

ArubaOS 6.5.2.0



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Hewlett Packard Enterprise Company
Attn: General Counsel
3000 Hanover Street
Palo Alto, CA 94304
USA

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ArubaOS 6.5.2.0 is a software release that includes new features and enhancements introduced in this release.



See the [Upgrade Procedure on page 45](#) for instructions on how to upgrade your controller to this release.

Chapter Overview

- [New Features](#) provides a description of features and enhancements introduced in this release.
- [Regulatory Updates](#) describes the regulatory updates in this release.
- [Resolved Issues](#) describes the issues resolved in this release.
- [Known Issues](#) describes the known and outstanding issues identified in this release.
- [Upgrade Procedure](#) describes the procedures for upgrading a controller to this release.
- [Glossary of Terms](#) lists the acronyms and abbreviations used in the document.



For information regarding prior releases, refer to the corresponding Release Notes on support.arubanetworks.com.

Supported Browsers

The following browsers are officially supported for use with ArubaOS 6.5.2.0 WebUI:

- Microsoft Internet Explorer 10.x and 11 on Windows 7 and Windows 8
- Mozilla Firefox 23 or later on Windows Vista, Windows 7, and Mac OS
- Apple Safari 5.1.7 or later on Mac OS
- Chrome 51.0.2704.103 m (64-bit)
- Microsoft Edge 25.10586.0.0 and Microsoft Edge HTML 13.10586

Contacting Support

Table 1: *Contact Information*

Main Site	arubanetworks.com
Support Site	support.arubanetworks.com
Airheads Social Forums and Knowledge Base	community.arubanetworks.com
North American Telephone	1-800-943-4526 (Toll Free) 1-408-754-1200
International Telephone	arubanetworks.com/support-services/contact-support/
Software Licensing Site	hpe.com/networking/support
End-of-life Information	arubanetworks.com/support-services/end-of-life/
Security Incident Response Team	Site: arubanetworks.com/support-services/security-bulletins/ Email: sirt@arubanetworks.com

This chapter describes the new features, enhancements, and hardware introduced in ArubaOS 6.5.2.0. For more information about these features, refer to the *ArubaOS 6.5.2.x User Guide*.

AirWave Management

Inline Monitoring

Starting with ArubaOS 6.5.2.0, inline monitoring feature is supported for Remote APs.

AMON

AirMatch Monitoring Information in AMON Messages

When AirMatch monitoring is enabled via the AP system profile, each AP measures its RF environment for a configurable duration (every 30 minutes by default). The controller uses this information to analyze its RF neighborhood, and can send this information in AMON messages to AirWave or a mobility manager server.



The AirMatch feature in ArubaOS 6.5.2.0 is used only to send monitoring messages to AirWave. ArubaOS 6.5.x uses the ARM feature to dynamically and intelligently choose the best 802.11 channel and transmit power for each Aruba AP in its current RF environment.

AP Configuration

AP Health Checks

The AP Health check feature uses ping probes to check reachability and latency levels for the connection between the AP and the controller. The recorded latency information appears in the output of the **show ap ip health-check** command. If the controller IP address becomes unreachable from the AP uplink, this feature records the time that the connection failed, and saves that information in a log file on the AP.

AP-Platform

BLE

Starting with ArubaOS 6.5.2.0, the BLE firmware image is part of ArubaOS. The BLE firmware will be upgraded automatically when ArubaOS is upgraded.

Mesh Support

Starting with ArubaOS 6.5.2.0, mesh support is introduced for AP-303H, 300 Series, 330 Series, and 360 Series access points.

Support for AP-203H Access Point

The AP-203H access point is an IEEE 802.11ac standard high-performance flex-radio wireless device ideal for hospitality and branch deployments. The AP is software configurable as either a single radio dual band or dual radio. MIMO technology allows the AP to deliver high-performance 802.11n 2.4 GHz and 802.11ac 5 GHz functionality, while also supporting 802.11a, b, and g wireless services. The AP works in conjunction with a controller.

The AP provides the following capabilities:

- IEEE 802.11a, b, g, n, or ac operation as a wireless access point
- IEEE 802.11a, b, g, n, or ac operation as a wireless air monitor
- Compatible with IEEE 802.3af PoE
- Centralized management configuration

For technical specifications, see the AP-203H data sheet. For installation instructions, see the *AP-203H Access Point Installation Guide*.

AP-203H Access Point Limitations

The unique private keys for AP-203H access points are stored in flash because these access points do not have TPM chip unlike most other APs. Therefore, AP-203H access points cannot use certificates in ArubaOS 6.5.2.0 release.

To convert an AP-203H Campus AP to a Remote AP, use PSK or locally generated certificates.



The future releases of ArubaOS will provide support for using certificates with AP-203H.

In addition to the certificate issue, the AP-203H access points have the following limitations:

- No support for Spectrum Monitoring.
- No support for on-board BLE. However, you can avail the BLE support by using an external USB.

Support for 203R Series Remote Access Points

The 203R Series (AP-203R and AP-203RP) Remote APs are IEEE 802.11ac standard high-performance Remote APs ideal for home and branch deployments. MIMO technology allows these Remote APs to deliver high-performance 802.11n 2.4 GHz and 802.11ac 5 GHz functionality, while also supporting 802.11a, b, and g wireless services. The Remote APs work in conjunction with a controller.

The Remote APs provides the following capabilities:

- IEEE 802.11a, b, g, n, or ac operation as a wireless access point
- IEEE 802.11a, b, g, n, or ac operation as a wireless air monitor

- Compatible with IEEE 802.3at PoE
- Centralized management configuration
- Support for PoE-in (E0 port)/PoE-out (E2 port)
- Support for selected USB peripherals
- Integrated BLE radio

For technical specifications, see the 203R Series data sheet. For installation instructions, see the *203R Series Remote Access Points Installation Guide*.

Support for AP-303H Access Point

The AP-303H access point is an IEEE 802.11ac standard high-performance wireless device ideal for hospitality and branch deployments. MIMO technology allows the AP to deliver high-performance 802.11n 2.4 GHz and 802.11ac 5 GHz functionality, while also supporting 802.11a, b, and g wireless services. The AP works in conjunction with a controller.

The AP provides the following capabilities:

- IEEE 802.11a, b, g, n, or ac operation as a wireless access point
- IEEE 802.11a, b, g, n, or ac operation as a wireless air monitor
- Compatible with IEEE 802.3af PoE and 802.3at PoE+
- Centralized management configuration
- Support for PoE-in (E0 port)/PoE-out (E3 port)
- Support for selected USB peripherals
- Integrated BLE radio

For technical specifications, see the AP-303H data sheet. For installation instructions, see the *AP-303H Access Point Installation Guide*.

Support for 360 Series Outdoor Access Points

The 360 Series (AP-365 and AP-367) outdoor APs support IEEE 802.11ac standard for high performance WLAN, and are equipped with two radios, which provide network access and monitor the network simultaneously. MIMO technology allows these APs to deliver high-performance 802.11n 2.4 GHz and 802.11ac 5 GHz functionality, while also supporting 802.11a, b, and g wireless services. The outdoor APs work in conjunction with a controller.

The outdoor APs provide the following capabilities:

- IEEE 802.11a, b, g, n, or ac operation as a wireless access point
- IEEE 802.11a, b, g, n, or ac operation as a wireless air monitor
- IEEE 802.11a, b, g, n, or ac spectrum monitor
- Compatible with IEEE 802.3af PoE
- Centralized management configuration
- Integrated BLE Radio

For technical specifications, see the 360 Series data sheet. For installation instructions, see the *360 Series Outdoor Access Points Installation Guide*.

Support for BLE-based Asset Tracking

Starting with ArubaOS 6.5.2.0, APs can monitor BLE asset tags to track the location of time-sensitive, high-value assets embedded with BLE tags.

Support for Franklin Wireless U772 LTE Modem

ArubaOS 6.5.2.0 introduces support for the Franklin Wireless U772 LTE modem on the following AP platforms:

- 200 Series access points
- 203R Series access point
- AP-205H access points
- 210 Series access points
- 220 Series access points
- 300 Series access points
- AP-303H access points
- 310 Series access points
- 320 Series access points
- 330 Series access points

AP Discovery Logic

Starting with ArubaOS 6.5.2.0, select APs can run in both controller-based mode and controller-less mode. Based on the selected mode, the AP runs a different image:

- Controller-based APs run an ArubaOS image.
- Controller-less APs run an Instant image.

The following APs support both controller-based mode and controller-less mode:

- 203H Series access points
- 203R/203RP Series access points
- 303H Series access points
- AP-365 and AP-367 access points

In the ArubaOS 6.5.1.x and earlier release trains, APs are predefined as either controller-based campus APs or controller-less Instant APs. Each campus AP is shipped with the ArubaOS manufacturing image and must connect to a controller in order to receive configurations. Campus APs can only run the ArubaOS image and cannot be converted into Instant APs. Each Instant AP is shipped with the Instant manufacturing image and must join an IAP cluster in order to receive configurations from a virtual controller. Instant APs run the Instant image and can also be converted into campus APs.

In ArubaOS 6.5.2.0, each AP is shipped with a manufacturing image based on the Instant image, but containing reduced functions. When the AP is booted up with the manufacturing image, it enters the controller/Instant discovery process to determine if it will be upgraded to the controller-based mode (ArubaOS image) or controller-less mode (Instant image). After the controller, Instant virtual controller (VC), or Activate/AirWave/Central is discovered, the AP image is upgraded accordingly.

By default, controller discovery has a higher priority than Instant discovery. APs can discover the IP address of a controller through one of the following methods:

- ADP
- DHCP server
- DNS server



APs can support up to 12 controller IP addresses via DHCP/DNS discovery. APs attempt to connect to each controller 10 times before switching to the next controller.



An AP can only be converted into a controller-based AP if the controller to which it connects is running ArubaOS 6.5.2.0.

If the AP cannot locate any controllers during the controller discovery process, the AP enters Instant discovery.

Enabling Flexible Radio

This feature allows the AP to seamlessly switch between modes where the radio resources are either combined in a single 2x2 radio (2.4 GHz or 5 GHz), or separated in two 1x1 radios (2.4 GHz and 5 GHz).

Intelligent Power Monitoring

Starting with ArubaOS 6.5.2.0, IPM is supported in AP-303H access points. IPM is a feature that actively measures the power utilization of an AP and dynamically adapts to the power resources.

Smart Antenna Polarization

The AP-335 access point supports the smart antenna feature, which optimizes the selection of antenna polarization values based on data collected from the training of polarization pattern combinations. This feature identifies the clients most likely to benefit from smart antenna polarization, based upon the average RSSI of the received frames, and the number of streams. This feature uses frame-based antenna training, which allows the AP to cycle through training combinations for training and collect statistics without any impact on the client. At the end of training sequence, the AP selects the best antenna polarization based upon these collected statistics.



The Smart Antenna feature does not support optimized antenna polarization for clients using Single-User or Multi-User transmit beamforming.

Transmit Power Calculation Support

Starting from ArubaOS 6.5.2.0, the AP transmit power is calculated on each outgoing 802.11 packet to adhere to the latest regulatory limits. The modification in the AP transmit power calculation results in change in the value of the conducted power on an AP. To operate the APs on a similar power level as earlier ArubaOS versions, it is recommended to slightly increase the EIRP value on the APs after upgrading to ArubaOS 6.5.2.0. You can use the **tx-power** parameter under the **rf dot11a-radio-profile** or **rf dot11g-radio-profile** command to increase the configured EIRP value.

Authentication

Configuring Source Interface VLAN in the TACACS Server

Starting with ArubaOS 6.5.2.0, a user has the option of specifying the source IP for a TACACS server.

Roaming RADIUS Accounting Service

Starting with ArubaOS 6.5.2.0, the Roaming RADIUS Accounting Service creates an Accounting session for each wireless client. The records in the session contain the same set of RADIUS attributes as compared to the timer-based RADIUS Interim-Update Accounting record, except the statistics attributes. Whenever a wireless client roams to a different AP, the Roaming triggered RADIUS Interim-Update Accounting record is sent to the configured RADIUS Accounting server. This record is used to track the current location of the wireless client. Currently this feature is supported for wireless clients in non-cluster environments, but is not supported for wired, VPN/VIA, and L3 mobility clients.

Base OS Security

Support for Querying RADIUS and Internal Server Users

Starting with ArubaOS 6.5.2.0, the **aaa query-user** command accepts RADIUS and internal authentication server names in addition to the LDAP server name for user search.

Dynamically Customizing the RADIUS Attributes

Starting with ArubaOS 6.5.2.0, supports dynamic data for the included attributes in the RADIUS Attribute modifier. Users can configure the dynamic value for each included attribute in the RADIUS modifier to be one or two data items.

Captive Portal

Support for Cisco-AvPair VSA

Starting with ArubaOS 6.5.2.0, the controller provides support for **Cisco AV-Pair** VSA in the **url-redirect** parameter configured in captive portal.

Centralized Licensing

License Server Supports Standalone and Local License Clients

Starting with ArubaOS 6.5.2.0, the centralized licensing feature supports topologies where a licensing master is connected to a standalone master licensing client controller, a master controller acting as a redundant licensing server, and a local licensing client controller. In previous releases of ArubaOS, licensing servers in centralized licensing topologies supported standalone master controllers or local controllers, but not both.

DHCP

Character Limitation for DHCP Option 242

Starting with ArubaOS 6.5.2.0, the number of characters for the text field under the DHCP pool option is increased from 128 to 256.

IPsec

Support IKEv1 SHA-2 for PSK RAP

Starting with ArubaOS 6.5.2.0, PSK RAPs support IKEv1 SHA-2 cryptographic hash function.

Forced Tunnel Mode

Starting from ArubaOS 6.5.2.0, the site-to-site IPsec SA can be switched to forced-tunnel mode, even if the protected network/mask and the peer-IP are the same. Enable or disable the forced-tunnel mode or the transport mode on both peers, otherwise a tunnel will not be established.

WebUI

Authentication Survivability Timeout

Starting with ArubaOS 6.5.2.0, the upper limit of the authentication survivability timeout is extended from 72 hrs to 168 hrs. To configure authentication survivability timeout, in the WebUI, navigate to **Configuration > Branch > Smart Config > WAN** and configure a value for the **Local Cache Lifetime (hrs)** parameter.

Zero-Touch Provisioning

Automatic Legacy Controller Upgrades via Activate

A factory-default controller running ArubaOS 6.5.1.4 or ArubaOS 6.5.2.0 or later can use Activate Zero-Touch Provisioning to upgrade its software to the latest version of ArubaOS 8.x as part of the provisioning process. If Activate detects that a factory-default controller is running a version of ArubaOS that supports this feature and has been assigned a **Managed Device to Master Controller** provisioning rule, Activate will automatically send that controller the information it needs to automatically download and upgrade to the latest version of ArubaOS 8.x.

This chapter describes the regulatory updates in ArubaOS 6.5.2.0.



Contact your local Aruba sales representative about device availability and support for your country.

Periodic regulatory changes may require modifications to the list of channels supported by an AP. For a complete list of channels supported by an AP using a specific country domain, access the controller Command Line Interface (CLI) and execute the **show ap allowed-channels country-code <country-code> ap-type <ap-model>** command.

The following default Downloadable Regulatory Table (DRT) version is part of ArubaOS 6.5.2.0:

- DRT-1.0_59118

For a complete list of countries certified with different AP models, refer to the DRT Release Notes at support.arubanetworks.com.



The FCC has changed the rules for operation in all of the 5 GHz bands. For more information, refer to the *FCC DFS Regulatory Change Impact and Resolution Plan - Support Advisory* available in [Support Advisories](#).

This chapter describes the issues resolved in ArubaOS 6.5.2.0.

