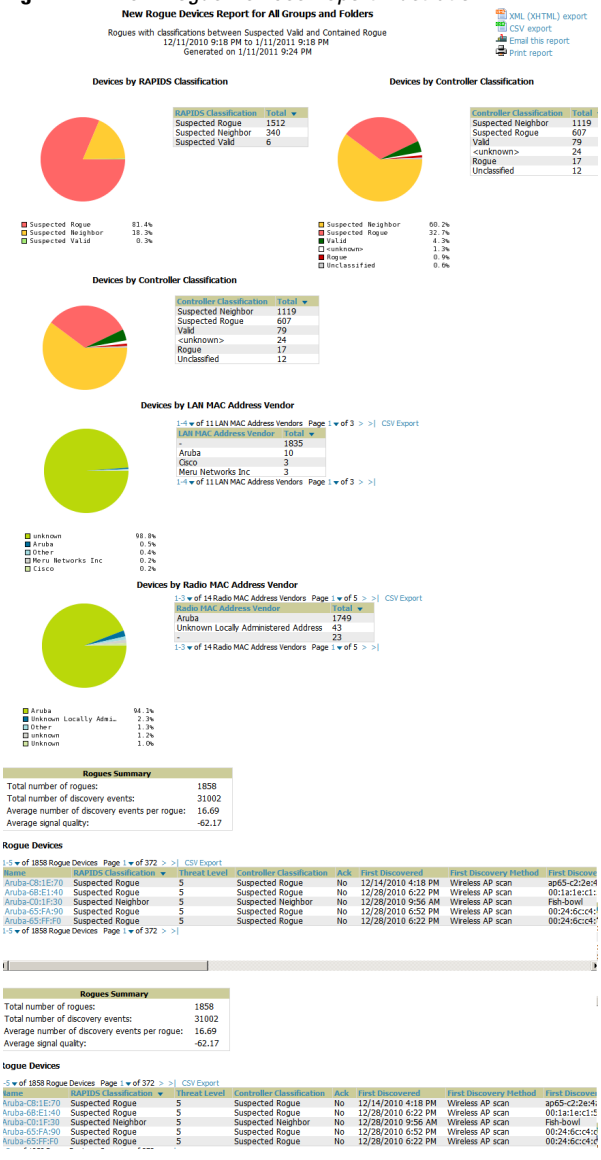
- Rogue devices by RAPIDS classification—described in "Using RAPIDS and Rogue Classification" on page 165

- Top rogue devices by number of discovering APs
- Top rogue devices by signal strength
- Graphical summary of rogue devices by LAN MAC address vendor
- Graphical summary of rogue devices by radio MAC address vendor
- Text-based table summary of rogue device counts
- Detailed and text-based table of rogue devices discovered only wirelessly with extensive device parameters and hyperlink interoperability to additional AWMS pages
- Detailed and text-based table of all rogue devices supporting all discovery methods with extensive device parameters and hyperlink interoperability to additional AWMS pages
- Detailed and text-based table of discovery events pertaining to the discovery of rogue devices with extensive parameters and hyperlink interoperability to additional AWMS pages

This report is not run by default, but is available after you define it.

Refer to Figure 167 for a sample illustration of this report.

Figure 167 *New Rogue Devices Report Illustration*



The rogue device inventories that comprise this report contain many fields, described in Table 133.

Table 133 *New Rogue Devices Report Fields and Descriptions*

Field	Description
Name	The device name, as able to be determined.
RAPIDS Classification	The RAPIDS classification for the rogue device, as classified by rules defined on the **RAPIDS > Rules** page. Refer to "Using RAPIDS and Rogue Classification" on page 165 for additional information.
Threat Level	The numeric threat level by which the device has been classified, according to rules defined on the **RAPIDS > Rules** page. Refer to "Using RAPIDS and Rogue Classification" on page 165 for additional information.
Ack	Whether the device has been acknowledged with the network.
First Discovered	The date and time that the rogue device was first discovered on the network.
First Discovery Method	The method by which the rogue device was discovered.
First Discovery Agent	The network device that first discovered the rogue device.
Last Discovering AP	The network device that most recently discovered the rogue device.
Model	The rogue device type when known.
Operating System	The operating system for the device type, when known.
IP Address	The IP address of the rogue device when known.
SSID	The SSID for the rogue device when known.
Network Type	The network type on which the rogue was detected, when known.
Channel	The wireless RF channel on which the rogue device was detected.
WEP	WEP encryption usage when known.
RSSI	Received Signal Strength (RSSI) information for radio signal strength when known.
Signal	Signal strength when known.
LAN MAC Address	The MAC address for the associated LAN when known.
LAN Vendor	LAN vendor information associated with the rogue device, when known.
Radio MAC Address	The MAC address for the radio device, when known.
Radio Vendor	The vendor information for the radio device when known.
Port	The router or switch port associated with the rogue device when known.
Last Seen	The last time in which the rogue device was seen on the network.
Total Discovering APs	The total number of APs that detected the rogue device.
Total Discovery Events	The total number of instances in which the rogue device was discovered.

Using the New Users Report

The **New Users Report** lists all new users that have appeared on the network during the time duration defined for the report. This report covers the user identifier, the associated role when known, device information and more. The report definition can filter on connection mode (wired, wireless or both).

Figure 168 illustrates the fields and information in the **New Users Report**.

Figure 168 *New Users Report Illustration*

Daily New Users Report for All Groups, Folders, SSIDs and Roles

2/6/2010 12:00 AM to 2/7/2010 12:00 AM
Generated on 2/7/2010 12:16 AM

XML (XHTML) export
CSV export
Email this report
Print report

New Users

1-9 of 9 New Users Page 1 of 1

Username	Role	MAC Address	Vendor	AP/Device	Association Time	Duration
-	VoFi	00:03:2A:00:03:2A	UniData Communication Systems, Inc.	Operations-AL25	1/20/2009 6:25 PM	38 mins
NETWORKS\abc	employee	00:16:CF:00:16:CF	Hon Hai Precision Ind. Co., Ltd.	ExecutiveSuite-AL16	1/20/2009 5:17 PM	17 mins
-	-	00:03:2A:00:03:2A	Cisco-Linksys LLC	HQ-Engineering	1/20/2009 2:46 PM	5 mins
wifiphone	employee	00:16:CF:00:16:CF	UniData Communication Systems, Inc.	Haystack-AL29	1/20/2009 1:44 PM	10 hrs 31 r
employee@networks.com	employee	00:03:2A:00:03:2A	Nokia Danmark AS	Area51-AL33	1/20/2009 11:17 AM	6 mins
58224	visitor	00:16:CF:00:16:CF	Intel	Facilities-AL37	1/20/2009 11:11 AM	2 hrs 33 m

Using the PCI Compliance Report

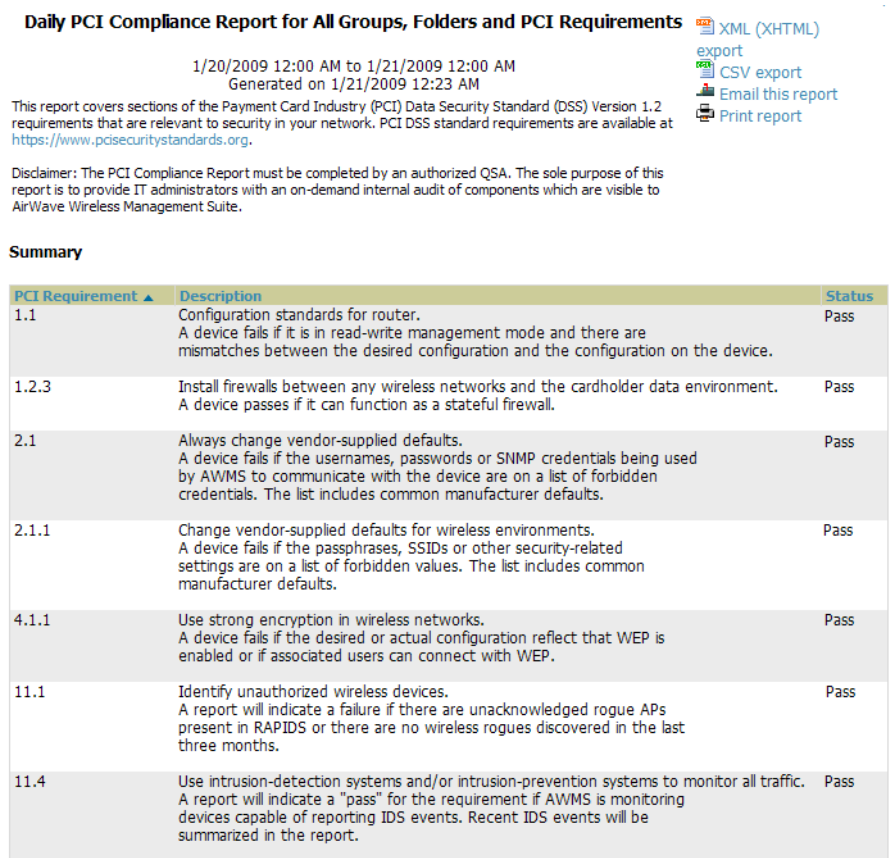
AWMS supports PCI requirements in accordance with the Payment Card Industry (PCI) Data Security Standard (DSS). The **PCI Compliance Report** displays current PCI configurations and status as enabled on the network. Verify that AWMS is enabled to monitor compliance with PCI requirements, as described in the "Enabling or Disabling PCI Auditing" on page 65.

In addition to citing simple pass or fail status with regard to each PCI requirement, AWMS introduces very detailed diagnostic information to recommend the specific action or actions required to achieve Pass status, when sufficient information is available.

Refer to the "Auditing PCI Compliance on the Network" on page 63 for information about enabling PCI on the network. The configurations in that section enable or disable the contents of the PCI Compliance Report that is viewable on the **Reports > Generated** page.

Figure 169 illustrates the fields and information in the most recent **PCI Compliance Report**.

Figure 169 *PCI Compliance Report Illustration*



Daily PCI Compliance Report for All Groups, Folders and PCI Requirements

1/20/2009 12:00 AM to 1/21/2009 12:00 AM
Generated on 1/21/2009 12:23 AM

XML (XHTML) export
CSV export
Email this report
Print report

This report covers sections of the Payment Card Industry (PCI) Data Security Standard (DSS) Version 1.2 requirements that are relevant to security in your network. PCI DSS standard requirements are available at https://www.pcisecuritystandards.org.

Disclaimer: The PCI Compliance Report must be completed by an authorized QSA. The sole purpose of this report is to provide IT administrators with an on-demand internal audit of components which are visible to AirWave Wireless Management Suite.

Summary

PCI Requirement	Description	Status
1.1	Configuration standards for router. A device fails if it is in read-write management mode and there are mismatches between the desired configuration and the configuration on the device.	Pass
1.2.3	Install firewalls between any wireless networks and the cardholder data environment. A device passes if it can function as a stateful firewall.	Pass
2.1	Always change vendor-supplied defaults. A device fails if the usernames, passwords or SNMP credentials being used by AWMS to communicate with the device are on a list of forbidden credentials. The list includes common manufacturer defaults.	Pass
2.1.1	Change vendor-supplied defaults for wireless environments. A device fails if the passphrases, SSIDs or other security-related settings are on a list of forbidden values. The list includes common manufacturer defaults.	Pass
4.1.1	Use strong encryption in wireless networks. A device fails if the desired or actual configuration reflect that WEP is enabled or if associated users can connect with WEP.	Pass
11.1	Identify unauthorized wireless devices. A report will indicate a failure if there are unacknowledged rogue APs present in RAPIDS or there are no wireless rogues discovered in the last three months.	Pass
11.4	Use intrusion-detection systems and/or intrusion-prevention systems to monitor all traffic. A report will indicate a "pass" for the requirement if AWMS is monitoring devices capable of reporting IDS events. Recent IDS events will be summarized in the report.	Pass

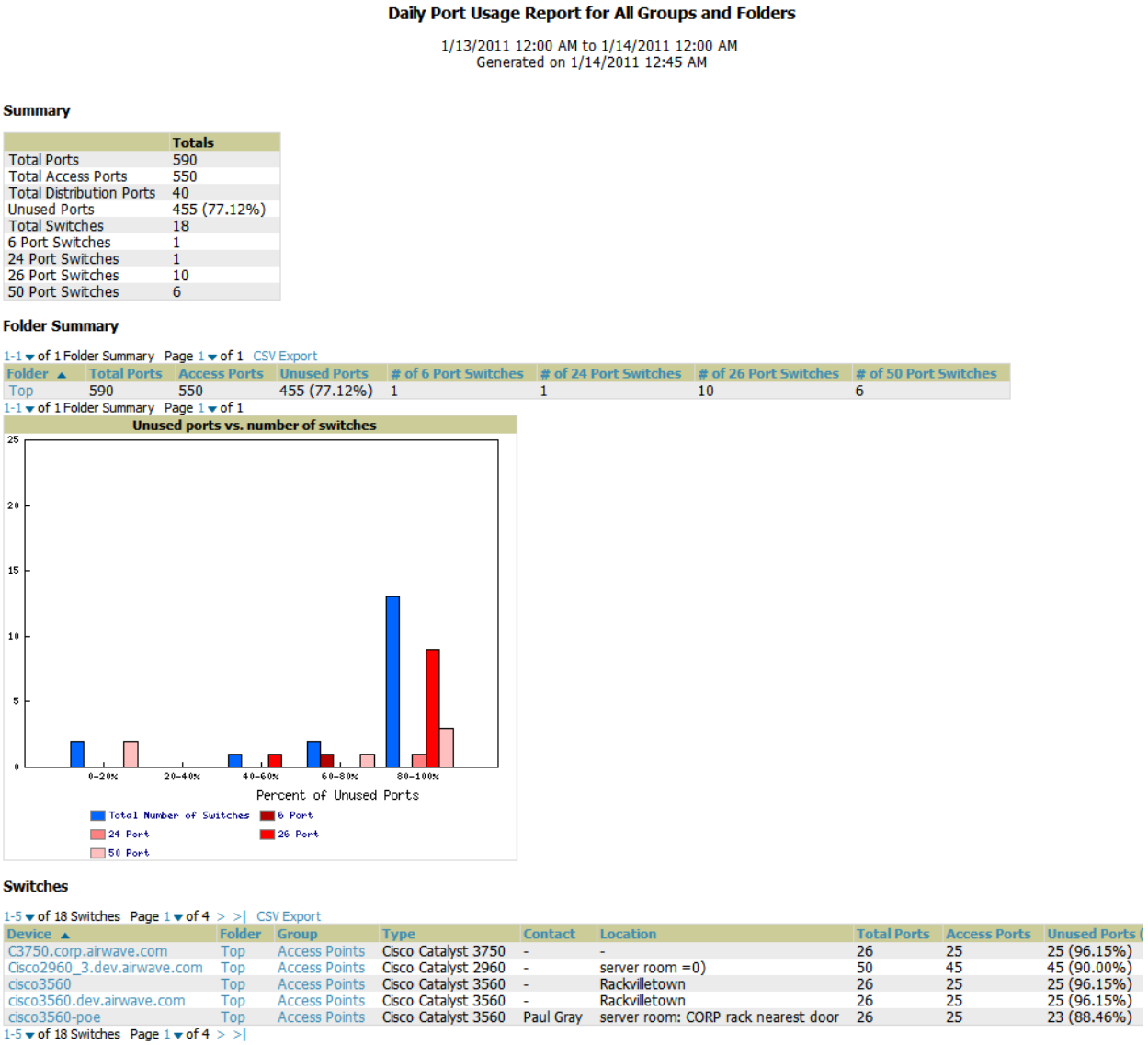
Using the Port Usage Report

You can generate a wide array of port usage statistics from the **Port Usage Report** including each of the following:

- List of all the switches and ports in your network by folder
- List of unused ports
- List of access and distribution ports
- Histogram displaying unused ports vs. unused switches by type (access or distribution)
- List of most used switches
- List of most used ports

A sample of the types of information used to generate in a **Port Usage Report** appears in Figure 170.

