Dell PowerConnect W AirWave 7.2

Best Practices Guide

Contents

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

Document Organization

This best practices guide includes instructions and examples of optimal ways to use and integrate AirWave Wireless Management Suite (AWMS) with Dell PowerConnect W devices and infrastructure.

Table 1 *Document Organization and Purposes*

Chapter	Description
Chapter 1, "Overview" on page 5	This chapter explains the minimum requirements, prerequisites, topology of a Dell PowerConnect W infrastructure integrated with AWMS.
Chapter 2, "Configuring AWMS for Global Dell PowerConnect W Infrastructure" on page 9	This chapter explains global configuration options in AWMS.
Chapter 3, "Configuring a Dell PowerConnect W Group in AWMS" on page 13	This chapter explains how to create and monitor a Dell PowerConnect W group in AWMS.
Chapter 4, "Discovering Dell PowerConnect W Infrastructure" on page 15	This chapter explains how to discover and manage your Dell PowerConnect W infrastructure.
Chapter 5, "AWMS and Dell PowerConnect W Integration Strategies" on page 19	This chapter highlights recommended integration strategies.
Chapter 6, "Dell-Specific Capabilities in AWMS" on page 29	This chapter highlights AWMS capabilities that are specific to Dell PowerConnect W devices.
Appendix A, "Dell PowerConnect ArubaOS & AWMS Commands" on page 35	This appendix explains command line interface (CLI) commands.
Appendix B, "How AWMS Acquires Data from Dell PowerConnect W Devices" on page 39	This appendix provides a table that explains how AWMS acquires data from Dell PowerConnect W devices.
Appendix C, "WMS Offload Details" on page 41	This appendix explains WMS Offload in further detail.
Appendix D, "Increasing Location Accuracy" on page 43	This appendix explains ways to increase location accuracy in AWMS.

Note, Caution and Warning Icons

This document uses the following 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*

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

Chapter 1

Overview

This document provides best practices for leveraging the AirWave Wireless Management Suite (AWMS) to monitor and manage your Dell PowerConnect W infrastructure. Dell PowerConnect W wireless infrastructure provides a wealth of functionality such as firewall, VPN, remote AP, IDS, IPS, and ARM, as well as an abundance of statistical information.

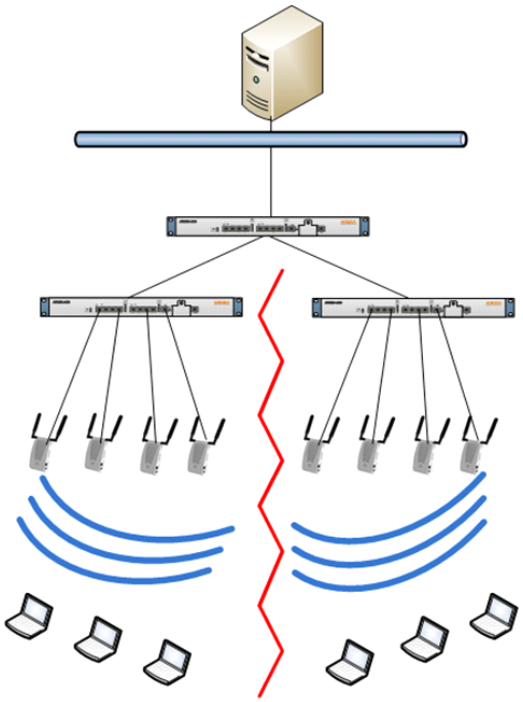
Follow the simple guidelines in this document to garner the full benefit of Dell PowerConnect W's infrastructure.

This overview chapter contains the following topics:

Understanding Dell PowerConnect W Topology

Figure 1 is a typical Master-Local deployment:

Figure 1 *Typical Dell PowerConnect W Deployment*



Component	Without AWMS	With AWMS
AWMS		AWMS communicates directly with local and master controllers to gather and correlate statistics
Master Controller	Correlates all state information from all downstream access points	Functions as a local controller
Local Controllers	Collect downstream AP statistical information	Collect downstream AP statistical and state information
Thin APs	Send all state information to the Master Controller	Send all state information to Local Controller

NOTE: There should never be a Local controller managed by an AWMS server whose Master controller is also not under management.

Prerequisites for Integrating Dell PowerConnect W Infrastructure

You will need the following information to monitor and manage your Dell infrastructure:

- SNMP community string (monitoring & discovery)
- Telnet/SSH credentials (configuration only)
- "enable" password (configuration only)

NOTE: Without proper Telnet/SSH credentials AWMS will not be able to acquire license and serial information from controllers.

- SNMPv3 credentials are required for WMS Offload.
  - Username
  - Auth password
  - Privacy password
  - Auth protocol

Feature Implementation Schedule

The following table describes the feature implementation schedule for AWMS:

Table 3 *Dell PowerConnect W Feature Implementation Schedule for AWMS*

Feature	AWMS Implementation
Ability filter User Session by Dell PowerConnect ArubaOS roles	7.0
Dell PowerConnect ArubaOS 5.0 support	7.0
RAP white list management for RN 3.1	7.0
Added support for rogue containment	7.0
Added support for configuring controller specific overrides	7.0
Client dot11counter status	7.0
Added support for AP-92 and AP-93	7.1
Ability to use controller WIPS classification within RAPIDS	7.1
Use controller classification/confidence level within a RAPIDS rule	7.1
Dell PowerConnect ArubaOS provides Ad-Hoc rogues and encryption type	7.1
Channel Utilization	7.1
AP dot11counter statistics	7.1
Support for SNMPv3 informs	7.1
Track BW on wired users connected to RAPs	7.1
Ability to configure SNMP local configuration	7.1
Ability to track ARM power and channel changes	7.2
Ability to track Noise Floor	7.2
Ability to track Interfering Devices	7.2
Ability to store and display ARM logs	7.2

Table 3 *Dell PowerConnect W Feature Implementation Schedule for AWMS (Continued)*

Feature	AWMS Implementation
Ability to track user associations and roaming via SNMP traps	7.2
Ability to pull Channel Summary CLI statistics from controller	7.2

Chapter 2

Configuring AWMS for Global Dell PowerConnect W Infrastructure

This chapter explains how to optimally configure AWMS to globally manage your Dell PowerConnect W infrastructure, and contains the following topics:

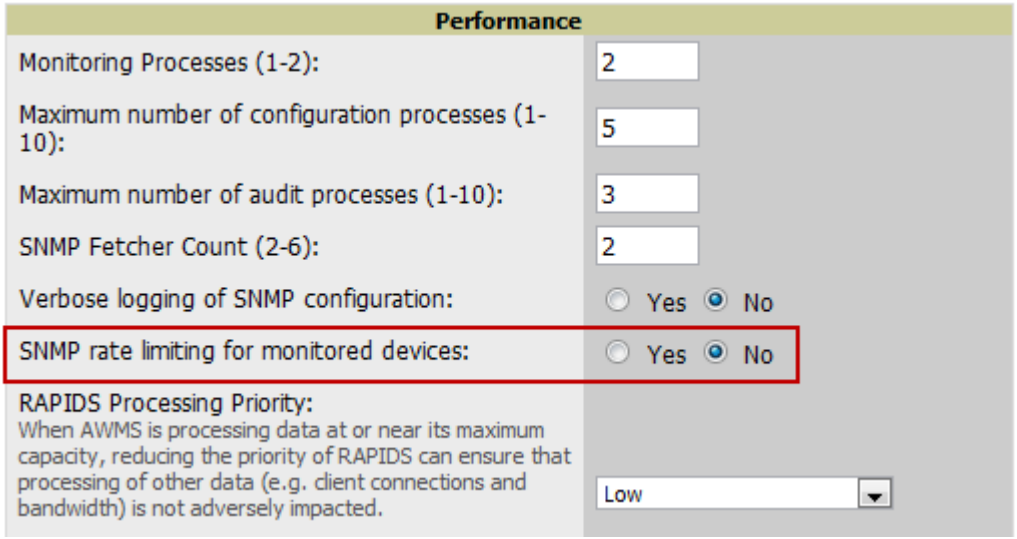
Disabling Rate Limiting in AMP Setup > General

Enabling the SNMP Rate Limiting for Monitored Devices option above adds a small delay between each SNMP Get request, thus the actual polling intervals will be longer than what is configured. For example, setting a 10-minute polling interval will result in an actual 12-minute polling interval.

To disable rate limiting in AWMS, follow these steps:

1. Navigate to **AMP Setup > General**.
2. Locate the **Performance** section on this page.
3. In the **SNMP Rate Limiting for Monitored Devices** field, select **No**, as shown in Figure 2.
4. Select **Save**.

Figure 2 *SNMP Rate Limiting in AMP Setup > General*



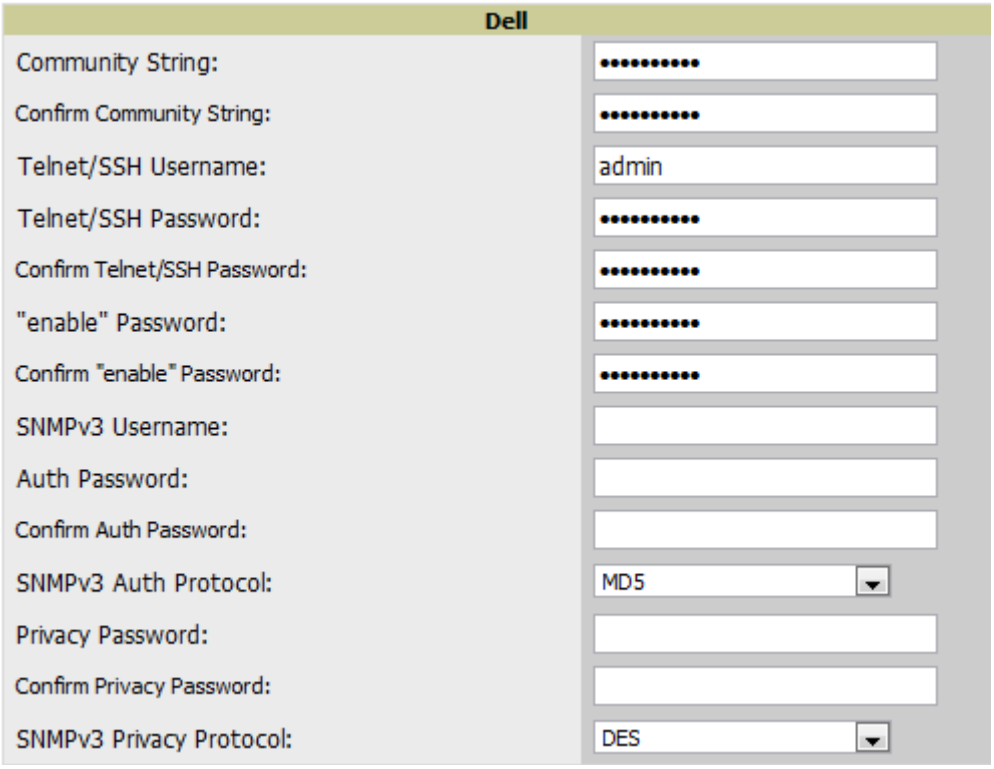
Entering Credentials in Device Setup > Communication

AWMS requires several credentials to properly interface with Dell PowerConnect W infrastructure. The device discovery process requires proper global credential configuration. To enter these credentials, follow these steps:

1. Navigate to **Device Setup >Communication**.
2. In the **Default Credentials** section, select the **Edit** link next to Dell PowerConnect W. The page illustrated in Figure 3 appears.
3. Enter the **SNMP Community String**, which is required field for device discovery.