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
104874 139962 149550 150743 151483 155084	<p>Symptom: Stale entries were present in both the controller and the AP association tables but not in the AP driver's client table, or vice versa. The fix ensures that the stale entries are cleared periodically from the association tables.</p> <p>Scenario: This issue occurred if APs were up for several weeks. This issue was not limited to any specific controller or AP model and ArubaOS release version.</p>	Station Management	All platforms	ArubaOS 6.4.3.0	ArubaOS 6.5.2.0
126244 133950 136632 136957 141924	<p>Symptom: The status of an AP did not match between a master and a local controller. The fix ensures that the status of an AP is consistent between a master and a local controller.</p> <p>Scenario: This issue occurred when an AP moved from one local controller to another but its status was not updated in the master controller. This issue was observed in APs running ArubaOS 6.4.4.8.</p>	AP-Platform	All platforms	ArubaOS 6.4.4.8	ArubaOS 6.5.2.0
126727 139011	<p>Symptom: There was EIRP value mismatch between the mesh portal and the mesh point. This issue is resolved by setting an init value of (127-1) dBm for the mesh point.</p> <p>Scenario: This issue occurred in a mesh environment and was observed in 270 Series access points. This issue was not limited to any specific ArubaOS release version.</p>	Mesh	270 Series access points	ArubaOS6.4.4.5	ArubaOS 6.5.2.0
127094 138590 139656 144730 151357	<p>Symptom: The Dashboard > Access Points > Radios page of the WebUI displayed some of the AP names as unknown. The fix ensures that the WebUI Dashboard displays the AP names correctly.</p> <p>Scenario: This issue occurred during a HA failover when the AP switched from the master controller to a standby controller. This issue was not limited to any specific AP model or ArubaOS version.</p>	AP-Platform	All AP platforms	ArubaOS 6.4.2.12	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
132770	<p>Symptom: In a centralised licensing system, the following license expiry message was displayed without sufficient information: Jan 7 08:30:00 :300158: <WARN> licensemgr Licenses contributed by the client will expire in 29 days The fix ensures that the license expiry message includes sufficient information such as the MAC address of the controller when it goes down if it contributes licenses. Scenario: This issue occurred in a centralised licensing system when a client controller that contributed license went down. This issue was not limited to any specific controller model or ArubaOS version.</p>	AP-Platform	All AP platforms	ArubaOS 6.4.2.12	ArubaOS 6.5.2.0
141310	<p>Symptom: The All WLAN Clients tab on the acting master controller did not display any records for the clients that were connected. This issue is resolved by always relaying the LMS list whenever controller role changes. Scenario: This issue occurred because of the following reasons:</p> <ul style="list-style-type: none"> ■ The LMS list was not relayed to apps if the role changed between master and standby controllers. ■ There was no heartbeat activity on the master. <p>This issue was observed in a Master-Standby topology and was not specific to any controller or ArubaOS version.</p>	Master-Redundancy	All platforms	ArubaOS 6.4.4.4	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
141594 142974 144029 145174 145583 147933 148379 148380 148381 148382 148383 148384 149916 151187 151466 153615 156639	<p>Symptom: An AP rebooted unexpectedly. The log file listed the reason for the event as Internal watchdog reset. Improvements in the wireless driver resolves this issue.</p> <p>Scenario: This issue was observed in AP-315 or AP-325 access points running ArubaOS 6.4.4.8.</p>	AP-Wireless	AP-315 and AP-325 access points	ArubaOS 6.4.4.8	ArubaOS 6.5.2.0
141661 153779 158448 158899 158907 159343	<p>Symptom: A RAP-109 access point crashed because of data bus error. This issue is resolved by stopping radio reset when pending packets exist.</p> <p>Scenario: This issue occurred because of radio reset when pending packets existed. This issue was observed in 7240 controllers running ArubaOS 6.4.3.7 in Master-Standby topology.</p>	AP-Wireless	RAP-109 access points	ArubaOS 6.4.3.7	ArubaOS 6.5.2.0
143016	<p>Symptom: The IPv6 link local address was deleted from the controller IP VLAN. The fix ensures that the IPv6 link local address is not deleted from the controller IPv6 VLAN, when the controller is rebooted.</p> <p>Scenario: This issue occurred when the controller was rebooted with user configured link local address for IPv6 VLAN. This issue was observed in controllers running ArubaOS 6.4.4.6.</p>	IPv6	All platforms	ArubaOS 6.4.4.6	ArubaOS 6.5.2.0
143062	<p>Symptom: Port 1144 was open in an AP although the RTLS feature was disabled. This issue is resolved by opening port 1144 only when the RTLS feature is enabled.</p> <p>Scenario: This issue occurred during the AP boot sequence irrespective of the status of the RTLS feature. This issue was observed in access points running ArubaOS 6.4.4.6.</p>	Air Management-IDS	All AP platforms	ArubaOS 6.4.4.6	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
143566	<p>Symptom: The error Module authentication is busy. Please try later. was displayed when the command, show reference user-role <role-name> was executed. The fix ensures that the output is displayed without any error.</p> <p>Scenario: This issue occurred when there were more than 212 entries for a given role in user derivation-rules or server-group derivation rules. This issue was observed in a master local topology with controllers running ArubaOS 6.4.2.16.</p>	Configuration	All platforms	ArubaOS 6.4.2.16	ArubaOS 6.5.2.0
144156 145374 145759 150408 156415	<p>Symptom: A controller processed wrong instructions. The fix ensures that the controller processes the correct instructions.</p> <p>Scenario: This issue was observed in controllers running ArubaOS 6.4.4.5.</p>	Controller-Platform	All platforms	ArubaOS 6.4.4.5	ArubaOS 6.5.2.0
145234 151998	<p>Symptom: The WebUI displayed an incorrect controller IP address for an AP. The fix ensures that the WebUI displays the correct controller IP address for an AP.</p> <p>Scenario: This issue occurred when a master controller was part of HA active-standby configuration and an AP associated with the master controller switched from active to standby state. This issue was observed in a master-local topology with controllers running ArubaOS 6.4.4.3.</p>	WebUI	All platforms	ArubaOS 6.4.4.3	ArubaOS 6.5.2.0
144774	<p>Symptom: An AP stopped responding and rebooted. The log file of the event suggested a radio set on the AP. Improvements in the wireless driver of the AP resolved the issue.</p> <p>Scenario: This issue was observed in 200 Series, 210 Series, 220 Series, and 270 Series access points running ArubaOS 6.4.4.8 or later versions.</p>	AP-Platform	200 Series, 210 Series, 220 Series, and 270 Series access points	ArubaOS 6.4.4.8	ArubaOS 6.5.2.0
145385	<p>Symptom: An AP rebooted frequently. The log file listed the reason for the event as SAPD: Reboot requested by controller. The fix ensures that the controller does not trigger an incorrect AP reboot.</p> <p>Scenario: This issue was observed in controllers running ArubaOS 6.3.1.14.</p>	Local Database	All platforms	ArubaOS 6.3.1.14	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
145934 149784 150173 155544 156308	<p>Symptom: Multiple processes in a controller crashed unexpectedly. The log file listed the reason for the event as KERNEL: Out of Memory signal 9: Killed process 30929 (httpd). Out of memory. Improvements in the controller memory management resolves this issue.</p> <p>Scenario: This issue was observed in controllers running ArubaOS 6.4.4.x and ArubaOS 6.4.3.x.</p>	Controller-Platform	All platforms	ArubaOS 6.3.1.22	ArubaOS 6.5.2.0
147300	<p>Symptom: A controller failed to respond and rebooted. Improvements in the process that handles AP management and user association resolves this issue.</p> <p>Scenario: This issue was observed in controllers running ArubaOS 6.4.3.6.</p>	Station Management	All platforms	ArubaOS 6.4.3.6	ArubaOS 6.5.2.0
148004 155405 157742	<p>Symptom: An AP experienced the following issues:</p> <ul style="list-style-type: none"> ■ The 2.4 GHz BSSID disappeared for a fraction of a second. ■ High CPU and memory utilization. ■ High ping latency on the physical interface of the AP. <p>The fix ensures that the AP performs as expected.</p> <p>Scenario: This issue occurred when the clock of the AP was slower than the clock of the controller. This issue was observed in AP-103H , 100 Series, and RAP 100 Series access points running ArubaOS 6.4.3.6 or later versions.</p>	AP-Platform	AP-103H, 100 Series, and RAP 100 Series access points	ArubaOS 6.4.3.6	ArubaOS 6.5.2.0
148416 149211	<p>Symptom: A crash was observed in the Station Management (STM) process due to memory corruption. This issue is resolved by fragmenting the role bandwidth message when it does not fit in one single PAPI message.</p> <p>Scenario: This issue occurred when there was an increase in the number of user roles and as a result the role bandwidth message did not fit into one PAPI message. This issue was observed in 7210 controllers running ArubaOS 6.4.3.4.</p>	AP-Platform	7210 controllers	ArubaOS 6.4.3.4	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
148557	<p>Symptom: Clients observed a sudden increase in the number of DHCPv6/Multicast messages from the access points. This issue is resolved by making changes to the SAPD process.</p> <p>Scenario: This issue occurred when DHCP daemon for IPv6 sent DHCPv6 solicit messages when an AP received IPv4 addresses continuously. This issue was observed in controllers running ArubaOS 6.4.4.9.</p>	AP-Platform	All platforms	ArubaOS 6.4.4.9	ArubaOS 6.5.2.0
148977 155343	<p>Symptom: A branch office controller randomly lost configuration updates from the master controller. This issue is resolved by triggering a reboot of the branch office controller whenever a new license is added or removed.</p> <p>NOTE: Adding an additional license count to an existing license type does not trigger a reboot of the branch office controller.</p> <p>Scenario: This issue occurred after a new license was sent from the master controller to the branch office controller. Thereafter, license dependent configuration updates were not sent to the branch office controller. This issue was observed in a master-branch office controller deployment with controllers running ArubaOS 6.5.0.0 or later versions.</p>	Licensing	All platforms	ArubaOS 6.5.0.0	ArubaOS 6.5.2.0
149131	<p>Symptom: A controller sent Alcatel Mapping Adjacency Protocol (AMAP) packets only on one member interface instead of all member interfaces of the port-channel. This issue is resolved by sending the AMAP packets on all member interfaces of the port-channel.</p> <p>Scenario: This issue occurred when AMAP was enabled on the port-channel interface. This issue was not limited to any specific controller model or ArubaOS version.</p>	SNMP	All platforms	ArubaOS 6.4.3.10	ArubaOS 6.5.2.0
149372	<p>Symptom: Clients failed to connect to some APs randomly until the APs were rebooted. The fix ensures that the channel change is triggered only after the channel switch announcement happens.</p> <p>Scenario: This issue occurred when a channel change was triggered on the APs due to a RADAR detection before the channel switch announcement happened. This issue was observed on APs running ArubaOS 6.4.4.6 or later versions.</p>	AP-Wireless	All AP platforms	ArubaOS 6.4.4.6	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
149594	<p>Symptom: <code>AMON_USER_INFO_MESSAGE</code> did not contain the user-agent information of the device. This issue is resolved by adding the MAC address and user-agent fields in <code>AMON_USER_FINGERPRINT_INFO_MESSAGE</code>.</p> <p>Scenario: This issue was observed in a master-local setup when AMP switched from SNMP to AMON and SNMP sent the user-agent string. This issue was observed in controllers running ArubaOS 6.4.3.9 or later versions.</p>	Base OS Security	All platforms	ArubaOS6.4.3.9	ArubaOS 6.5.2.0
149718 150678 150679 150683 151336 152025 152572 153743 154141 154574 155315 158126 158875 158970	<p>Symptom: There were do_ade crashes in many applications as well as unaligned access. This issue is resolved by increasing the branch history table's depth to ten.</p> <p>Scenario: This issue occurred because of a complex sequence of internal CPU events. This in turn caused incorrect instruction fetch and execution of these instructions. This issue was observed in 7000 Series and 7200 Series controllers running ArubaOS 6.4.2.15.</p>	Controller-Platform	7000 Series and 7200 Series controllers	ArubaOS 6.4.2.15	ArubaOS 6.5.2.0
150232	<p>Symptom: A controller crashed and rebooted. The The fix ensures that the controller does not crash when running the Veriwave throughput test.</p> <p>Scenario: This issue occurred when running the Veriwave throughput test on the controller. This issue was observed in 7005, 7008, and 7030 controllers running ArubaOS 6.4.4.9 or later versions.</p>	Controller-Datapath	7005, 7008, and 7030 controllers	ArubaOS 6.4.4.9	ArubaOS 6.5.2.0
150245	<p>Symptom: The <code>show user essid</code> command failed to execute. The fix ensures that the command executes successfully.</p> <p>Scenario: This issue occurred when the ESSID contained one or more space characters. This issue was observed in controllers running ArubaOS 6.4.3.9.</p>	Base OS Security	All platforms	ArubaOS 6.4.3.9	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
150861	<p>Symptom: A controller displayed the Error, cert manager service is busy or not available for user message. Improvements in handling the expired certificate resolves this issue.</p> <p>Scenario: This issue occurred in one of the following scenarios:</p> <ul style="list-style-type: none"> ■ A user attempted to map a new certificate to an existing management user whose certificate had expired. ■ A user attempted to delete an existing management user whose certificate had expired. <p>This issue was observed in controllers running ArubaOS 6.4.x or ArubaOS 6.5.x.</p>	Certificate Manager	All platforms	ArubaOS 6.4.4.8	ArubaOS 6.5.2.0
151105 151106	<p>Symptom: Some APs did not communicate with a Meridian server. The fix ensures that the APs work as expected and communicate with a Meridian server.</p> <p>Scenario: This issue was observed in AP-215 access points running ArubaOS 6.4.4.8.</p>	Bluetooth Low Energy	AP-215 access points	ArubaOS 6.4.4.8	ArubaOS 6.5.2.0
151310 158038	<p>Symptom: An AP rebooted unexpectedly due to low memory. The fix ensures that the debugging messages are not flooding the memory.</p> <p>Scenario: This issue occurred as a flood of debugging messages interrupted the kernel panic, which resulted in resetting the watchdog. This issue was observed in 310 Series, 320 Series, and 330 Series access points running ArubaOS 6.5.0.2 or later versions.</p>	AP-Platform	310 Series, 320 Series, and 330 Series access points	ArubaOS 6.5.0.2	ArubaOS 6.5.2.0
151565	<p>Symptom: The DHCP request packets were entering the firewall of the controller from RAP. This issue is resolved by ensuring that the AP's DHCP requests are not encrypted.</p> <p>Scenario: This issue occurred when an AP sent encrypted DHCP request packets with the DHCP server as the destination. This issue was observed in controllers running ArubaOS 6.3.1.22 or later versions.</p>	Remote AP	All platforms	ArubaOS 6.3.1.22	ArubaOS 6.5.2.0
151579	<p>Symptom: Smart Configuration page was not responding after multiple static routes were added on a branch configuration. This issue is resolved by enabling CLI pagination support for branch configuration.</p> <p>Scenario: This issue occurred when the size of the group configuration exceeded 40K. This issue was observed in branch controllers running ArubaOS 6.4.x and 6.5.x versions.</p>	Branch office Controller	All platforms	ArubaOS 6.5.0.1	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
151605 152410	<p>Symptom: A client failed to pass traffic. The fix ensures that the client can pass traffic.</p> <p>Scenario: This issue occurred when a client sent an IP packet before the DHCP packet. This issue was observed in controllers running ArubaOS 6.4.4.6.</p>	Base OS Security	All platforms	ArubaOS 6.4.4.6	ArubaOS 6.5.2.0
151855	<p>Symptom: Some APs stopped responding and rebooted unexpectedly. The log file listed the reason for the event as Unable to get IP address using DHCP after 10 tries, total DHCP retry:10 or DHCP timed out. Improvements in the AP memory management resolves this issue.</p> <p>Scenario: This issue was observed in 90 Series, 110 Series, RAP-108, RAP-109, or RAP-3WN test access points running ArubaOS 6.4.4.9.</p>	AP-Platform	90 Series, 110 Series, RAP-108, RAP-109, or RAP-3WN test access points	ArubaOS 6.4.4.9	ArubaOS 6.5.2.0
151995	<p>Symptom: The AP crashed and rebooted unexpectedly. The log for this event listed the reason as Reboot caused by kernel panic: Fatal exception. Improvements to the wireless driver resolved the issue.</p> <p>Scenario: This issue occurred due to high CPU and memory utilization. This issue was observed in APs running ArubaOS 6.4.4.8 or later versions.</p>	Wi-Fi Driver	All platforms	ArubaOS 6.4.4.8	ArubaOS 6.5.2.0
152040	<p>Symptom: The AP crashed and rebooted unexpectedly. The log for this event listed the reason as Reboot caused by kernel panic: Fatal exception. The fix ensure that the race condition is prevented.</p> <p>Scenario: This issue occurred because of a race condition when scan table entries were getting updated. This issue was observed in AP-325 access points running ArubaOS 6.5.1.0 or later versions.</p>	AP-Platform	AP-325 access points	ArubaOS 6.5.1.0	ArubaOS 6.5.2.0
152332	<p>Symptom: A blank image was displayed on the logon wait screen before the user was redirected to the captive portal page. The fix ensures that the user is redirected without any delay and the captive portal page appears correctly.</p> <p>Scenario: This issue occurred when the logon-wait cpu-threshold parameter was configured and the CPU utilization was high. As a result, HTTPD returned a transitional HTML page before redirecting to the captive portal page.</p>	Web Server	All platforms	ArubaOS 6.4.4.9	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
152467	<p>Symptom: AP-305 crashed and rebooted unexpectedly. The log for this event listed the reason as, kernel panic: soft lockup: hung tasks. The fix ensures that the AP does not crash.</p> <p>Scenario: This issue occurred when the mac-address-and-dhcp-options parameter was configured and the DHCP packet was incorrectly delivered to the DNS server. This issue was observed in AP-305 access points running ArubaOS 6.5.1.0 or later versions.</p>	AP-Platform	AP-305 access points	ArubaOS 6.5.1.0	ArubaOS 6.5.2.0
152602 154513	<p>Symptom: The master controller failed to delete the stale route entries of the branch office controller on the master controller. When you attempted to manually delete an entry, the controller did not delete the entry and displayed the following error message: ERROR: Cannot Delete Static Route. The fix ensures that the master controller deletes the stale route entries of the branch office controller when you change the VLAN IP address of the branch office controller.</p> <p>Scenario: This issue occurred when you change the VLAN IP address of the branch office controller and uploaded an updated CSV file (static IP address template) on the master controller. This triggered a reboot of the branch office controller but failed to delete the stale route entries from the master controller. This issue was observed in a master-branch office controller deployment with controllers running ArubaOS 6.5.1.1 or later versions.</p>	Branch Office Controller	All platforms	ArubaOS 6.5.1.1	ArubaOS 6.5.2.0
152665	<p>Symptom: 7210 controller crashed unexpectedly on the FPCLI module. The fix ensures that the controller works as expected.</p> <p>Scenario: This issue was observed in a master-standby topology with 7210 controllers running ArubaOS 6.4.4.9 or later versions.</p>	Controller-Platform	7210 controllers	ArubaOS 6.4.4.9	ArubaOS 6.5.2.0
152672	<p>Symptom: An AP generated multiple asap_voip_log: netif_rx to stm failedwith ret : 1 messages. The fix ensures that these messages are not printed in the log files.</p> <p>Scenario: This issue occurred when an AP generated unwanted log messages. This issue was observed in access points running ArubaOS 6.4.4.10.</p>	UCC	All AP platforms	ArubaOS 6.4.4.10	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
152688	<p>Symptom: Windows clients lost connectivity when they roamed to a different L3 cluster. The fix ensures the client is not disconnected when roaming from one cluster to another.</p> <p>Scenario: This issue was observed in access points running ArubaOS 6.4.2.6.</p>	L3 Mobility	All platforms	ArubaOS 6.4.2.6	ArubaOS 6.5.2.0
152740 154234	<p>Symptom: An increase in the memory consumption of the authentication process was observed when 802.11r clients were connected to the network. The fix ensures that when a user entry times out or is deleted, the neighbor entry list and the data associated with the user is deleted to avoid memory leak.</p> <p>Scenario: The neighbor list entry associated with the roaming user was not released when the user entry timed out or was deleted. This resulted in a memory leak of the authentication process in the controller. This issue was observed in 7220 controllers running ArubaOS 6.4.3.10.</p>	Base OS Security	7220 controllers	ArubaOS 6.4.3.10	ArubaOS 6.5.2.0
152890 153324	<p>Symptom: A controller stopped responding and rebooted. The log file for the event listed the reason as Datapath timeout (SOS Assert) (Intent:cause:register 54:86:50:2). Updating the SDK to the latest version resolved the issue.</p> <p>Scenario: This issue occurred when the WebCC feature was enabled on the controller. This issue was observed in controllers running ArubaOS 6.5.0.2 or later versions.</p>	Controller-Datapath	All platforms	ArubaOS 6.5.0.2	ArubaOS 6.5.2.0
153011 153017	<p>Symptom:An AP-125 access point crashed. This issue is resolved by incorporating code changes in the Ethernet driver.</p> <p>Scenario: This issue was observed in AP-125 access points running ArubaOS 6.4.4.10.</p>	AP-Wireless	AP-125 access points	ArubaOS 6.4.4.10	ArubaOS 6.5.2.0
153073	<p>Symptom: The Layer 2 (L2) GRE tunnel inside IPsec failed. This issue is resolved by resetting the packet VLAN after GRE encapsulation. Doing so ensures that the inner payload VLAN does not get applied to the outer GRE packet.</p> <p>Scenario: The issue occurred when L2 GRE configuration with tunnel VLAN having PBR rules was configured. This caused the payload VLAN getting applied to encapsulated GRE packets. This issue was observed in all controllers running ArubaOS 6.4.3.x or later versions.</p>	GRE	All platforms	ArubaOS 6.4.4.9	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
153216 153217	<p>Symptom: Memory leak in the auth process caused a controller to go out of memory. This resulted in multiple processes getting killed. This issue is resolved by making the RADIUS server drop the RADIUS response packet that has more than one RADIUS-state attributes.</p> <p>Scenario: This issue occurred when the AAA server responded with more than one RADIUS-state attributes in the RADIUS packets. This did not comply with RFC 2865. This issue was observed in all platforms running ArubaOS 6.3.x, ArubaOS 6.4.x, or ArubaOS 6.5.x.</p>	Base OS Security	All platforms	ArubaOS 6.4.3.6	ArubaOS 6.5.2.0
153222	<p>Symptom: AP-324 and AP-325 access points rebooted and the log files listed the reason as kernel panic: softlockup: hung tasks. This issue is resolved by removing the station device.</p> <p>Scenario: This issue was observed in AP-324 and AP-325 access points connected to controllers running ArubaOS 6.5.1.</p>	ARM	AP-324 and AP-325 access points	ArubaOS 6.5.1	ArubaOS 6.5.2.0
153227	<p>Symptom: Users were unable to configure an ESSID in the Configuration > Wizards page. This issue is resolved by updating the ESSID value for decrypt tunnel and bridge mode and allowing ESSID configuration for all modes.</p> <p>Scenario: This issue occurred when users tried to configure an ESSID through the WebUI with the forward mode set to decrypt tunnel or bridge mode. This issue was observed in controllers running ArubaOS 6.5.0.2.</p>	ARM	All platforms	ArubaOS 6.5.0.2	ArubaOS 6.5.2.0
153463	<p>Symptom: The AP channel utilization graph showed multiple breaks and was incomplete. The fix ensures that the AP channel utilization graph shows continuous and complete channel utilization.</p> <p>Scenario: This issue was observed in controllers running ArubaOS 6.4.3.10.</p>	AP-Wireless	All platforms	ArubaOS 6.4.3.10	ArubaOS 6.5.2.0
153576	<p>Symptom: ARM was changing channels frequently. The fix ensures that ARM does not change channels frequently.</p> <p>Scenario: This issue was caused by a missing software logic. This issue was observed in access points connected to controllers running ArubaOS 6.5.0.0.</p>	ARM	All platforms	ArubaOS 6.5.0.0	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
153824	<p>Symptom: Data was not transmitted when static IPsec routing with ip-to-ip IPsec tunnel was enabled. This issue is fixed by ensuring that the correct flag is used while installing route cache entry.</p> <p>Scenario: This issue occurred when the route cache entry was installed with the wrong flag. This issue was observed on controllers running ArubaOS 6.4.4.10.</p>	IPsec	All platforms	ArubaOS 6.4.4.10	ArubaOS 6.5.2.0
153951 157497	<p>Symptom: Datapath next hop was null. This issue is resolved by making sure that the incoming SPI and the SPI negotiated with the PAN Global Protect (PANGP) Gateway match.</p> <p>Scenario: This issue occurred because of incorrect modifications on incoming SPI values during decryption. This caused IP health check failure and the next hop null. This issues was observed in 7005controller running ArubaOS 6.5.x, in a Stand-alone topology.</p>	Base OS Security	All platforms	ArubaOS 6.5.0.3	ArubaOS 6.5.2.0
154065	<p>Symptom: Users were unable to access the internet periodically. This issue is resolved by changing the threshold for dropping packets from 8MB to 4MB.</p> <p>Scenario: . This issue occurred when the system dropped downstream packets to avoid an out of memory issue as the available system memory was between 4MB - 8MB. This issue was observed in AP-205 access points and is not limited to any software version or controller model.</p>	Datapath/Firewall	All platforms	ArubaOS 6.4.4.8	ArubaOS 6.5.2.0
154132	<p>Symptom: Clients are unable to associate with APs. The fix ensures that the AP rejects HA configuration if the AP is unable to connect to LMS.</p> <p>Scenario: This issue occurred when an AP accepted HA configuration although it had lost connectivity to the LMS. This issue was observed in APs connected to controllers running ArubaOS 6.4.4.10.</p>	AP-Wireless	All platforms	ArubaOS 6.4.4.10	ArubaOS 6.5.2.0
154147	<p>Symptom: A client failed to establish an IKE VPN connection over an existing IPsec/L2TP VPN connection. This issue is resolved by adding an exception for the IKE traffic coming as L2TP traffic and by allowing the encryption of this IKE traffic in transport mode IPsec tunnel.</p> <p>Scenario: This issue occurred because IKE traffic encryption over transport mode IPsec tunnel was blocked. This also blocked the IKE traffic coming into the L2TP tunnel.</p>	IPsec	All platforms	ArubaOS 6.4.4.9	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
154245	<p>Symptom: The web content classification was incorrect for some sites. Updating the SDK to the latest version resolves this issue.</p> <p>Scenario: This issue was observed in controllers running ArubaOS 6.4.x and ArubaOS 6.5.x.</p>	AppRF	All platforms	ArubaOS 6.4.4.0	ArubaOS 6.5.2.0
154291	<p>Symptom: Although the user completed Captive Portal authentication and the appropriate role was set in the user table, web auth disabled message was displayed when the user tried to login again. The fix ensures that the authentication and user tables are synchronized.</p> <p>Scenario: When the user logged in again, MAC authentication failed. The user was deauthenticated from the L3 role and placed in pre-auth role as the authentication and user tables were not synchronized. This issue was observed in controllers running ArubaOS 6.3.1.23.</p>	Base OS Security	All platforms	ArubaOS 6.3.1.23	ArubaOS 6.5.2.0
154422	<p>Symptom: Clients failed to establish a VPN connection using L2TP over IPsec. The fix ensures that the clients can successfully establish a VPN connection when they are behind a NAT device.</p> <p>Scenario: This issue occurred when the clients were behind a NAT device. This issue was observed in controllers running ArubaOS 6.5.0.3 or later versions.</p>	L2TP	All platforms	ArubaOS 6.5.0.3	ArubaOS 6.5.2.0
154443	<p>Symptom: A user was stuck in the machine authentication role after an 802.1X authentication. The fix ensures that the user role is updated in the AP datapath.</p> <p>Scenario: This issue occurred when a user attempted multiple L2 authentications in split-tunnel forwarding mode and the user role was not updated in the AP datapath. This issue was observed in a master-local deployment with controllers running ArubaOS 6.4.4.10.</p>	Base OS Security	All platforms	ArubaOS 6.4.4.10	ArubaOS 6.5.2.0
154483	<p>Symptom: A controller stopped responding and rebooted. The log file for the event listed the reason as isakmpd and datapath timeout. This issue is resolved by restricting the deletion of a CA certificate if it is configured in group certificate.</p> <p>Scenario: This issue was triggered when you delete the global CA certificate from ISAKMP which is referenced in the group certificate. This issue was observed in controllers running ArubaOS 6.5.0.2 or later versions.</p>	IPsec	All platforms	ArubaOS 6.5.0.2	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
154487	<p>Symptom: The FPCLI process crashed when the show user authentication-method stateful-dot1x command was executed. This issue is resolved by initializing the MAC address to NULL, if there is no entry made by the user.</p> <p>Scenario: This issue occurred when the user did not specify the MAC address when the show user authentication-method stateful-dot1x command was executed. This issue was observed in 7240 controllers running ArubaOS 6.4.2.16, in a master-local topology.</p>	Base OS Security	7240 controllers	ArubaOS 6.4.2.16	ArubaOS 6.5.2.0
154507	<p>Symptom: A controller redirected to the wrong URL. The fix ensures that the controller redirects to the correct URL.</p> <p>Scenario: This issue was observed in controllers running ArubaOS 6.5.1.0.</p>	OEM	All platforms	ArubaOS 6.5.1.0	ArubaOS 6.5.2.0
154533	<p>Symptom: An AirGroup user was not able to see an AirGroup server. The fix ensures that an AirGroup user is able to see an AirGroup server.</p> <p>Scenario: This issue occurred when an AirGroup user logged in with the domain name but the username was stored without stripping the domain name. This issue was observed in controllers running ArubaOS 6.4.x or ArubaOS 6.5.x with ClearPass Policy Manager.</p>	Controller-Platform	7240controllers	ArubaOS 6.4.3.0	ArubaOS 6.5.2.0
154827 155214	<p>Symptom: When the show datapath dns-id-map command was executed, the format of the IPv6 addresses listed were incorrect. This issue is resolved by modifying the mobility packets of the DNS list.</p> <p>Scenario: This issue occurred when the DNS packets contained AAA records for IPv6 address. This issue was observed in APs running ArubaOS 6.5.1.0.</p>	IPv6	All platforms	ArubaOS 6.5.1.0	ArubaOS 6.5.2.0
154882	<p>Symptom: AP-335 access point crashed and rebooted unexpectedly. The log for this event listed the reason as, Kernel panic - not syncing Fatal Exception in Interrupt. Improvements to the ethernet driver resolved the issue.</p> <p>Scenario: This issue was observed in AP-335 access points running ArubaOS 6.5.0.3 and later versions.</p>	AP-Datapath	AP-335 access points	ArubaOS 6.5.0.3	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
154915 156084	<p>Symptom: AP crashed and rebooted. The fix ensures that the AP does not crash when a wireless client tries to establish a connection to its BSS ID.</p> <p>Scenario: AP crashed when a wireless client tried to establish a connection to its BSS ID. This issue was observed in 300 Series, 310 Series, 320 Series, and 330 Series access points running ArubaOS 6.5.2.0.</p>	AP-Wireless	300 Series, 310 Series, 320 Series, and 330 Series access points	ArubaOS 6.5.2.0	ArubaOS 6.5.2.0
155038	<p>Symptom: The TACACS accounting configuration was deleted. The fix ensures that the TACACS accounting configuration is retained after upgrading ArubaOS.</p> <p>Scenario: This issue occurred after upgrading a controller from ArubaOS 6.4.2.x to ArubaOS 6.4.3.x or later versions.</p>	Base OS Security	All platforms	ArubaOS 6.4.4.11	ArubaOS 6.5.2.0
155081	<p>Symptom: The SNMP process displayed an error - OID not increasing, when clients had a MAC address ending with FF. The fix ensures that the packets of clients having MAC address ending with FF are forwarded to the next node.</p> <p>Scenario: This issue was observed when the SNMP process used MAC address plus 1 and VLAN to search for the node. When the client had a MAC address ending with FF, the SNMP process used the MAC address ending with FF and VLAN to search for the next node, which resulted in an infinite loop. This issue was observed in access points running ArubaOS 6.4.2.6.</p>	SNMP	All platforms	ArubaOS 6.4.2.6	ArubaOS 6.5.2.0
155090 156580	<p>Symptom: The mdNS process in controllers crashed because of specific packets coming from the Cisco switch. This issue is resolved by adding the required protection to prevent any null access.</p> <p>Scenario: This issue occurred when AirGroup was enabled on the controllers and switches. However, specific switches (Cisco) replaced the MAC address of the original packets with their own MAC address and sent them to the controller. This issue was observed in 7220 controllers running ArubaOS 6.4.4.11.</p>	AirGroup	All platforms	ArubaOS 6.4.4.11	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
155215	<p>Symptom: A user could not access the RAP console page. The fix ensures that the user can access the RAP console page.</p> <p>Scenario: This issue occurred when a user was in bridge-forwarding mode and attempted to access the RAP console page. This issue was observed in RAPs running ArubaOS 6.4.3.x, ArubaOS 6.4.4.x, or ArubaOS 6.5.1.x.</p>	AP Datapath	All platforms	ArubaOS 6.4.4.11	ArubaOS 6.5.2.0
155419	<p>Symptom: A controller rebooted and log files listed the reason as Nanny rebooted machine - fpapps process failed. The issue is resolved by making changes in the isakmpd process.</p> <p>Scenario: This issue was caused by a memory leak that occurred due to a certificate mismatch when APs tried to establish a tunnel. This issue was observed in controllers running ArubaOS 6.4.3.6.</p>	Controller-Platform	All platforms	ArubaOS 6.4.3.6	ArubaOS 6.5.2.0
155425	<p>Symptom: Auto Sign-On between a controller and ClearPass Policy Manager failed. The fix ensures that Auto Sign-On succeeds.</p> <p>Scenario: This issue occurred when the length of a username exceeded 25 characters. This issue was observed in controllers running ArubaOS 6.4.4.11.</p>	BaseOS Security	All platforms	ArubaOS 6.4.4.11	ArubaOS 6.5.2.0
155459 156718 158140	<p>Symptom: An AP crashed unexpectedly. The fix ensures that the AP works as expected.</p> <p>Scenario: This issue was observed after configuring a deny-inter-user-bridging ACL. This issue was observed in AP-215 or AP-305 access points running ArubaOS 6.5.2.0.</p>	Datapath/Firewall	AP-215 and AP-305 access points	ArubaOS 6.5.2.0	ArubaOS 6.5.2.0
155672	<p>Symptom: When the snmpwalk command was executed, the output did not reflect the configured Link Aggregation Identifier. This issue is resolved by modifying the MIB value of the LinkAggregation interface to match the Port Channel Id.</p> <p>Scenario: This issue was observed in controllers running ArubaOS 6.4.4.9.</p>	SNMP	All platforms	ArubaOS 6.4.4.9	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
155685	<p>Symptom: A master controller crashed and rebooted unexpectedly. The log file for the event listed the reason as Nanny rebooted machine - fpapps process died (Intent:cause:register 34:86:50:2) and crashed on fpapps module. The fix ensures that the applications are valid DPI applications.</p> <p>Scenario: This issue occurred when the show datapath session dpi counters command was executed. This issue was observed in controllers running ArubaOS 6.4.3.7 or later versions.</p>	Controller-Platform	All platforms	ArubaOS 6.4.3.7	ArubaOS 6.5.2.0
155730	<p>Symptom: Client search based on the User Name field in the Monitoring > NETWORK > All WLAN Clients page of the WebUI failed to display correct results. The fix ensures that the client search from the WebUI works as expected.</p> <p>Scenario: This issue occurred when the user name of the client contained a special character such as /. This issue was observed in controllers running ArubaOS 6.4.4.10 or later versions.</p>	WebUI	All platforms	ArubaOS 6.4.4.10	ArubaOS 6.5.2.0
155750	<p>Symptom: The user roles went missing in a local controller. This issue is resolved by adding missing checks in handling Master-Master redundancy and license changes.</p> <p>Scenario: This issue occurred in a Master-Local or Master-Standby setup where Master had PEF license and Standby did not have PEF license. This issue was observed in all controllers running ArubaOS 6.4.x or later versions, in Master-Local or Master-Standby topology.</p>	Base OS Security	All platforms	ArubaOS 6.4.3.7	ArubaOS 6.5.2.0
155977	<p>Symptom: A controller prompted to reboot when a non-master VRRP instance was added. The fix ensures that the controller does not prompt to reboot when a non-master VRRP instance is added.</p> <p>Scenario: This issue occurred when the no shutdown command was executed after adding a non-master VRRP instance. This issue was observed in a master-standby topology with controllers running ArubaOS 6.3.1.18.</p>	VRRP	All platforms	ArubaOS 6.3.1.18	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
156586	<p>Symptom: When the VLAN of the server changed, the controller could not handle the DLNA update. This issue is resolved by sending wildcard query on the new VLAN.</p> <p>Scenario: This issue occurred when the final VLAN was not the default VLAN of the VAP. This resulted in the controller unable to learn DLNA from Chromecast. This issue was observed in 7200 Series controllers running ArubaOS 6.4.4.10.</p>	AirGroup	All platforms	ArubaOS 6.4.4.10	ArubaOS 6.5.2.0
156951	<p>Symptom: The show running-config command displayed extra spaces for IPv6-related ACLs, though the administrator configured the ACLs without any extra spaces. The fix ensures that the extra spaces are removed from the running configuration.</p> <p>Scenario: This issue was observed in controllers running ArubaOS 6.4.4.9 or later versions.</p>	Base OS Security	All platforms	ArubaOS 6.4.4.9	ArubaOS 6.5.2.0
157044	<p>Symptom: The controllers disclosed the SSH server version on performing a vulnerability scan. The fix ensures that the SSH server version is not disclosed.</p> <p>Scenario: This issue was not limited to any specific controller model or ArubaOS version.</p>	Base OS Security	All platforms	ArubaOS 6.4.2.10	ArubaOS 6.5.2.0
157056	<p>Symptom: A local controller did not generate a syslog message for a successful 802.1X authentication of a client. The fix ensures that the syslog message is generated for successful 802.1X client authentications.</p> <p>Scenario: This issue was observed in a master local setup running ArubaOS 6.4.4.10 or later versions.</p>	Base OS Security	All platforms	ArubaOS 6.4.4.10	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
157198	<p>Symptom: Controller was unable to send IP address as a calling station ID. This issue is resolved by:</p> <ul style="list-style-type: none"> ■ Changing the RADIUS attribute Calling-Station-Id based on the use-ip-for-calling-station parameter in RADIUS authentication server. ■ Adding Framed-IP-Address in the RADIUS packet. <p>Scenario: When a VIA client was configured to use IKEv2 EAP-pass-through, the following issues were observed in the RADIUS packets that were exchanged with an external authentication server:</p> <ul style="list-style-type: none"> ■ The Calling-Station-ID RADIUS-attribute was sent with zero-mac, although the use-ip-for-calling-station parameter was enabled in the RADIUS authentication server. ■ Framed-IP-Address RADIUS-attribute was not sent to the authentication server as its order in the sending-VP-list was after Message-Auth. <p>This issue was observed during VIA authentication when connection-profile was configured with IKEv2 and EAP-pass through. This issue was observed in controllers running ArubaOS 6.5.0.3.</p>	RADIUS	All platforms	ArubaOS 6.5.0.3	ArubaOS 6.5.2.0
157450	<p>Symptom: APs did not come up in 802.3at mode although the switch provided 25.5W power. This issue is resolved by null terminating the power strings.</p> <p>Scenario: This issue randomly occurred when APs were configured to send and receive power TLV in LLDP. This issue was observed in 330 Series access points running ArubaOS 6.5.0.x and ArubaOS 6.5.1.x versions.</p>	AP-Platform	330 Series access points	ArubaOS 6.5.0.0	ArubaOS 6.5.2.0
157610	<p>Symptom: While connecting to an external host using the ssh command on the controller, a random syntax error message was displayed. Improvements in handling special characters in the password field of the ssh command resolved this issue.</p> <p>Scenario: This issue occurred when the password for the host contained a special character such as &,*,(,), and ". This issue was observed in controllers running ArubaOS 6.5.0.0 or later versions.</p>	Controller-Platform	All platforms	ArubaOS 6.5.1.2	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
158031	<p>Symptom: The MobileIP process crashed on a controller. The fix ensures that the MobileIP process does not crash.</p> <p>Scenario: This issue was observed when router mobile was enabled on the controller in the following scenarios:</p> <ul style="list-style-type: none"> ■ When anchor tables were configured on the controller. ■ When the clients had static IP address. <p>This issue was observed in controllers running ArubaOS 6.4.3.4 or later versions.</p>	Mobility	All platforms	ArubaOS 6.4.3.11	ArubaOS 6.5.2.0
158229	<p>Symptom: A controller showed an error on boot after an upgrade. The log file listed the reason for this event as WARNING: Configuration upgrade failed. The fix ensure that the controller upgrade is successful.</p> <p>Scenario: This issue was seen when a controller was upgraded from ArubaOS 6.3 to ArubaOS 6.4.4.12. This issue was observed in controllers running ArubaOS 6.4.4.12.</p>	Base OS Security	All platforms	ArubaOS 6.4.4.12	ArubaOS 6.5.2.0
158368	<p>Symptom: Users were not able to an access point and the log file listed the reason as AP is resource constrained. This issue is resolved by removing stale entries.</p> <p>Scenario: This issue was caused by stale entries. This issue was observed in access points connected to a 7240 controller running ArubaOS 6.5.1.3.</p>	Base OS Security	All platforms	ArubaOS 6.5.1.3	ArubaOS 6.5.2.0