Figure 170 *Port Usage Report Detail Page (partial view)*



Daily Port Usage Report for All Groups and Folders

1/13/2011 12:00 AM to 1/14/2011 12:00 AM
Generated on 1/14/2011 12:45 AM

Summary

	Totals
Total Ports	590
Total Access Ports	550
Total Distribution Ports	40
Unused Ports	455 (77.12%)
Total Switches	18
6 Port Switches	1
24 Port Switches	1
26 Port Switches	10
50 Port Switches	6

Folder Summary

1-1 of 1 Folder Summary Page 1 of 1 CSV Export

Folder	Total Ports	Access Ports	Unused Ports	# of 6 Port Switches	# of 24 Port Switches	# of 26 Port Switches	# of 50 Port Switches
Top	590	550	455 (77.12%)	1	1	10	6

1-1 of 1 Folder Summary Page 1 of 1

Unused ports vs. number of switches

Switches

1-5 of 18 Switches Page 1 of 4 > >| CSV Export

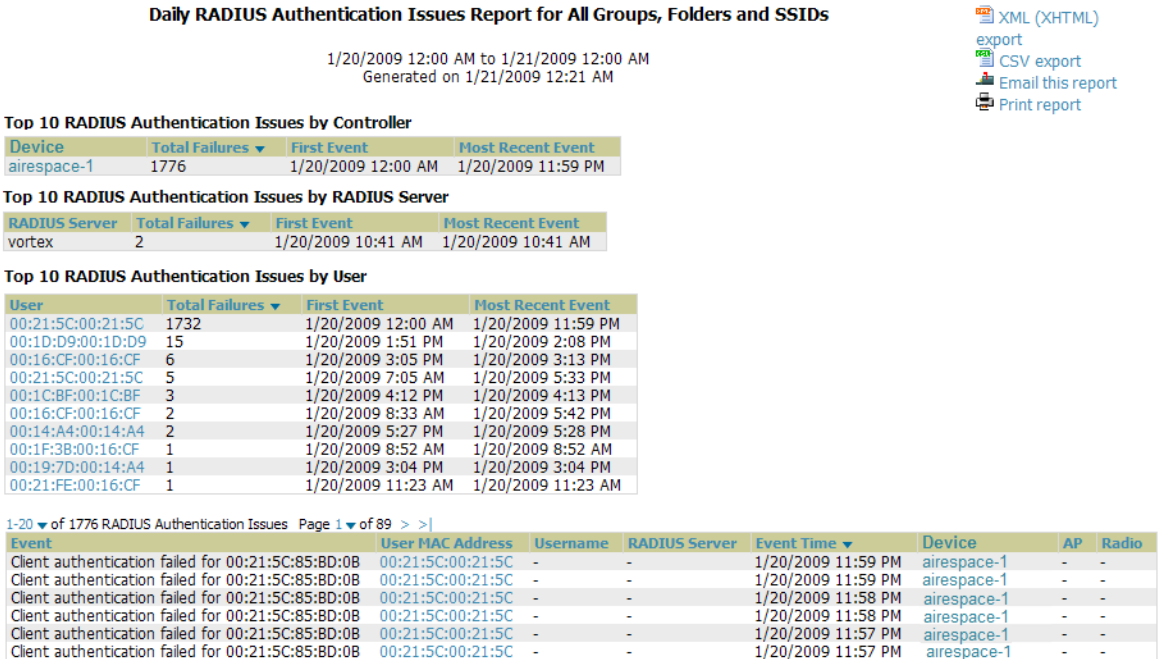
Device	Folder	Group	Type	Contact	Location	Total Ports	Access Ports	Unused Ports (
C3750.corp.airwave.com	Top	Access Points	Cisco Catalyst 3750	-	-	26	25	25 (96.15%)
Cisco2960_3.dev.airwave.com	Top	Access Points	Cisco Catalyst 2960	-	server room =0)	50	45	45 (90.00%)
cisco3560	Top	Access Points	Cisco Catalyst 3560	-	Rackvilletown	26	25	25 (96.15%)
cisco3560.dev.airwave.com	Top	Access Points	Cisco Catalyst 3560	-	Rackvilletown	26	25	25 (96.15%)
cisco3560-poe	Top	Access Points	Cisco Catalyst 3560	Paul Gray	server room: CORP rack nearest door	26	25	23 (88.46%)

1-5 of 18 Switches Page 1 of 4 > >|

Using the RADIUS Authentication Issues Report

The **RADIUS Authentication Issues Report** contains issues that may appear with controllers, RADIUS servers, and users. Figure 171 illustrates the fields and information in the **RADIUS Authentication Issues Report**.

Figure 171 *RADIUS Authentication Issues Detail Page Illustration*



Daily RADIUS Authentication Issues Report for All Groups, Folders and SSIDs

1/20/2009 12:00 AM to 1/21/2009 12:00 AM
Generated on 1/21/2009 12:21 AM

XML (XHTML) export
CSV export
Email this report
Print report

Top 10 RADIUS Authentication Issues by Controller

Device	Total Failures	First Event	Most Recent Event
airespace-1	1776	1/20/2009 12:00 AM	1/20/2009 11:59 PM

Top 10 RADIUS Authentication Issues by RADIUS Server

RADIUS Server	Total Failures	First Event	Most Recent Event
vortex	2	1/20/2009 10:41 AM	1/20/2009 10:41 AM

Top 10 RADIUS Authentication Issues by User

User	Total Failures	First Event	Most Recent Event
00:21:5C:00:21:5C	1732	1/20/2009 12:00 AM	1/20/2009 11:59 PM
00:1D:D9:00:1D:D9	15	1/20/2009 1:51 PM	1/20/2009 2:08 PM
00:16:CF:00:16:CF	6	1/20/2009 3:05 PM	1/20/2009 3:13 PM
00:21:5C:00:21:5C	5	1/20/2009 7:05 AM	1/20/2009 5:33 PM
00:1C:BF:00:1C:BF	3	1/20/2009 4:12 PM	1/20/2009 4:13 PM
00:16:CF:00:16:CF	2	1/20/2009 8:33 AM	1/20/2009 5:42 PM
00:14:A4:00:14:A4	2	1/20/2009 5:27 PM	1/20/2009 5:28 PM
00:1F:3B:00:16:CF	1	1/20/2009 8:52 AM	1/20/2009 8:52 AM
00:19:7D:00:14:A4	1	1/20/2009 3:04 PM	1/20/2009 3:04 PM
00:21:FE:00:16:CF	1	1/20/2009 11:23 AM	1/20/2009 11:23 AM

1-20 of 1776 RADIUS Authentication Issues Page 1 of 89 > >|

Event	User MAC Address	Username	RADIUS Server	Event Time	Device	AP	Radio
Client authentication failed for 00:21:5C:85:BD:0B	00:21:5C:00:21:5C	-	-	1/20/2009 11:59 PM	airespace-1	-	-
Client authentication failed for 00:21:5C:85:BD:0B	00:21:5C:00:21:5C	-	-	1/20/2009 11:59 PM	airespace-1	-	-
Client authentication failed for 00:21:5C:85:BD:0B	00:21:5C:00:21:5C	-	-	1/20/2009 11:58 PM	airespace-1	-	-
Client authentication failed for 00:21:5C:85:BD:0B	00:21:5C:00:21:5C	-	-	1/20/2009 11:58 PM	airespace-1	-	-
Client authentication failed for 00:21:5C:85:BD:0B	00:21:5C:00:21:5C	-	-	1/20/2009 11:57 PM	airespace-1	-	-
Client authentication failed for 00:21:5C:85:BD:0B	00:21:5C:00:21:5C	-	-	1/20/2009 11:57 PM	airespace-1	-	-

Using the RF Health Report

The RF Health Report tracks the top AP radio issues by noise, MAC/Phy errors, channel changes, transmit power changes, mode changes, and interfering devices (the last two apply only if there are ARM events). This report assists in pinpointing the most problematic devices on your network, and lists the top 10 devices by problem type.

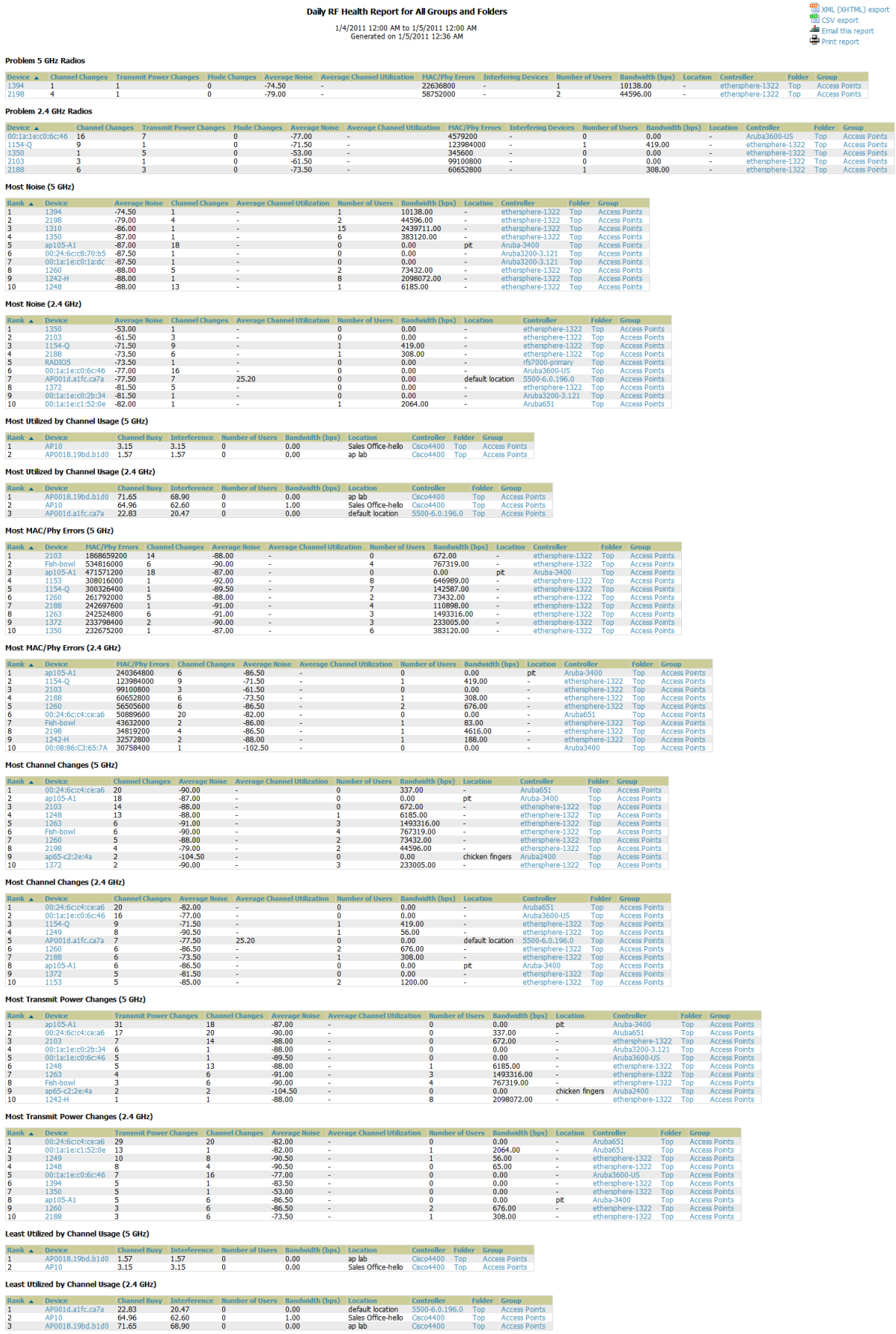
Problematic APs are displayed in two separate lists Problem Radios lists, grouped by radio frequency. A device will make it into the list if it violates two or more thresholds. (For more on the thresholds that indicate problems, refer to "Evaluating Radio Statistics for an AP" on page 123.)