NOTE: Be sure to note the community string, because it must match the SNMP Trap community string which is configured later in this document.

Figure 3 *Dell Credentials in Device Setup > Communication*



4. Enter the required fields for configuration and basic monitoring:
   - Telnet/SSH Username
   - Telnet/SSH Password
   - "enable" Password
5. Enter the required fields for WMS Offload:
   - SNMPv3 Username
   - Auth Password
   - Privacy Password

NOTE: Auth and Privacy passwords must match because the WMS Offload command only accepts a single password that is leveraged for both options.

6. When finished, select **Save**.

Setting Up Time Synchronization

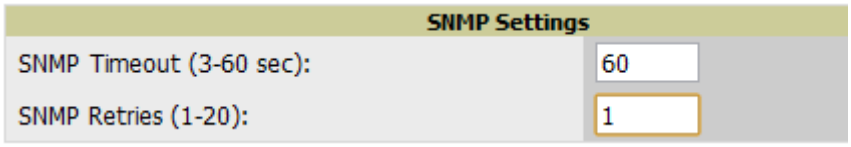
CAUTION: If you are using SNMPv3 and the controller's date/time is incorrect, the SNMP agent will not respond to SNMP requests from AWMS SNMP manager. This will result in the controller and all of its downstream access points showing down in AWMS.

Leveraging NTP for your Dell PowerConnect W infrastructure and your AWMS server is recommended to ensure time synchronization.

To set recommended timeout and retries settings, follow these steps:

1. In the **Device Setup > Communication** page, locate the **SNMP Setting** section.
2. Change **SNMP Timeout** setting to **60**.
3. Change **SNMP Retries** to **1**.

Figure 4 *Time sync settings in Device Setup > Communication*



4. Select **Save**.

Enabling Support for Channel Utilization & Statistics

In order to enable support for channel utilization statistics, you must have the following:

- AWMS 7.2 or greater
- Dell PowerConnect ArubaOS 6.0.1 or greater

NOTE: Dell PowerConnect ArubaOS 6.0.1 can report RF utilization metrics, while Dell PowerConnect ArubaOS 6.1 is necessary to also obtain classified interferer information.

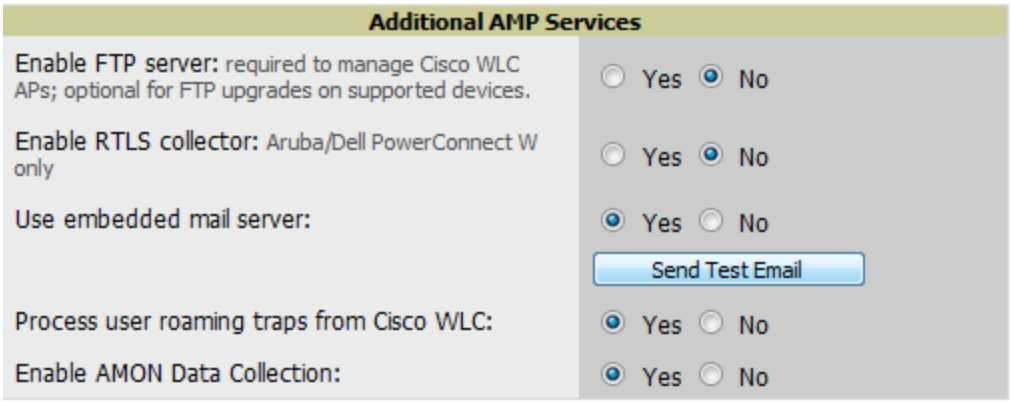
- Access points - Dell PowerConnect W-AP105, W-AP92, W-AP93, W-AP125, or W- AP124
- Controllers - Dell PowerConnect W 6xx, 3xxx, and 6000 Controller Series

AWMS Setup

Follow these steps in AWMS:

1. Navigate to **AMP Setup > General.**
2. In the **Additional AMP Services** section, set **Enable AMON Data Collection** to **Yes**, as shown in Figure 5:

Figure 5 *AMON Data Collection setting in AMP Setup > General*



3. Select **Save**.

Controller Setup (Master & Local)

CAUTION: Enabling these commands on Dell PowerConnect ArubaOS versions prior to 6.0.1 can result in performance issues on the controller. If you are running previous firmware versions such as Dell PowerConnect ArubaOS 6.0.0.0, you should upgrade to Dell PowerConnect ArubaOS 6.0.1 (to obtain RF utilization metrics) or 6.1 (to obtain RF utilization and classified interferer information) before you enter this command.