Table 2: Resolved Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version	Resolved in Version
158551	<p>Symptom: Memory leak in the auth process caused a controller to go out of memory. This issue is resolved by freeing the memory reserved to handle a response from the RADIUS server.</p> <p>Scenario: This issue was caused when memory allocated for a response was not freed. This issue was observed in controllers running ArubaOS 6.5.0.3.</p>	Base OS Security	All platforms	ArubaOS 6.5.0.3	ArubaOS 6.5.2.0
158580	<p>Symptom: The authentication process on the controller crashed. The fix ensures that the authentication process functions as expected.</p> <p>Scenario: This issue occurred when the MAC address of a client was processed using an incorrect format specifier. This issue was observed in controllers running ArubaOS 6.5.1.4 or later versions.</p>	Base OS Security	All platforms	ArubaOS 6.5.1.4	ArubaOS 6.5.2.0
159108 159268	<p>Symptom: An AP crashed unexpectedly. The CPU core was stuck and the AP remained in the AP boot state until reboot. Improvements in handling the internal watchdog resolves this issue.</p> <p>Scenario: This issue occurred when the internal watchdog in an AP was stuck during AP boot. This issue was observed in APs running ArubaOS 6.5.2.</p>	AP-Platform	All AP platforms	ArubaOS 6.5.2.0	ArubaOS 6.5.2.0

This chapter describes the known and outstanding issues identified in ArubaOS 6.5.2.0.

Table 3: *Known Issues in ArubaOS 6.5.2.0*

Bug ID	Description	Component	Platform	Reported Version
121019	<p>Symptom: A few wireless clients are marked as internal in the user-table and assume ap-role.</p> <p>Scenario: This issue occurs when some wireless clients are assigned with the commonly used nonpublic IP addresses such as 192.168.1.*. These IP addresses clash with the AP's IP address. This issue is observed in controllers running ArubaOS 6.4.2.5 in a master-standby topology.</p> <p>Workaround: Do not assign commonly used non-public IP-addresses to APs.</p>	Base OS Security	All platforms	ArubaOS 6.4.2.5
128448	<p>Symptom: A controller crashes and reboots unexpectedly.</p> <p>Scenario: After upgrading the controller from ArubaOS 6.3.1.2 to ArubaOS 6.4.4.1, the controller crashes while running some SNMPv3 queries if configured with VRRP. This issue is observed in 7240 controllers running ArubaOS 6.4.4.1.</p> <p>Workaround: None.</p>	Controller-Datapath	7240 controllers	ArubaOS 6.4.4.1
130274	<p>Symptom: Datapath timeout is observed when traffic passes through ports of a controller linked to a device with speed of 100 Mbps and half duplex.</p> <p>Scenario: This issue is observed in 7008 controllers running ArubaOS 6.5.0.0.</p> <p>Workaround: None.</p>	Controller-Datapath	7008 controllers	ArubaOS 6.5.0.0
133036	<p>Symptom: A controller encounters kernel panic.</p> <p>Scenario: This issue occurs when the USB reclassification happens many times, when a cellular modem—that is, modem models E3276 and E3372 (one that is not supported in ArubaOS 6.5.0.0)—is connected as uplink to the controller in addition to the wired uplink. This issue is not limited to any specific controller model or ArubaOS release version.</p> <p>Workaround: Either plug out and plug in the modem or reboot the controller.</p>	Controller-Platform	All platforms	ArubaOS 6.5.0.0

Table 3: *Known Issues in ArubaOS 6.5.2.0*

Bug ID	Description	Component	Platform	Reported Version
136329 138009	<p>Symptom: A 7220 controller (local) reboots because of datapath timeout.</p> <p>Scenario: This issue occurs after the local controller—supporting more than 1000 RAPs and 3000 wireless clients—is upgraded to ArubaOS 6.4.2.15. This issue is observed in 7220 controllers running ArubaOS 6.4.2.15 in a master-local topology.</p> <p>Workaround: None.</p>	Controller-Datapath	7220 controllers	ArubaOS 6.4.2.15
138224	<p>Symptom: A controller does not generate the syslog message 124821 when a Remote AP has loop on Ethernet ports.</p> <p>Scenario: This issue is observed in controllers running ArubaOS 6.3.1.16.</p> <p>Workaround: None.</p>	Remote Access Point	All platforms	ArubaOS 6.3.1.16
141285	<p>Symptom: The ports on a controller move to DOWN state unexpectedly.</p> <p>Scenario: This issue is observed in 7200 Series controllers running ArubaOS 6.5.0.0.</p> <p>Workaround: None.</p>	Controller-Platform	7200 Series controllers	ArubaOS 6.5.0.0
148053	<p>Symptom: A local controller reboots unexpectedly. The log file for the event lists the reason as Datapath timeout (SOS Assert) (Intent:cause:register 54:86:50:2).</p> <p>Scenario: This issue is observed in 7220 controllers running ArubaOS 6.4.4.9 in a master-local topology.</p> <p>Workaround: None.</p>	Controller-Datapath	7220 controllers	ArubaOS 6.4.4.9
148172	<p>Symptom: Users are unable to create VLANs as Trusted in a BOC interface.</p> <p>Scenario: This issue is observed in a master-branch controller deployment. This issue is persistent even after upgrading to ArubaOS 6.5.0.0.</p> <p>Workaround: None.</p>	WebUI	7200 Series controllers	ArubaOS 6.5.0.0
149431	<p>Symptom: Clients trying to access the Captive Portal page are redirected to the secure login page.</p> <p>Scenario: The WebUI shows that the default certificate is mapped for Captive Portal though the web-server profile in the CLI shows that custom certificate being mapped. This issue is observed in 7220 stand-alone controllers running ArubaOS 6.5.0.0.</p> <p>Workaround: Reconfigure the web-server profile for skype4b configuration by executing the web-skype4b-listen-port https 3999 command in the controller CLI.</p>	Captive Portal	7220 controllers	ArubaOS 6.5.0.0.

Table 3: Known Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version
152595	<p>Symptom: The datapath process in a controller crashes and the controller reboots unexpectedly. The log file lists the reason for the event as Datapath timeout (SOS Assert) (Intent:cause:register 54:86:50:2).</p> <p>Scenario: This issue is observed in 7210 controllers running ArubaOS 6.5.0.0.</p> <p>Workaround: None.</p>	Controller-Datapath	7210 controllers	ArubaOS 6.5.0.0
152602 154513	<p>Symptom: A master controller fails to delete the stale route entries of a branch office controller. When you attempt to manually delete an entry, the controller does not delete the entry and displays the ERROR: Cannot Delete Static Route error message.</p> <p>Scenario: This issue occurs when you change the VLAN IP address of the branch office controller and upload the updated CSV file (static IP address template) on the master controller. This triggers a reboot of the branch office controller but fails to delete the stale route entries from the master controller. This issue is observed in a master-branch office controller deployment with controllers running ArubaOS 6.5.1.1 or later versions.</p> <p>Workaround: None.</p>	Branch Office Controller	All platforms	ArubaOS 6.5.1.1
154286	<p>Symptom: Client loses connectivity randomly and is unable to pass traffic.</p> <p>Scenario: This issue is observed in master-standby topology with controllers running ArubaOS 6.4.4.9.</p> <p>Workaround: None.</p>	Controller-Datapath	All platforms	ArubaOS 6.4.4.9
154470	<p>Symptom: A user cannot upload a CSV file to a branch office controller using the WebUI or the CLI. The WebUI displays the Failed to query VLANS error and the CLI displays the Error occurred while executing CLI command: bulkeedit config-group SOHO-AMR-ShillerPark csv SOHO-AMR-ShillerPark.csv - Failed to query VLANS error.</p> <p>Scenario: This issue occurs when a user attempts to upload a CSV file to a branch office controller. This issue is observed in a branch office controller topology with 7210 controllers running ArubaOS 6.4.4.10.</p> <p>Workaround: None.</p>	Branch Controller	7210 controllers	ArubaOS 6.4.4.10
154625	<p>Symptom: There is a change in the VRRP state though there are no missed heartbeats.</p> <p>Scenario: This issue is observed when a standby controller inadvertently transitions to Master state due to delayed processing of VRRP advertisements from the master controller.</p> <p>Workaround: Disable debug logs and syslog server. Increase the advertisement interval.</p>	VRRP	All platforms	ArubaOS 6.5.0.3