Other lists grouped by radio frequency include Most Noise, Most/Least Utilized by Channel Usage, Most MAC/Phy Errors, Most Channel Changes, Most Transmit Power Changes.

If an RF Health Report has not been generated before, you can create it by following the instructions on the Defining Reports section of this chapter.

Figure 172 illustrates a sample RF Health Report.

Figure 172 *Daily RF Health Report Page Illustration*



Daily RF Health Report for All Groups and Folders

1/4/2011 12:00 AM to 1/5/2011 12:00 AM
Generated on 1/5/2011 12:36 AM

XML (XHTML) export
CSV export
Email this report
Print report

Problem 5 GHz Radios

Device	Channel Changes	Transmit Power Changes	Mode Changes	Average Noise	Average Channel Utilization	MAC/Phy Errors	Interfering Devices	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1394	1	1	0	-74.50	-	22636800	-	1	10138.00	-	ethersphere-1322	Top	Access Points
2198	4	1	0	-79.00	-	58752000	-	2	44596.00	-	ethersphere-1322	Top	Access Points

Problem 2.4 GHz Radios

Device	Channel Changes	Transmit Power Changes	Mode Changes	Average Noise	Average Channel Utilization	MAC/Phy Errors	Interfering Devices	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
00:1a:1e:c0:6c:46	16	7	0	-77.00	-	4579200	-	0	0.00	-	Aruba3600-US	Top	Access Points
1154-Q	9	1	0	-71.50	-	123984000	-	1	419.00	-	ethersphere-1322	Top	Access Points
1350	1	5	0	-53.00	-	345600	-	0	0.00	-	ethersphere-1322	Top	Access Points
2103	3	1	0	-61.50	-	99100800	-	0	0.00	-	ethersphere-1322	Top	Access Points
2188	6	3	0	-73.50	-	60652800	-	1	308.00	-	ethersphere-1322	Top	Access Points

Most Noise (5 GHz)

Rank	Device	Average Noise	Channel Changes	Average Channel Utilization	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1	1394	-74.50	1	-	1	10138.00	-	ethersphere-1322	Top	Access Points
2	2198	-79.00	4	-	2	44596.00	-	ethersphere-1322	Top	Access Points
3	1310	-86.00	1	-	15	2439711.00	-	ethersphere-1322	Top	Access Points
4	1350	-87.00	1	-	6	383120.00	-	ethersphere-1322	Top	Access Points
5	ap105-A1	-87.00	18	-	0	0.00	pit	Aruba-3400	Top	Access Points
6	00:24:6c:c8:70:b5	-87.50	1	-	0	0.00	-	Aruba3200-3.121	Top	Access Points
7	00:1a:1e:c0:1a:dc	-87.50	1	-	0	0.00	-	Aruba3200-3.121	Top	Access Points
8	1260	-88.00	5	-	2	73432.00	-	ethersphere-1322	Top	Access Points
9	1242-H	-88.00	1	-	8	2098072.00	-	ethersphere-1322	Top	Access Points
10	1248	-88.00	13	-	1	6185.00	-	ethersphere-1322	Top	Access Points

Most Noise (2.4 GHz)

Rank	Device	Average Noise	Channel Changes	Average Channel Utilization	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1	1350	-53.00	1	-	0	0.00	-	ethersphere-1322	Top	Access Points
2	2103	-61.50	3	-	0	0.00	-	ethersphere-1322	Top	Access Points
3	1154-Q	-71.50	9	-	1	419.00	-	ethersphere-1322	Top	Access Points
4	2188	-73.50	6	-	1	308.00	-	ethersphere-1322	Top	Access Points
5	RADIO5	-73.50	1	-	0	0.00	-	rfs7000-primary	Top	Access Points
6	00:1a:1e:c0:6c:46	-77.00	16	-	0	0.00	-	Aruba3600-US	Top	Access Points
7	AP001d.a1fc.ca7a	-77.50	7	25.20	0	0.00	default location	5500-6.0.196.0	Top	Access Points
8	1372	-81.50	5	-	0	0.00	-	ethersphere-1322	Top	Access Points
9	00:1a:1e:c0:2b:34	-81.50	1	-	0	0.00	-	Aruba3200-3.121	Top	Access Points
10	00:1a:1e:c1:52:0e	-82.00	1	-	1	2064.00	-	Aruba651	Top	Access Points

Most Utilized by Channel Usage (5 GHz)

Rank	Device	Channel Busy	Interference	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1	AP10	3.15	3.15	0	0.00	Sales Office-hello	Cisco4400	Top	Access Points
2	AP0018.19bd.b1d0	1.57	1.57	0	0.00	ap lab	Cisco4400	Top	Access Points

Most Utilized by Channel Usage (2.4 GHz)

Rank	Device	Channel Busy	Interference	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1	AP0018.19bd.b1d0	71.65	68.90	0	0.00	ap lab	Cisco4400	Top	Access Points
2	AP10	64.96	62.60	0	1.00	Sales Office-hello	Cisco4400	Top	Access Points
3	AP001d.a1fc.ca7a	22.83	20.47	0	0.00	default location	5500-6.0.196.0	Top	Access Points

Most MAC/Phy Errors (5 GHz)

Rank	Device	MAC/Phy Errors	Channel Changes	Average Noise	Average Channel Utilization	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1	2103	186859200	14	-88.00	-	0	672.00	-	ethersphere-1322	Top	Access Points
2	Fish-bowl	534816000	6	-90.00	-	4	767319.00	-	ethersphere-1322	Top	Access Points
3	ap105-A1	471571200	18	-87.00	-	0	0.00	pit	Aruba-3400	Top	Access Points
4	1153	308016000	1	-92.00	-	8	646989.00	-	ethersphere-1322	Top	Access Points
5	1154-Q	300326400	1	-89.50	-	7	142587.00	-	ethersphere-1322	Top	Access Points
6	1260	261792000	5	-88.00	-	2	73432.00	-	ethersphere-1322	Top	Access Points
7	2188	242697600	1	-91.00	-	4	110898.00	-	ethersphere-1322	Top	Access Points
8	1263	242524800	6	-91.00	-	3	1493316.00	-	ethersphere-1322	Top	Access Points
9	1372	233798400	2	-90.00	-	3	233005.00	-	ethersphere-1322	Top	Access Points
10	1350	232675200	1	-87.00	-	6	383120.00	-	ethersphere-1322	Top	Access Points

Most MAC/Phy Errors (2.4 GHz)

Rank	Device	MAC/Phy Errors	Channel Changes	Average Noise	Average Channel Utilization	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1	ap105-A1	240364800	6	-86.50	-	0	0.00	pit	Aruba-3400	Top	Access Points
2	1154-Q	123984000	9	-71.50	-	1	419.00	-	ethersphere-1322	Top	Access Points
3	2103	99100800	3	-61.50	-	0	0.00	-	ethersphere-1322	Top	Access Points
4	2188	60652800	6	-73.50	-	1	308.00	-	ethersphere-1322	Top	Access Points
5	1260	56505600	6	-86.50	-	2	676.00	-	ethersphere-1322	Top	Access Points
6	00:24:6c:c4:ce:a6	50889600	20	-82.00	-	0	0.00	-	Aruba651	Top	Access Points
7	Fish-bowl	43632000	2	-86.00	-	1	83.00	-	ethersphere-1322	Top	Access Points
8	2198	34819200	4	-86.50	-	1	4616.00	-	ethersphere-1322	Top	Access Points
9	1242-H	32572800	2	-88.00	-	1	188.00	-	ethersphere-1322	Top	Access Points
10	00:08:86:C3:65:7A	30758400	1	-102.50	-	0	0.00	-	Aruba3400	Top	Access Points

Most Channel Changes (5 GHz)

Rank	Device	Channel Changes	Average Noise	Average Channel Utilization	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1	00:24:6c:c4:ce:a6	20	-90.00	-	0	337.00	-	Aruba651	Top	Access Points
2	ap105-A1	18	-87.00	-	0	0.00	pit	Aruba-3400	Top	Access Points
3	2103	14	-88.00	-	0	672.00	-	ethersphere-1322	Top	Access Points
4	1248	13	-88.00	-	1	6185.00	-	ethersphere-1322	Top	Access Points
5	1263	6	-91.00	-	3	1493316.00	-	ethersphere-1322	Top	Access Points
6	Fish-bowl	6	-90.00	-	4	767319.00	-	ethersphere-1322	Top	Access Points
7	1260	5	-88.00	-	2	73432.00	-	ethersphere-1322	Top	Access Points
8	2198	4	-79.00	-	2	44596.00	-	ethersphere-1322	Top	Access Points
9	ap65-c2:2e:4a	2	-104.50	-	0	0.00	chicken fingers	Aruba2400	Top	Access Points
10	1372	2	-90.00	-	3	233005.00	-	ethersphere-1322	Top	Access Points

Most Channel Changes (2.4 GHz)

Rank	Device	Channel Changes	Average Noise	Average Channel Utilization	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1	00:24:6c:c4:ce:a6	20	-82.00	-	0	0.00	-	Aruba651	Top	Access Points
2	00:1a:1e:c0:6c:46	16	-77.00	-	0	0.00	-	Aruba3600-US	Top	Access Points
3	1154-Q	9	-71.50	-	1	419.00	-	ethersphere-1322	Top	Access Points
4	1249	8	-90.50	-	1	56.00	-	ethersphere-1322	Top	Access Points
5	AP001d.a1fc.ca7a	7	-77.50	25.20	0	0.00	default location	5500-6.0.196.0	Top	Access Points
6	1260	6	-86.50	-	2	676.00	-	ethersphere-1322	Top	Access Points
7	2188	6	-73.50	-	1	308.00	-	ethersphere-1322	Top	Access Points
8	ap105-A1	6	-86.50	-	0	0.00	pit	Aruba-3400	Top	Access Points
9	1372	5	-81.50	-	0	0.00	-	ethersphere-1322	Top	Access Points
10	1153	5	-85.00	-	2	1200.00	-	ethersphere-1322	Top	Access Points

Most Transmit Power Changes (5 GHz)

Rank	Device	Transmit Power Changes	Channel Changes	Average Noise	Average Channel Utilization	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1	ap105-A1	31	18	-87.00	-	0	0.00	pit	Aruba-3400	Top	Access Points
2	00:24:6c:c4:ce:a6	17	20	-90.00	-	0	337.00	-	Aruba651	Top	Access Points
3	2103	7	14	-88.00	-	0	672.00	-	ethersphere-1322	Top	Access Points
4	00:1a:1e:c0:2b:34	6	1	-88.00	-	0	0.00	-	Aruba3200-3.121	Top	Access Points
5	00:1a:1e:c0:6c:46	5	1	-89.50	-	0	0.00	-	Aruba3600-US	Top	Access Points
6	1248	5	13	-88.00	-	1	6185.00	-	ethersphere-1322	Top	Access Points
7	1263	4	6	-91.00	-	3	1493316.00	-	ethersphere-1322	Top	Access Points
8	Fish-bowl	3	6	-90.00	-	4	767319.00	-	ethersphere-1322	Top	Access Points
9	ap65-c2:2e:4a	2	2	-104.50	-	0	0.00	chicken fingers	Aruba2400	Top	Access Points
10	1242-H	1	1	-88.00	-	8	2098072.00	-	ethersphere-1322	Top	Access Points

Most Transmit Power Changes (2.4 GHz)

Rank	Device	Transmit Power Changes	Channel Changes	Average Noise	Average Channel Utilization	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1	00:24:6c:c4:ce:a6	29	20	-82.00	-	0	0.00	-	Aruba651	Top	Access Points
2	00:1a:1e:c1:52:0e	13	1	-82.00	-	1	2064.00	-	Aruba651	Top	Access Points
3	1249	10	8	-90.50	-	1	56.00	-	ethersphere-1322	Top	Access Points
4	1248	8	4	-90.50	-	0	65.00	-	ethersphere-1322	Top	Access Points
5	00:1a:1e:c0:6c:46	7	16	-77.00	-	0	0.00	-	Aruba3600-US	Top	Access Points
6	1394	5	1	-83.50	-	0	0.00	-	ethersphere-1322	Top	Access Points
7	1350	5	1	-53.00	-	0	0.00	-	ethersphere-1322	Top	Access Points
8	ap105-A1	5	6	-86.50	-	0	0.00	pit	Aruba-3400	Top	Access Points
9	1260	3	6	-86.50	-	2	676.00	-	ethersphere-1322	Top	Access Points
10	2188	3	6	-73.50	-	1	308.00	-	ethersphere-1322	Top	Access Points

Least Utilized by Channel Usage (5 GHz)

Rank	Device	Channel Busy	Interference	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1	AP0018.19bd.b1d0	1.57	1.57	0	0.00	ap lab	Cisco4400	Top	Access Points
2	AP10	3.15	3.15	0	0.00	Sales Office-hello	Cisco4400	Top	Access Points

Least Utilized by Channel Usage (2.4 GHz)

Rank	Device	Channel Busy	Interference	Number of Users	Bandwidth (bps)	Location	Controller	Folder	Group
1	AP001d.a1fc.ca7a	22.83	20.47	0	0.00	default location	5500-6.0.196.0	Top	Access Points
2	AP10	64.96	62.60	0	1.00	Sales Office-hello	Cisco4400	Top	Access Points
3	AP0018.19bd.b1d0	71.65	68.90	0	0.00	ap lab	Cisco4400	Top	Access Points

All tables indicate the rank, device type, number of users, bandwidth, location, controller, folder, and group, and

all are sorted according to rank. Selecting a value under the **Device** column in any table will take you to the **APs/ Devices > Monitor > Radio Statistics** page for the band indicated in the table title (5 GHz or 2.4 GHz).

- Every list contains Rank, Device (name, not type), Channel Changes, Average Noise, Average Channel Utilization, Users, Bandwidth, Location, Controller name, Folder, and Group.
- The third column in the list (after Device) will be the column the list is sorted by.
- If that column would otherwise be in the list (Channel Changes), it does not show up in the list where it would otherwise.
- Note that sometimes the sorted column is not one of those common ones, such as the Interfering Devices section.

