aruba 650 Series Campus Access Points Installation Guide

650 Series Campus Access Points
Installation Guide

The Aruba 650 Series Campus access points are high-performance, multi-radio wireless devices that can be deployed in either controller-based (ArubaAOS) or controllerless (InstantOS) network environments. These access points support the 802.11ax standard in the 2.4GHz, 5GHz, and 6GHz bands with a 4×4 MIMO tri-radio WI-Fi 6E platform. Additionally, 650 Series Campus access points provide dual wired 5Gbps Smart Rate Ethernet network interfaces enhance their performance and client capacity.

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Hardware Overview

Figure 1 AP-655 Access Point Front View

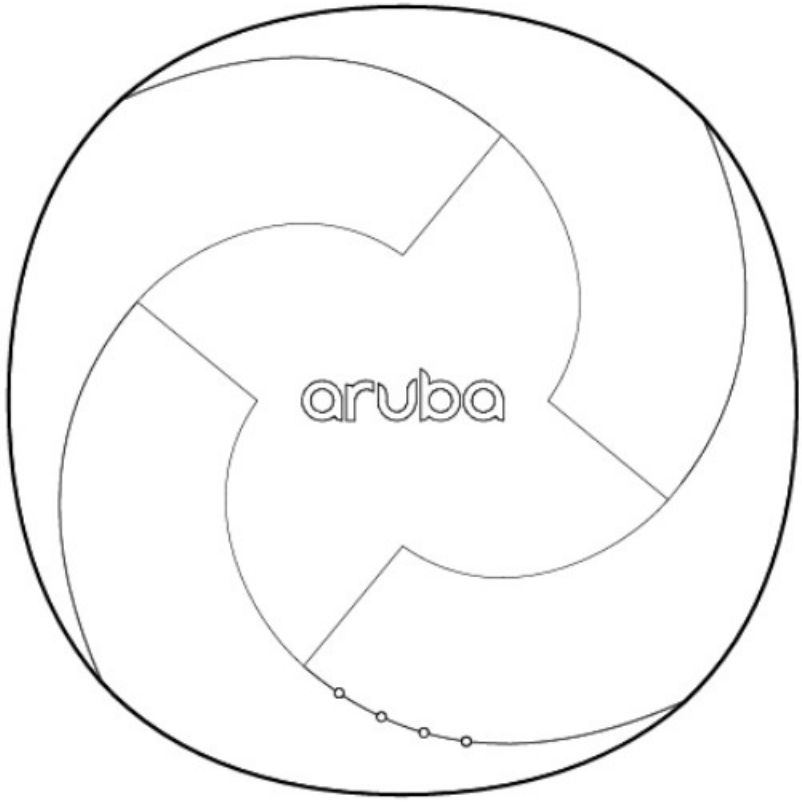


Figure 2 AP-655 Access Point Side and Rear View

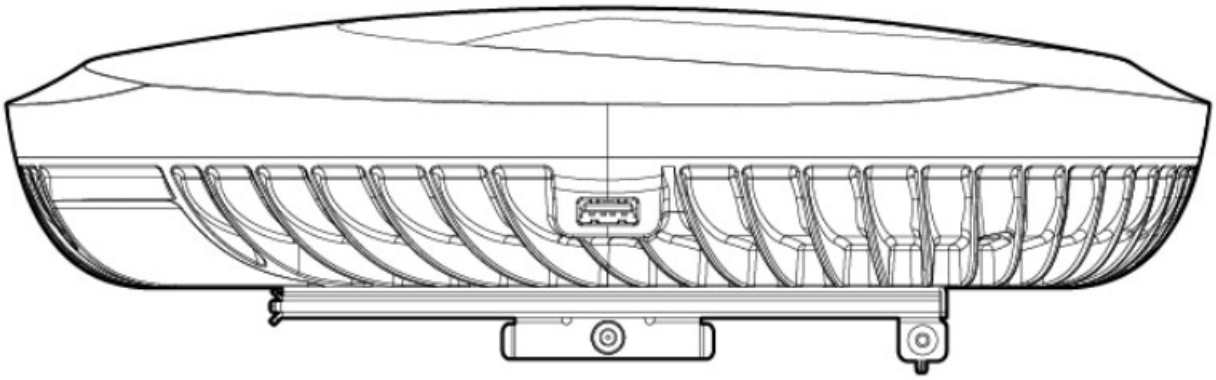
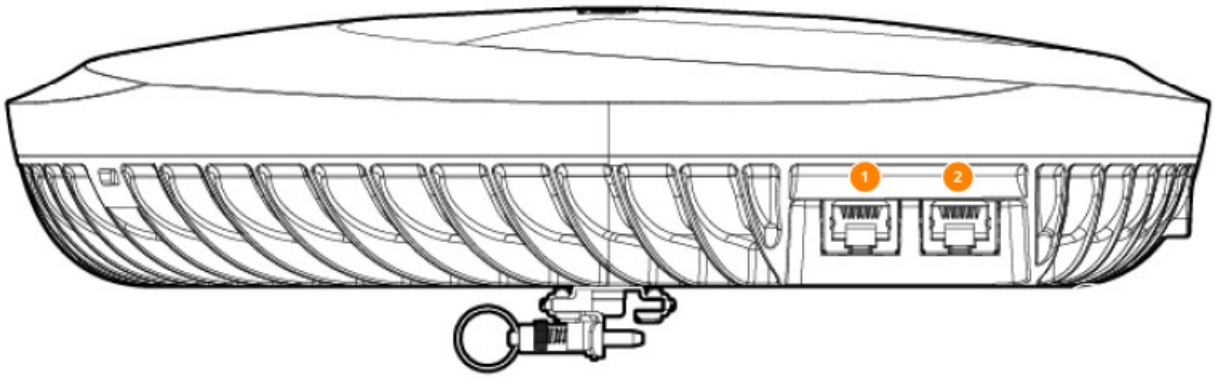


Figure 3 AP-655 Access Point Bottom View



1	E0 Ethernet Port
2	E1Ethernet Port

LED
The LED displays located on the front panel of the access point indicate the system status of the access point.
System Status LED
Table 1: System Status LED

Color/State	Meaning
Off	Device Powered off
Green- solid 1	Device ready, fully functional, no network restrictions