Table 3: *Known Issues in ArubaOS 6.5.2.0*

Bug ID	Description	Component	Platform	Reported Version
155190	<p>Symptom: A controller does not identify certain models of HPE DAC cables of 1 m, 3 m, or 7 m; for example, J9281B, J9285B, or J9536A.</p> <p>Scenario: This issue is observed in 7210, 7220, 7240, or 7240XM controllers running ArubaOS 6.x versions.</p> <p>Workaround: None.</p>	Controller-Platform	7210, 7220, 7240, and 7240XM controllers	ArubaOS 6.4.3.9
155332	<p>Symptom: The number of DOWN APs in the Monitoring > Network Summary > WLAN Network Status page (in the Access Points > Down APs hyperlink) and that in the All Access Points page do not match.</p> <p>Scenario: This issue occurred when the user executed the command in the Master controller. This issue is observed in 7210 controllers deployed in Master-Local setup, running ArubaOS 6.4.4.11 version.</p> <p>Workaround:</p> <ul style="list-style-type: none"> ■ Use Dashboard in the WebUI to access the AP information. ■ Execute the show ap database-summary command or the show ap database status down command to display the correct number of DOWN APs. 	UI-Monitoring	7210 controllers	ArubaOS 6.4.4.11
156030	<p>Symptom: The datapath process in a controller crashes and the controller reboots unexpectedly. The log file lists the reason for the event as Datapath timeout (SOS Assert) (Intent:cause:register 54:86:0:2c).</p> <p>Scenario: This issue is observed in a master-standby topology with 7205 controllers running ArubaOS 6.5.0.3.</p> <p>Workaround: None.</p>	Controller-Datapath	7205 controllers	ArubaOS 6.5.0.3
156061 158728 159140	<p>Symptom: Clients are unable to get a DHCP IP and the datapath bridge counters shows high allocation failures.</p> <p>Scenario: This issue is observed when the user upgrades to ArubaOS 6.5.0.4. This issue is observed in 7240 controllers running ArubaOS 6.5.0.2.</p> <p>Workaround: Enable preserve VLAN.</p>	Controller-Datapath	7240 controllers	ArubaOS 6.5.0.2
156496	<p>Symptom: Some APs are randomly stuck in ID state when trying to establish standby tunnel with the master controller.</p> <p>Scenario: This issue occurs when the PAPI remote-IP hash table is full and hence does not allow to create new PAPI entries. This issue is observed in 7210 controller, which is deployed in Master-Local setup, running ArubaOS 6.4.4.11.</p> <p>Workaround: None. Reboot is required to clean up the hash table.</p>	Controller-Datapath	7210 controllers	ArubaOS 6.4.4.11

Table 3: *Known Issues in ArubaOS 6.5.2.0*

Bug ID	Description	Component	Platform	Reported Version
156660	<p>Symptom: The AP image preload operation fails when executed from a 7240 controller.</p> <p>Scenario: This issue is observed in 7240 controllers running ArubaOS 6.5.2.0.</p> <p>Workaround: Disable DPI using the no firewall dpi command and reboot the controller.</p>	Controller-Datapath	7240 controllers	ArubaOS 6.5.2.0
156878	<p>Symptom: WMS offloading does not work in controllers.</p> <p>Scenario: This issue occurs when snmp-server source controller-ip is configured in controllers. Even after pushing the Mobility Manager commands from the AirWave server, the Mobility Manager is not enabled. This issue is observed in all platforms running ArubaOS 6.x-FIPS version, in a Master-Local or Stand-alone topology.</p> <p>Workaround: Remove the snmp-server source controller-ip configuration in controllers.</p>	SNMP	All platforms	ArubaOS 6.4.3.7-FIPS
157661	<p>Symptom: SDR-based VLAN assignment does not work in a controller when 802.11R is enabled.</p> <p>Scenario: This issue occurs when a client roams between 802.11R enabled BSSIDs. This issue is observed in controllers running ArubaOS 6.4.3.7.</p> <p>Workaround: None.</p>	Role/VLAN Derivation	All platforms	ArubaOS 6.4.3.7
157662	<p>Symptom: A controller reboots unexpectedly. The log file for the event lists the reason as Datapath timeout (SOS Assert) (Intent:cause:register 54:86:0:2c).</p> <p>Scenario: This issue was observed in a standalone master controller running ArubaOS 6.4.4.8.</p> <p>Workaround: None.</p>	Controller-Datapath	All platforms	ArubaOS 6.4.4.8
157752	<p>Symptom: Viber application traffic is not denied by AppRF as expected.</p> <p>Scenario: This issue occurs when a Viber call is initiated from one of the clients from an external network. This issue is observed in a 7210 controller running ArubaOS 6.4.4.10</p> <p>Workaround: None.</p>	Controller-Datapath	All platforms	ArubaOS 6.4.4.10
158108	<p>Symptom: PPTP VPN does not work after upgrading from ArubaOS 6.4.4.10 to ArubaOS 6.5.0.3.</p> <p>Scenario: This issue was not specific to any controller model or ArubaOS version.</p> <p>Workaround: None.</p>	Remote Access VPN-PPTP	All platforms	ArubaOS 6.4.4.10

Table 3: Known Issues in ArubaOS 6.5.2.0

Bug ID	Description	Component	Platform	Reported Version
158110	<p>Symptom: The synchronization between a master and local controller fails randomly.</p> <p>Scenario: This issue is observed in a master-local-standby topology with controllers running ArubaOS 6.5.0.3.</p> <p>Workaround: None.</p>	IPSec	All platforms	ArubaOS 6.5.0.3
158252	<p>Symptom: Network advertisement (NA) packets sent from the router are modified by the controller.</p> <p>Scenario: When Neighbor Discovery (ND) proxy is used in case of bcmc-optimization, the route-cache entry is used to send a proxy NA. The ipv6 route-cache entry in datapath does not store the R-bit status, as a result the proxy ND does not have this bit set. This issue is observed in controllers running ArubaOS 6.5.0.3 in a in a master-standby topology.</p> <p>Workaround: Disable bcmc-optimization.</p>	IPv6	All platforms	ArubaOS 6.5.0.3
158409	<p>Symptom: Some APs fail to download the image from a 7240 controller operating in FIPS mode.</p> <p>Scenario: This issue is observed in 360 Series and AP-303H access points while downloading the image from a 7240 controller running ArubaOS 6.5.2.0-FIPS version.</p> <p>Workaround: Disable DPI using the no firewall dpi command and reboot the controller.</p>	Controller-Platform	7240 controllers	ArubaOS 6.5.2.0-FIPS
158448	<p>Symptom: An AP crashes unexpectedly.</p> <p>Scenario: This issue is observed in AP-103 access points running ArubaOS 6.5.0.0.</p> <p>Workaround: Disable bcmc-optimization.</p>	AP-Platform	AP-103 access points	ArubaOS 6.5.0.0
158842	<p>Symptom: The enet1 port of an AP shows OperState UP although the wired port was shut down in the enet1 profile.</p> <p>Scenario: This issue is observed in AP-225 access points running ArubaOS 6.4.3.9.</p> <p>Workaround: None.</p>	AP-Platform	AP-225 access points	ArubaOS 6.4.3.9
158872	<p>Symptom: The show iap table command output shows duplicate entries after a VRRP failover.</p> <p>Scenario: This issue is observed in a 7240 controller, which is deployed in a Master-Local topology, running ArubaOS 6.4.4.11.</p> <p>Workaround: None.</p>	VPN	All platforms	ArubaOS 6.4.4.11

Table 3: *Known Issues in ArubaOS 6.5.2.0*

Bug ID	Description	Component	Platform	Reported Version
158899	Symptom: An AP crashes unexpectedly. Scenario: This issue is observed in AP-103 access points running ArubaOS 6.5.0.0 Workaround: None.	AP-Wireless	AP-103 access points	ArubaOS 6.5.0.0
158901	Symptom: An AP crashes and reboots unexpectedly. Scenario: This issue is observed in AP-104 access points running ArubaOS 6.5.0.0 Workaround: None.	AP-Wireless	AP-104 access points	ArubaOS 6.5.0.0
158907	Symptom: An AP crashes and reboots unexpectedly. Scenario: This issue is observed in AP-115 access points running ArubaOS 6.5.0.0 Workaround: None.	AP-Wireless	AP-115 access points	ArubaOS 6.5.0.0
158965	Symptom: An AP crashes and reboots unexpectedly. The log file lists the reason for the event as Kernel panic - not syncing: Fatal exception in interrupt. Scenario: This issue is observed in AP-305 access points running ArubaOS 6.5.1.4 Workaround: None.	AP-Wireless	AP-305 access points	ArubaOS 6.5.1.4
158996	Symptom: An AP crashes and reboots unexpectedly.. Scenario: This issue is observed in AP-225 access points running ArubaOS 6.4.4.11 with BLE on USB. Workaround: None.	AP-Platform	AP-225 access points	ArubaOS 6.4.4.11
159125	Symptom: A mesh point crashes unexpectedly and recovers after a few minutes. Scenario: This issue is observed AP-274 access points which are configured as mesh points and run ArubaOS 6.4.3.11. Workaround: None.	AP-Wireless	7220 controllers	ArubaOS 6.4.3.11
159137	Symptom: An AP crashes and reboots unexpectedly. Scenario: This issue is observed in AP-104 access points running ArubaOS 6.5.0.0 Workaround: None.	AP-Wireless	AP-104 access points	ArubaOS 6.5.0.0

Table 3: *Known Issues in ArubaOS 6.5.2.0*

Bug ID	Description	Component	Platform	Reported Version
159212	<p>Symptom: The Dashboard > Access Points page in the WebUI shows the name of an AP as UNKNOWN.</p> <p>Scenario: This issue occurs after an AP failover. This issue is observed in controllers running ArubaOS 6.5.1.4.</p> <p>Workaround: None.</p>	WebUI	AP-104 access points	ArubaOS 6.5.1.4
159235	<p>Symptom: A controller goes offline in the AirWave server.</p> <p>Scenario: This issue occurs when the SNMP trap host is deleted in the controller and the controller shows offline in the AirWave server. This issue is observed in controllers running ArubaOS 6.4.4.9 or later version.</p> <p>Workaround: Configure the SNMPv3 user again using the snmp-server user "test" auth-prot sha ***** priv-prot AES ***** command.</p>	SNMP	All platforms	ArubaOS 6.4.4.9
159797 161170 161918 161997 162800 162816 162909	<p>Symptom: The internal controller module that manages AP management and user association processes stops responding.</p> <p>Scenario: This issue is observed in controllers running ArubaOS 6.5.2.0 connected to an ALE or AirWave management server.</p> <p>Workaround: Manually restart the module using process restart stm core command or disable the management server using the following commands:</p> <ul style="list-style-type: none"> ■ no mgmt-server type ale primary-server <primary-server-ip> ■ no mgmt-server type amp primary-server <primary-server-ip> <p>NOTE: By disabling the management server, the controller's communication with AirWave, ALE, and other applications that rely on AMON messages, is disabled.</p>	Station Management	All platforms	ArubaOS 6.5.2.0

Maximum Number of NAT Pools

A controller supports a maximum of 60 NAT pools.

This chapter details the software upgrade procedures. Aruba best practices recommend that you schedule a maintenance window for upgrading your controllers.



Read all the information in this chapter before upgrading your controller.

Topics in this chapter include:

- [Upgrade Caveats on page 45](#)
- [GRE Tunnel-Type Requirements on page 46](#)
- [Important Points to Remember and Best Practices on page 46](#)
- [Memory Requirements on page 47](#)
- [Backing up Critical Data on page 48](#)
- [Upgrading in a Multicontroller Network on page 49](#)
- [Installing the FIPS Version of ArubaOS 6.5.2.0 on page 49](#)
- [Upgrading to ArubaOS 6.5.2.0 on page 50](#)
- [Downgrading on page 54](#)
- [Before You Call Technical Support on page 56](#)

Upgrade Caveats

Before upgrading to this version of ArubaOS, take note of these known upgrade caveats.

- 120 Series access points, 600 Series, 3000 Series, M3, and 6000 controllers are not supported in ArubaOS 6.5.x. Do not upgrade to ArubaOS 6.5.x if your deployment contains a mix of these controllers in a master-local setup.
- If your controller is running ArubaOS 6.4.0.0 or later versions, do not use a Windows-based TFTP server to copy the ArubaOS image to the nonboot partition of the controller for upgrading or downgrading. Use FTP or SCP to copy the image.
- Starting from ArubaOS 6.4.x, you cannot create redundant firewall rules in a single ACL. ArubaOS will consider a rule redundant if the primary keys are the same. The primary key is made up of the following variables:
 - source IP or alias
 - destination IP or alias

- proto-port or service

If you are upgrading from ArubaOS 6.1 or earlier and your configuration contains an ACL with redundant firewall rules, upon upgrading, only the last rule will remain.

For example, in the following ACL, both ACE entries could not be configured in ArubaOS 6.4.x. When the second ACE is added, it overwrites the first.

```
(host) (config) #ip access-list session allowall-laptop
(host) (config-sess-allowall-laptop) #any any any permit time-range test_range
(host) (config-sess-allowall-laptop) #any any any deny
(host) (config-sess-allowall-laptop) #!
(host) (config) #end
(host) #show ip access-list allowall-laptop
```

```
ip access-list session allowall-laptop
allowall-laptop
-----
Priority      Source  Destination      Service Action  TimeRange
-----
1             any    any              any    deny
```

- When upgrading the software in a multicontroller network (one that uses two or more Aruba controllers), special care must be taken to upgrade all the controllers in the network and to upgrade them in the proper sequence. (See [Upgrading in a Multicontroller Network on page 49.](#))

GRE Tunnel-Type Requirements

This section describes the important points to remember when configuring an L2 GRE tunnel with respect to tunnel type:

- ArubaOS 6.5.2.0 continues to support L2 GRE tunnel type zero, but it is recommended to use a non-zero tunnel type.
- If both L2 and L3 tunnels are configured between endpoint devices, you must use a non-zero tunnel type for L2 GRE tunnels.

Important Points to Remember and Best Practices

Ensure a successful upgrade and optimize your upgrade procedure by taking the recommended actions provided in the following list. You should save this list for future use.

- Schedule the upgrade during a maintenance window and notify your community of the planned upgrade. This prevents users from being surprised by a brief wireless network outage during the upgrade.
- Avoid making any other changes to your network, such as configuration changes, hardware upgrades, or changes to the rest of the network during the upgrade. This simplifies troubleshooting.
- Know your network and verify the state of your network by answering the following questions:
 - How many APs are assigned to each controller? Verify this information by navigating to the **Monitoring > NETWORK > All Access Points** section of the WebUI, or by executing the **show ap active** and **show ap database** CLI commands.

- How are those APs discovering the controller (DNS, DHCP Option, Broadcast)?
- What version of ArubaOS is currently on the controller?
- Are all controllers in a master-local cluster running the same version of software?
- Which services are used on the controllers (employee wireless, guest access, remote AP, wireless voice)?
- Resolve any existing issues (consistent or intermittent) before you upgrade.
- If possible, use FTP to load software images to the controller. FTP is faster than TFTP and offers more resilience over slow links. If you must use TFTP, ensure the TFTP server can send over 30 MB of data.
- Always upgrade the non-boot partition first. If problems occur during the upgrade, you can restore the flash, and switch back to the boot partition. Upgrading the non-boot partition gives you a smoother downgrade path should it be required.
- Before you upgrade to this version of ArubaOS, assess your software license requirements and load any new or expanded licenses you may require. For a detailed description of these new license modules, refer to the “Software Licenses” chapter in the *ArubaOS 6.5.x User Guide*.

Memory Requirements

All Aruba controllers store critical configuration data on an onboard compact flash memory module. Ensure that there is always free flash space on the controller. Loading multiple large files such as JPEG images for RF Plan can consume flash space quickly. To maintain the reliability of your WLAN network, the following compact memory best practices are recommended:

- Confirm that there is at least 60 MB of free memory available for an upgrade using the WebUI, or execute the **show memory** command to confirm that there is at least 40 MB of free memory available for an upgrade using the CLI. Do not proceed unless this much free memory is available. To recover memory, reboot the controller. After the controller comes up, upgrade immediately.
- Confirm that there is at least 75 MB of flash space available for an upgrade using the WebUI, or execute the **show storage** command to confirm that there is at least 60 MB of flash space available for an upgrade using the CLI.



In certain situations, a reboot or a shutdown could cause the controller to lose the information stored in its compact flash card. To avoid such issues, it is recommended that you execute the **halt** command before power cycling.

If the output of the **show storage** command indicates that there is insufficient flash memory space, you must free up some used memory. Any controller logs, crash data, or flash backups should be copied to a location off the controller, then deleted from the controller to free up flash space. You can delete the following files from the controller to free up some memory before upgrading:

- **Crash Data:** Execute the **tar crash** command to compress crash files to a file named **crash.tar**. Use the procedures described in [Backing up Critical Data on page 48](#) to copy the **crash.tar** file to an external server, and then execute the **tar clean crash** command to delete the file from the controller.
- **Flash Backups:** Use the procedures described in [Backing up Critical Data on page 48](#) to back up the flash directory to a file named **flash.tar.gz**, and then execute the **tar clean flash** command to delete the file from the controller.

- **Log files:** Execute the **tar logs** command to compress log files to a file named **logs.tar**. Use the procedures described in [Backing up Critical Data on page 48](#) to copy the **logs.tar** file to an external server, and then execute the **tar clean logs** command to delete the file from the controller.

Backing up Critical Data

It is important to frequently back up all critical configuration data and files on the compact flash file system to an external server or mass storage device. At the very least, you should include the following files in these frequent backups:

- Configuration data
- WMS database
- Local user database
- Licensing database
- Floor plan JPEGs
- Custom captive portal pages
- X.509 certificates
- Controller Logs

Backing up and Restoring Compact Flash in the WebUI

The WebUI provides the easiest way to back up and restore the entire compact flash file system. The following steps describe how to back up and restore the compact flash file system using the WebUI on the controller:

1. Click the **Configuration** tab.
2. Click **Save Configuration** at the top of the page.
3. Navigate to the **Maintenance > File > Backup Flash** page.
4. Click **Create Backup** to back up the contents of the compact flash file system to the **flashbackup.tar.gz** file.
5. Click **Copy Backup** to copy the file to an external server.

You can later copy the backup file from the external server to the compact flash file system using the file utility in the **Maintenance > File > Copy Files** page.

6. To restore the backup file to the Compact Flash file system, navigate to the **Maintenance > File > Restore Flash** page and click **Restore**.

Backing up and Restoring Compact Flash in the CLI

The following steps describe the backup and restore procedure for the entire compact flash file system using the controller's command line:

1. Make sure you are in the **enable** mode in the controller CLI, and execute the following command:

```
(host) # write memory
```

2. Execute the **backup** command to back up the contents of the compact flash file system to the **flashbackup.tar.gz** file.


```
(host) # backup flash
Please wait while we tar relevant files from flash...
Please wait while we compress the tar file...
Checking for free space on flash...
Copying file to flash...
File flashback.tar.gz created successfully on flash.
```

3. Execute the **copy** command to transfer the backup flash file to an external server or storage device.

```
(host) copy flash: flashback.tar.gz ftp: <ftphost> <ftpusername> <ftpuserpassword> <remote directory>
(host) copy flash: flashback.tar.gz usb: partition <partition-number>
```

You can later transfer the backup flash file from the external server or storage device to the compact flash file system by executing the **copy** command.

```
(host) # copy tftp: <tftphost> <filename> flash: flashback.tar.gz
(host) # copy usb: partition <partition-number> <filename> flash: flashback.tar.gz
```

4. Execute the **restore** command to untar and extract the **flashbackup.tar.gz** file to the compact flash file system.

```
(host) # restore flash
```

Upgrading in a Multicontroller Network

In a multicontroller network (a network with two or more Aruba controllers), special care must be taken to upgrade all controllers based on the controller type (master or local). Be sure to back up all controllers being upgraded, as described in [Backing up Critical Data on page 48](#).



For proper operation, all controllers in the network must be upgraded with the same version of ArubaOS software. For redundant environments such as VRRP, the controllers should be of the same model.

To upgrade an existing multicontroller system to this version of ArubaOS:

1. Load the software image onto all controllers (including redundant master controllers).
2. If all the controllers cannot be upgraded with the same software image and rebooted simultaneously, use the following guidelines:
 - a. Upgrade the software image on all the controllers. Reboot the master controller. After the master controller completes rebooting, you can reboot the local controllers simultaneously.
 - b. Verify that the master and all local controllers are upgraded properly.

Installing the FIPS Version of ArubaOS 6.5.2.0

Download the FIPS version of the software from <https://support.arubanetworks.com>.

Instructions on Installing FIPS Software



Before you install a FIPS version of the software on a controller that is currently running a non-FIPS version of the software, follow the procedure below. If you are currently running a FIPS version of the software on the controller, you do not have to perform a **write erase** to reset the configuration as mentioned in step 2.

Follow the steps below to install the FIPS software on a controller that is currently running a non-FIPS version of the software:

1. Install the FIPS version of the software on the controller.
2. Execute the **write erase** command to reset the configuration to the factory default; otherwise, you cannot log in to the controller using the CLI or WebUI.
3. Reboot the controller by executing the **reload** command.

This is the only supported method of moving from non-FIPS software to FIPS software.

Upgrading to ArubaOS 6.5.2.0

The following sections provide the procedures for upgrading the controller to ArubaOS 6.5.2.0 by using the WebUI and the CLI.

Install Using the WebUI



Confirm that there is at least 60 MB of free memory and at least 75 MB of flash space available for an upgrade using the WebUI. For details, see [Memory Requirements on page 47](#).



When you navigate to the **Configuration** tab of the controller's WebUI, the controller may display the **Error getting information: command is not supported on this platform** message. This error occurs when you upgrade the controller from the WebUI and navigate to the **Configuration** tab as soon as the controller completes rebooting. This error is expected and disappears after clearing the Web browser cache.

Upgrading From an Older Version of ArubaOS

Before you begin, verify the version of ArubaOS currently running on your controller. If you are running one of the following versions of ArubaOS, you must download and upgrade to an interim version of ArubaOS before upgrading to ArubaOS 6.5.0.0.

- For controllers running ArubaOS 3.x versions earlier than ArubaOS 3.4.4.1, download the latest version of ArubaOS 3.4.5.x.
- For controllers running ArubaOS 3.x or those running ArubaOS 5.0.x versions earlier than ArubaOS 5.0.3.1, download and install the latest version of ArubaOS 5.0.4.x.
- For controllers running ArubaOS 6.0.0.0 or 6.0.0.1 versions, download and install the latest version of ArubaOS 6.0.1.x.

Follow step 2 to step 11 of the procedure described in [Upgrading From a Recent Version of ArubaOS on page 51](#) to install the interim version of ArubaOS, and then repeat steps 1 through 11 of the procedure to download and install ArubaOS 6.5.0.0.

Upgrading From a Recent Version of ArubaOS

The following steps describe the procedure to upgrade from one of these recent ArubaOS versions:

- ArubaOS 3.4.4.1 or later
- ArubaOS 5.0.3.1 or the latest version of ArubaOS 5.0.x
- ArubaOS 6.0.1.0 or later version of ArubaOS 6.x



When upgrading from an existing ArubaOS 6.4.x release, it is required to set AMON packet size manually to a desired value. However, the packet size is increased to 32K by default for fresh installations of ArubaOS 6.4.3.9.