AWMS limits data storage to 183 days (approximately six months) per radio. If you create an RF Health Report with a date range longer than 183 days, it will only include Channel Changes, Transmit Power Changes, Average Utilization, Mac/Phy Errors and Average Noise based on whatever part of the report intersects the last 183 days. This differs from most reports because other data (like bandwidth and users) maxes out at 425 days, and AWMS validates reports so you can only run them over a 366-day duration.

Using the Rogue Containment Audit Report

The rogue containment audit report that lets you know if any containment is failing. Figure 173 illustrates the fields and information in this report type.

Figure 173 *Rogue Containment Audit Report Page Illustration*

Rogue Containment Audit Report for All Groups and Folders

Generated on 12/1/2009 4:33 PM

XML (XHTML) export
CSV export
Email this report
Print report

1-8 of 8 Rogues Contained Page 1 of 1 Export to CSV

Controller	Rogue	BSSID	Containment State	Desired Containment State	Classifying Rule	Location
- All -	- All -	- All -	- All -	- All -	- All -	- All -
Airespace-5500	Apple-ED:3B:17	00:03:93:ED:3B:17	Contained	Not Contained	Signal strength > -75 dBm	-
Airespace-5500	Senao Inte-43:7B:B1	00:02:6F:43:7B:B1	Contained	Not Contained	Signal strength > -75 dBm	-
Airespace-5500	Cisco-9F:75:90	00:1D:45:9F:75:90	Not Contained	Contained	Manual Classification Override	-
Aruba2400	Enterasys-36:5C:18	00:01:F4:36:5C:18	Contained	Not Contained	Signal strength > -75 dBm	-
Aruba2400	Enterasys-37:4A:C3	00:01:F4:37:4A:C3	Contained	Not Contained	Signal strength > -75 dBm	-
Aruba2400	Cisco-9F:75:90	00:1D:45:9F:75:90	Not Contained	Contained	Manual Classification Override	-
Aruba2400	Locally Ad-71:BA:90	02:20:A6:71:BA:90	Contained	Not Contained	Signal strength > -75 dBm	-
Aruba2400	Locally Ad-71:BA:90	02:20:A6:71:BA:91	Contained	Not Contained	Signal strength > -75 dBm	-

1-8 of 8 Rogues Contained Page 1 of 1

Using the User Session Report

The **User Session Report** extensively itemizes user-level activity by session. A session is any instance in which a user connects to the network. You can track and display in list and chart form session information that includes all of the following:

- Connection Mode (wired, wireless or both depending on how report definition is created)
- SSID
- Role
- VLAN
- Cipher
- Summary
- Sessions
- User

The figures that follow illustrate the fields and information in the **User Session Report.**

Figure 174 *User Session Detail > Connection Mode Information*

Daily User Session Report for All Groups, Folders and SSIDs

1/20/2009 12:00 AM to 1/21/2009 12:00 AM
Generated on 1/21/2009 12:21 AM

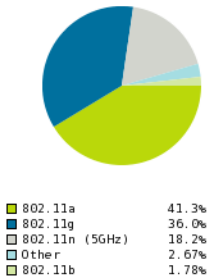
XML (XHTML) export
CSV export
Email this report
Print report

Session Data by Connection Mode

1-6 of 6 Connection Modes Page 1 of 1

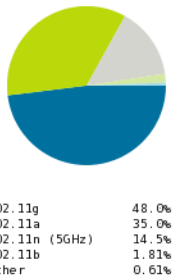
Connection Mode	Number of Users	% of Users	Amount of Time	% of Time	MB Used	% of MB Used	Average Signal Quality	Number of Sessions
802.11a	93	41.33%	36 days 21 hrs 56 mins	35.04%	49839.53	21.68%	29.07	309
802.11g	81	36.00%	50 days 14 hrs 12 mins	48.03%	17434.61	7.58%	43.55	301
802.11n (5GHz)	41	18.22%	15 days 6 hrs 54 mins	14.51%	137846.66	59.96%	27.74	118
802.11b	4	1.78%	1 day 21 hrs 39 mins	1.81%	0.12	0.00%	8.66	42
802.11n (2.4GHz)	3	1.33%	15 hrs 3 mins	0.60%	24785.36	10.78%	26.88	4
802.11bg	3	1.33%	28 mins	0.02%	0.00	0.00%	51.69	3
6 Connection Modes	225	100.00%	105 days 8 hrs 14 mins	100.00%	229906.28	100.00%		777

Number of Users by Connection Mode



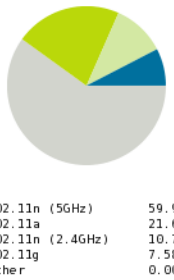
802.11a 41.3%
802.11g 36.0%
802.11n (5GHz) 18.2%
Other 2.67%
802.11b 1.78%

Amount of Time Spent by Connection Mode



802.11g 48.0%
802.11a 35.0%
802.11n (5GHz) 14.5%
802.11b 1.81%
Other 0.61%

MB Used by Connection Mode



802.11n (5GHz) 59.9%
802.11a 21.6%
802.11n (2.4GHz) 10.7%
802.11g 7.58%
Other 0.00%

Figure 175 *User Session Detail > SSID Information*

Session Data by SSID

1-14 of 14 SSIDs Page 1 of 1

SSID	Number of Users	% of Users	Amount of Time	% of Time	MB Used	% of MB Used	Average Signal Quality	Number of Sessions
airesphere-wpa2	119	49.17%	46 days 18 hrs 9 mins	44.38%	173937.03	75.66%	29.16	361
airesphere-vocera	66	27.27%	39 days 11 hrs 55 mins	37.49%	17665.52	7.68%	44.25	228
guest	29	11.98%	6 days 20 hrs 24 mins	6.50%	37956.40	16.51%	22.02	104
airesphere-vocera	12	4.96%	10 days 21 hrs 49 mins	10.36%	347.29	0.15%	42.41	37
	2	0.83%	1 hr 30 mins	0.06%	0.00	0.00%	68.87	5
Aruba3200-Moscato	2	0.83%	15 hrs 38 mins	0.62%	0.00	0.00%	0.25	14
4400 CKIP	2	0.83%	2 hrs 34 mins	0.10%	0.00	0.00%	35.14	7
open	2	0.83%	3 hrs 1 min	0.12%	0.04	0.00%	3.63	6
Cisco IOS Ben	2	0.83%	8 mins	0.01%	0.00	0.00%	12.21	2
aruba-ap	2	0.83%	7 hrs 41 mins	0.30%	0.00	0.00%	0.27	7
ab	1	0.41%	12 mins	0.01%	0.00	0.00%	4.96	2
101	1	0.41%	10 mins	0.01%	0.00	0.00%	14	1
14 SSIDs	242	100.00%	105 days 8 hrs 14 mins	100.00%	229906.28	100.00%		777

Number of Users by SSID

airesphere-wpa2 49.1%
airesphere-voip 27.2%
guest 11.9%
Other 6.61%
ethersphere-vocera 4.96%

Amount of Time Spent by SSID

airesphere-wpa2 44.3%
airesphere-voip 37.4%
airesphere-vocera 10.3%
guest 6.50%
Other 1.26%

MB Used by SSID

airesphere-wpa2 75.6%
guest 16.5%
airesphere-voip 7.68%
airesphere-vocera 0.15%
Other 0.00%

Figure 176 *User Session Detail > Role Information*

Session Data by Role

1-4 of 4 Roles Page 1 of 1 CSV Export

Role	Number of Users	% of Users	Amount of Time	% of Time	MB Used	% of MB Used	Average Signal Quality	Number of Sessions
employee	2	40.00%	1 day 8 hrs 1 min	14.03%	345.90	96.58%	40.99	34
-	1	20.00%	1 day 4 hrs 15 mins	12.38%	3.93	1.10%	29.81	4
logon	1	20.00%	5 mins	0.04%	0.00	0.00%	0	1
help desk	1	20.00%	6 days 23 hrs 54 mins	73.56%	8.31	2.32%	56.63	2
4 Roles	5	100.00%	9 days 12 hrs 16 mins	100.00%	358.14	100.00%		41

1-4 of 4 Roles Page 1 of 1

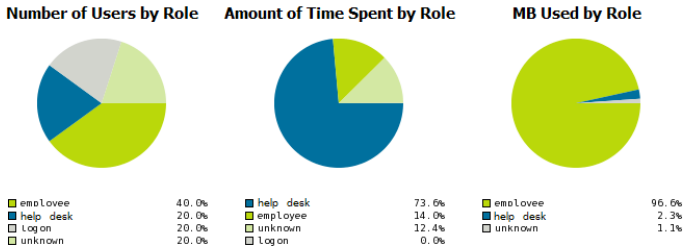


Figure 177 *User Session Detail > VLAN Information*

Session Data by VLAN

1-8 of 8 VLANs Page 1 of 1

VLAN	Number of Users	% of Users	Amount of Time	% of Time	MB Used	% of MB Used	Average Signal Quality	Number of Sessions
65	109	45.42%	44 days 12 hrs 40 mins	42.27%	164966.94	71.75%	29.19	337
66	78	32.50%	50 days 7 hrs 58 mins	47.78%	18012.81	7.83%	43.91	263
63	29	12.08%	6 days 20 hrs 24 mins	6.50%	37956.40	16.51%	22.02	104
64	10	4.17%	2 days 5 hrs 28 mins	2.12%	8970.09	3.90%	28.5	24
51	6	2.50%	1 day 3 hrs 19 mins	1.08%	0.04	0.00%	0.72	32
	3	1.25%	3 hrs 16 mins	0.13%	0.00	0.00%	35.53	7
0	3	1.25%	2 hrs 54 mins	0.12%	0.00	0.00%	39.35	8
1	2	0.83%	12 mins	0.01%	0.00	0.00%	12.14	2
8 VLANs	240	100.00%	105 days 8 hrs 14 mins	100.00%	229906.28	100.00%		777

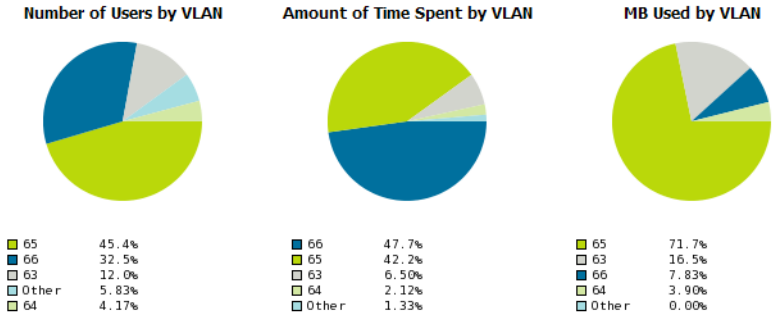


Figure 178 *User Session Detail > Cipher Information*

Session Data by Cipher

1-2 of 2 Ciphers Page 1 of 1

Cipher	Number of Users	% of Users	Amount of Time	% of Time	MB Used	% of MB Used	Average Signal Quality	Number of Sessions
-	219	99.10%	105 days 7 hrs 44 mins	99.98%	229906.24	100.00%	35.46	773
AES	2	0.90%	30 mins	0.02%	0.04	0.00%	12.18	4
2 Ciphers	221	100.00%	105 days 8 hrs 14 mins	100.00%	229906.28	100.00%		777

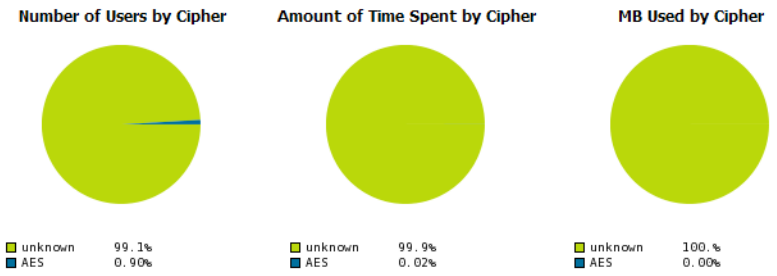
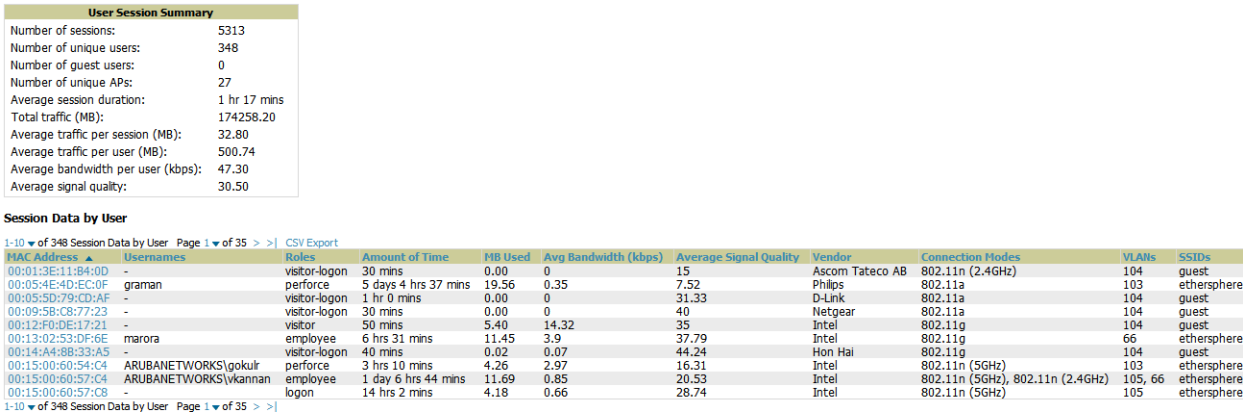


Figure 179 *Summary and User Information (partial view)*



User Session Summary	
Number of sessions:	5313
Number of unique users:	348
Number of guest users:	0
Number of unique APs:	27
Average session duration:	1 hr 17 mins
Total traffic (MB):	174258.20
Average traffic per session (MB):	32.80
Average traffic per user (MB):	500.74
Average bandwidth per user (kbps):	47.30
Average signal quality:	30.50