SSH into the controller, enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z
(Controller-Name) (config) # mgmt-server type amp primary-server <AMP IP>
(Controller-Name) (config) # write mem
```

Chapter 3

Configuring a Dell PowerConnect W Group in AWMS

It is prudent to establish a Dell PowerConnect W Group within AWMS. During the discovery process you will move new discovered controllers into this group.

This chapter contains the following topics:

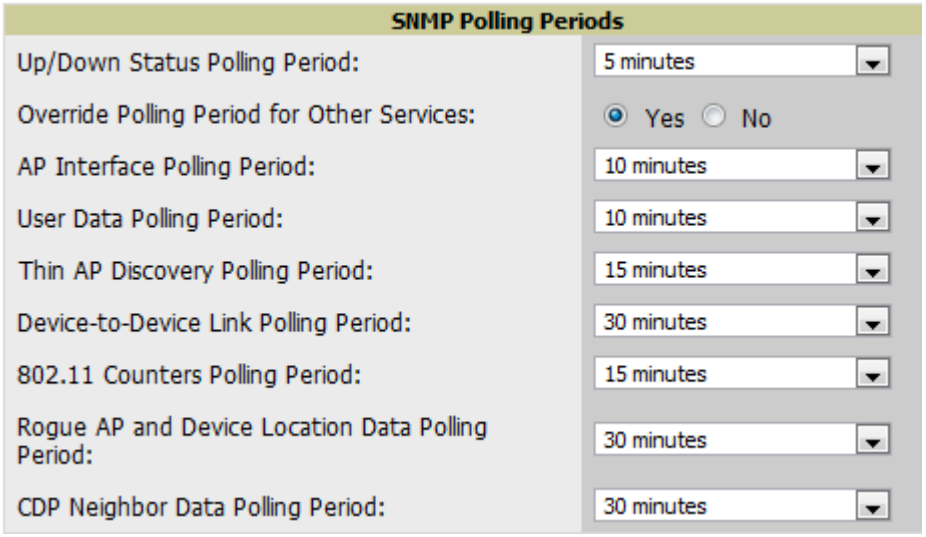
Basic Monitoring Configuration

1. Navigate to **Groups > List.**
2. Select **Add**.
3. Enter a **Name** that represents the Dell PowerConnect W infrastructure from a security, geographical, or departmental perspective and select **Add**.
4. You will be redirected to the **Groups > Basic** page for the Group you just created. On this page you will need to tweak a few Dell PowerConnect W-specific settings.
5. Find the **SNMP Polling Periods** section of the page.
6. Change **Override Polling Period for Other Services** to **Yes.**
7. Ensure **User Data Polling Period** is set to 10 minutes. Do not configure this interval lower than 5 minutes.

NOTE: Enabling the SNMP Rate Limiting for Monitored Devices option in the previous chapter adds a small delay between each SNMP Get request, thus the actual polling interval is 12 minutes for 10 minute polling interval.

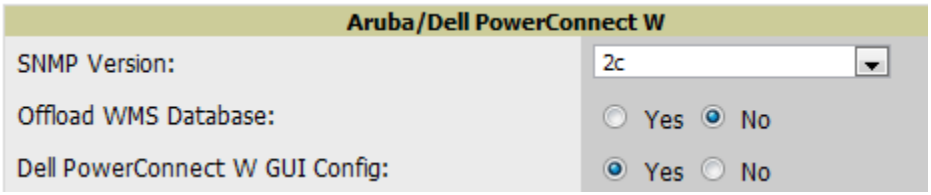
8. Change **Device-to-Device Link Polling Period** to **30 minutes.**
9. Change **Rogue AP and Device Location Data Polling Period** to **30 minutes.**

Figure 6 *SNMP Polling Periods section of Groups > Basic*



10. Find the **Aruba/Dell PowerConnect W** section of this page.
11. Configure the proper **SNMP Version** for monitoring the Dell PowerConnect W infrastructure.

Figure 7 *Group SNMP Version for Monitoring*



12. Select **Save and Apply**.

Advanced Configuration

Refer to the *Dell PowerConnect W Configuration Guide* located in support.dell.com/manuals for detailed instructions.

Chapter 4

Discovering Dell PowerConnect W Infrastructure

This chapter guides you through the process of discovering and managing your Dell PowerConnect W infrastructure.

AWMS utilizes Dell PowerConnect W's topology to efficiently discover downstream infrastructure.

Refer to the following earlier chapters in this book before attempting discovery:

- Chapter 2, “Configuring AWMS for Global Dell PowerConnect W Infrastructure” on page 9
- Chapter 3, “Configuring a Dell PowerConnect W Group in AWMS” on page 13

The following topics in this chapter walk through the procedure for discovering and managing Dell PowerConnect W Infrastructure:

- “Discovering Master Controllers” on page 15
- “Local Controller Discovery” on page 17
- “Thin AP Discovery” on page 17

NOTE: Always add one Controller and its affiliated Thin APs into management or monitoring mode in a serial fashion, one at a time. Adding new devices is a very CPU intensive process for AWMS and can quickly overwhelm all of the processing power of the server if hundreds of Thin APs are added (migrated from New to Managed or Monitoring) simultaneously.

Discovering Master Controllers

Scan networks containing Dell PowerConnect W Master controllers from **Device Setup > Discover.** This will use your Global Credentials configured in the previous section.

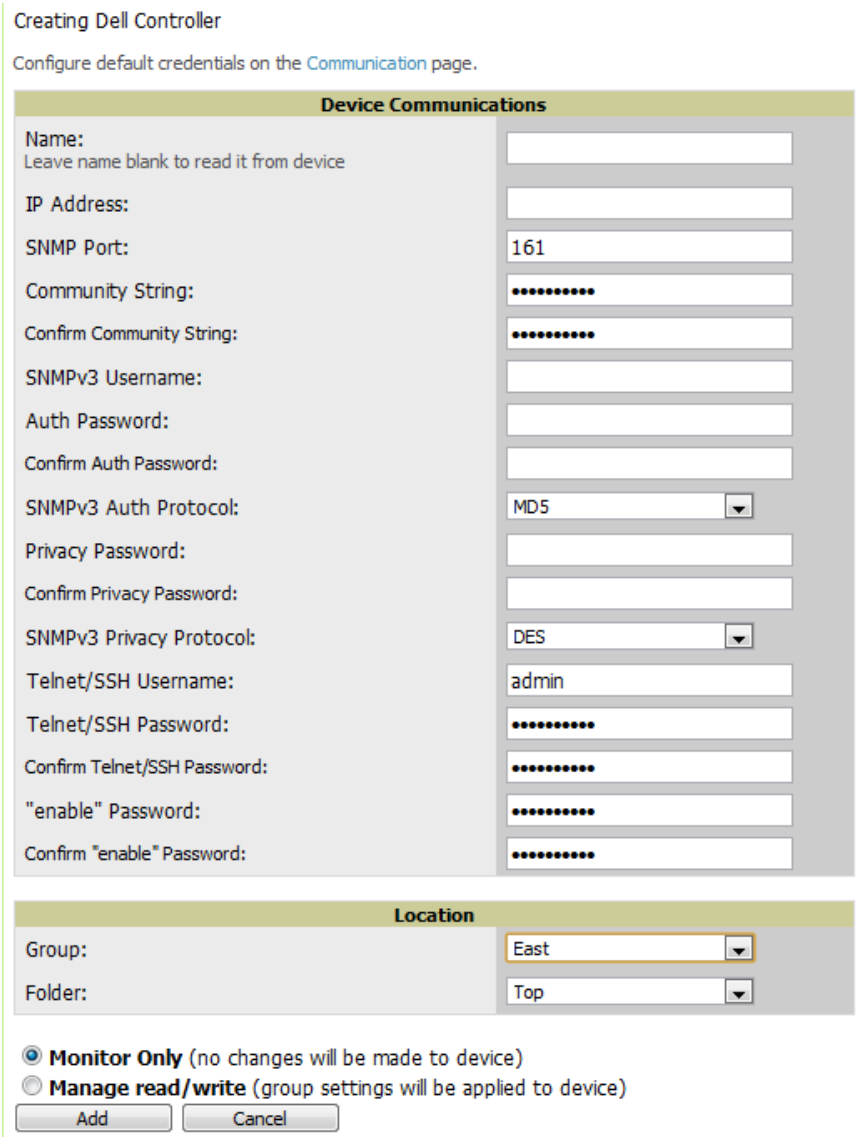
- or -

Manually enter the Master controller by following these steps in the **Device Setup > Add** page:

1. Select the **Dell Controller** type and select **Add**. The page illustrated on Figure 8 appears.
2. Enter the **Name** and the **IP Address** for the controller.
3. Enter **SNMP Community String**, which is required field for device discovery.

NOTE: Be sure to note the community string, because it must match the SNMP Trap community string which is configured later in this document.

Figure 8 *Dell Credentials in Device Setup > Add*



4. Enter the required fields for configuration and basic monitoring:
   - Telnet/SSH Username
   - Telnet/SSH password
   - "enable" password
5. Enter the required fields for WMS Offload
   - SNMPv3 Username
   - Auth Password
   - Privacy Password

NOTE: Auth and Privacy passwords must match because the WMS Offload command only accepts a single password that is leveraged for both options.

CAUTION: If you are using SNMPv3 and the controller's date/time is incorrect, the SNMP agent will not respond to SNMP requests from AWMS SNMP manager. This will result in the controller and all of its downstream access points showing as Down in AWMS.

6. Assign controller to a Group & Folder.
7. Ensure **Monitor Only** option is selected
8. Select **Add**
9. Navigate to **APs/Devices > New** page.
10. Select the Dell PowerConnect W Master controller you just added from the list of new devices.
11. Ensure **Monitor Only** option is selected.
12. Select **Add**.

Local Controller Discovery

Local controllers are discovered via the Master controller. After waiting for the Thin AP Polling Period interval or executing a Poll Now command from the **APs/Devices > Monitoring** page, the Local controllers will appear on the **APs/Devices > New** page.

Add the Local controller to Group defined previously. Within AWMS, Local controllers can be split away from the Master controller's Group.

Thin AP Discovery

Thin APs are discovered via the Local controller. After waiting for the Thin AP Polling Period or executing a Poll Now command from the **APs/Devices > Monitoring** page, thin APs will appear on the **APs/Devices > New** page.

Add the Thin APs to the Group defined previously. Within AMWS, thin APs can be split away from the controller's Group. You can split thin APs into multiple Groups if required.

Chapter 5

AWMS and Dell PowerConnect W Integration Strategies

This chapter describes strategies for integrating AWMS and Dell PowerConnect W and contains the following topics:

Integration Goals

The following table summarizes the types of integration goals and strategies for meeting them in certain architectural contexts:

Table 4 *Integration Goals in All Masters or Master/Local Architectures*

Integration Goals	All Masters Architecture	Master/ Local Architecture
Rogue & Client Info		enable stats
Rogue containment only	ssh access to controllers	ssh access to controllers
Rogue & Client containment	WMS Offload	WMS Offload
Reduce Master Controller Load		WMS Offload debugging off
IDS & Auth Tracking	Define AWMS as trap host	Define AWMS as trap host
Track Tag Location	enable RTLS WMS Offload	enable RTLS WMS Offload

Key integration points to consider include the following:

- IDS Tracking does not require WMS Offload in an All-Master or Master/Local environment
- IDS Tracking does require enable stats in a Master/Local environment
- WMS Offload will hide the Security Summary tab on Master Controller's web interface
- WMS Offload encompasses enable stats or enable stats is a subset of WMS Offload
- Unless you enable stats on the Local Controllers in a Master/Local environment, the Local Controllers do not populate their MIBs with any information about clients or rogue devices discovered/associated with their APs. Instead the information is sent upstream to Master Controller.

Example Use Cases

The following are example use cases of integration strategies:

When to Use Enable Stats

You want to pilot AMWS and doesn't want to make major configuration changes to their infrastructure or manage configuration from AWMS.

NOTE: Enable Stats still pushes a small subset of commands to the controllers via SSH.

See "Enable Stats Utilizing AWMS" on page 21.

When to Use WMS Offload

- You have older Dell PowerConnect W infrastructure in a Master/Local environment and their Master controller is fully taxed. Offloading WMS will increase the capacity of the Master Controller by offloading statistic gathering requirements and device classification coordination to AWMS.
- You want to use AWMS to distribute client and rogue device classification amongst multiple Master Controllers in a Master/Local environment or in an All-Masters environment.
- See the following topics:
  - "WMS Offload Utilizing AWMS" on page 22
  - "Understanding WMS Offload Impact on Dell PowerConnect W Infrastructure" on page 26
  - "WMS Offload Details" on page 41

When to Use RTLS

- A hospital wants to achieve very precise location accuracy (5 -15 feet) for their medical devices which are associating to the WLAN.
- You want to locate items utilizing WiFi Tags.

NOTE: RTLS could negatively impact your AWMS server's performance.

- See "Leveraging RTLS to Increase Accuracy" on page 43.

When to Define AWMS as Trap Host

- You want to track IDS events within the AWMS UI.
- You are in the process of converting their older third-party WLAN devices to Dell PowerConnect W and want a unified IDS dashboard for all WLAN infrastructure.
- You want to relate Auth failures to a client device, AP, Group of APs, and controller. AWMS provides this unique correlation capability.
- See "Define AWMS as Trap Host using Dell PowerConnect ArubaOS CLI" on page 23.

Prerequisites for Integration

If you have not discovered the Dell PowerConnect W infrastructure or configured credentials, refer to the previous chapters of this book:

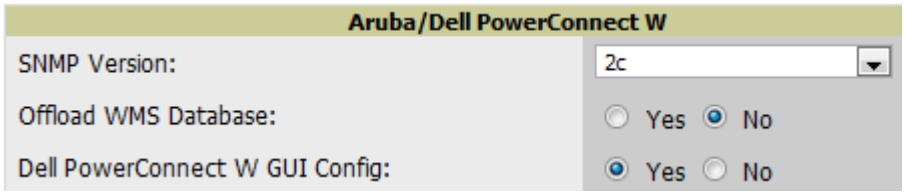
- Chapter 2, “Configuring AWMS for Global Dell PowerConnect W Infrastructure” on page 9
- Chapter 3, “Configuring a Dell PowerConnect W Group in AWMS” on page 13
- Chapter 4, “Discovering Dell PowerConnect W Infrastructure” on page 15

Enable Stats Utilizing AWMS

To enable stats on the Dell PowerConnect W controllers, follow these steps:

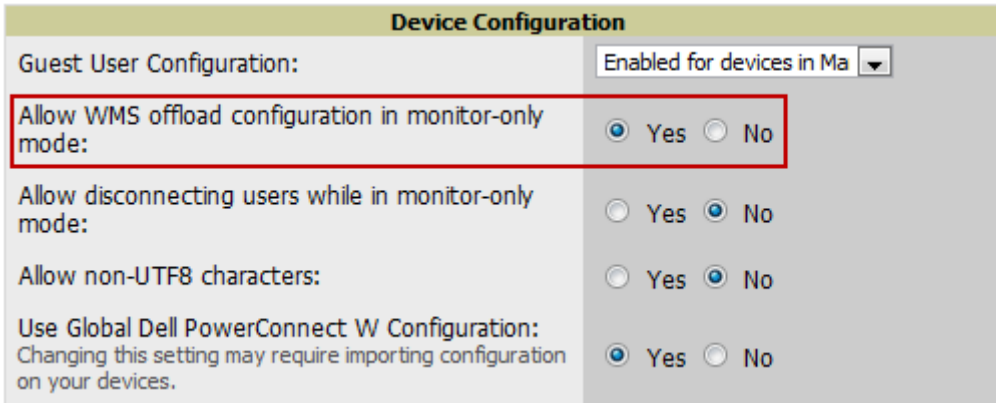
1. Navigate to **Groups > Basic** for the group that contains your Dell controllers.
2. Locate the **Dell PowerConnect W** section.
3. Set the **Offload WMS Database** field to **No,** as shown in Figure 9:

Figure 9 *Offload WMS Database field in Device Setup > Communication*



4. Select **Save and Apply**.
5. Navigate to **AMP Setup > General** and locate the **Device Configuration** section.
6. Set the **Allow WMS Offload Configuration in Monitor-Only Mode** field to **Yes**, as shown in Figure 10:

Figure 10 *WMS Offload Configuration in AMP Setup > General*



7. Select **Save**.

This will push a set of commands via SSH to all Dell PowerConnect W local controllers. AWMS must have read/write access to the controllers in order to push these commands.

NOTE: This process will not reboot your controllers.

CAUTION: If you don't follow the above steps, local controllers will not be configured to populate statistics. This decreases AWMS' capability to trend client signal information and to properly locate devices. See Appendix A, "Dell PowerConnect ArubaOS & AWMS Commands" on page 35 to utilize Dell PowerConnect ArubaOS CLI to enable stats on Dell PowerConnect W infrastructure.

If your credentials are invalid or the changes are not applied to the controller, error messages will display on the controller's **APs/Devices > Monitoring** page under the **Recent Events** section. If the change fails, AWMS does not audit these setting (display mismatches) and you will need to apply to the controller by hand. See Appendix A for detailed instructions.

These are the commands pushed by AWMS during Enable Stats (do not enter these commands):

```
configure terminal
no mobility-manager <Active WMS IP Address>
wms
general collect-stats enable
stats-update-interval 120
show wms general
write mem
```

WMS Offload Utilizing AWMS

To offload WMS on the Dell PowerConnect W controllers using AWMS:

1. Navigate to **Groups > Basic** and locate the Dell PowerConnect W section.
2. Set the **Offload WMS Database** field to **Yes**, as shown previously in Figure 9.
3. Locate the **Device Configuration** section and enable or disable **Allow WMS Offload Configuration in Monitor-Only Mode.**
4. Select **Save and Apply**. This will push a set of commands via SSH to all Dell PowerConnect W Master Controllers. If the controller does not have an SNMPv3 user that matches the AWMS database it will automatically create a new SNMPv3 user. AWMS must have read/write access to the controllers in order to push these commands.

NOTE: This process will not reboot your controllers. See Appendix A on how to utilize Dell PowerConnect ArubaOS CLI to enable stats or WMS Offload.

CAUTION: The SNMPv3 user's Auth Password and Privacy Password must be the same.

Do not enter these commands; these are pushed by AWMS during Enable Stats.