Install the ArubaOS software image from a PC or workstation using the WebUI on the controller. You can also install the software image from a TFTP or FTP server using the same WebUI page.

1. Download ArubaOS 6.5.2.0 from the customer support site.
2. Upload the new software image(s) to a PC or workstation on your network.
3. Validate the SHA hash for a software image:
 - a. Download the **Aruba.sha256** file from the download directory.
 - b. To verify the image, load the image onto a Linux system and execute the **sha256sum <filename>** command or use a suitable tool for your operating system that can generate a **SHA256** hash of a file.
 - c. Verify that the output produced by this command matches the hash value found on the support site.



The ArubaOS image file is digitally signed, and is verified using RSA2048 certificates preloaded on the controller at the factory. Therefore, even if you do not manually verify the SHA hash of a software image, the controller will not load a corrupted image.

4. Log in to the ArubaOS WebUI from the PC or workstation.
5. Navigate to the **Maintenance > Controller > Image Management** page.
 - a. Select the **Local File** option.
 - b. Click **Browse** to navigate to the saved image file on your PC or workstation.
6. Select the downloaded image file.
7. Choose the nonboot partition from the **Partition to Upgrade** radio button.
8. Choose **Yes** in the **Reboot Controller After Upgrade** radio button to automatically reboot after upgrading. Choose **No**, if you do not want the controller to reboot immediately.



Upgrade will not take effect until you reboot the controller.

9. Choose **Yes** in the **Save Current Configuration Before Reboot** radio button.

10. Click **Upgrade**.

When the software image is uploaded to the controller, a popup window displays the **Changes were written to flash successfully** message.

11. Click **OK**.

If you chose to automatically reboot the controller in step 8, the reboot process starts automatically within a few seconds (unless you cancel it).

12. When the reboot process is complete, log in to the WebUI and navigate to the **Monitoring > NETWORK > All WLAN Controllers** page to verify the upgrade.

When your upgrade is complete, perform the following steps to verify that the controller is functioning as expected.

1. Log in to the WebUI to verify all your controllers are up after the reboot.
2. Navigate to the **Monitoring > NETWORK > Network Summary** page to determine if your APs are up and ready to accept clients. In addition, verify that the number of access points and clients are what you would expect.
3. Verify that the number of access points and clients are what you would expect.
4. Test a different type of client for each access method that you use and in different locations when possible.
5. Complete a backup of all critical configuration data and files on the compact flash file system to an external server or mass storage facility. See [Backing up Critical Data on page 48](#) for information on creating a backup. If the flash (Provisioning/Backup) image version string shows the letters *m*, for example, 3.3.2.11-rn-3.0, note those AP names and IP addresses.

Install Using the CLI



Confirm that there is at least 40 MB of free memory and at least 60 MB of flash space available for an upgrade using the CLI. For details, see [Memory Requirements on page 47](#).

Upgrading From an Older Version of ArubaOS

Before you begin, verify the version of ArubaOS currently running on your controller. For more information, see [Upgrading From an Older Version of ArubaOS on page 50](#).

Follow steps 2 through 7 of the procedure described in [Upgrading From a Recent Version of ArubaOS on page 52](#) to install the interim version of ArubaOS, and then repeat steps 1 through 7 of the procedure to download and install ArubaOS 6.5.0.0.

Upgrading From a Recent Version of ArubaOS

The following steps describe the procedure to upgrade from one of these recent ArubaOS versions:

- ArubaOS 3.4.4.1 or later
- ArubaOS 5.0.3.1 or the latest version of ArubaOS 5.0.x
- ArubaOS 6.0.1.0 or later version of ArubaOS 6.x

To install the ArubaOS software image from a PC or workstation using the CLI on the controller:

1. Download ArubaOS 6.5.2.0 from the customer support site.
2. Open an SSH session on your master (and local) controllers.
3. Execute the **ping** command to verify the network connection from the target controller to the SCP/FTP/TFTP server.

```
(host)# ping <ftphost>
```

or

```
(host)# ping <tftphost>
```

or

```
(host)# ping <scphost>
```

4. Execute the **show image version** command to check if the ArubaOS images are loaded on the controller's flash partitions. The partition number appears in the **Partition** row; **0:0** is partition 0, and **0:1** is partition 1. The active boot partition is marked as **Default boot**.
5. Execute the **copy** command to load the new image onto the nonboot partition.

```
(host)# copy ftp: <ftphost> <ftpusername> <image filename> system: partition <0|1>
```

or

```
(host)# copy tftp: <tftphost> <image filename> system: partition <0|1>
```

or

```
(host)# copy scp: <scphost> <scpusername> <image filename> system: partition <0|1>
```

or

```
(host)# copy usb: partition <partition-number> <image filename> system: partition <0|1>
```



The USB option is available on the 7000 Series and 7200 Series controllers.

6. Execute the **show image version** command to verify that the new image is loaded.
7. Reboot the controller.
8. Execute the **show version** command to verify that the upgrade is complete.

```
(host)# reload
```

```
(host)# show version
```

When your upgrade is complete, perform the following steps to verify that the controller is functioning as expected.

1. Log in to the CLI to verify that all your controllers are up after the reboot.
2. Execute the **show ap active** command to determine if your APs are up and ready to accept clients.

3. Execute the **show ap database** command to verify that the number of access points and clients are what you expected.
4. Test a different type of client for each access method that you use and in different locations when possible.
5. Complete a backup of all critical configuration data and files on the compact flash file system to an external server or mass storage facility. See [Backing up Critical Data on page 48](#) for information on creating a backup.

Downgrading

If necessary, you can return to your previous version of ArubaOS.



If you upgraded from ArubaOS 3.3.x to ArubaOS 5.0, the upgrade script encrypts the internal database. New entries created in ArubaOS 6.5.2.0 are lost after the downgrade (this warning does not apply to upgrades from ArubaOS 3.4.x to ArubaOS 6.1).

Database versions are not compatible between different ArubaOS releases.



If you do not downgrade to a previously saved pre-6.1 configuration, some parts of your deployment may not work as they previously did. For example, when downgrading from ArubaOS 6.5.2.0 to 5.0.3.2, changes made to WIPS in ArubaOS 6.x prevent the new predefined IDS profile assigned to an AP group from being recognized by the older version of ArubaOS. This unrecognized profile can prevent associated APs from coming up, and can trigger a profile error. These new IDS profiles begin with *ids-transitional* while older IDS profiles do not include *transitional*. If you have encountered this issue, execute the **show profile-errors** and **show ap-group** commands to view the IDS profile associated with the AP group.



When reverting the controller software, whenever possible, use the previous version of software known to be used on the system. Loading a release not previously confirmed to operate in your environment could result in an improper configuration.

Before You Begin

Before you reboot the controller with the preupgrade software version, you must perform the following steps:

1. Back up your controller. For details, see [Backing up Critical Data on page 48](#).
2. Verify that the control plane security is disabled.
3. Set the controller to boot with the previously saved pre-ArubaOS 6.5.2.0 configuration file.
4. Set the controller to boot from the system partition that contains the previously running ArubaOS image.
When you specify a boot partition (or copy an image file to a system partition), the software checks to ensure that the image is compatible with the configuration file used on the next controller reload. An error message is displayed if system boot parameters are set for incompatible image and configuration files.
5. After downgrading the software on the controller, perform the following steps:
 - Restore pre-ArubaOS 6.5.2.0 flash backup from the file stored on the controller. Do not restore the ArubaOS 6.5.2.0 flash backup file.

- You do not need to reimport the WMS database or RF Plan data. However, if you have added changes to RF Plan in ArubaOS 6.5.2.0, the changes do not appear in RF Plan in the downgraded ArubaOS version.
- If you installed any certificates while running ArubaOS 6.5.2.0, you need to reinstall the certificates in the downgraded ArubaOS version.

Downgrading Using the WebUI

The following section describes how to use the WebUI to downgrade the software on the controller.

1. If the saved preupgrade configuration file is on an external FTP/TFTP server, copy the file to the controller by navigating to the **Maintenance > File > Copy Files** page.
 - a. For **Source Selection**, select FTP/TFTP server, and enter the IP address of the FTP/TFTP server and the name of the preupgrade configuration file.
 - b. For **Destination Selection**, enter a file name (other than default.cfg) for Flash File System.
2. Set the controller to boot with your preupgrade configuration file by navigating to the **Maintenance > Controller > Boot Parameters** page.
 - a. Select the saved preupgrade configuration file from the **Configuration File** drop-down list.
 - b. Click **Apply**.
3. Determine the partition on which your previous software image is stored by navigating to the **Maintenance > Controller > Image Management** page. If there is no previous software image stored on your system partition, load it into the backup system partition (you cannot load a new image into the active system partition) by performing the following steps:
 - a. Enter the FTP/TFTP server address and image file name.
 - b. Select the backup system partition.
 - c. Click **Upgrade**.
4. Navigate to the **Maintenance > Controller > Boot Parameters** page.
 - a. Select the system partition that contains the preupgrade image file as the boot partition.
 - b. Click **Apply**.
5. Navigate to the **Maintenance > Controller > Reboot Controller** page. Click **Continue**. The controller reboots after the countdown period.
6. When the boot process is complete, verify that the controller is using the correct software by navigating to the **Maintenance > Controller > Image Management** page.

Downgrading Using the CLI

The following section describes how to use the CLI to downgrade the software on the controller.

1. If the saved preupgrade configuration file is on an external FTP/TFTP server, use the following command to copy it to the controller:

```
(host) # copy ftp: <ftphost> <ftpusername> <image filename> system: partition 1
```

or

```
(host) # copy tftp: <tftphost> <image filename> system: partition 1
```

2. Set the controller to boot with your preupgrade configuration file.

```
(host) # boot config-file <backup configuration filename>
```

3. Execute the **show image version** command to view the partition on which your previous software image is stored. You cannot load a new image into the active system partition (the default boot).

In the following example, partition 1, the backup system partition, contains the backup release ArubaOS 6.1.3.2. Partition 0, the default boot partition, contains the ArubaOS 6.5.2.0 image.

4. Set the backup system partition as the new boot partition.

```
(host) # boot system partition 1
```

5. Reboot the controller.

```
(host) # reload
```

6. When the boot process is complete, verify that the controller is using the correct software.

```
(host) # show image version
```

Before You Call Technical Support

Before you place a call to Technical Support, follow these steps:

1. Provide a detailed network topology (including all the devices in the network between the user and the Aruba controller with IP addresses and Interface numbers if possible).
2. Provide the wireless device's make and model number, OS version (including any service packs or patches), wireless Network Interface Card (NIC) make and model number, wireless NIC's driver date and version, and the wireless NIC's configuration.
3. Provide the controller logs and output of the **show tech-support** command via the WebUI Maintenance tab or via the CLI (**tar logs tech-support**).
4. Provide the syslog file of the controller at the time of the problem. Aruba strongly recommends that you consider adding a syslog server if you do not already have one to capture logs from the controller.
5. Let the support person know if this is a new or existing installation. This helps the support team to determine the troubleshooting approach, depending on whether you have an outage in a network that worked in the past, a network configuration that has never worked, or a brand new installation.
6. Let the support person know if there are any recent changes in your network (external to the Aruba controller) or any recent changes to your controller and/or AP configuration. If there was a configuration change, list the exact configuration steps and commands used.
7. Provide the date and time (if possible) of when the problem first occurred. If the problem is reproducible, list the exact steps taken to re-create the problem.
8. Provide any wired or wireless sniffer traces taken during the time of the problem.
9. Provide the controller site access information, if possible.

The following table provides a brief description of the terminology used in this guide.

3DES	Triple Data Encryption Standard. 3DES is a symmetric-key block cipher that applies the DES cipher algorithm three times to each data block.
3G	Third Generation of Wireless Mobile Telecommunications Technology. See W-CDMA.
3GPP	Third Generation Partnership Project. 3GPP is a collaborative project aimed at developing globally acceptable specifications for third generation mobile systems.
4G	Fourth Generation of Wireless Mobile Telecommunications Technology. See LTE.
802.11	802.11 is an evolving family of specifications for wireless LANs developed by a working group of the Institute of Electrical and Electronics Engineers (IEEE). 802.11 standards use the Ethernet protocol and Carrier Sense Multiple Access with collision avoidance (CSMA/CA) for path sharing.
802.11 bSec	802.11 bSec is an alternative to 802.11i. The difference between bSec and standard 802.11i is that bSec implements Suite B algorithms wherever possible. Notably, Advanced Encryption Standard-Counter with CBC-MAC is replaced by Advanced Encryption Standard - Galois/Counter Mode, and the Key Derivation Function (KDF) of 802.11i is upgraded to support SHA-256 and SHA-384.
802.11a	802.11a provides specifications for wireless systems. Networks using 802.11a operate at radio frequencies in the 5 GHz band. The specification uses a modulation scheme known as orthogonal frequency-division multiplexing (OFDM) that is especially well suited to use in office settings. The maximum data transfer rate is 54 Mbps.
802.11ac	802.11ac is a wireless networking standard in the 802.11 family that provides high-throughput WLANs on the 5 GHz band.
802.11b	802.11b is a WLAN standard often called Wi-Fi and is backward compatible with 802.11. Instead of the Phase-Shift Keying (PSK) modulation method used in 802.11 standards, 802.11b uses Complementary Code Keying (CCK) that allows higher data speeds and makes it less susceptible to multipath-propagation interference. 802.11b operates in the 2.4 GHz band and the maximum data transfer rate is 11 Mbps.
802.11d	802.11d is a wireless network communications specification for use in countries where systems using other standards in the 802.11 family are not allowed to operate. Configuration can be fine-tuned at the Media Access Control (MAC) layer level to comply with the rules of the country or district in which the network is to be used. Rules are subject to variation and include allowed frequencies, allowed power levels, and allowed signal bandwidth. 802.11d facilitates global roaming.
802.11e	802.11e is an enhancement to the 802.11a and 802.11b specifications that enhances the 802.11 Media Access Control layer with a coordinated Time Division Multiple Access (TDMA) construct. It adds error-correcting mechanisms for delay-sensitive applications such as voice and video. The 802.11e

specification provides seamless interoperability between business, home, and public environments such as airports and hotels, and offers all subscribers high-speed Internet access with full-motion video, high-fidelity audio, and VoIP.

802.11g

802.11g offers transmission over relatively short distances at up to 54 Mbps, compared with the 11 Mbps theoretical maximum of 802.11b standard. 802.11g employs Orthogonal Frequency Division Multiplexing (OFDM), the modulation scheme used in 802.11a, to obtain higher data speed. Computers or terminals set up for 802.11g can fall back to speed of 11 Mbps, so that 802.11b and 802.11g devices can be compatible within a single network.

802.11h

802.11h is intended to resolve interference issues introduced by the use of 802.11a in some locations, particularly with military Radar systems and medical devices. Dynamic Frequency Selection (DFS) detects the presence of other devices on a channel and automatically switches the network to another channel if and when such signals are detected. Transmit Power Control (TPC) reduces the radio frequency (RF) output power of each network transmitter to a level that minimizes the risk of interference.

802.11i

802.11i provides improved encryption for networks that use 802.11a, 802.11b, and 802.11g standards. It requires new encryption key protocols, known as Temporal Key Integrity Protocol (TKIP) and Advanced Encryption Standard (AES).

802.11j

802.11j is a proposed addition to the 802.11 family of standards that incorporates Japanese regulatory extensions to 802.11a; the main intent is to add channels in the radio frequency (RF) band of 4.9 GHz to 5.0 GHz.

802.11k

802.11k is an IEEE standard that enables APs and client devices to discover the best available radio resources for seamless BSS transition in a WLAN.

802.11m

802.11m is an Initiative to perform editorial maintenance, corrections, improvements, clarifications, and interpretations relevant to documentation for 802.11 family specifications.

802.11n

802.11n is a wireless networking standard to improve network throughput over the two previous standards, 802.11a and 802.11g. With 802.11n, there will be a significant increase in the maximum raw data rate from 54 Mbps to 600 Mbps with the use of four spatial streams at a channel width of 40 MHz.

802.11r

802.11r is an IEEE standard for enabling seamless BSS transitions in a WLAN. 802.11r standard is also referred to as Fast BSS transition.

802.11u

802.11u is an amendment to the IEEE 802.11 WLAN standards for connection to external networks using common wireless devices such as smartphones and tablet PCs. The 802.11u protocol provides wireless clients with a streamlined mechanism to discover and authenticate to suitable networks, and allows mobile users to roam between partner networks without additional authentication. An 802.11u-capable device supports the Passpoint technology from the Wi-Fi Alliance Hotspot 2.0 R2 Specification that simplifies and automates access to public Wi-Fi.

802.11v

802.11v is an IEEE standard that allows client devices to exchange information about the network topology and RF environment. This information is used for assigning best available radio resources for the client devices to provide seamless connectivity.

802.1Q

802.1Q is an IEEE standard that enables the use of VLANs on an Ethernet network. 802.1Q supports VLAN tagging.

802.1X

802.1X is an IEEE standard for port-based network access control designed to enhance 802.11 WLAN security. 802.1X provides an authentication framework that allows a user to be authenticated by a central authority.

802.3af

802.3af is an IEEE standard for Power over Ethernet (PoE) version that supplies up to 15.4W of DC power. See PoE.

802.3at

802.3at is an IEEE standard for PoE version that supplies up to 25.5W of DC power. See PoE+.

AAA

Authentication, Authorization, and Accounting. AAA is a security framework to authenticate users, authorize the type of access based on user credentials, and record authentication events and information about the network access and network resource consumption.

ABR

Area Border Router. ABR is used for establishing connection between the backbone networks and the Open Shortest Path First (OSPF) areas. ABR is located near the border of one or more OSPF areas.

AC

Access Category. As per the IEEE 802.11e standards, AC refers to various levels of traffic prioritization in Enhanced Distributed Channel Access (EDCA) operation mode. The WLAN applications prioritize traffic based on the Background, Best Effort, Video, and Voice access categories. AC can also refer to Alternating Current, a form of electric energy that flows when the appliances are plugged to a wall socket.

ACC

Advanced Cellular Coexistence. The ACC feature in APs enable WLANs to perform at peak efficiency by minimizing interference from 3G/4G/LTE networks, distributed antenna systems, and commercial small cell/femtocell equipment.

Access-Accept

Response from the RADIUS server indicating successful authentication and containing authorization information.

Access-Reject

Response from RADIUS server indicating that a user is not authorized.

Access-Request

RADIUS packet sent to a RADIUS server requesting authorization.

Accounting-Request

RADIUS packet type sent to a RADIUS server containing accounting summary information.

Accounting-Response

RADIUS packet sent by the RADIUS server to acknowledge receipt of an Accounting-Request.

ACE

Access Control Entry. ACE is an element in an ACL that includes access control information.

ACI

Adjacent Channel Interference. ACI refers to interference or interruptions detected on a broadcasting channel, caused by too much power on an adjacent channel in the spectrum.

ACL

Access Control List. ACL is a common way of restricting certain types of traffic on a physical port.

Active Directory

Microsoft Active Directory. The directory server that stores information about a variety of things, such as organizations, sites, systems, users, shares, and other network objects or components. It also provides authentication and authorization mechanisms, and a framework within which related services can be deployed.

ActiveSync

Mobile data synchronization app developed by Microsoft that allows a mobile device to be synchronized with either a desktop or a server running compatible software products.

ad hoc network

An ad hoc network is a network composed of individual devices communicating with each other directly. Many ad hoc networks are Local Area Networks (LANs) where computers or other devices are enabled to send data directly to one another rather than going through a centralized access point.

ADO

Active X Data Objects is a part of Microsoft Data Access Components (MDACs) that enables client applications to access data sources through an (Object Linking and Embedding Database) OLE DB provider. ADO supports key features for building client-server and Web-based applications.

ADP

Aruba Discovery Protocol. ADP is an Aruba proprietary Layer 2 protocol. It is used by the APs to obtain the IP address of the TFTP server from which it downloads the AP boot image.

AES

Advanced Encryption Standard. AES is an encryption standard used for encrypting and protecting electronic data. The AES encrypts and decrypts data in blocks of 128 bits (16 bytes), and can use keys of 128 bits, 192 bits, and 256 bits.

AIFSN

Arbitrary Inter-frame Space Number. AIFSN is set by the AP in beacon frames and probe responses. AIFS is a method of prioritizing a particular category of traffic over the other, for example prioritizing voice or video messages over email.

AirGroup

The application that allows the end users to register their personal mobile devices on a local network and define a group of friends or associates who are allowed to share them. AirGroup is primarily designed for colleges and other institutions. AirGroup uses zero configuration networking to allow Apple mobile devices, such as the AirPrint wireless printer service and the AirPlay mirroring service, to communicate over a complex access network topology.

AirWave Management Client

AirWave Management Client is a Windows software utility that enables client devices (such as a laptop) to act as passive RF sensors and augments the AirWave RAPIDS module.

ALE

Analytics and Location Engine. ALE gives visibility into everything the wireless network knows. This enables customers and partners to gain a wealth of information about the people on their premises. This can be very important for many different verticals and use cases. ALE includes a location engine that calculates associated and unassociated device location periodically using context streams, including RSSI readings, from WLAN controllers or Instant clusters.

ALG

Application Layer Gateway. ALG is a security component that manages application layer protocols such as SIP, FTP and so on.

AM

Air Monitor. AM is a mode of operation supported on wireless APs. When an AP operates in the Air Monitor mode, it enhances the wireless networks by collecting statistics, monitoring traffic, detecting intrusions, enforcing security policies, balancing wireless traffic load, self-healing coverage gaps, and more. However, clients cannot connect to APs operating in the AM mode.

AMON

Advanced Monitoring. AMON is used in Aruba WLAN deployments for improved network management, monitoring and diagnostic capabilities.