Session Data by User

1-10 of 348 Session Data by User Page 1 of 35 > >| CSV Export

MAC Address	Usernames	Roles	Amount of Time	MB Used	Avg Bandwidth (kbps)	Average Signal Quality	Vendor	Connection Modes	VLANs	SSIDs
00:01:3E:11:B4:0D	-	visitor-logon	30 mins	0.00	0	15	Ascom Tateco AB	802.11n (2.4GHz)	104	guest
00:05:4E:4D:EC:0F	graman	perforce	5 days 4 hrs 37 mins	19.56	0.35	7.52	Philips	802.11a	103	ethersphere
00:05:5D:79:CD:AF	-	visitor-logon	1 hr 0 mins	0.00	0	31.33	D-Link	802.11a	104	guest
00:09:5B:C8:77:23	-	visitor-logon	30 mins	0.00	0	40	Netgear	802.11a	104	guest
00:12:F0:DE:17:21	-	visitor	50 mins	5.40	14.32	35	Intel	802.11g	104	guest
00:13:02:53:DF:6E	marora	employee	6 hrs 31 mins	11.45	3.9	37.79	Intel	802.11g	66	ethersphere
00:14:A4:8B:33:A5	-	visitor-logon	40 mins	0.02	0.07	44.24	Hon Hai	802.11g	104	guest
00:15:00:60:54:C4	ARUBANETWORKS\gokulr	perforce	3 hrs 10 mins	4.26	2.97	16.31	Intel	802.11n (5GHz)	103	ethersphere
00:15:00:60:57:C4	ARUBANETWORKS\vkannan	employee	1 day 6 hrs 44 mins	11.69	0.85	20.53	Intel	802.11n (5GHz), 802.11n (2.4GHz)	105, 66	ethersphere
00:15:00:60:57:C8	-	logon	14 hrs 2 mins	4.18	0.66	28.74	Intel	802.11n (5GHz)	105	ethersphere

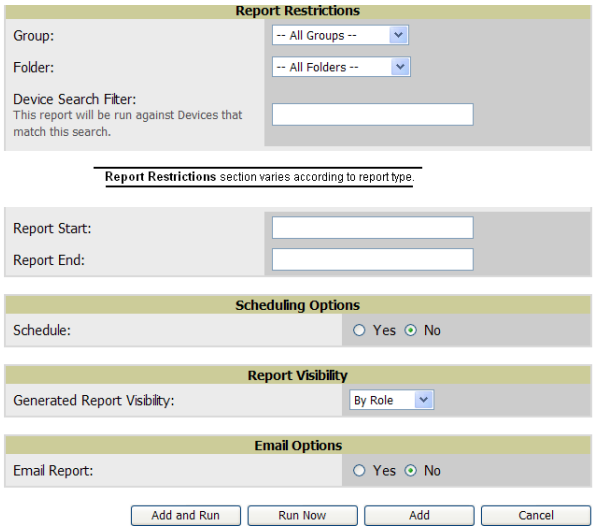
1-10 of 348 Session Data by User Page 1 of 35 > >|

Defining Reports

You can create reports in AWMS for any time period you wish, to be run when you wish, and distributed to recipients that you define. Perform these steps to create and run custom reports. Reports created with the **Reports > Definition** page appear on this and on the **Reports > Generated** page once defined.

1. To create or edit a report, browse to the **Reports > Definition** page and select the **Add** button, or select the pencil icon to edit an existing report definition. Figure 180 illustrates one view of the **Reports > Definition** page.

Figure 180 *Defining a Report with the **Reports > Definitions > Add** Button*



2. Complete the fields described in Table 134 and any additional **Report Restrictions**. The **Report Restrictions** section changes according to the report type you choose. Additional information about each report type is described in "Using Daily Reports" on page 222.

Table 134 ***Reports > Definitions > Add** Page Fields*

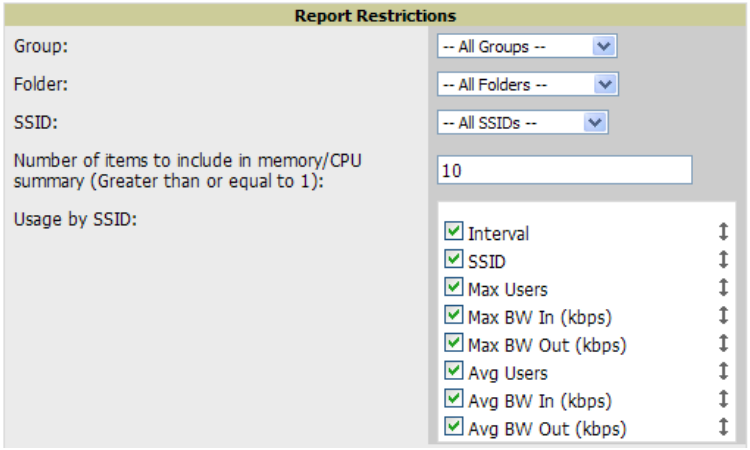
Field	Default	Description
Title	Empty	Enter a **Report Title**. Dell PowerConnect W recommends using a title that is a meaningful and descriptive, so it may be found easily on the lists of reports that appear on either **Generated** or **Definitions** pages.
Type	Capacity	Choose the type of report you wish to create in the Report Type drop-down menu.

Table 134 ***Reports > Definitions > Add*** *Page Fields (Continued)*

Field	Default	Description
Group	All Groups	Specify the groups and folders to be covered in the report by choosing **All Groups** (or **All Folders**) or specifying **Use selected groups** (or **Use selected folders**) in the drop-down menu. If **Use selected groups** is chosen, a menu with checkboxes appears, allowing you to choose the groups to include in the report.
Folder	All Folders	
Device Search Filter	Blank	Add a specific alpha numeric string for finding devices that match that which you entered. Note that once you enter a search string, new or deleted devices that match the search string will automatically be included or excluded in all future reports generated until you delete or change the search string. For certain reports, such as **New User** and **User Session**, will allow you to search devices associated with a specific user or device.
SSID	All SSIDs	This field displays for most report types. When this field appears, and when you select **Use Selected IDs**, a new list of SSIDs displays. Check (select) the specific SSIDs to be included in the report.
Report Start **Report End**	Blank	These fields establish the time period to be covered by the report. These fields are supported for most report types. When these fields do not appear, the report provides a snapshot of current status rather than information covering a period of time Times can be entered in relative or absolute form. A start date of 6 months 3 weeks 5 days 9 hours ago and an end time of 4 months 2 weeks 1 day ago is valid, as is a start date of 5/5/2008 13:00 and an end date of 6/6/2008 9:00. Absolute times must be entered in a 24-hour format. Other reports, like the Inventory Report, give a snapshot picture of the AWMS at the present time.
Schedule	No	When you select **Yes**, new fields display that allow you to define a specific time for report creation. The report schedule setting is distinct from the **Report Start** and **Report End** fields, as these define the period of time to be covered by the report. These **Schedule** fields establish the time that a report runs, independent of report scope: • **Current Local Time**—Displays for reference the time of the AWMS system. • **Desired Start Date/Time**—Sets the time the report runs, which may often be separate from the time period covered by the report. This allows you to run a report during less busy hours. • **Occurs**—Select whether the report is to be run one time, daily, weekly, monthly, or annually. Depending on the recurrence pattern selected, you get an additional drop-down menu. For example, if you select a recurrence of monthly, you get an additional drop-down menu that allows you to pick which day of the month (day 1, day 2, and so forth) the report should run.
Generated Report Visibility	By Role	This field allows you to display the report either by user role, with the report appearing in User Role lists on the **Reports > Generated** page. Alternatively, this field allows you to display reports by **Subject** on the **Reports > Generated** page.
Email Report	No	Select **Yes** to display sender and recipient fields. Enter the Sender Address where marked to indicate the address that appears in the **From** field of the emailed report. Enter recipient email addresses separated by commas when using multiple email addresses. **NOTE:** AWMS will not attempt to email a report with an excessively large number of rows in the detail section.

In the report restrictions section you can customize any detailed information contained in a chosen report. Figure 181 shows a sample **Report Restrictions** page.

Figure 181 *Report Restrictions Illustration*



By default all data will be included. Deselect the checkbox to hide specific information. The list can also be reordered by dragging and dropping the separate lines. The order displayed here will match the column order in the report.

3. Do one of the following:
   - Select **Add and Run** to generate the report immediately, in addition to saving report settings.
   - Select **Run Now** to generate the report immediately without creating a new report definition or saving the report settings.
   - Select **Add** (only) to complete the report creation, to be run at the time scheduled.
   - Select **Cancel** to exit from the **Add** page.

Table 135 describes the configurable settings for the custom report to be created. Select any of the report names to view additional information on that report type.

Table 135 *Report Types and Scheduling Options Supported for Custom Reports*

Report Type	Can by Run by Time Period	Can be Run by Group/Folder	Description
Using Custom Reports	Yes	Yes	Summarizes devices based on which have exceeded a defined percentage of their maximum bandwidth capacity. Pulls data for AP radios or interfaces of universal devices (ifSpeed value).
Using the Capacity Planning Report	Yes	Yes	Tracks bandwidth capacity and consumption according to thresholds for data throughput. This is a device-oriented report.
Using the Configuration Audit Report	**No**	Yes	Provides a snapshot of the configuration of all specified access points in AWMS, at report run time.
Using the Device Summary Report	Yes	Yes	Summarizes user and bandwidth statistics and lists devices in AWMS.
Using the Device Uptime Report	Yes	Yes	Summarizes device uptime within defined groups or folders.
Using the IDS Events Report	Yes	Yes	Summarizes IDS events; can be limited to a summary of a certain number of events.
Using the Inventory Report	**No**	Yes	Provides an audit of vendors, models and firmware versions of devices in AWMS.
Using the Memory and CPU Utilization Report	Yes	Yes	Summarizes usage for controllers for defined top number of devices; can be run with or without per-CPU details and details about device memory usage.

Table 135 *Report Types and Scheduling Options Supported for Custom Reports (Continued)*

Report Type	Can by Run by Time Period	Can be Run by Group/Folder	Description
Using the Network Usage Report	Yes	Yes	Summarizes bandwidth data and number of users.
Using the New Rogue Devices Report	Yes	**No**	Shows new rogue devices by score, discovering AP, and MAC address vendor.
Using the New Users Report	Yes	**No**	Provides a summary list of new users, including username, role, MAC address, discovering AP, and association time.
Using the PCI Compliance Report	Yes	Yes	Provides a summary of network compliance with PCI requirements, according to the PCI requirements enabled in AWMS using the **AMP Setup > PCI Compliance** page.
Using the Port Usage Report	Yes	Yes	Summarizes switch and port information across the network. Generates information on the unused ports. Provides a detailed list of all available switches and ports in the network.
Using the RADIUS Authentication Issues Report	Yes	Yes	Summarizes RADIUS authentication issues by controller and by user, as well as a list of all issues.
Using the RF Health Report	Yes	Yes	Tracks problematic radios, changes, errors, and interfering devices.
Using the RF Health Report	**No**	Yes	Identifies discrepancies between access point containment status specified in AMP compared to containment status identified by the controller at report run time.
Using the User Session Report	Yes	Yes	Summarizes user data by radio mode, SSID and VLAN, as well as lists all sessions.

Emailing and Exporting Reports

This section describes three ways in which distribute reports from AWMS:

- Emailing Reports in General Email Applications
- Emailing Reports to Smarthost
- Exporting Reports to XML or CSV

Emailing Reports in General Email Applications

Perform these steps to set up email distribution of reports in AWMS:

- All reports contain a link to export the report to an XML file and a text box where you may specify email addresses, separated by commas, to which reports are sent.
- Select **Email This Report** to email the report to the address specified in the text box above the button.

Additional information about email-based report generation is described in "Defining Reports" on page 242, and in "Emailing Reports to Smarthost" on page 245.

Emailing Reports to Smarthost

AWMS uses Postfix to deliver alerts and reports via email, because it provides a high level of security and locally queues email until delivery. If AWMS sits behind a firewall, which prevents it from sending email directly to the specified recipient, use the following procedure to forward email to a smarthost.

1. Add the following line to `/etc/postfix/main.cf`:

   ```
   relayhost = [mail.example.com]
   ```

Where `mail.example.com` is the IP address or hostname of your smarthost.

2. Run service postfix restart
3. Send a test message to an email address.

```
Mail -v xxx@xxx.com
Subject: test mail
.
CC:
```

4. Press **Enter**.
5. Check the mail log to ensure mail was sent.

```
tail -f /var/log/maillog
```

Exporting Reports to XML or CSV

AWMS allows you to export individual reports in XML (xhtml) or CSV. You can also export all reports at once and a zip file will be generated with all of the files in CSV format included. These files may be read by an HTML browser or opened in Excel. The CSV files can be opened in any text editor.

NOTE: This method of exporting files supports graphics and links, and prevents **Missing File C:\filename.css** error messages.

Transferring Reports Using FTP

Once reports are generated, you can also copy them to any FTP-accessible destination using a sample script. Contact Dell support for more information.