Green- blinking 2	Device booting, is not ready
Green- flashing off 3	Device ready, fully functional, either uplink negotiated in sub-optimal sp eed (<1Gbps)
Green- flashing on	The device in deep-sleep mode
Amber- solid	Device ready, restricted power mode (limited PoE power available, or I PM restrictions applied), no network restrictions
Amber- flashing off	Device ready, restricted power mode (limited PoE power available, or I PM restrictions applied), uplink negotiated in sub-optimal speed (<1Gbp s)
Red	System error condition – Immediate attention required

1. Blinking: one second on, one second off, 2 seconds cycle.
2. Flashing off: mostly on, a fraction of a second off, 2 seconds cycle.
3. Flashing on: mostly off, a fraction of a second on, 2 seconds cycle.

Radio Status LED
Table 2: Radio Status LED

Color/State	Meaning
Off	The device powered off, or the radio disabled
Green- solid	Radio enabled in access (AP) mode
Green- flashing off	Radio enabled in uplink or mesh mode
Amber- solid	Radio enabled in monitor or spectrum analysis mode

LED Display Settings
The LEDs have three operating modes that can be selected in the system management software:

- Default mode: refer to Table 1 and Table 2.
- Off mode: all LEDs are off
- Blink mode: all LEDs blink green (synchronized)