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- AMP**
AirWave Management Platform. AMP is a network management system for configuring, monitoring, and upgrading wired and wireless devices on your network.
- A-MPDU**
Aggregate MAC Protocol Data Unit. A-MPDU is a method of frame aggregation, where several MPDUs are combined into a single frame for transmission.
- A-MSDU**
Aggregate MAC Service Data Unit. A-MSDU is a structure containing multiple MSDUs, transported within a single (unfragmented) data MAC MPDU.
- ANQP**
Access Network Query Protocol. ANQP is a query and a response protocol for Wi-Fi hotspot services. ANQP includes information Elements (IEs) that can be sent from the AP to the client to identify the AP network and service provider. The IEs typically include information about the domain name of the AP operator, the IP addresses available at the AP, and information about potential roaming partners accessible through the AP. If the client responds with a request for a specific IE, the AP will send a Generic Advertisement Service (GAS) response frame with the configured ANQP IE information.
- ANSI**
American National Standards Institute. It refers to the ANSI compliance standards for products, systems, services, and processes.
- API**
Application Programming Interface. Refers to a set of functions, procedures, protocols, and tools that enable users to build application software.
- app**
Short form for application. It generally refers to the application that is downloaded and used on mobile devices.
- ARM**
Adaptive Radio Management. ARM dynamically monitors and adjusts the network to ensure that all users are allowed ready access. It enables full utilization of the available spectrum to support maximum number of users by intelligently choosing the best RF channel and transmit power for APs in their current RF environment.
- ARP**
Address Resolution Protocol. ARP is used for mapping IP network address to the hardware MAC address of a device.
- Aruba Activate**
Aruba Activate is a cloud-based service that helps provision your Aruba devices and maintain your inventory. Activate automates the provisioning process, allowing a single IT technician to easily and rapidly deploy devices throughout a distributed enterprise network.
- ASCII**
American Standard Code for Information Interchange. An ASCII code is a numerical representation of a character or an action.
- band**
Band refers to a specified range of frequencies of electromagnetic radiation.
- BGP**
Border Gateway Protocol. BGP is a routing protocol for exchanging data and information between different host gateways or autonomous systems on the Internet.
- BLE**
Bluetooth Low Energy. The BLE functionality is offered by Bluetooth® to enable devices to run for long durations with low power consumption.

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- BMC** Beacon Management Console. BMC manages and monitors beacons from the BLE devices. The BLE devices are used for location tracking and proximity detection.
- BPDU** Bridge Protocol Data Unit. A BPDU is a data message transmitted across a local area network to detect loops in network topologies.
- B-RAS** Broadband Remote Access Server. A B-RAS is a server that facilitates and converges traffic from multiple Internet traffic resources such as cable, DSL, Ethernet, or Broadband wireless.
- BRE** Basic Regular Expression. The BRE syntax standards designed by the IEEE provides extension to the traditional Simple Regular Expressions syntax and allows consistency between utility programs such as grep, sed, and awk.
- BSS** Basic Service Set. A BSS is a set of interconnected stations that can communicate with each other. BSS can be an independent BSS or infrastructure BSS. An independent BSS is an ad hoc network that does not include APs, whereas the infrastructure BSS consists of an AP and all its associated clients.
- BSSID** Basic Service Set Identifier. The BSSID identifies a particular BSS within an area. In infrastructure BSS networks, the BSSID is the MAC address of the AP. In independent BSS or ad hoc networks, the BSSID is generated randomly.
- BYOD** Bring Your Own Device. BYOD refers to the use of personal mobile devices within an enterprise network infrastructure.
- CA** Certificate Authority or Certification Authority. Entity in a public key infrastructure system that issues certificates to clients. A certificate signing request received by the CA is converted into a certificate when the CA adds a signature generated with a private key. See digital certificate.
- CAC** Call Admission Control. CAC regulates traffic volume in voice communications. CAC can also be used to ensure or maintain a certain level of audio quality in voice communications networks.
- CALEA** Communications Assistance for Law Enforcement Act. To comply with the CALEA specifications and to allow lawful interception of Internet traffic by the law enforcement and intelligence agencies, the telecommunications carriers and manufacturers of telecommunications equipment are required to modify and design their equipment, facilities, and services to ensure that they have built-in surveillance capabilities.
- Campus AP** Campus APs are used in private networks where APs connect over private links (LAN, WLAN, WAN or MPLS) and terminate directly on controllers. Campus APs are deployed as part of the indoor campus solution in enterprise office buildings, warehouses, hospitals, universities, and so on.
- captive portal** A captive portal is a web page that allows the users to authenticate and sign in before connecting to a public-access network. Captive portals are typically used by business centers, airports, hotel lobbies, coffee shops, and other venues that offer free Wi-Fi hotspots for the guest users.
- CCA** Clear Channel Assessment. In wireless networks, the CCA method detects if a channel is occupied or clear, and determines if the channel is available for data transmission.

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- CDP** Cisco Discovery Protocol. CDP is a proprietary Data Link Layer protocol developed by Cisco Systems. CDP runs on Cisco devices and enables networking applications to learn about the neighboring devices directly connected to the network.
- CDR** Call Detail Record. A CDR contains the details of a telephone or VoIP call, such as the origin and destination addresses of the call, the start time and end time of the call, any toll charges that were added through the network or charges for operator services, and so on.
- CEF** Common Event Format. The CEF is a standard for the interoperability of event or log-generating devices and applications. The standard syntax for CEF includes a prefix and a variable extension formatted as key-value pairs.
- CGI** Common Gateway Interface. CGI is a standard protocol for exchanging data between the web servers and executable programs running on a server to dynamically process web pages.
- CHAP** Challenge Handshake Authentication Protocol. CHAP is an authentication scheme used by PPP servers to validate the identity of remote clients.
- CIDR** Classless Inter-Domain Routing. CIDR is an IP standard for creating and allocating unique identifiers for networks and devices. The CIDR IP addressing scheme is used as a replacement for the older IP addressing scheme based on classes A, B, and C. With CIDR, a single IP address can be used to designate many unique IP addresses. A CIDR IP address ends with a slash followed by the IP network prefix, for example, 192.0.2.0/24.
- ClearPass** ClearPass is an access management system for creating and enforcing policies across a network to all devices and applications. The ClearPass integrated platform includes applications such as Policy Manager, Guest, Onboard, OnGuard, Insight, Profile, QuickConnect, and so on.
- ClearPass Guest** ClearPass Guest is a configurable ClearPass application for secure visitor network access management.
- ClearPass Policy Manager** ClearPass Policy Manager is a baseline platform for policy management, AAA, profiling, network access control, and reporting. With ClearPass Policy Manager, the network administrators can configure and manage secure network access that accommodates requirements across multiple locations and multivendor networks, regardless of device ownership and connection method.
- CLI** Command-Line Interface. A console interface with a command line shell that allows users to execute text input as commands and convert these commands to appropriate functions.
- CN** Common Name. CN is the primary name used to identify a certificate.
- CNA** Captive Network Assistant. CNA is a popup page shown when joining a network that has a captive portal.
- CoA** Change of Authorization. The RADIUS CoA is used in the AAA service framework to allow dynamic modification of the authenticated, authorized, and active subscriber sessions.
- CoS** Class of Service. CoS is used in data and voice protocols for classifying packets into different types of traffic (voice, video, or data) and setting a service priority. For example, voice traffic can be assigned a higher priority over email or HTTP traffic.

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- CPE** Customer Premises Equipment. It refers to any terminal or equipment located at the customer premises.
- CPsec** Control Plane Security. CPsec is a secure form of communication between a controller and APs to protect the control plane communications. This is performed by means of using public-key self-signed certificates created by each master controller.
- CPU** Central Processing Unit. A CPU is an electronic circuitry in a computer for processing instructions.
- CRC** Cyclic Redundancy Check. CRC is a data verification method for detecting errors in digital data during transmission, storage, or retrieval.
- CRL** Certificate Revocation List. CRL is a list of revoked certificates maintained by a certification authority.
- cryptobinding** Short for cryptographic binding. A procedure in a tunneled EAP method that binds together the tunnel protocol and the tunneled authentication methods, ensuring the relationship between a collection of data assets. Cryptographic binding focuses on protecting the server; mutual cryptographic binding protects both peer and server.
- CSA** Channel Switch Announcement. The CSA element enables an AP to advertise that it is switching to a new channel before it begins transmitting on that channel. This allows the clients, which support CSA, to transition to the new channel with minimal downtime.
- CSMA/CA** Carrier Sense Multiple Access / Collision Avoidance. CSMA/CA is a protocol for carrier transmission in networks using the 802.11 standard. CSMA/CA aims to prevent collisions by listening to the broadcasting nodes, and informing devices not to transmit any data until the broadcasting channel is free.
- CSR** Certificate Signing Request. In PKI systems, a CSR is a message sent from an applicant to a CA to apply for a digital identity certificate.
- CSV** Comma-Separated Values. A file format that stores tabular data in the plain text format separated by commas.
- CTS** Clear to Send. The CTS refers to the data transmission and protection mechanism used by the 802.11 wireless networking protocol to prevent frame collision occurrences. See RTS.
- CW** Contention Window. In QoS, CW refers to a window set for access categories based on the type of traffic. Based on the type and volume of the traffic, the minimum and maximum values can be calculated to provide a wider window when necessary.
- DAI** Dynamic ARP inspection. A security feature that validates ARP packets in a network.
- DAS** Distributed Antenna System. DAS is a network of antenna nodes strategically placed around a geographical area or structure for additional cellular coverage.

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- dB** Decibel. Unit of measure for sound or noise and is the difference or ratio between two signal levels.
- dBm** Decibel-Milliwatts. dBm is a logarithmic measurement (integer) that is typically used in place of mW to represent receive-power level. AMP normalizes all signals to dBm, so that it is easy to evaluate performance between various vendors.
- DCB** Data Center Bridging. DCB is a collection of standards developed by IEEE for creating a converged data center network using Ethernet.
- DCE** Data Communication Equipment. DCE refers to the devices that establish, maintain, and terminate communication network sessions between a data source and its destination.
- DCF** Distributed Coordination Function. DCF is a protocol that uses carrier sensing along with a four-way handshake to maximize the throughput while preventing packet collisions.
- DDMO** Distributed Dynamic Multicast Optimization. DDMO is similar to Dynamic Multicast Optimization (DMO) where the multicast streams are converted into unicast streams on the AP instead of the controller, to enhance the quality and reliability of streaming videos, while preserving the bandwidth available to non-video clients.
- DES** Data Encryption Standard. DES is a common standard for data encryption and a form of secret key cryptography, which uses only one key for encryption and decryption.
- designated router** Designated router refers to a router interface that is elected to originate network link advertisements for networks using the OSPF protocol.
- destination NAT** Destination Network Address Translation. Destination NAT is a process of translating the destination IP address of an end route packet in a network. Destination NAT is used for redirecting the traffic destined to a virtual host to the real host, where the virtual host is identified by the destination IP address and the real host is identified by the translated IP address.
- DFS** Dynamic Frequency Selection. DFS is a mandate for radio systems operating in the 5 GHz band to be equipped with means to identify and avoid interference with Radar systems.
- DFT** Discrete Fourier Transform. DFT converts discrete-time data sets into a discrete-frequency representation. See FFT.
- DHCP** Dynamic Host Configuration Protocol. A network protocol that enables a server to automatically assign an IP address to an IP-enabled device from a defined range of numbers configured for a given network.
- DHCP snooping** DHCP snooping enables the switch to monitor and control DHCP messages received from untrusted devices that are connected to the switch.
- digital certificate** A digital certificate is an electronic document that uses a digital signature to bind a public key with an identity—information such as the name of a person or an organization, address, and so forth.

Digital wireless pulse

A wireless technology for transmitting large amounts of digital data over a wide spectrum of frequency bands with very low power for a short distance. Ultra Wideband radio can carry a huge amount of data over a distance up to 230 ft at very low power (less than 0.5 mW), and has the ability to carry signals through doors and other obstacles that tend to reflect signals at more limited bandwidths and a higher power.

Disconnect-Ack

Disconnect-Ack is a NAS response packet to a Disconnect-Request, which indicates that the session was disconnected.

Disconnect-Nak

Disconnect-Nak is NAS response packet to a Disconnect-Request, which indicates that the session was not disconnected.

Disconnect-Request

Disconnect-Request is a RADIUS packet type sent to a NAS requesting that a user or session be disconnected.

distribution certificate

Distribution certificate is used for digitally signing iOS mobile apps to enable enterprise app distribution. It verifies the identity of the app publisher.

DLNA

Digital Living Network Alliance. DLNA is a set of interoperability guidelines for sharing digital media among multimedia devices.

DMO

Dynamic Multicast Optimization. DMO is a process of converting multicast streams into unicast streams over a wireless link to enhance the quality and reliability of streaming videos, while preserving the bandwidth available to non-video clients.

DN

Distinguished Name. A series of fields in a digital certificate that, taken together, constitute the unique identity of the person or device that owns the digital certificate. Common fields in a DN include country, state, locality, organization, organizational unit, and the "common name", which is the primary name used to identify the certificate.

DNS

Domain Name System. A DNS server functions as a phone book for the intranet and Internet users. It converts human-readable computer host names into IP addresses and IP addresses into host names. It stores several records for a domain name such as an address 'A' record, name server (NS), and mail exchanger (MX) records. The Address 'A' record is the most important record that is stored in a DNS server, because it provides the required IP address for a network peripheral or element.

DOCSIS

Data over Cable Service Interface Specification. A telecommunication standard for Internet access through cable modem.

DoS

Denial of Service. DoS is any type of attack where the attackers send excessive messages to flood traffic and thereby preventing the legitimate users from accessing the service.

DPD

Dead Peer Detection. A method used by the network devices to detect the availability of the peer devices.

DPI

Deep Packet Inspection. DPI is an advanced method of network packet filtering that is used for inspecting data packets exchanged between the devices and systems over a network. DPI functions at the Application layer of the Open Systems Interconnection (OSI) reference model and enables users to identify, categorize, track, reroute, or stop packets passing through a network.

DRT

Downloadable Regulatory Table. The DRT feature allows new regulatory approvals to be distributed for APs without a software upgrade or patch.

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- DS**
Differentiated Services. The DS specification aims to provide uninterrupted quality of service by managing and controlling the network traffic, so that certain types of traffic get precedence.
- DSCP**
Differentiated Services Code Point. DSCP is a 6-bit packet header value used for traffic classification and priority assignment.
- DSL**
Digital Subscriber Line. The DSL technology allows the transmission of digital data over telephone lines. A DSL modem is a device used for connecting a computer or router to a telephone line that offers connectivity to the Internet.
- DSSS**
Direct-Sequence Spread Spectrum. DSSS is a modulation technique used for reducing overall signal interference. This technique multiplies the original data signal with a pseudo random noise spreading code. Spreading of this signal makes the resulting wideband channel more noisy, thereby increasing the resistance to interference. See FHSS.
- DST**
Daylight Saving Time. DST is also known as summer time that refers to the practice of advancing clocks, so that evenings have more daylight and mornings have less. Typically clocks are adjusted forward one hour near the start of spring and are adjusted backward in autumn.
- DTE**
Data Terminal Equipment. DTE refers to a device that converts user information into signals or re-converts the received signals.
- DTIM**
Delivery Traffic Indication Message. DTIM is a kind of traffic indication map. A DTIM interval determines when the APs must deliver broadcast and multicast frames to their associated clients in power save mode.
- DTLS**
Datagram Transport Layer Security. DTLS communications protocol provides communications security for datagram protocols.
- dynamic authorization**
Dynamic authorization refers to the ability to make changes to a visitor account's session while it is in progress. This might include disconnecting a session or updating some aspect of the authorization for the session.
- dynamic NAT**
Dynamic Network Address Translation. Dynamic NAT maps multiple public IP addresses and uses these addresses with an internal or private IP address. Dynamic NAT helps to secure a network by masking the internal configuration of a private network.
- EAP**
Extensible Authentication Protocol. An authentication protocol for wireless networks that extends the methods used by the PPP, a protocol often used when connecting a computer to the Internet. EAP can support multiple authentication mechanisms, such as token cards, smart cards, certificates, one-time passwords, and public key encryption authentication.
- EAP-FAST**
EAP – Flexible Authentication Secure Tunnel (tunneled).
- EAP-GTC**
EAP – Generic Token Card. (non-tunneled).
- EAP-MD5**
EAP – Method Digest 5. (non-tunneled).

EAP-MSCHAP

EAP Microsoft Challenge Handshake Authentication Protocol.

EAP-MSCHAPv2

EAP Microsoft Challenge Handshake Authentication Protocol Version 2.

EAPoL

Extensible Authentication Protocol over LAN. A network port authentication protocol used in IEEE 802.1X standards to provide a generic network sign-on to access network resources.

EAP-PEAP

EAP-Protected EAP. A widely used protocol for securely transporting authentication data across a network (tunneled).

EAP-PWD

EAP-Password. EAP-PWD is an EAP method that uses a shared password for authentication.

EAP-TLS

EAP-Transport Layer Security. EAP-TLS is a certificate-based authentication method supporting mutual authentication, integrity-protected ciphersuite negotiation and key exchange between two endpoints. See RFC 5216.

EAP-TTLS

EAP-Tunneled Transport Layer Security. EAP-TTLS is an EAP method that encapsulates a TLS session, consisting of a handshake phase and a data phase. See RFC 5281.

ECC

Elliptical Curve Cryptography or Error correcting Code memory. Elliptical Curve Cryptography is a public-key encryption technique that is based on elliptic curve theory used for creating faster, smaller, and more efficient cryptographic keys. Error Correcting Code memory is a type of computer data storage that can detect and correct the most common kinds of internal data corruption. ECC memory is used in most computers where data corruption cannot be tolerated under any circumstances, such as for scientific or financial computing.

ECDSA

Elliptic Curve Digital Signature Algorithm. ECDSA is a cryptographic algorithm that supports the use of public or private key pairs for encrypting and decrypting information.

EDCA

Enhanced Distributed Channel Access. The EDCA function in the IEEE 802.11e Quality of Service standard supports differentiated and distributed access to wireless medium based on traffic priority and Access Category types. See WMM and WME.

EIGRP

Enhanced Interior Gateway Routing Protocol. EIGRP is a routing protocol used for automating routing decisions and configuration in a network.

EIRP

Effective Isotropic Radiated Power or Equivalent Isotropic Radiated Power. EIRP refers to the output power generated when a signal is concentrated into a smaller area by the Antenna.

ESI

External Services Interface. ESI provides an open interface for integrating security solutions that solve interior network problems such as viruses, worms, spyware, and corporate compliance.

ESS

Extended Service Set. An ESS is a set of one or more interconnected BSSs that form a single sub network.

ESSID

Extended Service Set Identifier. ESSID refers to the ID used for identifying an extended service set.

Ethernet

Ethernet is a network protocol for data transmission over LAN.

EULA

End User License Agreement. EULA is a legal contract between a software application publisher or author and the users of the application.

FCC

Federal Communications Commission. FCC is a regulatory body that defines standards for the interstate and international communications by radio, television, wire, satellite, and cable.

FFT

Fast Fourier Transform. FFT is a frequency analysis mechanism that aims at faster conversion of a discrete signal in time domain into a discrete frequency domain representation. See also DFT.

FHSS

Frequency Hopping Spread Spectrum. FHSS is transmission technique that allows modulation and transmission of a data signal by rapidly switching a carrier among many frequency channels in a random but predictable sequence. See also DSSS.

FIB

Forwarding Information Base. FIB is a forwarding table that maps MAC addresses to ports. FIB is used in network bridging, routing, and similar functions to identify the appropriate interface for forwarding packets.

FIPS

Federal Information Processing Standards. FIPS refers to a set of standards that describe document processing, encryption algorithms, and other information technology standards for use within non-military government agencies, and by government contractors and vendors who work with these agencies.

firewall

Firewall is a network security system used for preventing unauthorized access to or from a private network.

FQDN

Fully Qualified Domain Name. FQDN is a complete domain name that identifies a computer or host on the Internet.

FQLN

Fully Qualified Location Name. FQLN is a device location identifier in the format: AName.Floor.Building.Campus.

frequency allocation

Use of radio frequency spectrum as regulated by governments.

FSPL

Free Space Path Loss. FSPL refers to the loss in signal strength of an electromagnetic wave that would result from a line-of-sight path through free space (usually air), with no obstacles nearby to cause reflection or diffraction.

FTP

File Transfer Protocol. A standard network protocol used for transferring files between a client and server on a computer network.

GARP

Generic Attribute Registration Protocol. GARP is a LAN protocol that allows the network nodes to register and de-register attributes, such as network addresses, with each other.

GAS

Generic Advertisement Service. GAS is a request-response protocol, which provides Layer 2 transport mechanism between a wireless client and a server in the network prior to authentication. It helps in determining a wireless network infrastructure before associating clients, and allows clients to send queries to multiple 802.11 networks in parallel.

gateway

Gateway is a network node that allows traffic to flow in and out of the network.

Gbps

Gigabits per second.

GBps

Gigabytes per second.

GET

GET refers HTTP request method or an SNMP operation method. The GET HTTP request method submits data to be processed to a specified resource. The GET SNMP operation method obtains information from the Management Information Base (MIB).

GHz

Gigahertz.

GMT

Greenwich Mean Time. GMT refers to the mean solar time at the Royal Observatory in Greenwich, London. GMT is the same as Coordinated Universal Time (UTC) standard, written as an offset of UTC +/- 00:00.

goodput

Goodput is the application level throughput that refers to the ratio of the total bytes transmitted or received in the network to the total air time required for transmitting or receiving the bytes.

GPS

Global Positioning System. A satellite-based global navigation system.

GRE

Generic Routing Encapsulation. GRE is an IP encapsulation protocol that is used to transport packets over a network.

GTC

Generic Token Card. GTC is a protocol that can be used as an alternative to MSCHAPv2 protocol. GTC allows authentication to various authentication databases even in cases where MSCHAPv2 is not supported by the database.

GVRP

GARP VLAN Registration Protocol or Generic VLAN Registration Protocol. GARP is an IEEE 802.1Q-compliant protocol that facilitates VLAN registration and controls VLANs within a larger network.

H2QP

Hotspot 2.0 Query Protocol.

hot zone

Wireless access area created by multiple hotspots that are located in close proximity to one another. Hot zones usually combine public safety APs with public hotspots.

hotspot

Hotspot refers to a WLAN node that provides Internet connection and virtual private network (VPN) access from a given location. A business traveler, for example, with a laptop equipped for Wi-Fi can look up a local hotspot, contact it, and get connected through its network to reach the Internet.

HSPA

High-Speed Packet Access.

HT

High Throughput. IEEE 802.11n is an HT WLAN standard that aims to achieve physical data rates of close to 600 Mbps on the 2.4 GHz and 5 GHz bands.