Chapter 10

Using the AWMS Helpdesk

This chapter presents the functions, configuration, and use of the AWMS **Helpdesk** and includes the following sections:

- "AWMS Helpdesk Overview" on page 247
- "Monitoring Incidents with Helpdesk" on page 247
- "Creating a New Incident with Helpdesk" on page 249
- "Creating New Snapshots or Incident Relationships" on page 250
- "Using the Helpdesk Tab with an Existing Remedy Server" on page 251

AWMS Helpdesk Overview

The Helpdesk module of the AirWave Wireless Management Suite allows front-line technical support staff to take full advantage of the data available in the AirWave Wireless Management Suite. The AWMS Helpdesk includes the following features and functions, with additional features described in this chapter:

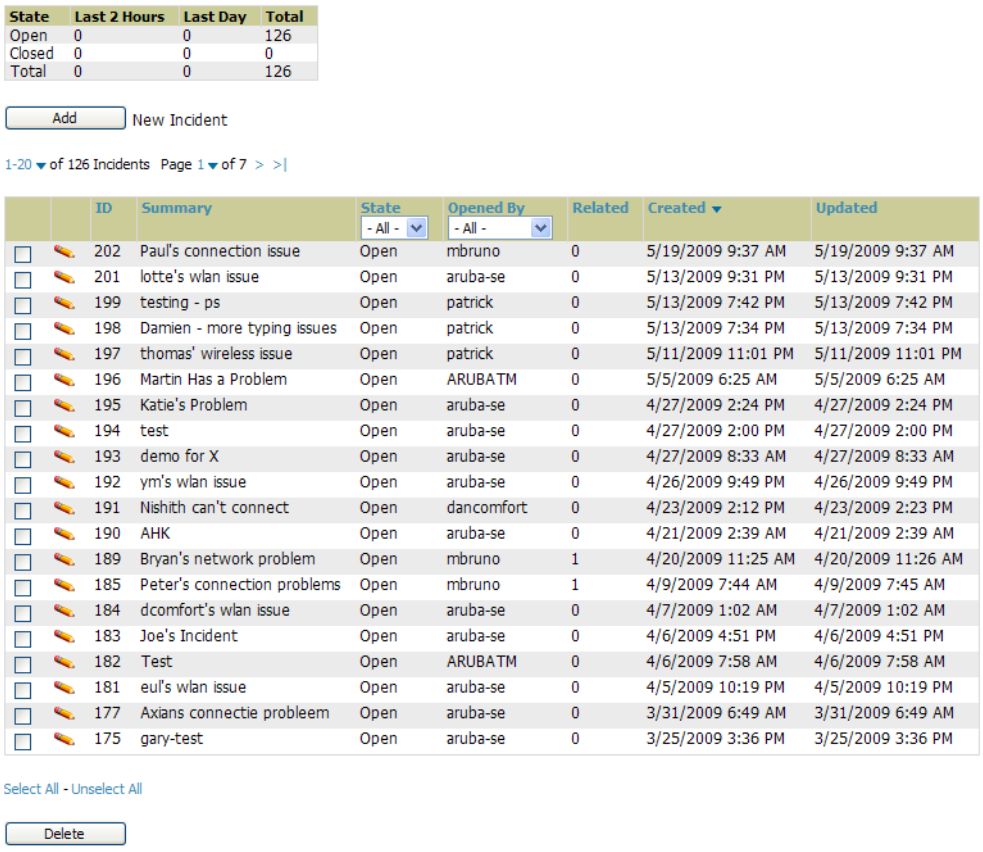
- The **Helpdesk** tab appears to the right of the **Home** tab.
- Users with an **Admin** role have the **Helpdesk** option enabled by default.
- **Admin** users can make the Helpdesk available to users of any role by selecting the **enabled** radio button on the **role detail** page. To edit existing roles, select the **pencil** icon next to a role on the **AMP Setup > Roles** page.
- The AWMS Helpdesk allows you to document incidents associated with users on the network.
- Installing Remedy allows you to disable Helpdesk, and use AWMS as an interface for creating, viewing, and editing incidents on the existing Remedy server. You can also associate snapshots with Remedy incidents and store them on your AWMS.

  The option to use an external Remedy server is disabled by default. Navigate to the **Helpdesk > Setup** page to enable Remedy. See "Using the Helpdesk Tab with an Existing Remedy Server" on page 251 for more information on how to integrate AWMS with a Remedy server.

Monitoring Incidents with Helpdesk

For a complete list of incidents, or to open a new incident, navigate to the **Helpdesk > Incidents** page. Figure 182 illustrates the components of the AWMS **Helpdesk Incidents** page.

Figure 182 ***Helpdesk > Incidents*** *Page Illustration*



State	Last 2 Hours	Last Day	Total
Open	0	0	126
Closed	0	0	0
Total	0	0	126

Add New Incident

1-20 of 126 Incidents Page 1 of 7 > >|

		ID	Summary	State - All -	Opened By - All -	Related	Created	Updated
☐		202	Paul's connection issue	Open	mbruno	0	5/19/2009 9:37 AM	5/19/2009 9:37 AM
☐		201	lotte's wlan issue	Open	aruba-se	0	5/13/2009 9:31 PM	5/13/2009 9:31 PM
☐		199	testing - ps	Open	patrick	0	5/13/2009 7:42 PM	5/13/2009 7:42 PM
☐		198	Damien - more typing issues	Open	patrick	0	5/13/2009 7:34 PM	5/13/2009 7:34 PM
☐		197	thomas' wireless issue	Open	patrick	0	5/11/2009 11:01 PM	5/11/2009 11:01 PM
☐		196	Martin Has a Problem	Open	ARUBATM	0	5/5/2009 6:25 AM	5/5/2009 6:25 AM
☐		195	Katie's Problem	Open	aruba-se	0	4/27/2009 2:24 PM	4/27/2009 2:24 PM
☐		194	test	Open	aruba-se	0	4/27/2009 2:00 PM	4/27/2009 2:00 PM
☐		193	demo for X	Open	aruba-se	0	4/27/2009 8:33 AM	4/27/2009 8:33 AM
☐		192	ym's wlan issue	Open	aruba-se	0	4/26/2009 9:49 PM	4/26/2009 9:49 PM
☐		191	Nishith can't connect	Open	dancomfort	0	4/23/2009 2:12 PM	4/23/2009 2:23 PM
☐		190	AHK	Open	aruba-se	0	4/21/2009 2:39 AM	4/21/2009 2:39 AM
☐		189	Bryan's network problem	Open	mbruno	1	4/20/2009 11:25 AM	4/20/2009 11:26 AM
☐		185	Peter's connection problems	Open	mbruno	1	4/9/2009 7:44 AM	4/9/2009 7:45 AM
☐		184	dcomfort's wlan issue	Open	aruba-se	0	4/7/2009 1:02 AM	4/7/2009 1:02 AM
☐		183	Joe's Incident	Open	aruba-se	0	4/6/2009 4:51 PM	4/6/2009 4:51 PM
☐		182	Test	Open	ARUBATM	0	4/6/2009 7:58 AM	4/6/2009 7:58 AM
☐		181	eul's wlan issue	Open	aruba-se	0	4/5/2009 10:19 PM	4/5/2009 10:19 PM
☐		177	Axians connectie probleem	Open	aruba-se	0	3/31/2009 6:49 AM	3/31/2009 6:49 AM
☐		175	gary-test	Open	aruba-se	0	3/25/2009 3:36 PM	3/25/2009 3:36 PM

Select All - Unselect All

Delete

The table in **Helpdesk > Incidents** displays the count of incidents by state and by time. You can sort incidents from within any category of information, whether in sequential or reverse-sequential order. You can display all incidents, or strictly open or closed incidents, and you can display incidents according to the person who created them. Finally, the **Helpdesk > Incidents** page allows you to add or delete incidents.

Table 136 ***Helpdesk > Incidents*** *Top Table*

Column	Description
State	Displays three states as they apply, as follows: • Open (currently under investigation) • Closed (resolved) • The total incident count
Period of time and Total	Shows the count of incidents in the last two hours, the last day, and the total count.

The table at the bottom of the page, as described in Table 137 below, summarizes the incidents that have been reported thus far, and which AWMS has not yet purged.

Use the **AMP Setup > General** page and the **Historical Data Retention** page. Using the **Closed Helpdesk Incidents** field, set the number of days that AWMS is to retain records of closed Helpdesk incidents. Settings this value to 0 disables this function.

Selecting the **pencil** icon next to any incident opens an edit page where you can modify and update the incident. An incident can be deleted by selecting the checkbox next to it and selecting **Delete**.

Table 137 ***Helpdesk > Incidents*** *Bottom Table*

Column	Description
ID	Displays the ID number of the incident, which is assigned automatically when the incident is logged.
Summary	Presents a summary statement of the issue or problem—entered by the AWMS user when the incident is created.
State	The current state of the incident - this can be either open or closed. The drop-down menu at the top can be used to show only open or closed incidents. The default is to show both states.
Opened By	Displays the username of the AWMS user who opened the incident. Helpdesk can be made available to users of any role by selecting the **enabled** radio button on the **Role Detail** page. Select the pencil icon next to a role on the **AMP Setup > Roles** page.
Related	Displays the number of items that have been associated to the incident. These link different groups, APs or clients to the incident report.
Created	Displays the time and date the incident was created.
Updated	Displays the time and date the incident was last modified by an AWMS user.

Creating a New Incident with Helpdesk

To create a new Helpdesk incident, select **Add New Incident** underneath the top table. This launches and displays an incident edit page, as illustrated in Figure 183. The page contents are described in Table 138.

Figure 183 ***Add Incident*** *Page Illustration*

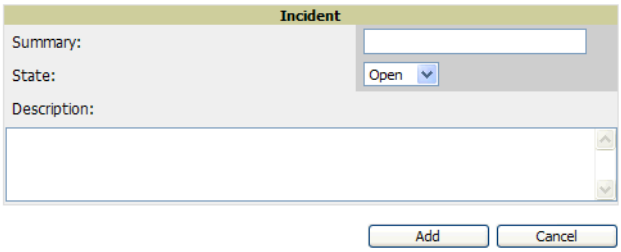


Table 138 ***Helpdesk Incident Edit*** *Page Fields*

Field	Description
Summary	Displays user-entered text that describes a short summary of the incident
State	Provides a drop-down menu with the options "Open" or "Closed"
Description	Provides a longer user-entered text area for a thorough description of the incident.

NOTE: The **Incidents** portion of the **Alert Summary** table on other AWMS pages only increments the counter for incidents that are open and associated to an AP. This field displays incidents based on the Top folder on this page and on the **Home > Overview** page. Incidents not related to devices in that folder are not counted in the **Alert Summary** table on other pages. To view all incidents including those not associated to an AP, use the **Helpdesk > Incidents** page.

Helpdesk icons appear at the top of other AWMS pages, allowing graphical snapshots and other records to be associated to existing incidents. These appear next to the **Help** link. Refer to Figure 184.

Figure 184 *Helpdesk Icons on Additional Pages*

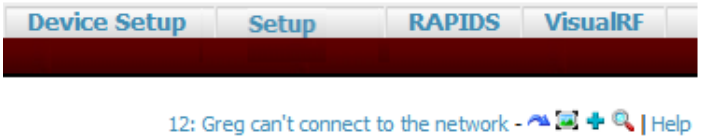


Table 139 describes the Helpdesk icon components.

Table 139 *Helpdesk Icon Components*

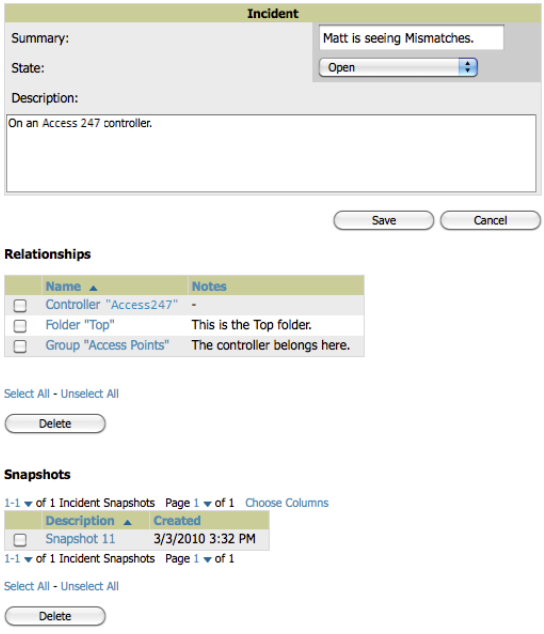
Icon	Description
Current Incident	(ID number and description) Identifies the current incident of focus in the Helpdesk header. Selecting the link brings up the **Incident Edit** page (see above). Mousing over the incident brings up a summary popup of the incident.
	Relates the device, group or client to the incident (see below for more details).
	Attaches a snapshot of the page to the incident. This feature can be used to record a screenshot of information and preserve it for future troubleshooting purposes.
	Creates a new incident report.
	Choose a new incident from the list of created incidents to be the **Current Incident** (see description of icon above).

Creating New Snapshots or Incident Relationships

Snapshots or relationships can be created by selecting the Helpdesk header icon (see Table 139) on the screen that needs to be documented. Snapshots or relationships can then be related to the current incident in the popup window. To attach them to another incident, select **Choose a New Incident**.

Relationships and snapshots appear on the **Incident Edit** page after they have been created. When a relationship is created the user can enter a brief note, and in the **Relationships** table the name of the relationship links to the appropriate page in AWMS. Selecting the snapshot description opens a popup window to display the screenshot. Figure 185 illustrates these GUI tools.

Figure 185 *Relationships and Snapshots on the **Incident Edit** Page*



Using the Helpdesk Tab with an Existing Remedy Server

If an external Remedy server exists, you can use the AWMS **Helpdesk** tab to create, view and edit incidents on the Remedy server. AWMS can only support integration with a Remedy server if it is a default installation of Remedy 7.0 with no changes to the web service definitions.

To use the Helpdesk tab with a Remedy server, first navigate to the **Helpdesk > Setup** page. In the **BMC Remedy Setup** area, select **Yes** to enable Remedy. This launches a set of fields for information about the Remedy server. Once enabled to use Remedy, the Helpdesk header icons work in the same way for a Remedy-configured Helpdesk as they do for the default AWMS **Helpdesk**. Figure 186 illustrates this appearance, and Table 140 describes the components. For more details, see "Creating New Snapshots or Incident Relationships" on page 250.