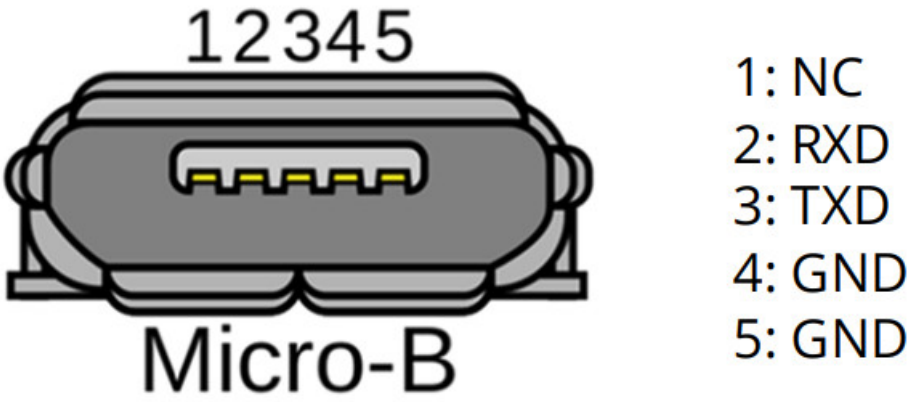
To force the LEDs into off mode or back to software-defined mode, press the reset button for a short duration (less than 10 seconds).
Bluetooth Low Energy Radios
650 Series access points are equipped with an integrated BLE and 802.15.4 radio that provide the following

capabilities:

- location and asset-tracking applications
- wireless console access
- IoT gateway applications

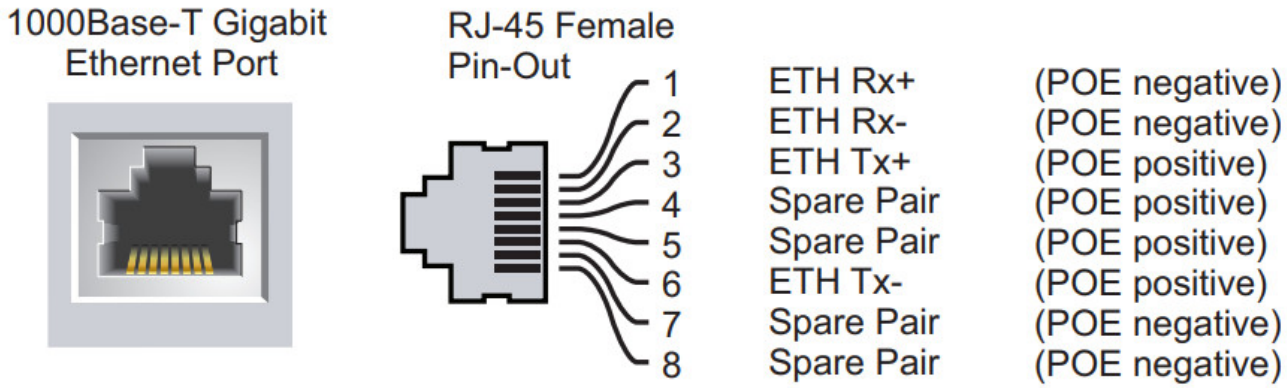
Console Port
The console port is a Micro-B connector located on the back of this device. Use the proprietary AP-CBL-SERU cable or AP-MOD-SERU module (sold separately) for direct management of this device when connected to a serial terminal or laptop. For pin-out details, refer to Figure 4.

Figure 4 Micro-B Port Pin-out



Ethernet Ports
The 650 Series Campusaccess points are equipped with two 100/1000/2500/5000 Base-T auto-sensing MDI/MDX wired RJ45 Ethernet ports (E0 and E1). The 2.5bps speed complies with NBase-T and 802.3bz specifications. Both ports are compliant with 802.3ab 1000Base-T Gigabit Ethernet and 802.3az (Energy Efficient Ethernet) standards. Both ports support 802.3af, 802.3at, and 802.3bt Power over Ethernet compliance to accept power from a POE source, such as a PoE midspan injector, or a network switch.
The 650 Series access points are equipped with two active Ethernet ports (Eth0 and Eth1) (link to figure). Both ports are 100/1000/2500/5000 Base-T, auto-sensing MDI/MDX, which supports uplink connectivity when linked by an Ethernet cable. Refer to Figure 5 for a detailed port pin-out.