HTTP

Hypertext Transfer Protocol. The HTTP is an application protocol to transfer data over the web. The HTTP protocol defines how messages are formatted and transmitted, and the actions that the w servers and browsers should take in response to various commands.

HTTPS

Hypertext Transfer Protocol Secure. HTTPS is a variant of the HTTP that adds a layer of security on the data in transit through a secure socket layer or transport layer security protocol connection.

IAS

Internet Authentication Service. IAS is a component of Windows Server operating systems that provides centralized user authentication, authorization, and accounting.

ICMP

Internet Control Message Protocol. ICMP is an error reporting protocol. It is used by network devices such as routers, to send error messages and operational information to the source IP address when network problems prevent delivery of IP packets.

IDS

Intrusion Detection System. IDS monitors a network or systems for malicious activity or policy violations and reports its findings to the management system deployed in the network.

IEEE

Institute of Electrical and Electronics Engineers.

IGMP

Internet Group Management Protocol. Communications protocol used by hosts and adjacent routers on IP networks to establish multicast group memberships.

IGMP snooping

IGMP snooping prevents multicast flooding on Layer 2 network by treating multicast traffic as broadcast traffic. Without IGMP snooping, all streams could be flooded to all ports on that VLAN. When multicast flooding occurs, end-hosts that happen to be in the same VLAN would receive all the streams only to be discarded without snooping.

IGP

Interior Gateway Protocol. IGP is used for exchanging routing information between gateways within an autonomous system (for example, a system of corporate local area networks).

IGRP

Interior Gateway Routing Protocol. IGRP is a distance vector interior routing protocol used by routers to exchange routing data within an autonomous system.

IKE

Internet Key Exchange. IKE is a key management protocol used with IPsec protocol to establish a secure communication channel. IKE provides additional feature, flexibility, and ease of configuration for IPsec standard.

IKEv1

Internet Key Exchange version 1. IKEv1 establishes a secure authenticated communication channel by using either the pre-shared key (shared secret), digital signatures, or public key encryption. IKEv1 operates in Main and Aggressive modes. See RFC 2409.

IKEv2

Internet Key Exchange version 2. IKEv2 uses the secure channel established in Phase 1 to negotiate Security Associations on behalf of services such as IPsec. IKEv2 uses pre-shared key and Digital Signature for authentication. See RFC 4306.

IoT

Internet of Things. IoT refers to the internetworking of devices that are embedded with electronics, software, sensors, and network connectivity features allowing data exchange over the Internet.

IPM

Intelligent Power Monitoring. IPM is a feature supported on certain APs that actively measures the power utilization of an AP and dynamically adapts to the power resources.

IPS

Intrusion Prevention System. The IPS monitors a network for malicious activities such as security threats or policy violations. The main function of an IPS is to identify suspicious activity, log the information, attempt to block the activity, and report it.

IPsec

Internet Protocol security. IPsec is a protocol suite for secure IP communications that authenticates and encrypts each IP packet in a communication session.

IPSG

Internet Protocol Source Guard. IPSG restricts IP address from untrusted interface by filtering traffic based on list of addresses in the DHCP binding database or manually configured IP source bindings. It prevents IP spoofing attacks.

IrDA

An industry-sponsored organization set up in 1993 to create international standards for the hardware and software used in infrared communication links. In this special form of radio transmission, a focused ray of light in the infrared frequency spectrum, measured in terahertz (THz), or trillions of hertz (cycles per second), is modulated with information and sent from a transmitter to a receiver over a relatively short distance.

ISAKMP

Internet Security Association and Key Management Protocol. ISAKMP is used for establishing Security Associations and cryptographic keys in an Internet environment.

ISP

Internet Service Provider. An ISP is an organization that provides services for accessing and using the Internet.

JSON

JavaScript Object Notation. JSON is an open-standard, language-independent, lightweight data-interchange format used to transmit data objects consisting of attribute–value pairs. JSON uses a "self-describing" text format that is easy for humans to read and write, and that can be used as a data format by any programming language.

Kbps

Kilobits per second.

KBps

Kilobytes per second.

keepalive

Signal sent at periodic intervals from one device to another to verify that the link between the two devices is working. If no reply is received, data will be sent by a different path until the link is restored. A keepalive can also be used to indicate that the connection should be preserved so that the receiving device does not consider it timed out and drop it.

L2TP

Layer-2 Tunneling Protocol. L2TP is a networking protocol used by the ISPs to enable VPN operations.

LACP

Link Aggregation Control Protocol. LACP is used for the collective handling of multiple physical ports that can be seen as a single channel for network traffic purposes.

LAG

Link Aggregation Group . A LAG combines a number of physical ports together to make a single high-bandwidth data path. LAGs can connect two switches to provide a higher-bandwidth connection to a public network.

LAN

Local Area Network. A LAN is a network of connected devices within a distinct geographic area such as an office or a commercial establishment and share a common communications line or wireless link to a server.

LCD

Liquid Crystal Display. LCD is the technology used for displays in notebook and other smaller computers. Like LED and gas-plasma technologies, LCDs allow displays to be much thinner than the cathode ray tube technology.

LDAP

Lightweight Directory Access Protocol. LDAP is a communication protocol that provides the ability to access and maintain distributed directory information services over a network.

LDPC

Low-Density Parity-Check. LDPC is a method of transmitting a message over a noisy transmission channel using a linear error correcting code. An LDPC is constructed using a sparse bipartite graph.

LEAP

Lightweight Extensible Authentication Protocol. LEAP is a Cisco proprietary version of EAP used in wireless networks and Point-to-Point connections.

LED

Light Emitting Diode. LED is a semiconductor light source that emits light when an electric current passes through it.

LEEF

Log Event Extended Format. LEEF is a type of customizable syslog event format. An extended log file contains a sequence of lines containing ASCII characters terminated by either the sequence LF or CRLF.

LI

Lawful Interception. LI refers to the procedure of obtaining communications network data by the Law Enforcement Agencies for the purpose of analysis or evidence.

LLDP

Link Layer Discovery Protocol. LLDP is a vendor-neutral link layer protocol in the Internet Protocol suite used by network devices for advertising their identity, capabilities, and neighbors on an IEEE 802 local area network, which is principally a wired Ethernet.

LLDP-MED

LLDP-Media Endpoint Discovery. LLDP-MED facilitates information sharing between endpoints and network infrastructure devices.

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- LMS** Local Management Switch. In multi-controller networks, each controller acts as an LMS and terminates user traffic from the APs, processes, and forwards the traffic to the wired network.
- LNS** L2TP Network Server. LNS is an equipment that connects to a carrier and handles the sessions from broadband lines. It is also used for dial-up and mobile links. LNS handles authentication and routing of the IP addresses. It also handles the negotiation of the link with the equipment and establishes a session.
- LTE** Long Term Evolution. LTE is a 4G wireless communication standard that provides high-speed wireless communication for mobile phones and data terminals. See 4G.
- MAB** MAC Authentication Bypass. Endpoints such as network printers, Ethernet-based sensors, cameras, and wireless phones do not support 802.1X authentication. For such endpoints, MAC Authentication Bypass mechanism is used. In this method, the MAC address of the endpoint is used to authenticate the endpoint.
- MAC** Media Access Control. A MAC address is a unique identifier assigned to network interfaces for communications on a network.
- MAM** Mobile Application Management. MAM refers to software and services used to secure, manage, and distribute mobile applications used in enterprise settings on mobile devices like smartphones and tablet computers. Mobile Application Management can apply to company-owned mobile devices as well as BYOD.
- Mbps** Megabits per second
- MBps** Megabytes per second
- MCS** Modulation and Coding Scheme. MCS is used as a parameter to determine the data rate of a wireless connection for high throughput.
- MD4** Message Digest 4. MD4 is an earlier version of MD5 and is an algorithm used to verify data integrity through the creation of a 128-bit message digest from data input.
- MD5** Message Digest 5. The MD5 algorithm is a widely used hash function producing a 128-bit hash value from the data input.
- MDAC** Microsoft Data Access Components. MDAC is a framework of interrelated Microsoft technologies that provides a standard database for Windows OS.
- MDM** Mobile Device Management. MDM is an administrative software to manage, monitor, and secure mobile devices of the employees in a network.
- mDNS** Multicast Domain Name System. mDNS provides the ability to perform DNS-like operations on the local link in the absence of any conventional unicast DNS server. The mDNS protocol uses IP multicast User Datagram Protocol (UDP) packets, and is implemented by the Apple Bonjour and Linux NSS-mDNS services. mDNS works in conjunction with DNS Service Discovery (DNS-SD), a companion zero-configuration technique specified. See RFC 6763.

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- MFA** Multi-factor Authentication. MFA lets you require multiple factors, or proofs of identity, when authenticating a user. Policy configurations define how often multi-factor authentication will be required, or conditions that will trigger it.
- MHz** Megahertz
- MIB** Management Information Base. A hierarchical database used by SNMP to manage the devices being monitored.
- microwave** Electromagnetic energy with a frequency higher than 1 GHz, corresponding to wavelength shorter than 30 centimeters.
- MIMO** Multiple Input Multiple Output. An antenna technology for wireless communications in which multiple antennas are used at both source (transmitter) and destination (receiver). The antennas at each end of the communications circuit are combined to minimize errors and optimize data speed.
- MISO** Multiple Input Single Output. An antenna technology for wireless communications in which multiple antennas are used at the source (transmitter). The antennas are combined to minimize errors and optimize data speed. The destination (receiver) has only one antenna.
- MLD** Multicast Listener Discovery. A component of the IPv6 suite. It is used by IPv6 routers for discovering multicast listeners on a directly attached link.
- MPDU** MAC Protocol Data Unit. MPDU is a message exchanged between MAC entities in a communication system based on the layered OSI model.
- MPLS** Multiprotocol Label Switching. The MPLS protocol speeds up and shapes network traffic flows.
- MPPE** Microsoft Point-to-Point Encryption. A method of encrypting data transferred across PPP-based dial-up connections or PPTP-based VPN connections.
- MS-CHAP** Microsoft Challenge Handshake Authentication Protocol. MS-CHAP is Password-based, challenge-response, mutual authentication protocol that uses MD4 and DES encryption.
- MS-CHAPv1** Microsoft Challenge Handshake Authentication Protocol version 1. MS-CHAPv1 extends the user authentication functionality provided on Windows networks to remote workstations. MS-CHAPv1 supports only one-way authentication.
- MS-CHAPv2** Microsoft Challenge Handshake Authentication Protocol version 2. MS-CHAPv2 is an enhanced version of the MS-CHAP protocol that supports mutual authentication.
- MSS** Maximum Segment Size. MSS is a parameter of the options field in the TCP header that specifies the largest amount of data, specified in bytes, that a computer or communications device can receive in a single TCP segment.
- MSSID** Mesh Service Set Identifier. MSSID is the SSID used by the client to access a wireless mesh network.

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- MSTP**
Multiple Spanning Tree Protocol. MSTP configures a separate Spanning Tree for each VLAN group and blocks all but one of the possible alternate paths within each spanning tree.
- MTU**
Maximum Transmission Unit. MTU is the largest size packet or frame specified in octets (eight-bit bytes) that can be sent in networks such as the Internet.
- MU-MIMO**
Multi-User Multiple-Input Multiple-Output. MU-MIMO is a set of multiple-input and multiple-output technologies for wireless communication, in which users or wireless terminals with one or more antennas communicate with each other.
- MVRP**
Multiple VLAN Registration Protocol. MVRP is a Layer 2 network protocol used for automatic configuration of VLAN information on switches.
- mW**
milliWatts. mW is 1/1000 of a Watt. It is a linear measurement (always positive) that is generally used to represent transmission.
- NAC**
Network Access Control. NAC is a computer networking solution that uses a set of protocols to define and implement a policy that describes how devices can secure access to network nodes when they initially attempt to connect to a network.
- NAD**
Network Access Device. NAD is a device that automatically connects the user to the preferred network, for example, an AP or an Ethernet switch.
- NAK**
Negative Acknowledgement. NAK is a response indicating that a transmitted message was received with errors or it was corrupted, or that the receiving end is not ready to accept transmissions.
- NAP**
Network Access Protection. The NAP feature in the Windows Server allows network administrators to define specific levels of network access based on identity, groups, and policy compliance. The NAP Agent is a service that collects and manages health information for NAP client computers. If a client is not compliant, NAP provides a mechanism to automatically bring the client back into compliance and then dynamically increase its level of network access.
- NAS**
Network Access Server. NAS provides network access to users, such as a wireless AP, network switch, or dial-in terminal server.
- NAT**
Network Address Translation. NAT is a method of remapping one IP address space into another by modifying network address information in Internet Protocol (IP) datagram packet headers while they are in transit across a traffic routing device.
- NetBIOS**
Network Basic Input/Output System. A program that lets applications on different computers communicate within a LAN.
- netmask**
Netmask is a 32-bit mask used for segregating IP address into subnets. Netmask defines the class and range of IP addresses.
- NFC**
Near-Field Communication. NFC is a short-range wireless connectivity standard (ECMA-340, ISO/IEC 18092) that uses magnetic field induction to enable communication between devices when they touch or are brought closer (within a few centimeters of distance). The standard specifies a way for the devices to establish a peer-to-peer (P2P) network to exchange data.

NIC

Network Interface Card. NIC is a hardware component that allows a device to connect to the network.

Nmap

Network Mapper. Nmap is an open-source utility for network discovery and security auditing. Nmap uses IP packets to determine such things as the hosts available on a network and their services, operating systems and versions, types of packet filters/firewalls, and so on.

NMI

Non-Maskable Interrupt. NMI is a hardware interrupt that standard interrupt-masking techniques in the system cannot ignore. It typically occurs to signal attention for non-recoverable hardware errors.

NMS

Network Management System. NMS is a set of hardware and/or software tools that allow an IT professional to supervise the individual components of a network within a larger network management framework.

NOE

New Office Environment. NOE is a proprietary VoIP protocol designed by Alcatel-Lucent Enterprise.

NTP

Network Time Protocol. NTP is a protocol for synchronizing the clocks of computers over a network.

OAuth

Open Standard for Authorization. OAuth is a token-based authorization standard that allows websites or third-party applications to access user information, without exposing the user credentials.

OCSP

Online Certificate Status Protocol. OCSP is used for determining the current status of a digital certificate without requiring a CRL.

OFDM

Orthogonal Frequency Division Multiplexing. OFDM is a scheme for encoding digital data on multiple carrier frequencies.

OID

Object Identifier. An OID is an identifier used to name an object. The OIDs represent nodes or managed objects in a MIB hierarchy. The OIDs are designated by text strings and integer sequences and are formally defined as per the ASN.1 standard.

OKC

Opportunistic Key Caching. OKC is a technique available for authentication between multiple APs in a network where those APs are under common administrative control. Using OKC, a station roaming to any AP in the network will not have to complete a full authentication exchange, but will instead just perform the 4-way handshake to establish transient encryption keys.

onboarding

The process of preparing a device for use on an enterprise network, by creating the appropriate access credentials and setting up the network connection parameters.

OpenFlow

OpenFlow is an open communications interface between control plane and the forwarding layers of a network.

OpenFlow agent

OpenFlow agent. OpenFlow is a software module in Software-Defined Networking (SDN) that allows the abstraction of any legacy network element, so that it can be integrated and managed by the SDN controller. OpenFlow runs on network devices such as switches, routers, wireless controllers, and APs.

Optical wireless

Optical wireless is combined use of conventional radio frequency wireless and optical fiber for telecommunication. Long-range links are provided by using optical fibers; the links from the long-range endpoints to end users are accomplished by RF wireless or laser systems. RF wireless at Ultra High Frequencies and microwave frequencies can carry broadband signals to individual computers at substantial data speeds.

OSI

Open Systems Interconnection. OSI is a reference model that defines a framework for communication between the applications in a network.

OSPF

Open Shortest Path First. OSPF is a link-state routing protocol for IP networks. It uses a link-state routing algorithm and falls into the group of interior routing protocols that operates within a single Autonomous System (AS).

OSPFv2

Open Shortest Path First version 2. OSPFv2 is the version 2 of the link-state routing protocol, OSPF. See RFC 2328.

OUI

Organizationally Unique Identifier. Synonymous with company ID or vendor ID, an OUI is a 24-bit, globally unique assigned number, referenced by various standards. The first half of a MAC address is OUI.

OVA

Open Virtualization Archive. OVA contains a compressed installable version of a virtual machine.

OVF

Open Virtualization Format. OVF is a specification that describes an open-standard, secure, efficient, portable and extensible format for packaging and distributing software for virtual machines.

PAC

Protected Access Credential. PAC is distributed to clients for optimized network authentication. These credentials are used for establishing an authentication tunnel between the client and the authentication server.

PAP

Password Authentication Protocol. PAP validates users by password. PAP does not encrypt passwords for transmission and is thus considered insecure.

PAPI

Process Application Programming Interface. PAPI controls channels for ARM and Wireless Intrusion Detection System (WIDS) communication to the master controller. A separate PAPI control channel connects to the local controller where the SSID tunnels terminate.

PBR

Policy-based Routing. PBR provides a flexible mechanism for forwarding data packets based on policies configured by a network administrator.

PDU

Power Distribution Unit or Protocol Data Unit. Power Distribution Unit is a device that distributes electric power to the networking equipment located within a data center. Protocol Data Unit contains protocol control information that is delivered as a unit among peer entities of a network.

PEAP

Protected Extensible Authentication Protocol. PEAP is a type of EAP communication that addresses security issues associated with clear text EAP transmissions by creating a secure channel encrypted and protected by TLS.

PEF

Policy Enforcement Firewall. PEF also known as PEFNG provides context-based controls to enforce application-layer security and prioritization. The customers using Aruba mobility controllers can avail PEF features and services by obtaining a PEF license. PEF for VPN users—Customers with PEF for VPN license can apply firewall policies to the user traffic routed to a controller through a VPN tunnel.

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PFS

Perfect Forward Secrecy. PFS refers to the condition in which a current session key or long-term private key does not compromise the past or subsequent keys.

PHB

Per-hop behavior. PHB is a term used in DS or MPLS. It defines the policy and priority applied to a packet when traversing a hop (such as a router) in a DiffServ network.

PIM

Protocol-Independent Multicast. PIM refers to a family of multicast routing protocols for IP networks that provide one-to-many and many-to-many distribution of data over a LAN, WAN, or the Internet.

PIN

Personal Identification Number. PIN is a numeric password used to authenticate a user to a system.

PKCS#n

Public-key cryptography standard n. PKCS#n refers to a numbered standard related to topics in cryptography, including private keys (PKCS#1), digital certificates (PKCS#7), certificate signing requests (PKCS#10), and secure storage of keys and certificates (PKCS#12).

PKI

Public Key Infrastructure. PKI is a security technology based on digital certificates and the assurances provided by strong cryptography. See also certificate authority, digital certificate, public key, private key.

PLMN

Public Land Mobile Network. PLMS is a network established and operated by an administration or by a Recognized Operating Agency for the specific purpose of providing land mobile telecommunications services to the public.

PMK

Pairwise Master Key. PMK is a shared secret key that is generated after PSK or 802.1X authentication.

PoE

Power over Ethernet. PoE is a technology for wired Ethernet LANs to carry electric power required for the device in the data cables. The IEEE 802.3af PoE standard provides up to 15.4 W of power on each port.

PoE+

Power over Ethernet+. PoE+ is an IEEE 802.3at standard that provides 25.5W power on each port.

POST

Power On Self Test. An HTTP request method that requests data from a specified resource.

PPP

Point-to-Point Protocol. PPP is a data link (layer 2) protocol used to establish a direct connection between two nodes. It can provide connection authentication, transmission encryption, and compression.

PPPoE

Point-to-Point Protocol over Ethernet. PPPoE is a method of connecting to the Internet, typically used with DSL services, where the client connects to the DSL modem.

PPTP

Point-to-Point Tunneling Protocol. PPTP is a method for implementing virtual private networks. It uses a control channel over TCP and a GRE tunnel operating to encapsulate PPP packets.

private key

The part of a public-private key pair that is always kept private. The private key encrypts the signature of a message to authenticate the sender. The private key also decrypts a message that was encrypted with the public key of the sender.

PRNG

Pseudo-Random Number Generator. PRNG is an algorithm for generating a sequence of numbers whose properties approximate the properties of sequences of random numbers.

PSK

Pre-shared key. A unique shared secret that was previously shared between two parties by using a secure channel. This is used with WPA security, which requires the owner of a network to provide a passphrase to users for network access.

PSU

Power Supply Unit. PSU is a unit that supplies power to an equipment by converting mains AC to low-voltage regulated DC power.

public key

The part of a public-private key pair that is made public. The public key encrypts a message and the message is decrypted with the private key of the recipient.

PVST

Per-VLAN Spanning Tree. PVST provides load balancing of VLANs across multiple ports resulting in optimal usage of network resources.

PVST+

Per-VLAN Spanning Tree+. PVST+ is an extension of the PVST standard that uses the 802.1Q trunking technology.

QoS

Quality of Service. It refers to the capability of a network to provide better service and performance to a specific network traffic over various technologies.

RA

Router Advertisement. The RA messages are sent by the routers in the network when the hosts send multicast router solicitation to the multicast address of all routers.

Radar

Radio Detection and Ranging. Radar is an object-detection system that uses radio waves to determine the range, angle, or velocity of objects.

RADIUS

Remote Authentication Dial-In User Service. An Industry-standard network access protocol for remote authentication. It allows authentication, authorization, and accounting of remote users who want to access network resources.

RAM

Random Access Memory.

RAPIDS

Rogue Access Point identification and Detection System. An AMP module that is designed to identify and locate wireless threats by making use of all of the information available from your existing infrastructure.

RARP

Reverse Address Resolution Protocol. RARP is a protocol used by a physical machine in a local area network for determining the IP address from the ARP table or cache of the gateway server.

Regex

Regular Expression. Regex refers to a sequence of symbols and characters defining a search pattern.

Registration Authority

Type of Certificate Authority that processes certificate requests. The Registration Authority verifies that requests are valid and comply with certificate policy, and authenticates the user's identity. The Registration Authority then forwards the request to the Certificate Authority to sign and issue the certificate.

Remote AP

Remote APs extend corporate network to the users working from home or at temporary work sites. Remote APs are deployed at branch office sites and are connected to the central network on a WAN link.