Figure 186 ***Helpdesk > Setup*** *with Remedy Enabled*

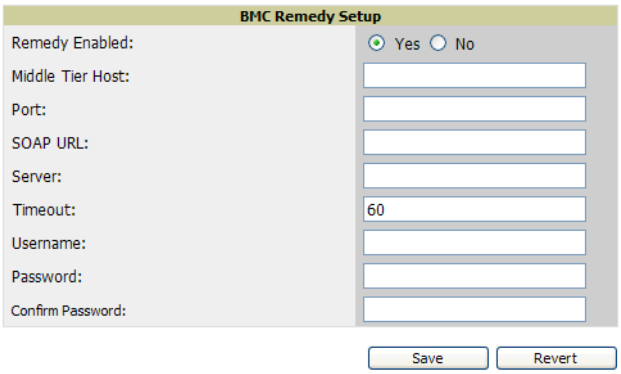


Table 140 *Components of* ***Helpdesk > Setup*** *with Remedy Enabled*

Field	Description
Remedy Enabled	If **no** (default) is selected, the existing AWMS Helpdesk functionality is available. If **yes** is selected, the Helpdesk functionality is disabled and the **Helpdesk** tab can be used with an existing Remedy server. Fields for server data appear only when Remedy is enabled.
Middle Tier Host	The location of the Remedy installation's web server.
Port	The port for the HTTP interface with the web server (this is likely 8080, but there is no default value in AWMS).
SOAP URL	Gateway for web services on Remedy's middle tier host. This is usually arsys/services/ARService, but there is no default value in AWMS.
Server	The location of the backend server where Remedy data is stored.
Timeout	The timeout for HTTP requests (60 seconds by default).
Username	Username for an existing Remedy account; the role of this user defines the visibility AWMS will have into the Remedy server.
Password and Confirm Password	The password for the Remedy user account.

Once the server settings have been saved and applied, **Helpdesk** features become disabled. AWMS then displays incident data pulled from the **Remedy** server and push changes back. With the exception of snapshots, AWMS does not store any Remedy data locally.

To view **Remedy** incidents in AWMS, navigate to the **Helpdesk > Incidents** tab. Figure 187 illustrates the appearance and Table 141 describes the components of this page.

Figure 187 ***Helpdesk > Incidents*** *with Remedy Enabled*

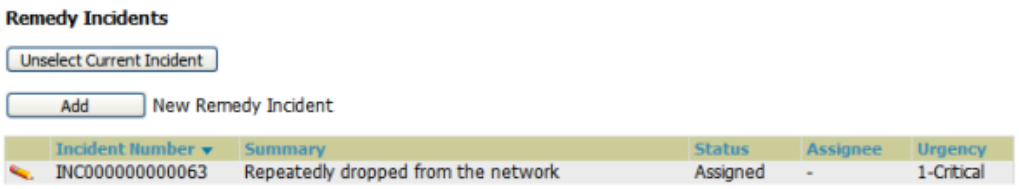


Table 141 *Helpdesk > Incidents Components with Remedy Enabled*

Field	Description
Incident Number	Displays a unique identifier for each incident; assigned by the Remedy installation.
Summary	Contains a brief incident summary as entered by AWMS or Remedy user.
Status	Displays the status as chosen by AWMS or the Remedy user: • New • Assigned • In Progress • Pending • Resolved • Closed • Cancelled
Assignee	Assigned by Remedy installation; cannot be changed in AWMS.
Urgency	Displays the urgency level, as chosen by the AWMS or Remedy User: • **1** - Critical • **2** - High • **3** - Medium • **4** - Low

To change the current incident in the **Helpdesk** header, select **Unselect Current Incident**. To add a new Remedy incident, select **Add**. To edit an existing Remedy incident, select the pencil icon next to the incident you wish to edit. Refer to Figure 188 and Table 142 for additional illustration and explanation.

Figure 188 ***Helpdesk > Incidents > Add a New Remedy Incident*** *Page Illustration*

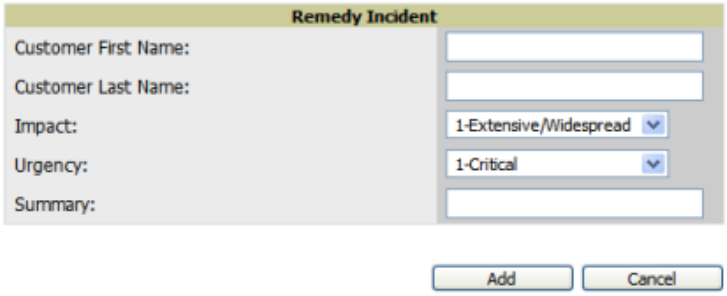


Table 142 *Helpdesk > Incidents > Add a New Remedy Incident Fields*

Field	Description
Customer First and Last Name	These must match exactly a customer that already exists on the Remedy server. There is no way to create a new customer from AWMS or to search Remedy customers remotely.
Impact	• 1 - Extensive/Widespread (default) • 2 - Significant/Large • 3 - Moderate/Limited • 4- Minor/Localized

Table 142 *Helpdesk > Incidents > Add a New Remedy Incident Fields*

Field	Description
Urgency	• 1 - Critical (default) • 2 - High • 3 - Medium • 4 - Low
Summary	Free-form text field.

NOTE: A new incident is not created if the customer First and Last name do not exist on the Remedy server. However, in this scenario, there is no failure message or warning that the incident was not created.

Once an incident has been created, select the pencil icon in the incident list to edit the information. The status or urgency can be changed as the case progresses, and more detailed information about the incident can be added. Snapshots can also be related to Remedy incidents as described above. However, snapshots are only stored locally on the AWMS server—they are not pushed to the Remedy server.

Yum for AWMS

This appendix describes the Yum packaging management system. Dell PowerConnect W recommends running Yum to ensure your packages are up to date, and so that your AWMS is as secure as possible if you are running RHEL 5 or CentOS 5.

Yum is an automated package management system that verifies AWMS is running the most recently released RPMs and upgrades any out-of-date packages. Yum accesses the Internet, and downloads and installs new versions of any installed RPMs. It is important to keep the AWMS RPMs current to close any known security holes in the OS as quickly as possible.

To run Yum on a CentOS 5 machine, follow the instructions below:

1. Before running Yum for the first time, you need to install the GPG key. The GPG key is used to validate the authenticity of all packages downloaded by Yum. To install the GPG key, type **`rpm --import /etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-5`**. If the key was not manually installed before Yum is run for the first time, you will be prompted to install and accept a new key.
2. To run Yum manually, log in to the AWMS console and type **`yum update`** and press **Enter**. If the packages seem to be downloading slowly, press **Ctrl+C** to connect to a new mirror.
3. To configure Yum to run nightly, type **`yum install yum-cron`** and press **Enter**. Then type **`service yum start`** and press **Enter**. Note that yum-cron will default to off if the machine is restarted.
4. To configure yum-cron to start at system startup, type **`chkconfig yum-cron on`** and press **Enter**.
5. In some instances, running Yum may cause a problem with AWMS. If that happens, a good first step is to use SSH to go into the AWMS server as root, and issue the following command:

   ```
   # root; make
   ```

If that does not resolve the issue, please contact Dell support.

Appendix B

Third-Party Security Integration for AWMS

This appendix describes the optional integration of third party security products for AWMS, as follows:

- "Bluesocket Integration" on page 257
- "ReefEdge Integration" on page 257
- "HP ProCurve 700wl Series Secure Access Controllers Integration" on page 258

Bluesocket Integration

A Bluesocket security scheme for AWMS has the following prerequisites:

- Bluesocket version 2.1 or higher
- AWMS version 1.8 or higher
- Completion of **AMP Setup > RADIUS Accounting** page

Bluesocket Configuration

Perform these steps to configure a Bluesock security scheme:

1. Log in into the Bluesocket Server via HTTP with proper user credentials.
2. Navigate to the **Users > External Accounting Servers** page.
3. Select **External RADIUS Accounting** from the **Create** drop-down list.
4. Select **Enable server** onscreen.
5. Enter the user-definable **Name** for the AWMS server.
6. Enter the **Server IP Address** or **DNS entry** for AWMS.
7. Accept the default Port setting of 1813.
8. Enter the **Shared Secret** (matching the AWMS shared secret).
9. Enter Notes (optional).
10. Select **Save**.
11. If you are using an External LDAP Server, ensure that the accounting records are forwarding to AWMS upon authentication.
12. Navigate to **Users > External Authentication Servers**.
13. Modify the LDAP server.
14. Ensure under the Accounting server matches the server entered in step 5.
15. Select **Save**.
16. To verify and view the log files on the Bluesocket server, proceed to **Status > Log**.
17. To verify and view the log files on AWMS, proceed to **System > Event Log**.

ReefEdge Integration

A ReefEdge security scheme for AWMS has the following prerequisites:

- ReefEdge version 3.0.3 or higher

- AWMS version 1.5 or higher
- Completion of the **AMP Setup > Radius Accounting** page configurations, as described in "Integrating a RADIUS Accounting Server" on page 55.

ReefEdge Configuration

Perform these steps to configure a ReefEdge security scheme:

1. Log in into the ReefEdge ConnectServer via HTTP with the proper user credentials.
2. Navigate to the **Connect System > Accounting** page.
3. Select **Enable RADIUS Accounting**.
4. Enter the Primary Server IP Address or DNS entry for AWMS server.
5. Enter Primary Server Port Number 1813.
6. Enter the Shared Secret (matching the AWMS shared secret).
7. To verify and view the log files on the **Connect Server** proceed to **Monitor > System Log**.
8. To verify and view the log files on AWMS, proceed to **System > Event Log**.

HP ProCurve 700wl Series Secure Access Controllers Integration

A ProCurve security scheme for AWMS has the following prerequisites:

- HP 700 version 4.1.1.33 or higher
- AWMS version 3.0.4 or higher
- Completion of the **AMP Setup > Radius Accounting** page configurations, as described in "Integrating a RADIUS Accounting Server" on page 55.

Example Network Configuration

In this example, the APs are connected to the Access Controller. The Access Controller routes wireless user traffic to the Employee Network, while bridging AP management traffic. Each AP is presumed to have a static IP address.

Perform these steps for HP ProCurve 700wl Series Configuration, allowing AWMS to manage APs through **Control** pages.

1. Log in to the Access Control Server via HTTP with proper credentials.
2. Navigate to **Rights > Identity Profiles**.
3. Select **Network Equipment**.
4. Enter the **Name**, **LAN MAC** and ensure the device is identified as an **Access Points in the Identity Profile** section for all access points in the network.

   The Access Points Identity Profile is the default profile for network equipment. Enabling this option instructs the Access Controller to pass management traffic between the Access Points and the Customer's wired network.

HP ProCurve 700wl Series Configuration

This procedure enables the sending of client authentication information to AWMS. Perform the following steps to enable this configuration.

1. Log in to the Access Control Server via HTTP with proper credentials.
2. Navigate to the **Rights > Authentication Policies** configuration page.
3. Select **Authentication Services**.

4. Select **New Services**.
5. Select **RADIUS**.
6. Enter **Name - Logical Name.**
7. Enter **Server - AWMS IP Address.**
8. Enter **Shared Secret**.
9. Enter **Port - 1812**.
10. Enter the **Shared Secret** and **Confirm** (matching the AWMS shared secret).
11. Enter **Reauthentication Field - Session Timeout**.
12. Enter **Timeout - 5.**
13. Select the **Enable RADIUS Accounting RFC-2866** check box.
14. Enter **Port - 1813** for RFC-2866.
15. To verify and view the log files on AWMS, proceed to **System > Event Log**.

Appendix C

Access Point Notes

This appendix contains a few additional notes relevant to Cisco devices monitored by AWMS, and includes the following sections:

- "Resetting Cisco (VxWorks) Access Points" on page 261
- "Cisco IOS Dual Radio Template" on page 263
- "Speed Issues Related to Cisco IOS Firmware Upgrades" on page 264
- "AWMS Firmware Upgrade Process" on page 264

Resetting Cisco (VxWorks) Access Points

When using any WLAN equipment, it may sometimes be necessary to recover a password and/or to restore the default settings on the equipment. Unlike other access points, the Cisco Aironet hardware and software sometimes do not permit password recovery. In these instances, you may need to first return the equipment to its default state, from which it can then be reconfigured.

For any Cisco VxWorks AP, regardless of the software version being used, you must first connect to the AP via the serial console and then perform the required steps to reset the unit.

Note that Cisco changed the procedure for resetting the AP configuration beginning with software version 11.07. The procedure below helps you determine which software version your AP(s) is currently running and which procedure to use to reset the AP.

Connecting to the AP

Perform these steps to return VxWorks Access Points to their default state and to reset the unit.

1. Connect the COM 1 or COM 2 port on your computer to the RS-232 port on the AP, using a straight-through cable with 9-pin-male to 9-pin-female connectors.
2. Open a terminal-emulation program on your computer.

NOTE: The instructions below assume that you are using Microsoft HyperTerminal; other terminal emulation programs are similar but may vary in certain minor respects.

3. Go to the **Connection Description** window, enter a name and select an icon for the connection, and select **OK**.
4. Go to the **Connect To window** field, and use the pull-down menu to select the port to which the cable is connected, then select **OK**.
5. In the Port Settings window, make the following settings:
   - Bits per second (baud): 9600
   - Data bits: 8
   - Parity: None
   - Stop bits: 1
   - Flow Control: Xon/Xoff
6. Click **OK**.
7. Press **Enter**.

Determining the Boot-Block Version

The subsequent steps that you must follow to reset the Cisco AP depend on the version of the AP's boot-block. Follow the steps below to determine which boot-block version is currently on your AP, then use the corresponding instructions detailed below.

When you connect to the AP, the Summary Status screen appears. Reboot the AP by pressing **CTRL-X** or by unplugging and then re-plugging the power connector. As the AP reboots, introductory system information will appear onscreen.