```
configure terminal
mobility-manager <AWMS IP> user <AWMS SNMPv3 User Name> <AWMS Auth/Priv PW>
stats-update-interval 120
write mem
```

NOTE: AWMS will configure SNMPv2 traps with the mobile manager command.

Define AWMS as Trap Host using Dell PowerConnect ArubaOS CLI

To ensure the AWMS server is defined a trap host, SSH into each controller (Master and Local), enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z
(Controller-Name) (config) # snmp-server host <AWMS IP ADDR> version 2c <SNMP
COMMUNITY STRING OF CONTROLLER>
```

NOTE: Ensure the SNMP community matches what was configured in Chapter 2, "CPU, BIOS, Operating Systems, and Storage" on page 7.

```
(Controller-Name) (config) # snmp-server trap source <CONTROLLER'S IP>
(Controller-Name) (config) # write mem
```

CAUTION: Do not configure the SNMP version to v3 because AWMS does not support SNMPv3 traps/informs.

Dell PowerConnect ArubaOS Traps Utilized by AWMS

The following are Auth, IDS, and ARM traps utilized by AWMS:

Auth Traps

- wlsxNUserAuthenticationFailed
- wlsxNAuthServerReqTimedOut

IDS Traps

- wlsxwlsxSignatureMatchAP
- wlsxSignatureMatchSta
- wlsxSignAPNetstumbler
- wlsxSignStaNetstumbler
- wlsxSignAPAsleap
- wlsxSignStaAsleap
- wlsxSignAPAirjack
- wlsxSignStaAirjack
- wlsxSignAPNullProbeResp
- wlsxSignStaNullProbeResp
- wlsxSignAPDeauthBcast
- wlsxSignStaDeauthBcastwlsxChannelFrameErrorRateExceeded
- wlsxChannelFrameFragmentationRateExceeded
- wlsxChannelFrameRetryRateExceeded
- wlsxNIpSpoofingDetected
- wlsxStaImpersonation
- wlsxReservedChannelViolation

- wlsxValidSSIDViolation
- wlsxStaPolicyViolation
- wlsxRepeatWEPIVViolation
- wlsxWeakWEPIVViolation
- wlsxFrameRetryRateExceeded
- wlsxFrameReceiveErrorRateExceeded
- wlsxFrameFragmentationRateExceeded
- wlsxFrameBandWidthRateExceeded
- wlsxFrameLowSpeedRateExceeded
- wlsxFrameNonUnicastRateExceeded
- wlsxChannelRateAnomaly
- wlsxNodeRateAnomalyAP
- wlsxNodeRateAnomalySta
- wlsxEAPRateAnomaly
- wlsxSignalAnomaly
- wlsxSequenceNumberAnomalyAP
- wlsxSequenceNumberAnomalySta
- wlsxApFloodAttack
- wlsxInvalidMacOUIAP
- wlsxInvalidMacOUISta
- wlsxStaRepeatWEPIVViolation
- wlsxStaWeakWEPIVViolation
- wlsxStaAssociatedToUnsecureAP
- wlsxStaUnAssociatedFromUnsecureAP
- wlsxAPImpersonation
- wlsxDisconnectStationAttackAP
- wlsxDisconnectStationAttackSta

ARM Traps

- AP Power Change
- AP Mode Change
- AP Channel Change

Ensuring That IDS & Auth Traps Display in AWMS Using CLI

Validate your Dell PowerConnect ArubaOS configuration by exiting the configure terminal mode and issue the following command:

```
(Controller-Name) # show snmp trap-list
```

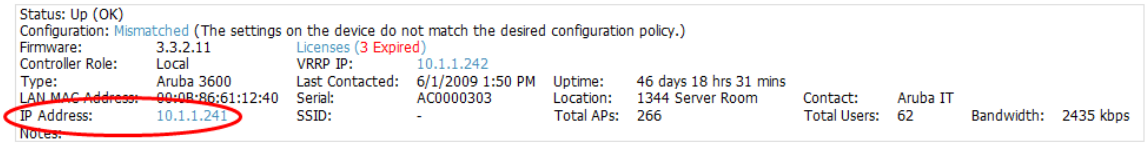
If any of the traps below don't show as enabled, enter **configure terminal** mode and issue the following command:

```
(Controller-Name) (config) # snmp-server trap enable <TRAPS FROM LIST ABOVE>
(Controller-Name) (config) # write mem
```

NOTE: See Appendix A, "Dell PowerConnect ArubaOS & AWMS Commands" on page 35 for the full command that can be copied and pasted directly into the Dell PowerConnect ArubaOS CLI.

Ensure the source IP of the traps match the IP that AWMS utilizes to manage the controller, as shown in Figure 11. Navigate to **APs/Devices > Monitoring** to validate the IP address.

Figure 11 *Verify IP Address on APs/Devices > Monitoring Page*



Verify that there is a SNMPv2 community string that matches the SNMP Trap community string on the controller.

```
(Controller-Name) # show snmp community
SNMP COMMUNITIES
----------------
COMMUNITY ACCESS     VERSION
--------- ------     -------
public    READ_ONLY V1, V2c

(Controller-Name) # #show snmp trap-host

SNMP TRAP HOSTS
---------------
HOST          VERSION    SECURITY NAME PORT   TYPE TIMEOUT RETRY
----          -------    ------------- ----   ---- ------- -----
10.2.32.4     SNMPv2c    public         162    Trap N/A      N/A
```

Verify firewall port **162** (default) is **open** between AWMS and the controller.

Validate traps are making it into AWMS by issuing the following commands from AWMS command line.

```
[root@AWMS ~]# qlog enable snmp_traps

[root@AWMS ~]# tail -f /var/log/amp_diag/snmp_traps

1241627740.392536 handle_trap|2009-05-06 09:35:40 UDP: [10.2.32.65]->[10.51.5.118]:-
32737 sends trap: DISMAN-EVENT-MIB::sysUpTimeInstance = Timeticks: (127227800) 14
days, 17:24:38.00 SNMPv2-MIB::snmpTrapOID.0 = OID: SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.2.1106 SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.60 = Hex-STRING: 07 D9 05 06 09 16 0F 00 2D 08 00
SNMPv2-SMI::enterprises.14823.2.3.1.11.1.1.5.0 = Hex-STRING: 00 1A 1E 6F 82 D0
SNMPv2-SMI::enterprises.14823.2.3.1.11.1.1.6.0 = STRING: aruba-apSNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.1.0 = Hex-STRING: 00 1A 1E C0 2B 32 SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.56.0 = INTEGER: 2    SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.17.0 = STRING: aruba-124-c0:2b:32 SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.18.0 = INTEGER: 11   SNMPv2-
SMI::enterprises.14823.2.3.1.11.1.1.58.0 = STRING: http://10.51.5.118/screens/wmsi/
reports.html?mode=ap&bssid=00:1a:1e:6f:82:d0
```

NOTE: You will see many IDS and Auth Traps from this command. AWMS only processes a small subset of these traps which display within AWMS. The Traps that AWMS does process are listed above.

Ensure you disable qlogging after testing as it could negatively impact AWMS performance if left turned on:

```
[root@AWMS ~]# qlog enable snmp_traps
```

Understanding WMS Offload Impact on Dell PowerConnect W Infrastructure

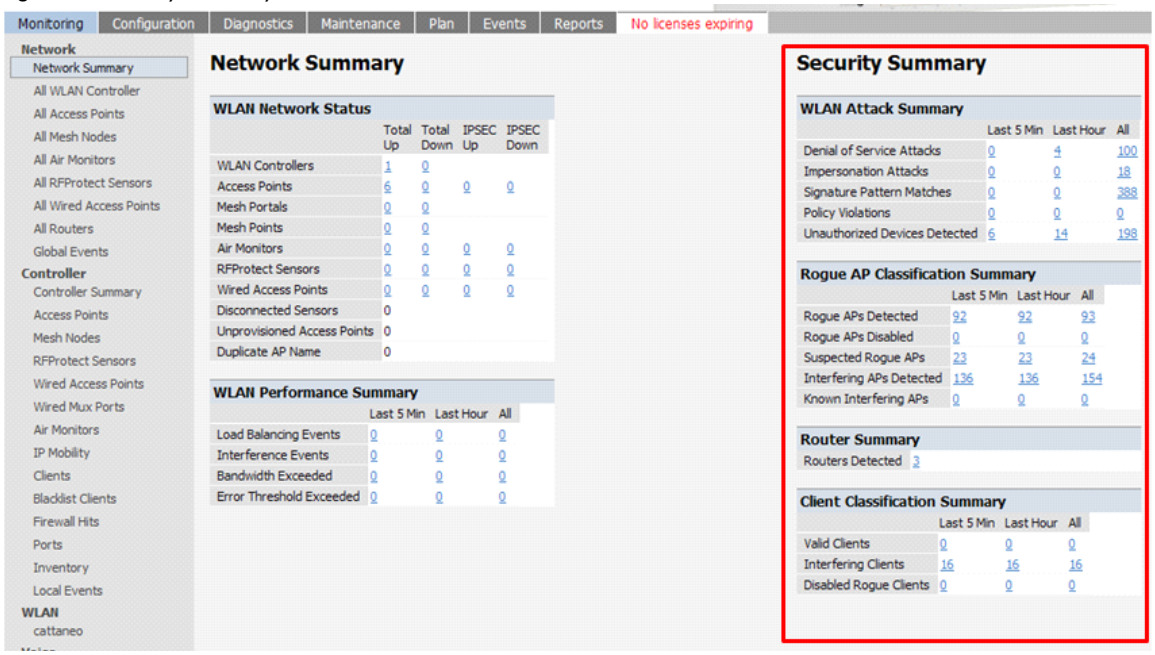
When offloading WMS, it is important to understand what functionality is migrated to AWMS and what functionality is deprecated.

The following tabs and sections are deprecated after offloading WMS:

- **Plan Tab -** where floor plans are stored and heatmaps are generated. Prior to offloading WMS, ensure that you have exported floor plans from the Dell PowerConnect ArubaOS and imported into AWMS. All functionality within the Plan Tab is incorporated with the VisualRF module in AWMS.
- **Report Tab** - All reports are incorporate within AWMS.
- **Events Tab** - the majority of functionality within this Tab is incorporate within AWMS Reports and Alerts sections with the exception of:
  - Interference Detected
  - Rogue AP
  - Station Failed
  - Suspected Rogue AP

The Security Summary (Figure 12) disappears after offloading WMS. The data is still being processed by the Master Controller, but the summary information is not available. AWMS does provide the ability to view some of this information in detail and summary form.

Figure 12 *Security Summary on Master Controller*



WLAN Attack Summary

- DOS Attacks - no summary data available in AWMS

- Impersonation Attacks - no summary data available in AWMS
- Signature Pattern Matches - partial summary data available on Home and RAPIDS > Overview pages
- Policy Violations - no summary data available in AWMS
- Unauthorized Devices Detected - no summary data available in AWMS

Rogue AP Classification Summary

- Rogue APs Detected - summary data available on **RAPIDS > Overview**
- Rogue APs Disabled - no summary data available in AWMS
- Suspected Rogue APs - partial data is available in AWMS on each APs/Devices > Manage page
- Interfering APs Detected - partial data is available in AWMS on each APs/Devices > Manage page
- Known Interfering APs - partial data is available in AWMS on each APs/Devices > Manage page

Router Summary

- Routers Detected - no summary data available in AWMS

Client Classification Summary

- Valid Clients - summary data available on all pages in the dashboard
- Interfering clients - no summary data available in AWMS
- Disabled Clients - no summary data available in AWMS

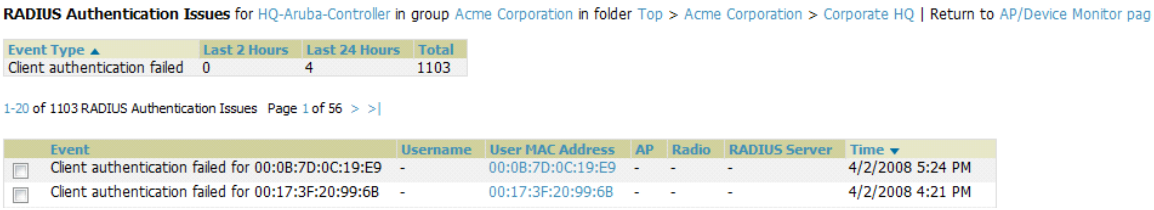
See "Device Classification" on page 32 for more information on security, IDS, WIPS, WIDS, classification, and RAPIDS.