REST

Representational State Transfer. REST is a simple and stateless architecture that the web services use for providing interoperability between computer systems on the Internet. In a RESTful web service, requests made to the URI of a resource will elicit a response that may be in XML, HTML, JSON or some other defined format.

RF

Radio Frequency. RF refers to the electromagnetic wave frequencies within a range of 3 kHz to 300 GHz, including the frequencies used for communications or Radar signals.

RFC

Request For Comments. RFC is a commonly used format for the Internet standards documents.

RFID

Radio Frequency Identification. RFID uses radio waves to automatically identify and track the information stored on a tag attached to an object.

RIP

Routing Information Protocol. RIP prevents the routing loops by limiting the number of hops allowed in a path from source to destination.

RJ45

Registered Jack 45. RJ45 is a physical connector for network cables.

RMA

Return Merchandise Authorization. RMA is a part of the product returning process that authorizes users to return a product to the manufacturer or distributor for a refund, replacement, or repair. The customers who want to return a product within its Warranty period contact the manufacturer to initiate the product returning process. The manufacturer or the seller generates an authorization number for the RMA, which is used by the customers, when returning a product to the warehouse.

RMON

Remote Monitoring. RMON provides standard information that a network administrator can use to monitor, analyze, and troubleshoot a group of distributed LANs.

RoW

Rest of World. RoW or RW is an operating country code of a device.

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- RSA** Rivest, Shamir, Adleman. RSA is a cryptosystem for public-key encryption, and is widely used for securing sensitive data, particularly when being sent over an insecure network such as the Internet.
- RSSI** Received Signal Strength Indicator. RSSI is a mechanism by which RF energy is measured by the circuitry on a wireless NIC (0-255). The RSSI is not standard across vendors. Each vendor determines its own RSSI scale/values.
- RSTP** Rapid Spanning Tree Protocol. RSTP provides significantly faster spanning tree convergence after a topology change, introducing new convergence behaviors and bridge port roles to do this.
- RTCP** RTP Control Protocol. RTCP provides out-of-band statistics and control information for an Real-Time Transport Protocol session.
- RTLS** Real-Time Location Systems. RTLS automatically identifies and tracks the location of objects or people in real time, usually within a building or other contained area.
- RTP** Real-Time Transport Protocol. RTP is a network protocol used for delivering audio and video over IP networks.
- RTS** Request to Send. RTS refers to the data transmission and protection mechanism used by the 802.11 wireless networking protocol to prevent frame collision occurrences. See CTS.
- RTSP** Real Time Streaming Protocol. RTSP is a network control protocol designed for use in entertainment and communications systems to control streaming media servers.
- RVI** Routed VLAN Interface. RVI is a switch interface that forwards packets between VLANs.
- RW** Rest of World. RoW or RW is an operating country code of a device.
- SA** Security Association. SA is the establishment of shared security attributes between two network entities to support secure communication.
- SAML** Security Assertion Markup Language. SAML is an XML-based framework for communicating user authentication, entitlement, and attribute information. SAML enables single sign-on by allowing users to authenticate at an identity provider and then access service providers without additional authentication.
- SCEP** Simple Certificate Enrollment Protocol. SCEP is a protocol for requesting and managing digital certificates.
- SCP** Secure Copy Protocol. SCP is a network protocol that supports file transfers between hosts on a network.

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- SCSI** Small Computer System Interface. SCSI refers to a set of interface standards for physical connection and data transfer between a computer and the peripheral devices such as printers, disk drives, CD-ROM, and so on.
- SDN** Software-Defined Networking. SDN is an umbrella term encompassing several kinds of network technology aimed at making the network as agile and flexible as the virtualized server and storage infrastructure of the modern data center.
- SDR** Server Derivation Rule. An SDR refers to a role assignment model used by the controllers running ArubaOS to assign roles and VLANs to the WLAN users based on the rules defined under a server group. The SDRs override the default authentication roles and VLANs defined in the AAA and Virtual AP profiles.
- SDU** Service Data Unit. SDU is a unit of data that has been passed down from an OSI layer to a lower layer and that has not yet been encapsulated into a PDU by the lower layer.
- SD-WAN** Software-Defined Wide Area Network. SD-WAN is an application for applying SDN technology to WAN connections that connect enterprise networks across disparate geographical locations.
- SFP** The Small Form-factor Pluggable. SFP is a compact, hot-pluggable transceiver that is used for both telecommunication and data communications applications.
- SFP+** Small Form-factor Pluggable+. SFP+ supports up to data rates up to 16 Gbps.
- SFTP** Secure File Transfer Protocol. SFTP is a network protocol that allows file access, file transfer, and file management functions over a secure connection.
- SHA** Secure Hash Algorithm. SHA is a family of cryptographic hash functions. The SHA algorithm includes the SHA, SHA-1, SHA-2 and SHA-3 variants.
- SIM** Subscriber Identity Module. SIM is an integrated circuit that is intended to securely store the International Mobile Subscriber Identity (IMSI) number and its related key, which are used for identifying and authenticating subscribers on mobile telephony devices.
- SIP** Session Initiation Protocol. SIP is used for signaling and controlling multimedia communication session such as voice and video calls.
- SIRT** Security Incident Response Team. SIRT is responsible for reviewing as well as responding to computer security incident reports and activity.
- SKU** Stock Keeping Unit. SKU refers to the product and service identification code for the products in the inventory.
- SLAAC** Stateless Address Autoconfiguration. SLAAC provides the ability to address a host based on a network prefix that is advertised from a local network router through router advertisements.

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- SMB** Server Message Block or Small and Medium Business. Server Message Block operates as an application-layer network protocol mainly used for providing shared access to files, printers, serial ports, and for miscellaneous communications between the nodes on a network.
- SMS** Short Message Service. SMS refers to short text messages (up to 140 characters) sent and received through mobile phones.
- SMTP** Simple Mail Transfer Protocol. SMTP is an Internet standard protocol for electronic mail transmission.
- SNIR** Signal-to-Noise-Plus-Interference Ratio. SNIR refers to the power of a central signal of interest divided by the sum of the interference power and the power of the background noise. SINR is defined as the power of a certain signal of interest divided by the sum of the interference power (from all the other interfering signals) and the power of some background noise.
- SNMP** Simple Network Management Protocol. SNMP is a TCP/IP standard protocol for managing devices on IP networks. Devices that typically support SNMP include routers, switches, servers, workstations, printers, modem racks, and more. It is used mostly in network management systems to monitor network-attached devices for conditions that warrant administrative attention.
- SNMPv1** Simple Network Management Protocol version 1. SNMPv1 is a widely used network management protocol.
- SNMPv2** Simple Network Management Protocol version 2. SNMPv2 is an enhanced version of SNMPv1, which includes improvements in the areas of performance, security, confidentiality, and manager-to-manager communications.
- SNMPv2c** Community-Based Simple Network Management Protocol version 2. SNMPv2C uses the community-based security scheme of SNMPv1 and does not include the SNMPv2 security model.
- SNMPv3** Simple Network Management Protocol version 3. SNMPv3 is an enhanced version of SNMP that includes security and remote configuration features.
- SNR** Signal-to-Noise Ratio. SNR is used for comparing the level of a desired signal with the level of background noise.
- SNTP** Simple Network Time Protocol. SNTP is a less complex implementation of NTP. It uses the same , but does not require the storage of state over extended periods of time.
- SOAP** Simple Object Access Protocol. SOAP enables communication between the applications running on different operating systems, with different technologies and programming languages. SOAP is an XML-based messaging protocol for exchanging structured information between the systems that support web services.
- SoC** System on a Chip. SoC is an Integrated Circuit that integrates all components of a computer or other electronic system into a single chip.
- source NAT** Source NAT changes the source address of the packets passing through the router. Source NAT is typically used when an internal (private) host initiates a session to an external (public) host.

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- SSH** Secure Shell. SSH is a network protocol that provides secure access to a remote device.
- SSID** Service Set Identifier. SSID is a name given to a WLAN and is used by the client to access a WLAN network.
- SSL** Secure Sockets Layer. SSL is a computer networking protocol for securing connections between network application clients and servers over the Internet.
- SSO** Single Sign-On. SSO is an access-control property that allows the users to log in once to access multiple related, but independent applications or systems to which they have privileges. The process authenticates the user across all allowed resources during their session, eliminating additional login prompts.
- STBC** Space-Time Block Coding. STBC is a technique used in wireless communications to transmit multiple copies of a data stream across a number of antennas and to exploit the various received versions of the data to improve the reliability of data transfer.
- STM** Station Management. STM is a process that handles AP management and user association.
- STP** Spanning Tree Protocol. STP is a network protocol that builds a logical loop-free topology for Ethernet networks.
- subnet** Subnet is the logical division of an IP network.
- subscription** A business model where a customer pays a certain amount as subscription price to obtain access to a product or service.
- SU-MIMO** Single-User Multiple-Input Multiple-Output. SU-MIMO allocates the full bandwidth of the AP to a single high-speed device during the allotted time slice.
- SVP** SpectraLink Voice Priority. SVP is an open, straightforward QoS approach that has been adopted by most leading vendors of WLAN APs. SVP favors isochronous voice packets over asynchronous data packets when contending for the wireless medium and when transmitting packets onto the wired LAN.
- SWAN** Structured Wireless-Aware Network. A technology that incorporates a Wireless Local Area Network (WLAN) into a wired Wide Area Network (WAN). SWAN technology can enable an existing wired network to serve hundreds of users, organizations, corporations, or agencies over a large geographic area. SWAN is said to be scalable, secure, and reliable.
- TAC** Technical Assistance Center.
- TACACS** Terminal Access Controller Access Control System. TACACS is a family of protocols that handles remote authentication and related services for network access control through a centralized server.
- TACACS+** Terminal Access Controller Access Control System+. TACACS+ provides separate authentication, authorization, and accounting services. It is derived from, but not backward compatible with, TACACS.

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- TCP** Transmission Control Protocol. TCP is a communication protocol that defines the standards for establishing and maintaining network connection for applications to exchange data.
- TCP/IP** Transmission Control Protocol/ Internet Protocol. TCP/IP is the basic communication language or protocol of the Internet.
- TFTP** Trivial File Transfer Protocol. The TFTP is a software utility for transferring files from or to a remote host.
- TIM** Traffic Indication Map. TIM is an information element that advertises if any associated stations have buffered unicast frames. APs periodically send the TIM within a beacon to identify the stations that are using power saving mode and the stations that have undelivered data buffered on the AP.
- TKIP** Temporal Key Integrity Protocol. A part of the WPA encryption standard for wireless networks. TKIP is the next-generation Wired Equivalent Privacy (WEP) that provides per-packet key mixing to address the flaws encountered in the WEP standard.
- TLS** Transport Layer Security. TLS is a cryptographic protocol that provides communication security over the Internet. TLS encrypts the segments of network connections above the Transport Layer by using asymmetric cryptography for key exchange, symmetric encryption for privacy, and message authentication codes for message integrity.
- TLV** Type-length-value or Tag-Length-Value. TLV is an encoding format. It refers to the type of data being processed, the length of the value, and the value for the type of data being processed.
- ToS** Type of Service. The ToS field is part of the IPv4 header, which specifies datagrams priority and requests a route for low-delay, high-throughput, or a highly reliable service.
- TPC** Transmit Power Control. TPC is a part of the 802.11h amendment. It is used to regulate the power levels used by 802.11a radio cards.
- TPM** Trusted Platform Module. TPM is an international standard for a secure cryptoprocessor, which is a dedicated microcontroller designed to secure hardware by integrating cryptographic keys into devices.
- TSF** Timing Synchronization Function. TSF is a WLAN function that is used for synchronizing the timers for all the stations in a BSS.
- TSPEC** Traffic Specification. TSPEC allows an 802.11e client or a QoS-capable wireless client to signal its traffic requirements to the AP.
- TSV** Tab-Separated Values. TSV is a file format that allows the exchange of tabular data between applications that use different internal data formats.
- TTL** Time to Live. TTL or hop limit is a mechanism that sets limits for data expiry in a computer or network.

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- TTY** TeleTypeWriter. TTY-enabled devices allow telephones to transmit text communications for people who are deaf or hard of hearing as well as transmit voice communication.
- TXOP** Transmission Opportunity. TXOP is used in wireless networks supporting the IEEE 802.11e Quality of Service (QoS) standard. Used in both EDCA and HCF Controlled Channel Access modes of operation, TXOP is a bounded time interval in which stations supporting QoS are permitted to transfer a series of frames. TXOP is defined by a start time and a maximum duration.
- UAM** Universal Access Method. UAM allows subscribers to access a wireless network after they successfully log in from a web browser.
- U-APSD** Unscheduled Automatic Power Save Delivery. U-APSD is a part of 802.11e and helps considerably in increasing the battery life of VoWLAN terminals.
- UCC** Unified Communications and Collaboration. UCC is a term used to describe the integration of various communications methods with collaboration tools such as virtual whiteboards, real-time audio and video conferencing, and enhanced call control capabilities.
- UDID** Unique Device Identifier. UDID is used to identify an iOS device.
- UDP** User Datagram Protocol. UDP is a part of the TCP/IP family of protocols used for data transfer. UDP is typically used for streaming media. UDP is a stateless protocol, which means it does not acknowledge that the packets being sent have been received.
- UDR** User Derivation Rule. UDR is a role assignment model used by the controllers running ArubaOS to assign roles and VLANs to the WLAN users based on MAC address, BSSID, DHCP-Option, encryption type, SSID, and the location of a user. For example, for an SSID with captive portal in the initial role, a UDR can be configured for scanners to provide a role based on their MAC OUI.
- UHF** Ultra high frequency. UHF refers to radio frequencies between the range of 300 MHz and 3 GHz. UHF is also known as the decimeter band as the wavelengths range from one meter to one decimeter.
- UI** User Interface.
- UMTS** Universal Mobile Telecommunication System. UMTS is a third generation mobile cellular system for networks. See 3G.
- UPnP** Universal Plug and Play. UPnP is a set of networking protocols that permits networked devices, such as personal computers, printers, Internet gateways, Wi-Fi APs, and mobile devices to seamlessly discover each other's presence on the network and establish functional network services for data sharing, communications, and entertainment.
- URI** Uniform Resource Identifier. URI identifies the name and the location of a resource in a uniform format.
- URL** Uniform Resource Locator. URL is a global address used for locating web resources on the Internet.

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- USB** Universal Serial Bus. USB is a connection standard that offers a common interface for communication between the external devices and a computer. USB is the most common port used in the client devices.
- UTC** Coordinated Universal Time. UTC is the primary time standard by which the world regulates clocks and time.
- UWB** Ultra-Wideband. UWB is a wireless technology for transmitting large amounts of digital data over a wide spectrum of frequency bands with very low power for a short distance.
- VA** Virtual Appliance. VA is a pre-configured virtual machine image, ready to run on a hypervisor.
- VBR** Virtual Beacon Report. VBR displays a report with the MAC address details and RSSI information of an AP.
- VHT** Very High Throughput. IEEE 802.11ac is an emerging VHT WLAN standard that could achieve physical data rates of close to 7 Gbps for the 5 GHz band.
- VIA** Virtual Intranet Access. VIA provides secure remote network connectivity for Android, Apple iOS, Mac OS X, and Windows mobile devices and laptops. It automatically scans and selects the best secure connection to the corporate network.
- VLAN** Virtual Local Area Network. In computer networking, a single Layer 2 network may be partitioned to create multiple distinct broadcast domains, which are mutually isolated so that packets can only pass between them through one or more routers; such a domain is referred to as a Virtual Local Area Network, Virtual LAN, or VLAN.
- VM** Virtual Machine. A VM is an emulation of a computer system. VMs are based on computer architectures and provide functionality of a physical computer.
- VoIP** Voice over IP. VoIP allows transmission of voice and multimedia content over an IP network.
- VoWLAN** Voice over WLAN. VoWLAN is a method of routing telephone calls for mobile users over the Internet using the technology specified in IEEE 802.11b. Routing mobile calls over the Internet makes them free, or at least much less expensive than they would be otherwise.
- VPN** Virtual Private Network. VPN enables secure access to a corporate network when located remotely. It enables a computer to send and receive data across shared or public networks as if it were directly connected to the private network, while benefiting from the functionality, security, and management policies of the private network. This is done by establishing a virtual point-to-point connection through the use of dedicated connections, encryption, or a combination of the two.
- VRD** Validated Reference Design. VRDs are guides that capture the best practices for a particular technology in field.
- VRF** VisualRF. VRF is an AirWave Management Platform (AMP) module that provides a real-time, network-wide views of your entire Radio Frequency environment along with floor plan editing capabilities. VRF also includes overlays on client health to help diagnose issues related to clients, floor plan, or a specific location.

VRF Plan

VisualRF Plan. A stand-alone Windows client used for basic planning procedures such as adding a floor plan, provisioning APs, and generating a Bill of Materials report.

VRRP

Virtual Router Redundancy Protocol. VRRP is an election protocol that dynamically assigns responsibility for a virtual router to one of the VRRP routers on a LAN.

VSA

Vendor-Specific Attribute. VSA is a method for communicating vendor-specific information between NASs and RADIUS servers.

VTP

VLAN Trunking Protocol. VTP is a Cisco proprietary protocol for propagating VLANs on a LAN.

walled garden

Walled garden is a feature that allows blocking of unauthorized users from accessing network resources.

WAN

Wide Area Network. WAN is a telecommunications network or computer network that extends over a large geographical distance.

WASP

Wireless Application Service Provider. WASP provides a web-based access to applications and services that would otherwise have to be stored locally and makes it possible for customers to access the service from a variety of wireless devices, such as a smartphone or Personal Digital Assistant (PDA).

WAX

Wireless abstract XML. WAX is an abstract markup language and a set of tools that is designed to help wireless application development as well as portability. Its tags perform at a higher level of abstraction than that of other wireless markup languages such as HTML, HDML, WML, XSL, and more.

W-CDMA

Wideband Code-Division Multiple Access. W-CDMA is a third-generation (3G) mobile wireless technology that promises much higher data speeds to mobile and portable wireless devices.

web service

Web services allow businesses to share and process data programmatically. Developers who want to provide integrated applications can use the API to programmatically perform actions that would otherwise require manual operation of the user interface.

WEP

Wired Equivalent Privacy. WEP is a security protocol that is specified in 802.11b and is designed to provide a WLAN with a level of security and privacy comparable to what is usually expected of a wired LAN.

WFA

Wi-Fi Alliance. WFA is a non-profit organization that promotes Wi-Fi technology and certifies Wi-Fi products if they conform to certain standards of interoperability.

WIDS

Wireless Intrusion Detection System. WIDS is an application that detects the attacks on a wireless network or wireless system.

Wi-Fi

Wi-Fi is a technology that allows electronic devices to connect to a WLAN network, mainly using the 2.4 GHz and 5 GHz radio bands. Wi-Fi can apply to products that use any 802.11 standard.

WiMAX

Worldwide Interoperability for Microwave Access. WiMAX refers to the implementation of IEEE 802.16 family of wireless networks standards set by the WiMAX forum.

WIP

Wireless Intrusion Protection. The WIP module provides wired and wireless AP detection, classification, and containment. It detects Denial of Service (DoS) and impersonation attacks, and prevents client and network intrusions.

WIPS

Wireless Intrusion Prevention System. WIPS is a dedicated security device or integrated software application that monitors the radio spectrum of WLAN network for rogue APs and other wireless threats.

WISP

Wireless Internet Service Provider. WISP allows subscribers to connect to a server at designated hotspots using a wireless connection such as Wi-Fi. This type of ISP offers broadband service and allows subscriber computers called stations, to access the Internet and the web from anywhere within the zone of coverage provided by the server antenna, usually a region with a radius of several kilometers.

WISPr

Wireless Internet Service Provider Roaming. The WISPr framework enables the client devices to roam between the wireless hotspots using different ISPs.

WLAN

Wireless Local Area Network. WLAN is a 802.11 standards-based LAN that the users access through a wireless connection.

WME

Wireless Multimedia Extension. WME is a Wi-Fi Alliance interoperability certification, based on the IEEE 802.11e standard. It provides basic QoS features to IEEE 802.11 networks. WMM prioritizes traffic according to four ACs: voice (AC_VO), video (AC_VI), best effort (AC_BE) and background (AC_BK). See WMM.

WMI

Windows Management Instrumentation. WMI consists of a set of extensions to the Windows Driver Model that provides an operating system interface through which instrumented components provide information and notification.

WMM

Wi-Fi Multimedia. WMM is also known as WME. It refers to a Wi-Fi Alliance interoperability certification, based on the IEEE 802.11e standard. It provides basic QoS features to IEEE 802.11 networks. WMM prioritizes traffic according to four ACs: voice (AC_VO), video (AC_VI), best effort (AC_BE), and background (AC_BK).

WPA

Wi-Fi Protected Access. WPA is an interoperable wireless security specification subset of the IEEE 802.11 standard. This standard provides authentication capabilities and uses TKIP for data encryption.

WPA2

Wi-Fi Protected Access 2. WPA2 is a certification program maintained by IEEE that oversees standards for security over wireless networks. WPA2 supports IEEE 802.1X/EAP authentication or PSK technology, but includes advanced encryption mechanism using CCMP that is referred to as AES.

WSDL

Web Service Description Language. WSDL is an XML-based interface definition language used to describe the functionality provided by a web service.

WSP

Wireless Service Provider. The service provider company that offers transmission services to users of wireless devices through Radio Frequency (RF) signals rather than through end-to-end wire communication.

WWW

World Wide Web.

X.509

X.509 is a standard for a public key infrastructure for managing digital certificates and public-key encryption. It is an essential part of the Transport Layer Security protocol used to secure web and email communication.

XAuth

Extended Authentication. XAuth provides a mechanism for requesting individual authentication information from the user, and a local user database or an external authentication server. It provides a method for storing the authentication information centrally in the local network.

XML

Extensible Markup Language. XML is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable.

XML-RPC

XML Remote Procedure Call. XML-RPC is a protocol that uses XML to encode its calls and HTTP as a transport mechanism. Developers who want to provide integrated applications can use the API to programmatically perform actions that would otherwise require manual operation of the user interface.

ZTP

Zero Touch Provisioning. ZTP is a device provisioning mechanism that allows automatic and quick provisioning of devices with a minimal or at times no manual intervention.