The boot-block version appears in the third line of this text and is labeled Bootstrap Ver.

```
System ID: 00409625854D
Motherboard: MPC860 50MHz, 2048KB FLASH, 16384KB DRAM, Revision 20
Bootstrap Ver. 1.01: FLASH, CRC 4143E410 (OK)
Initialization: OK
```

Resetting the AP (for Boot-Block Versions from 1.02 to 11.06)

Follow these steps to reset your AP if the boot-block version on your AP is greater than or equal to version 1.02 but less than 11.07:

1. If you have not done so already, connect to the AP (see above), select **OK**, and press **Enter**.
2. When the **Summary Status** screen appears, reboot the AP by pressing **CTRL-X** or by unplugging and then re-plugging the power connector.
3. When the memory files are listed under the heading Memory: File, press **CTRL-W** within five seconds to reach the boot-block menu.
4. Copy the AP's installation key to the AP's DRAM by performing the following steps:
   - Press **C** to select **Copy File**.
   - Press **1** to select **DRAM**.
   - Press the selection letter for AP Installation Key.
5. Perform the following steps to reformat the AP's configuration memory bank:
   - Press **CTRL-Z** to reach the Reformat menu.
   - Press ! (**SHIFT-1**) to select **FORMAT Memory Bank**.
   - Press **2** to select **Config**.
   - Press upper-case **Y** (**SHIFT-Y**) to confirm the **FORMAT** command.
   - Press **CTRL-Z** to reach the reformat menu and to reformat the AP's configuration memory bank.
6. Copy the installation key back to the configuration memory bank as follows:
   - Press **C** to select Copy file
   - Press **2** to select Config.
   - Press the selection letter for AP Installation Key.
7. Perform the following steps to run the AP firmware:
   - Press **R** to select Run
   - Select the letter for the firmware file that is displayed.

   The following message appears while the AP starts the firmware: Inflating <*firmware file name*>.
8. When the **Express Setup** screen appears, begin reconfiguring the AP using the terminal emulator or an Internet browser.

Resetting the AP (for Boot-Block Versions 11.07 and Higher)

Follow these steps to reset your AP if the boot-block version on your AP is greater than 11.07:

1. If you have not done so already, connect to the AP (see above), select **OK**, and press **Enter**.
2. When the **Summary Status** screen appears after you have connected to the AP, reboot the AP by unplugging and then re-plugging the power connector.
3. When the AP reboots and the **Summary Status** screen reappears, type **:resetall** and press **Enter**.
4. Type **yes**, and press **Enter** to confirm the command.

NOTE: The :resetall command is valid for only two minutes after the AP reboots. If you do not enter and confirm the:resetall command during that two minutes, reboot the AP again.

5. After the AP reboots and the **Express Setup** screen appears, reconfigure the AP by using the terminal emulator or an Internet browser.

Cisco IOS Dual Radio Template

A dual-radio Cisco IOS AP template is included as reference.

```
! Template created from Cisco Aironet 1240 IOS 12.3(11)JA1 'newName'
!  at 2/12/2007 10:14 AM by user 'admin'
<ignore_and_do_not_push>ntp clock-period</ignore_and_do_not_push>

version 12.3
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
hostname %hostname%
enable secret 5 $1$ceH2$/1BN2DQpOoBAz/KI2opH7/
ip subnet-zero
ip domain name example.com
ip name-server 10.2.24.13
no aaa new-model
dot11 ssid OpenSSID
   authentication open
power inline negotiation prestandard source
username newpassword password 7 05050318314D5D1A0E0A0516
username Cisco password 7 01300F175804
bridge irb
interface Dot11Radio0
 %enabled%
 no ip address
 no ip route-cache
 ssid OpenSSID
 speed basic-1.0 basic-2.0 basic-5.5 6.0 9.0 basic-11.0 12.0 18.0 24.0 36.0 48.0 54.0
 channel %channel%
 station-role root
 bridge-group 1
 bridge-group 1 subscriber-loop-control
 bridge-group 1 block-unknown-source
 no bridge-group 1 source-learning
 no bridge-group 1 unicast-flooding
 bridge-group 1 spanning-disabled
%if interface=Dot11Radio1%
interface Dot11Radio1
 no ip address
 no ip route-cache
 %enabled%
 ssid OpenSSID
 dfs band 3 block
 speed basic-6.0 9.0 basic-12.0 18.0 basic-24.0 36.0 48.0 54.0
 channel %channel%
 station-role root
 bridge-group 1
```

```
 bridge-group 1 subscriber-loop-control
 bridge-group 1 block-unknown-source
 no bridge-group 1 source-learning
 no bridge-group 1 unicast-flooding
 bridge-group 1 spanning-disabled
%endif%
interface FastEthernet0
 no ip address
 no ip route-cache
 duplex auto
 speed auto
 bridge-group 1
 no bridge-group 1 source-learning
 bridge-group 1 spanning-disabled
interface BVI1
%if ip=dhcp%
 ip address dhcp client-id FastEthernet0
%endif%
%if ip=static%
 ip address %ip_address% %netmask%
%endif%
 no ip route-cache
%if ip=static%
ip default-gateway %gateway%
%endif%
ip http server
no ip http secure-server
ip http help-path http://www.cisco.com/warp/public/779/smbiz/prodconfig/help/eag
access-list 111 permit tcp any any neq telnet
snmp-server view iso iso included
snmp-server community public view iso RW
control-plane
bridge 1 route ip
line con 0
line vty 0 4
 login local
end
```

Speed Issues Related to Cisco IOS Firmware Upgrades

AWMS provides a very robust method of upgrading firmware on APs. To ensure that firmware is upgraded correctly, AWMS adds a few additional steps which are not included in vendor-supplied management software.

AWMS Firmware Upgrade Process

1. AWMS reads the firmware version on the AP to ensure the firmware to which the AP is upgrading is greater than the actual firmware version currently running on the AP.
2. AWMS configures the AP to initiate the firmware download from AWMS.
3. AWMS monitors itself and the AP during the file transfer.
4. After a reboot is detected, AWMS verifies the firmware was applied correctly and all AP configuration settings match those in the AWMS database
5. AWMS pushes the configuration if necessary to restore the desired configuration. Some firmware upgrades reconfigure settings.

Cisco IOS access points take longer than most access points because their firmware is larger.

Appendix D

Initiating a Support Connection

The Support Connection Manager establishes a secure point-to-point connection between the customer AWMS and Dell's support organization. Using this secure connection, Dell support engineers can remotely diagnose problems or upgrade software without breaching security and exposing AWMS to the Internet.

This appendix includes the following sections:

- "Network Requirements" on page 265
- "Procedure" on page 265

Network Requirements

The AWMS Support Connection initiates a TCP connection on port 23 to AirWave's support server. Please ensure your firewall allows this. The connection can be configured to run on 22, 80, 443 and a few other ports if necessary. Please contact Dell support if you need to make any changes.

CAUTION: Initiating the support connection will create a point to point tunnel between AWMS and a support server at Dell.

Procedure

Perform these steps to initiate a support connection for AWMS:

1. Sign into the serial or regular console with your root login.
2. Type **service support_connection start** at the command line interface.
3. Type **service support_connection status** to verify that the connection is running properly.
4. To end the connection to support, type **service support_connection stop** at the command line interface.

If you have any questions, please contact Dell support.

Appendix E

Cisco Clean Access Integration (Perfigo)

This appendix includes the following sections:

- "Prerequisites for Integrating AWMS with Cisco Clean Access" on page 267
- "Adding AWMS as RADIUS Accounting Server" on page 267
- "Configuring Data in Accounting Packets" on page 267

Prerequisites for Integrating AWMS with Cisco Clean Access

- Run Clean Access Software 3.5 or higher
- Run AWMS version 3.4.0 or higher
- Complete the **AMP Setup > RADIUS Accounting** section on AMP.

Adding AWMS as RADIUS Accounting Server

Perform these steps to configure Cisco Clean Access integration:

1. Log in to the clean machine server and navigate to the **User Management > Accounting > Server Config** page.
   - Select **Enable RADIUS Accounting**.
   - Input the **AWMS Hostname** or **IP Address**.
   - For Timeout (sec) - leave default **30**.
   - Ensure the Server Port is set for **1813**.
   - Ensure that the input Shared Secret matches the AWMS shared secret.
2. Select **Update** to save.

Configuring Data in Accounting Packets

1. Navigate to **User Management > Accounting > Shared Events**.
2. Map the following attributes to corresponding data elements:

```
Framed_IP_Address = "User IP"
User_Name = "LocalUser"
Calling_Station_ID = "User MAC"
```

NOTE: These attribute element pairs are mandatory for username display within AWMS.

Appendix F

HP Insight Install Instructions for AWMS Servers

To install HP/Compaq Insight Manager on the AWMS, perform the following steps:

1. Use SCP to move the two files over to the server:

- `hpasm-7.8.0-88.rhel4.i386.rpm` <- The actual HP agents
- `hpsmh-2.1.9-178.linux.i386.rpm` <- The HP web portal to the agents

2. Enter **`rpm -i hpasm-7.8.0-88.rhel4.i386.rpm`** at the command line interface.
3. Enter **`hpasm activate`**.

   Take the default values. You will need the SNMP RW and RO strings at this point.
4. Enter **`rpm -i --nopre hpsmh-2.1.9-178.linux.i386.rpm`** at the command line interface. The **`nopre`** syntax component is required to keep the RPM from producing errors on CentOS, as opposed to Red Hat. This rpm *must* be run after the hpasm RPM because the pre-install scripts in the hpsmh RPM are not being run.
5. Enter **`perl /usr/local/hp/hpSMHSetup.pl`**.

   This configures the web server.

   Configure the **Add Group > Administrator** page with a name '**`0`**'.

   Enable IP Binding—type **`1`**.

   At the next interface, enter the IP address and mask of the server.
6. Enter **`/etc/init.d/hpasm reconfigure`**.

   When going through this menu this time, select '**`y`**' to use the existing snmpd.conf.
7. Enter **`vi /etc/snmp/snmpd.conf`**.

   Change the following two lines:

   ```
   rwcommunity xxxstringxxx 127.0.0.1
   rocommunity xxxstringxxx 127.0.0.1
   ```

   Change these lines to read as follows:

   ```
   rwcommunity xxxstringxxx
   rwcommunity xxxstringxxx
   ```
8. Enter **`service snmpd restart`**.
9. Enter **`user add xxusernamexx`**.
10. Enter **`passwd xxusernamexx`** and enter a password for the user.
11. Enter **`vi /etc/passwd`**.

    Scroll to the bottom of the list and change the new users UID and GroupID to **`0`** (fourth and fifth column).
12. Connect to the server using `https://xxx.xxx.xxx.xxx:2381` and the username and password that you created in steps 9 and 10.

Appendix G

Installing AWMS on VMware ESX (3i v. 3.5)

This appendix provides complete instructions for installing AWMS on VMware ESX (3i v. 3.5) and includes the following sections:

- "Creating a New Virtual Machine to Run AWMS" on page 271
- "Installing AWMS on the Virtual Machine" on page 271
- "AWMS Post-Installation Issues on VMware" on page 272

Creating a New Virtual Machine to Run AWMS

1. Select **Create a new virtual machine** from the VMware Infrastructure Client.
2. Select **Next** to select a **Typical > Virtual Machine Configuration**.
3. Name your virtual machine (AirWave Management Platform) and then click **Next**.
4. Select an available datastore with sufficient space for the number of APs your AWMS will manage, choosing the right server hardware to comply with the hardware requirements in this document. Select **Next**.
5. Select the **Linux** radio button and select **Red Hat Enterprise Linux 5 (32-bit)** from the drop-down menu, then click **Next**.
6. Select a minimum of two virtual processors, then click **Next**.
7. Enter **3072** as the minimum virtual RAM (more virtual RAM may be required; refer to the section "Choosing the Right Server Hardware" for a table listing RAM requirements for AWMS). Select **Next**.
8. Accept the VMware default virtual network adapter and click **Next**.
9. Allocate a virtual disk large enough to contain the AWMS operating system, application and data files (refer to the *AWMS Best Practices Guide* in **Home > Documentation** for suggested disk space allocations for typical wireless network deployments).
10. Select **Next**.
11. Review the virtual machine settings, then click **Finish** when done.

Installing AWMS on the Virtual Machine

Running AWMS installation on a VMware virtual machine is typically done in one of three ways:

1. By writing an AWMS ISO to CD, inserting the CD into a physical drive on a VMware server, then configure the AWMS virtual machine to boot from the CD.
2. By copying the AWMS ISO to the VMware server's datastore, or to a networked filesystem available to the VMware server, then configure the AWMS virtual machine to boot from the ISO file.
3. By using either a local physical CD or an AWMS ISO file from the VMware Infrastructure Client, then create a virtual CD on the virtual AWMS to point to and boot from that device.

Overall, the second option is likely the most efficient method to install AWMS. In addition, after booting the AWMS virtual machine with either a physical CD or a ISO image file, the installation process with this method is identical to the steps outlined in the *AirWave Wireless Management Suite Quick Start Guide* in **Home > Documentation**.

AWMS Post-Installation Issues on VMware

By default, AWMS runs the Linux 'smartd' service for detecting physical disk errors using the S.M.A.R.T. protocol. However, virtual disks do not support the S.M.A.R.T. protocol, so the AWMS smartd service will fail at startup.

The service can be prevented from starting at boot by running the following commands at the AWMS command line. Note that the first command prevents the service from starting, the last two commands remove the smartd service from the list of services to shutdown during a reboot or a complete system shutdown.

```
mv /etc/rc.d/rc3.d/S40smartd /etc/rc.d/rc3.d/Z40smartd
mv /etc/rc.d/rc0.d/K40smartd /etc/rc.d/rc3.d/Z40smartd
mv /etc/rc.d/rc6.d/K40smartd /etc/rc.d/rc3.d/Z40smartd
```

To install VMware Tools on AWMS, perform these steps:

1. From the VMware Infrastructure Client, select **Inventory > Virtual Machine > Install/Upgrade VMware Tools**.
2. At the AWMS console type **mkdir /media/cdrom.**
3. Then type **mount /dev/cdrom /media/cdrom**.
4. Next, type **cd /tmp/; tar -xvzf /media/cdrom/VMwareTools-3.5.0-67921.tar.gz\.**

The VMware Tools filename may be different, depending on the version of VMware installed.

NOTE: Desktop environments such as X Windows, GNOME, and KDE, that you will need to use for VMware tools installation will no longer work once you have AWMS installed.

5. Run the VMware Tools setup and install script by typing the following statement: **/tmp/vmware-toolsdistrib/vmware-install.pl.**
6. During the text-based VMware Tools install, select all default options.
7. Reboot the virtual machine once the VMware Tools install is complete.

Appendix H

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mod_auth_tacacs - TACACS+ authentication module:

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