This chapter discusses Dell PowerConnect W-specific capabilities in AWMS, and contains the following topics:

Dell PowerConnect W Traps for RADIUS Auth & IDS Tracking

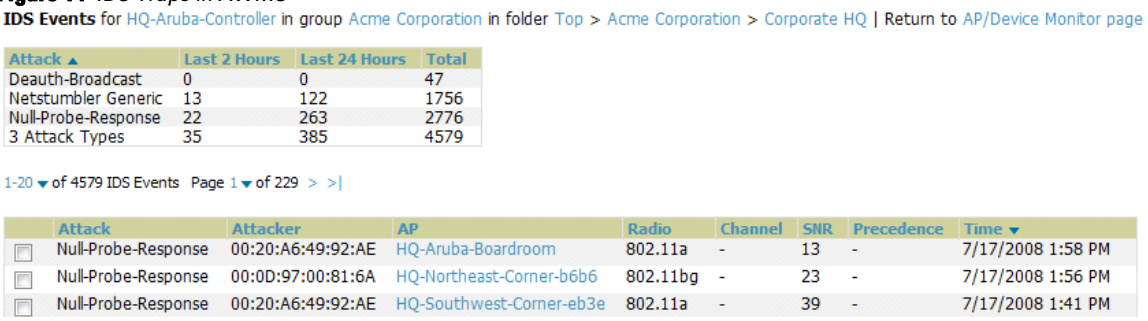
The authentication failure traps are received by the AWMS server and correlated to the proper controller, AP, and user. See Figure 13 showing all authentication failures related to a controller.

Figure 13 *RADIUS Authentication Traps in AWMS*



The IDS traps are received by the AWMS server and correlated to the proper controller, AP, and user. See Figure 14 showing all IDS traps related to a controller.

Figure 14 *IDS Traps in AWMS*

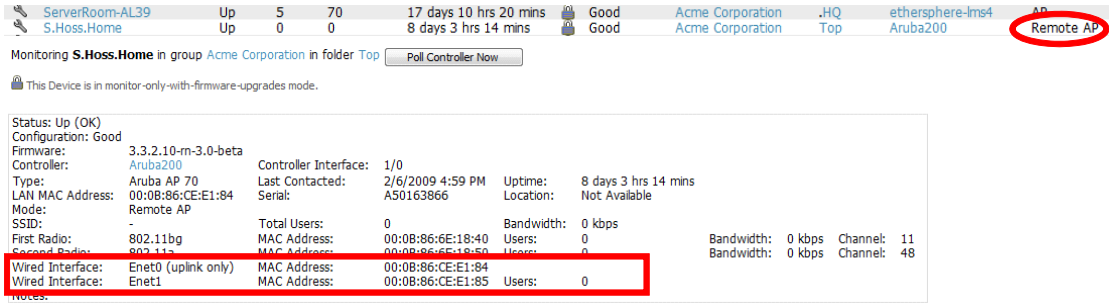


Remote AP & Wired Networking Monitoring

To monitor remote APs and wired devices, follow these steps:

1. From the **APs/Devices > List** page, you can distinguish and sort on the Mode to find Remote devices.
2. To view detailed information on the remote device, select the device name. The page illustrated in Figure 15 appears.

Figure 15 *Remote AP Detail Page*



3. You can also see if there are users plugged into the wired interfaces.

NOTE: This feature is only available when the remote APs are in split tunnel and tunnel modes.

ARM & Channel Utilization Information

ARM statistics & Channel utilization are very powerful tools for diagnosing capacity and other issues in your WLAN.

1. Navigate to a **Monitoring** page for any of the following Dell PowerConnect W models: W-AP105, W-AP92, W-AP93, W-AP124, or W-AP125.
2. Select the **Statistics** link for a radio.

Figure 16 *ARM and Channel Utilization Graphs*

See the *Dell PowerConnect W AirWave 7.2 User Guide* in **Home > Documentation** for more information on the data displayed in the **Radio Statistics** page for these devices.

VisualRF and Channel Utilization

To view how channel utilization is impacting an area within a building, follow these steps:

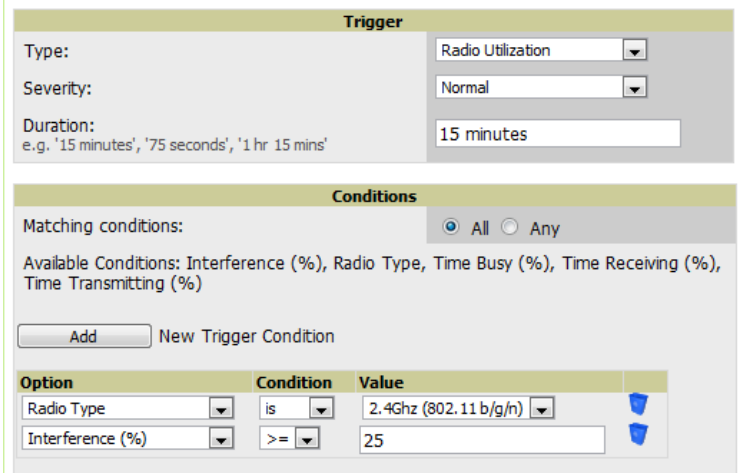
1. Navigate to a floor plan by clicking on the thumbnail on a device's **Monitoring** page or navigating to **VisualRF > Floor Plans** page.
2. Select the **Display** drop-down menu.
3. Select **Channel Utilization** overlay.
4. Select **Current** or **Maximum** (over last 24 hours).
5. Select total (default), receive, transmit, or interference (see Figure 17).

Figure 17 *Channel Utilization in VisualRF (Interference)*

Configuring Radio Utilization Triggers

1. Navigate to **System > Triggers** and select **Add**.
2. Select **Radio Utilization** from the **Type** drop-down menu as seen on Figure 18:

Figure 18 *Radio Utilization Trigger*



3. Enter the duration evaluation period.
4. Select **Add New Trigger Condition**.
5. Create a trigger condition for Radio Type and select the frequency to evaluate.
6. Select total, receive, transmit, or interference trigger condition.
7. Set up any restrictions or notifications (refer to the *Dell PowerConnect W AirWave 7.2 User Guide* in **Home > Documentation** for more details)
8. When finished, select **Add**.

Viewing Radio Utilization Alerts

1. Navigate to **APs/Devices > Monitoring** or **System > Alerts**.
2. Sort the **Trigger Type** column and find **Radio Utilization** alerts.

View Utilization and RF Health Reports

1. Navigate to **Reports > Generated**.
2. Find and select a Device Summary or RF Health report.

Figure 19 *Channel Utilization in an RF Health Report*

Most Utilized by Channel Usage on 2.4 GHz Radio

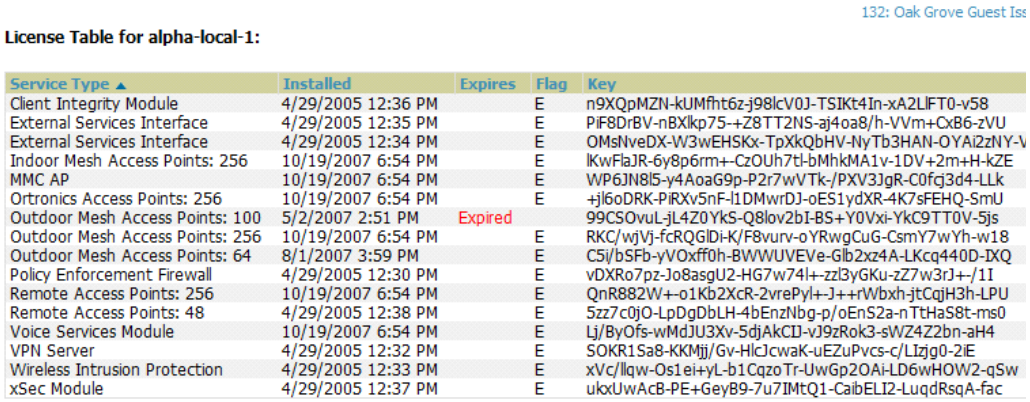
Rank	AP/Device	Channel Usage	Interference	Number of Users	Total Bandwidth (MB)	Location
1	AP92-A1.dev.airwave.com	51.18	18.50	0	0.00	there
2	ap105-A1.dev.airwave.com	48.82	9.45	0	0.00	pit

Viewing Controller License Information

Follow these steps to view your controller's license information in AWMS:

1. Navigate to the **APs/Devices > Detail** page of a controller under AWMS management.
2. Select the **License** link. A pop-up window appears listing all licenses.

Figure 20 *License Popup*



132: Oak Grove Guest Iss

License Table for alpha-local-1:

Service Type ▲	Installed	Expires	Flag	Key
Client Integrity Module	4/29/2005 12:36 PM		E	n9XQpMZN-kUMfht6z-j98lcV0J-TSIKt4In-xA2LlFT0-v58
External Services Interface	4/29/2005 12:35 PM		E	PiF8DrBV-nBXlkp75--+Z8TT2NS-aj4oa8/h-VVm+CxB6-zVU
External Services Interface	4/29/2005 12:34 PM		E	OMsNveDX-W3wEHSKx-TpXkQbHV-NyTb3HAN-OYAi2zNY-V
Indoor Mesh Access Points: 256	10/19/2007 6:54 PM		E	lKwFlaJR-6y8p6rm+-CzOUh7tl-bMhkMA1v-1DV+2m+H-kZE
MMC AP	10/19/2007 6:54 PM		E	WP6JN8l5-y4AoaG9p-P2r7wVTk-/PXV3JgR-C0fcj3d4-LLk
Ortronics Access Points: 256	10/19/2007 6:54 PM		E	+jl6oDRK-PiRXv5nF-l1DMwrDJ-oES1ydXR-4K7sFEHQ-SmU
Outdoor Mesh Access Points: 100	5/2/2007 2:51 PM	Expired		99CSOvuL-jL4Z0YkS-Q8lov2bI-BS+Y0Vxi-YkC9TT0V-5js
Outdoor Mesh Access Points: 256	10/19/2007 6:54 PM		E	RKC/wjVj-fcRQGlDi-K/F8vurv-oYRwgCuG-CsmY7wYh-w18
Outdoor Mesh Access Points: 64	8/1/2007 3:59 PM		E	C5i/bSFb-yVOxff0h-BWWUVEVe-Glb2xz4A-LKcq440D-IXQ
Policy Enforcement Firewall	4/29/2005 12:30 PM		E	vDXRo7pz-Jo8asgU2-HG7w74l+-zzl3yGKu-zZ7w3rJ+-/1I
Remote Access Points: 256	10/19/2007 6:54 PM		E	QnR882W+-o1Kb2XcR-2vrePyl+-J++rWbxh-jtCqjH3h-LPU
Remote Access Points: 48	4/29/2005 12:38 PM		E	5zz7c0jO-LpDgDbLH-4bEnzNbg-p/oEnS2a-nTtHaS8t-ms0
Voice Services Module	10/19/2007 6:54 PM		E	Lj/ByOfs-wMdJU3Xv-5djAkCIJ-vJ9zRok3-sWZ4Z2bn-aH4
VPN Server	4/29/2005 12:32 PM		E	SOKR1Sa8-KKMjj/Gv-HlcJcwaK-uEZuPvcs-c/LIzjg0-2iE
Wireless Intrusion Protection	4/29/2005 12:33 PM		E	xVc/llqw-Os1ei+yL-b1CqzoTr-UwGp2OAi-LD6wHOW2-qSw
xSec Module	4/29/2005 12:37 PM		E	ukxUwAcB-PE+GeyB9-7u7IMtQ1-CaibELI2-LuqdRsqA-fac

Device Classification

Only complete this section if you have completed WMS Offload procedure above. After offloading WMS, AWMS maintains the primary ARM, WIPS, and WIDS state classification for all devices discovered over-the-air.

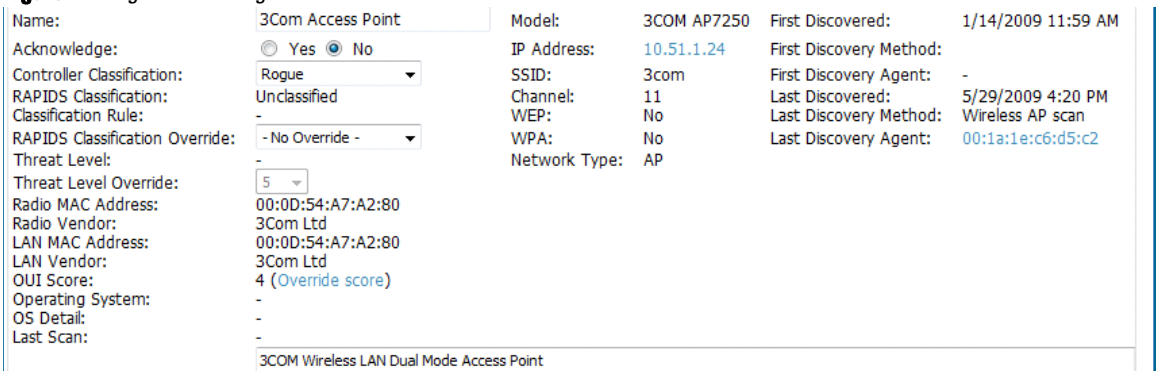
Table 5 *WIPS/WIDS to AWMS Controller Classification Matrix*

AWMS Controller Classification	Dell PowerConnect ArubaOS (WIPS/WIDS)
Unclassified (default state)	Unknown
Valid	Valid
Suspected Neighbor	Interfering
Neighbor	Known Interfering
Suspected Rogue	Suspected Rogue
Rogue	Rogue
Contained Rogue	DOS

To check and reclassify rogue devices, follow these steps:

1. Navigate to the **Rogue > Detail** page for the device, as shown in Figure 21:

Figure 21 *Rogue Detail Page Illustration*



2. Select the proper classification from the **Controller Classification** drop-down menu.

CAUTION: Changing the controller's classification within the AWMS UI will push a reclassification message to all controllers managed by the AWMS server that are in Groups with Offloading the WMS database set to Yes. To reset the controller classification of a rogue device on AWMS, change the controller classification on the AWMS UI to unclassified.

Controller classification can also be updated from **RAPIDS > List** via the Modify-Devices mechanism.

All rogue devices will be set to a default controller classification of unclassified when WMS is first offloaded except for devices classified as valid. Rogue devices classified in Dell PowerConnect ArubaOS as valid will also be classified within AWMS as valid for their controller classification as well. As APs report subsequent classification information about rogues, this classification will be reflected within AWMS UI and propagated to controllers that AWMS manages. The device classification reflected in the Controller's UI and in the AWMS UI will probably not match, because the Controller/APs do not reclassify rogue devices frequently.

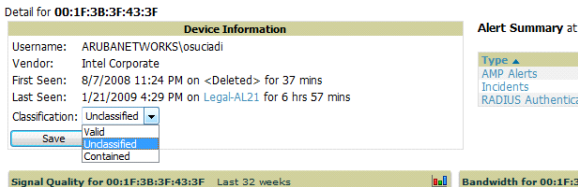
To update a group of devices' controller classification to match the Dell PowerConnect ArubaOS device classification navigate to **RAPIDS > List** and utilize the **Modify Devices** checkbox combined with the multiple sorting a filtering features.

Table 6 *ARM to AWMS Classification Matrix*

AWMS	Dell PowerConnect ArubaOS (ARM)
Unclassified (default state)	Unknown
Valid	Valid
Contained	DOS

1. Navigate to the **Users > User Detail** page for the user.
2. Select the proper classification from the **Classification** drop-down menu as seen in Figure 22:

Figure 22 *User Classification*



CAUTION: Changing User Classification within the AWMS UI will push a user reclassification message to all controllers managed by the AWMS server that are in Groups with Offloading the WMS database set to Yes.

All users will be set to a default classification of unclassified when wms is first offloaded. As APs report subsequent classification information about users, this classification will be reflected within AWMS UI and propagated to controllers that AWMS manages. It is probable that the user's classification reflected in the Controller's UI and in the AWMS UI will not match, because the Controller/APs do not reclassify users frequently.

There is no method in the AWMS UI to update user classification on mass to match the controller's classification. Each client must be updated individually within the AWMS UI.

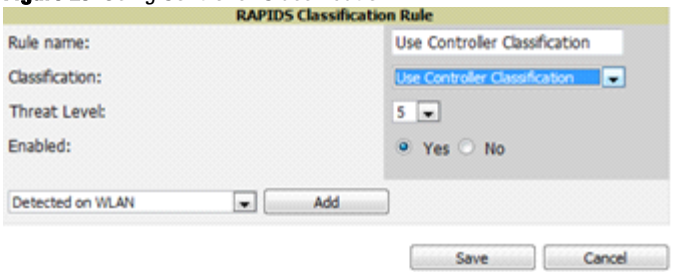
Rules Based Controller Classification

Using RAPIDS Defaults for Controller Classification

To use the controller's classification as RAPIDS classification, follow these steps:

1. Navigate to **RAPIDS > Rules**.
2. In the **Classification** drop-down menu, select **Use Controller Classification as seen in** Figure 23.
3. Select **Save**.

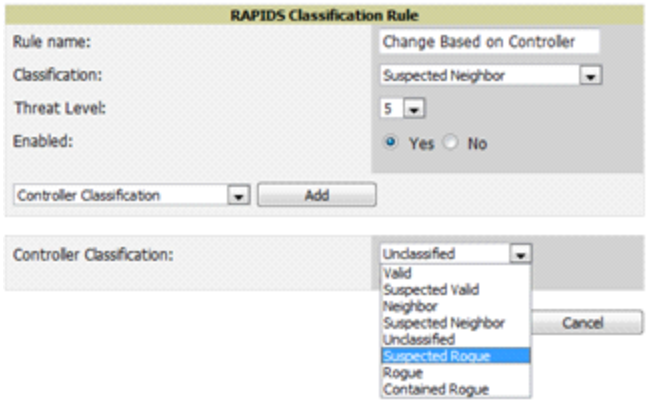
Figure 23 *Using Controller Classification*



Changing RAPIDS based on Controller Classification

1. Navigate to **RAPIDS > Rules**.
2. In the **Classification** drop-down menu, select desired RAPIDS classification.
3. Select **Controller Classification** from drop-down menu.
4. Select **Add**.
5. Select desired controller classification to use as an evaluation in RAPIDS as seen in Figure 24.
6. Select **Save**.

Figure 24 *Configure Rules for Classification*



Appendix A

Dell PowerConnect ArubaOS & AWMS Commands

Enable Channel Utilization Events (Local and Master Controllers)

CAUTION: Enabling these commands on Dell PowerConnect ArubaOS versions prior to 6.1 can result in performance issues on the controller.

SSH into the controller, and enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z

(Controller-Name) (config) # mgmt-server type amp primary-server <AMP IP>
(Controller-Name) (config) # write mem
```

Enable Stats With the CLI (Local Controller in Master Local Environment)

NOTE: Do not use these commands if using the AWMS GUI.

CAUTION: Enabling these commands on Dell PowerConnect ArubaOS versions prior to 6.1 can result in performance issues on the controller.

SSH into the controller, and enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z

(Controller-Name) (config) # wms general collect-stats enable
(Controller-Name) (config) # write mem
```

Offload WMS Utilizing ArubaOS CLI and AWMS CLI (SNMP Walk)

NOTE: Do not use these commands if using AWMS GUI.

Dell PowerConnect ArubaOS CLI

SSH into all controllers (local and master), and enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z
```

```
(Controller-Name) (config) # mobility-manager <AMP IP> user <MMS-USER> <MMS-SNMP-
PASSWORD> trap-version 2c
```

NOTE: This command creates an SNMPv3 user on the controller with authentication protocol configured to 'sha' and privacy protocol 'DES'. The user and password must be at least eight characters, because the Net-SNMP package in AWMS adheres to this IETF recommendation. ArubaOS automatically creates Auth and Privacy passwords from this single password. If mobility-manager is already using a preconfigured SNMPv3 user ensure the Privacy & Authentication passwords are the same.

NOTE: This command also creates the AWMS server as an SNMPv3 Trap Host in the controller's running configuration.

Sample: `mobility-manager 10.2.32.1 user airwave123 airwave123`

```
(Controller-Name) (config) # write mem
```

AWMS SNMP

Login into the AMWS server with proper administrative access and issue the following command for all controllers (master and locals):

NOTE: Do not use these commands if using AWMS GUI.

```
[root@AWMS ~]# snmpwalk -v3 -a SHA -l AuthPriv -u <MMS-USER> -A <MMS-SNMP-PASSWORD> -X
<MMS-SNMP-PASSWORD> <ARUBA CONTROLLER IP ADDRESS> wlsxSystemExtGroup

WLSX-SYSTEMEXT-MIB::wlsxSysExtSwitchIp.0 = IpAddress: 10.51.5.222
WLSX-SYSTEMEXT-MIB::wlsxSysExtHostname.0 = STRING: aruba-3600-2
.
..
WLSX-SYSTEMEXT-MIB::wlsxSysExtSwitchLastReload.0 = STRING: User reboot.
WLSX-SYSTEMEXT-MIB::wlsxSysExtLastStatsReset.0 = Timeticks: (0) 0:00:00.00 response
[root@AWMS ~]#
```

NOTE: Unless this SNMP walk command is issued properly on all of the controllers, they will not properly populate client and rogue statistics. Ensure the user and passwords match exactly to those entered in above sections.

Sample: `snmpwalk -v3 -a SHA -l AuthPriv -u airwave123 -A airwave123 -X airwave123 10.51.3.222 wlsxSystemExtGroup`

If you do not use AWMS GUI to offload WMS, you must add a cronjob on the AWMS server to ensure continued statistical population. Because the MIB walk/touch does not persist through a controller reboot, a cronjob is required to continually walk and touch the MIB.

Ensuring Master Controller Pushes Config to Local Controllers Utilizing ArubaOS CLI

NOTE: Do not use these commands if using AWMS GUI.

```
(Controller-Name) (config) # cfgm mms config disable
```

NOTE: This command ensures configuration changes made on the master controller will propagate to all local controllers.

```
(Controller-Name) (config) # write mem
```

Disable Debugging Utilizing ArubaOS CLI

If you are experiencing performance issues on the Master Controller, ensure that debugging is disabled. It should be disabled by default. Debugging coupled with gathering the enhanced statistics can put a strain on the controllers CPU, so it is highly recommended to disable debugging.

To disable debugging, SSH into the controller, enter "enable" mode, and issue the following commands:

```
(Controller-Name) # show running-config | include logging level debugging
```

If there is output, then use the following commands to remove the debugging:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z

(Controller-Name) (config) # no logging level debugging <module from above>
(Controller-Name) (config) # write mem
```

Restart WMS on Local Controllers Utilizing ArubaOS CLI

To ensure local controllers are populating rogue information properly, SSH into each local controller, enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z

(Controller-Name) (config) # process restart wms
```

NOTE: You will need to wait until the next Rogue Poll Period to execute a Poll Now for each local controller to see rogue devices begin to appear in AWMS after executing `restart wms` in Dell PowerConnect ArubaOS.

Configure ArubaOS CLI when not Offloading WMS to AWMS (AOS 6.0 & GT)

To ensure proper event correlation for IDS events when WMS if not offloaded to AWMS, SSH into each controller (Master and Local), enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z

(Controller-Name) (config) # ids management-profile
(Controller-Name) (config) # ids general-profile <name>
(Controller-Name) (config) # ids-events logs-and-traps
```

```
(Controller-Name) (config) # write mem
```

Copy & Paste to Enable Proper Traps With ArubaOS CLI

To ensure the proper traps are configured on Dell PowerConnect W controllers copy and paste the following command after entering "enable" mode and issuing the configure terminal command:

```
snmp-server trap enable wlsxNUserAuthenticationFailed
snmp-server trap enable wlsxUserAuthenticationFailed
snmp-server trap enable wlsxNAuthServerReqTimedOut
snmp-server trap enable wlsxSignatureMatchAP
snmp-server trap enable wlsxSignatureMatchSta
snmp-server trap enable wlsxSignAPNetstumbler
snmp-server trap enable wlsxSignStaNetstumbler
snmp-server trap enable wlsxSignAPAsleap
snmp-server trap enable wlsxSignStaAsleap
snmp-server trap enable wlsxSignAPAirjack
snmp-server trap enable wlsxSignStaAirjack
snmp-server trap enable wlsxSignAPNullProbeResp
snmp-server trap enable wlsxSignStaNullProbeResp
snmp-server trap enable wlsxSignAPDeauthBcast
snmp-server trap enable wlsxSignStaDeauthBcastwlsxChannelFrameErrorRateExceeded
snmp-server trap enable wlsxChannelFrameFragmentationRateExceeded
snmp-server trap enable wlsxChannelFrameRetryRateExceeded
snmp-server trap enable wlsxNIpSpoofingDetected
snmp-server trap enable wlsxStaImpersonation
snmp-server trap enable wlsxReservedChannelViolation
snmp-server trap enable wlsxValidSSIDViolation
snmp-server trap enable wlsxStaPolicyViolation
snmp-server trap enable wlsxRepeatWEPIVViolation
snmp-server trap enable wlsxWeakWEPIVViolation
snmp-server trap enable wlsxFrameRetryRateExceeded
snmp-server trap enable wlsxFrameReceiveErrorRateExceeded
snmp-server trap enable wlsxFrameFragmentationRateExceeded
snmp-server trap enable wlsxFrameBandWidthRateExceeded
snmp-server trap enable wlsxFrameLowSpeedRateExceeded
snmp-server trap enable wlsxFrameNonUnicastRateExceeded
snmp-server trap enable wlsxChannelRateAnomaly
snmp-server trap enable wlsxNodeRateAnomalyAP
snmp-server trap enable wlsxNodeRateAnomalySta
snmp-server trap enable wlsxEAPRateAnomaly
snmp-server trap enable wlsxSignalAnomaly
snmp-server trap enable wlsxSequenceNumberAnomalyAP
snmp-server trap enable wlsxSequenceNumberAnomalySta
snmp-server trap enable wlsxApFloodAttack
snmp-server trap enable wlsxInvalidMacOUIAP
snmp-server trap enable wlsxInvalidMacOUISta
snmp-server trap enable wlsxStaRepeatWEPIVViolation
snmp-server trap enable wlsxStaWeakWEPIVViolation
snmp-server trap enable wlsxStaAssociatedToUnsecureAP
snmp-server trap enable wlsxStaUnAssociatedFromUnsecureAP
snmp-server trap enable wlsxAPImpersonation
snmp-server trap enable wlsxDisconnectStationAttackAP
snmp-server trap enable wlsxDisconnectStationAttackSta
```

NOTE: You will need to issue the `write mem` command.

Appendix B

How AWMS Acquires Data from Dell PowerConnect W Devices

Table 7 *How AWMS Acquires Data from Dell PowerConnect W Devices*

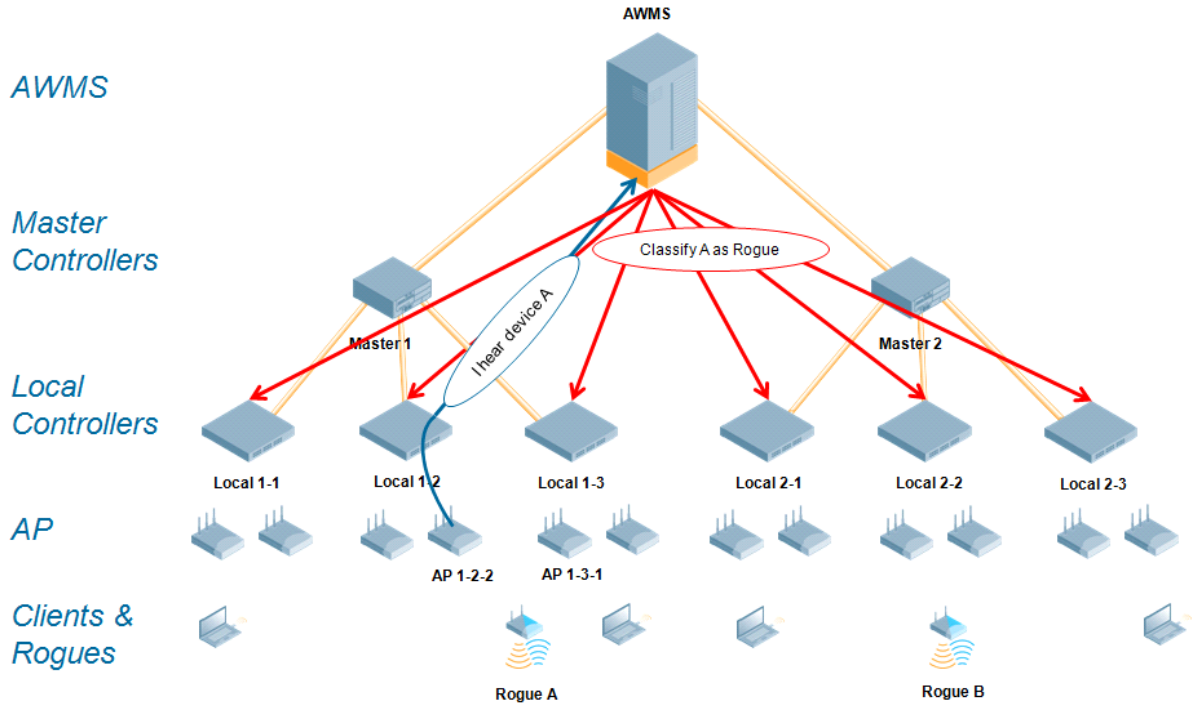
Data Elements	Controller/Thin AP					
	1.SNMP MIB	2.SNMP Traps	AMON	CLI/SSH	WMS Offload	RTLS
Configuration interface						
Device configuration/audit				X		
User and client interfaces						
Assoc/auth/roam	X	X				
Bandwidth	X					
Signal quality	X					X
Auth failures		X				
AX/radio interfaces						
CXU & memory utilization	*N/A*					
Bandwidth	X					
Transmit Power	X					
Channel utilization			X			
Noise floor	X					
Frame rates	X					
Error counters	X					
Channel summary				X		
ARM events		X				
Active interferers			X			
Active BSSIDs/SSIDs	X					
Security						
IDS events		X				
Neighbors/rogues	X				X	
Neighbor re-classification				X	X	
Client classification					X	
User de-auth				X		

Appendix C

WMS Offload Details

WMS Offload instructs the Master controller to stop correlating ARM, WIPS, and WIDS state information amongst its Local controllers, because AWMS will assume this responsibility. Figure 25 depicts how AMWS communicates state information with Local controllers.

Figure 25 *ARM/WIPS/WIDS Classification Message Workflow*



State Correlation Process

1. AP-1-3-1 hears rogue device A
2. Local controller 1-3 evaluates devices and does initial classification and sends a classification request to the AWMS
3. AWMS receives message and re-classifies the device if necessary and reflects this within AWMS GUI and via SNMP traps, if configured
4. AWMS sends a classification message back to all Local controllers managed by Master controller 1, (1-1, 1-2, and 1-3)
5. AWMS sends a classification message back to all additional Local controllers managed by the AMWS server. In this example all Local controllers under Master controller 2, (2-1, 2-2, and 2-3) would receive the classification messages.
6. If an administrative AWMS user manually overrides the classification, then AWMS will send a re-classification message to all applicable local controllers

7. AWMS periodically polls each Local controller's MIB to ensure state parity with the AWMS database. If the Local controller's device state does not comply with the AWMS database, AWMS will send a re-classification message to bring it back into compliance.

NOTE: The Rogue Detail page displays a BSSID table for each rogue that displays the desired classification and the classification on the device.

Benefits of using AWMS as Master Device State Manager

- Ability to correlate state among multiple Master controllers. This will reduce delays in containing a rogue device or authorizing a valid device when devices roam across a large campus.
- Ability to correlate state of third party access points with ARM. This will ensure Dell PowerConnect W infrastructure interoperates more efficiently in a mixed infrastructure environment.
- Ability to better classify devices based on AWMS wire-line information not currently available in ArubaOS.
- AWMS provides a near real-time event notification and classification of new devices entering air space.
- RAPIDS gains additional wire-line discovery data from Dell PowerConnect W controllers.

Understand Band Steering's Impact on Location

Band steering can negatively impact location accuracy when testing in highly mobile environment. The biggest hurdle is scanning times in 5 GHz frequency.

Table 8 *Location accuracy impact*

Operating Frequency	Total Channels	Scanning Frequency	Scanning Time	Total Time One Pass
2.4 GHz	11 (US)	10 seconds	110 milliseconds	121.21 seconds
5 GHz	24 (US)	10 seconds	110 milliseconds	242.64 seconds

Leveraging RTLS to Increase Accuracy

This section provides instructions for integrating the AWMS, Dell PowerConnect W WLAN infrastructure and Dell PowerConnect W's RTLS feed for more accurately locating wireless clients and WiFi Tags.

Deployment Topology

Figure 26 *Typical Client Location*

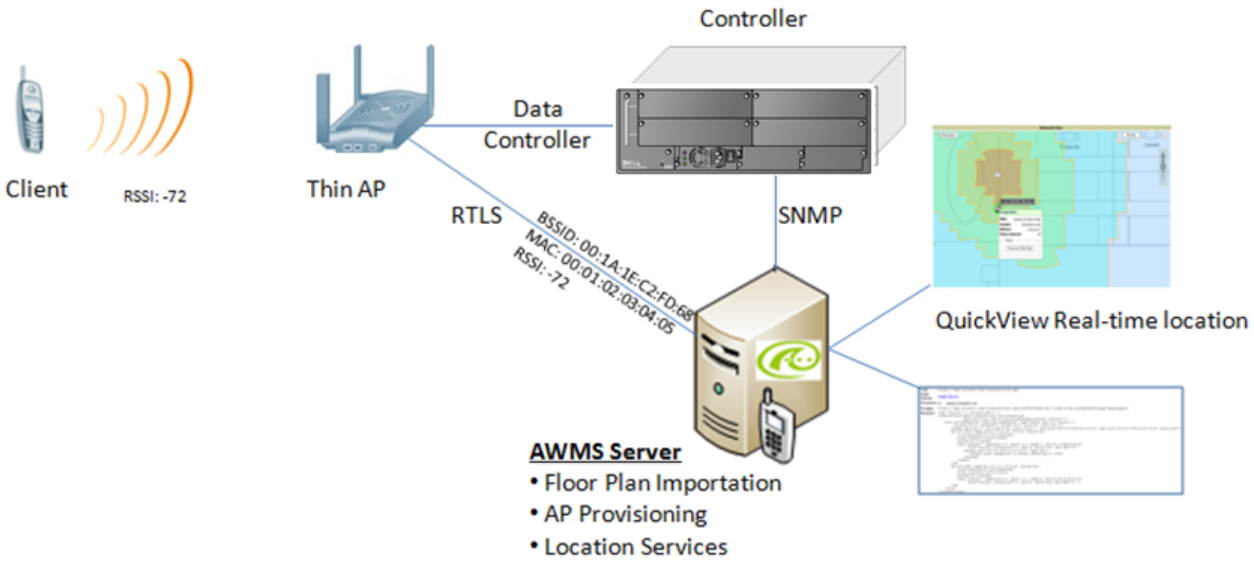
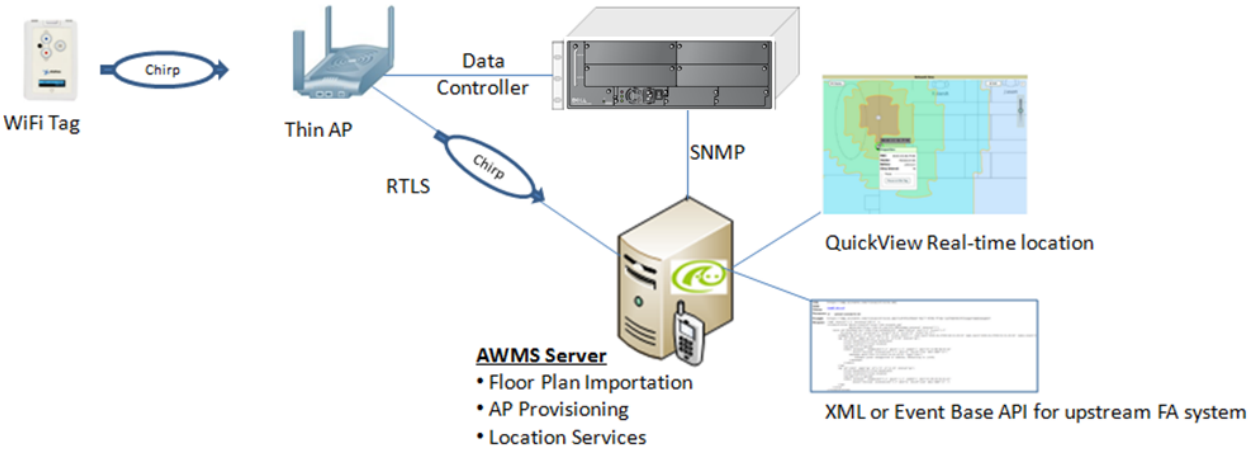


Figure 27 *Typical Tag Deployment*



Prerequisites

You will need the following information to monitor and manage your Dell PowerConnect W infrastructure.

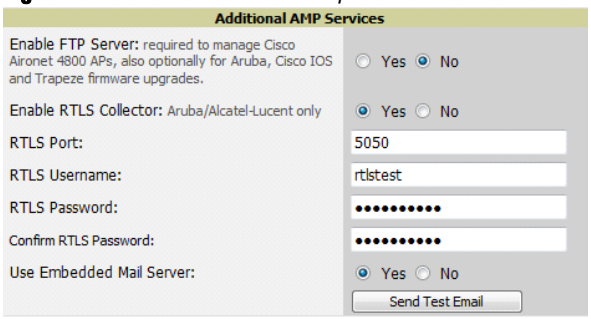
- Ensure AWMS server is already monitoring Dell PowerConnect W infrastructure
- Ensure WMS Offload process is complete
- Ensure firewall configuration for port 5050 (default port) supports bidirectional UDP communication between the AWMS server's IP address and each access point's IP address

Enable RTLS service on the AWMS server

To enable RTLS service on the AWMS server, follow these steps:

1. Navigate to **AMP Setup > General** and locate the **AMP Additional Services** section.
2. Select **Yes** to Enable RTLS Collector.
3. A new section will automatically appear with the following settings:
   - **RTLS Port** - match controller default is 5050
   - **RTLS Username** - match the SNMPv3 MMS username configured on controller
   - **RTLS Password** - match the SNMPv3 MMS password configured on controller

Figure 28 *RTLS Fields in AMP Setup > General*



4. Select **Save** at the bottom of the page.

Enable RTLS on Controller

NOTE: RTLS can only be enabled on the master controller and it will automatically propagate to all local controllers.

SSH into master controller, enter "enable" mode, and issue the following commands:

```
(Controller-Name) # configure terminal
Enter Configuration commands, one per line. End with CNTL/Z

(Controller-Name) (config) # ap system-profile <PROFILE USED BY THIN APs>

(Controller-Name) (AP system profile default) # rtls-server ip-addr <IP OF AWMS SERVER>
port 5050 key <SNMPv3 MMS PASSWORD CONFIGURED ON CONTROLLER>

(Controller-Name) (AP system profile default) # write mem
```

To validate exit configuration mode:

```
(Controller-Name) # show ap monitor debug status ip-addr <IP ADDRESS OF ANY THIN ACCESS
POINTS>
...
RTLS configuration
-------------------
Type       Server IP   Port Frequency Active
----       ---------   ---- --------- ------
MMS        10.51.2.45 5070 120
Aeroscout N/A         N/A   N/A
RTLS       10.51.2.45 5050 60         *
```

Troubleshooting RTLS

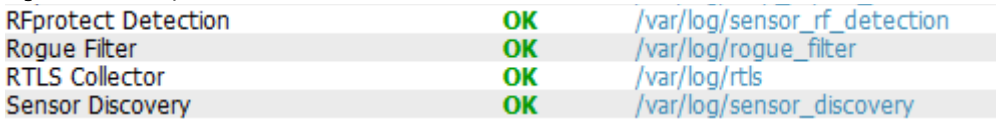
Ensure the RTLS service is running on your AWMS server. SSH into your AWMS server.

```
[root@AWMSServer]# daemons | grep RTLS
root     17859 12809 0 10:35 ?        00:00:00 Daemon::RTLS
```

or

Navigate to **System > Status** and look for the RTLS service, as shown in

Figure 29 *RTLS System Status*



Check the RTLS log file to ensure Tag chirps are making it to the AWMS server. SSH into your AWMS server.

```
[root@AWMSServer]# logs
[root@AWMSServer]# tail rtls
payload:
00147aaf01000020001a1ec02b320000000100000137aae0100000c001a1ec02b320000001a1e82b32259
0006ddff02
1224534900.588245 - got 96 bytes from 10.51.1.39 on port 5050
Mon Oct 20 13:35:00 2008: 1224534900.588338 - got 96 bytes from 10.51.1.39 on port 5050
```

```
payload:
0014c9c90100003c001a1ec0507800000002000000013c9c70100000c001a1ec050780000000d54a7a28054
0001ddff020013c9c80100000c001a1ec050780000000cdb8ae9a9000006c4ff02

1224534900.588245 - got 96 bytes from 10.51.1.39 on port 5050

Mon Oct 20 13:35:00 2008: 1224534900.588338 - got 96 bytes from 10.51.1.39 on port 5050

payload:
0014c9c90100003c001a1ec0507800000002000000013c9c70100000c001a1ec050780000000d54a7a28054
0001ddff020013c9c80100000c001a1ec050780000000cdb8ae9a9000006c4ff02
```

Ensure chirps are published to Airbus by snooping on proper topics

```
[root@AWMS server]# airbus_snoop rtls_tag_report
Snooping on rtls_tag_report:
Mon Oct 20 13:49:03 2008 (1224535743.54077)
%
    ap_mac => 00:1A:1E:C0:50:78
    battery => 0
    bssid => 00:1A:1E:85:07:80
    channel => 1
    data_rate => 2
    noise_floor => 85
    payload =>
    rssi => -64
    tag_mac => 00:14:7E:00:4C:E4
    timestamp => 303139810
    tx_power => 19
```

Verify external applications can see WiFi Tag information by exercising the Tag XML API:

https://<AWMS SERVER IP>/visualrf/rfid.xml

You should see the following XML output:

```
<visualrf:rfids version=1>
 <rfid battery-level=0 chirp-interval= radio-mac=00:14:7E:00:4C:E0
    vendor=>
    <radio phy=g xmit-dbm=10.0/>
    <discovering-radio ap=SC-MB-03-AP10 dBm=-91 id=811 index=1
      timestamp=2008-10-21T12:23:30-04:00/>
    <discovering-radio ap=SC-MB-03-AP06 dBm=-81 id=769 index=1
      timestamp=2008-10-21T12:23:31-04:00/>
    <discovering-radio ap=SC-MB-01-AP06 dBm=-63 id=708 index=1
      timestamp=2008-10-21T12:23:31-04:00/>
    <discovering-radio ap=SC-MB-02-AP04 dBm=-88 id=806 index=1
    timestamp=2008-10-21T12:22:34-04:00/>
 </rfid>
 <rfid battery-level=0 chirp-interval= radio-mac=00:14:7E:00:4B:5C
    vendor=>
    <radio phy=g xmit-dbm=10.0/>
    <discovering-radio ap=SC-MB-03-AP06 dBm=-74 id=769 index=1
      timestamp=2008-10-21T12:23:20-04:00/>
    <discovering-radio ap=SC-MB-01-AP06 dBm=-58 id=708 index=1
      timestamp=2008-10-21T12:23:20-04:00/>
    <discovering-radio ap=SC-MB-03-AP02 dBm=-91 id=734 index=1
      timestamp=2008-10-21T12:23:20-04:00/>
 </rfid>
```

```
 <rfid battery-level=0 chirp-interval= radio-mac=00:14:7E:00:4D:06
    vendor=>
    <radio phy=g xmit-dbm=10.0/>
    <discovering-radio ap=SC-SB-GR-AP04 dBm=-91 id=837 index=1
      timestamp=2008-10-21T12:21:08-04:00/>
    <discovering-radio ap=SC-MB-03-AP06 dBm=-79 id=769 index=1
      timestamp=2008-10-21T12:22:08-04:00/>
    <discovering-radio ap=SC-MB-01-AP06 dBm=-59 id=708 index=1
      timestamp=2008-10-21T12:23:08-04:00/>
    <discovering-radio ap=SC-MB-02-AP04 dBm=-90 id=806 index=1
      timestamp=2008-10-21T12:22:08-04:00/>
 </rfid>
</visualrf:rfids>
```

Wi-Fi Tag Setup Guidelines

- Ensure that the tags can be heard by at least three (3) access points from any given location. The recommended is 4 for best results.
- Ensure that the tags chirp on all regulatory channels.