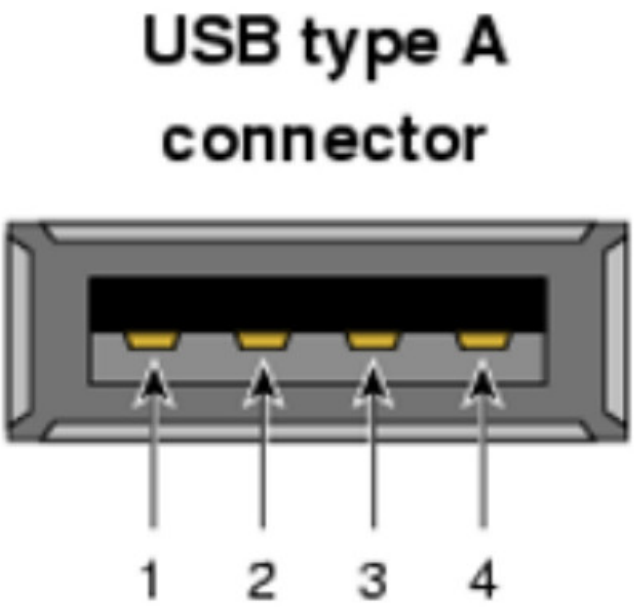
Figure 5 Ethernet Port Pin-Out



The 650 Seriesaccess points are equipped with two Ethernet ports (E0 and E1):

- E0 port: 100/1000/2500Base-T auto-sensing MDI/MDX wired RJ45 network connectivity port
- E1 port: 100/1000Base-T auto-sensing MDI/MDX wired RJ45 network connectivity port

Kensington Lock Slot
The 650 Series is equipped with a Kensington lock slot for additional physical security.
USB Interface
The USB 2.0 interface located on the top of the is 650 Series compatible with selected cellular modems and other peripherals. When active, this port can supply up to 5W/1A to a connected device.
Figure 6 650 Series USB



Reset Button
The reset button located on the bottom of the device can be used to reset the access point to factory default settings or turn off/on the LED display.
Use one of the following methods to reset the access point to the factory default settings:

- To reset during normal operation:
  - Hold the reset button for more than 10 seconds while the access point is running.
  - Release the reset button.
- To reset during power-up, hold the reset button while the access point is powering up.

The system status LED will flash again within 15 seconds indicating that the reset is completed. The access point will now continue to boot with the factory default settings.
To toggle the LED display between Off and Blinking, during the normal operation of the access point, shortly press and release the reset button using a small, narrow object, such as a paperclip.

Power
Both Ethernet ports support PoE-in, allowing the AP to draw power from an 802.3at/802.3bt PoE power source. When the AP is powered by both E0 and E1 ports simultaneously, the AP can be configured by management software to source PoE power from either port or to combine the power from both ports.
If PoE is not available, a proprietary AP-AC2-12B power adapter or AP-AC2-48C adapter (sold separately) can be used to power the access point. When both PoE and DC power sources are available, the DC power source takes precedence. In that case, the access point simultaneously draws a minimal current from the PoE source.
In the event that the DC source fails, the access point switches to the PoE sources.
The 650 Series access points support the Intelligent Power Monitoring (IPM) feature, to report AP power consumption and enable intelligent management of power-save capabilities.
Table 3 lists operational restrictions when the AP is powered by different power options.
Table 3: Power Options and Operational Restrictions

Power Source	IPM	Restrictions
1 x 802.3bt PoE	n/a	No restrictions, all capabilities available.
2 x 802.3at PoE	n/a	No restrictions, all capabilities available.
1 x 802.3at PoE	enabled	AP starts up in unrestricted mode, but may dynamically apply restrictions depending on the PoE budget and actual power.
1 x 802.3at PoE	disabled	The second (other) Ethernet port is disabled.
1 x 802.3af PoE	n/a	AP does not start up, red system LED.
DC power	n/a	No restrictions, all capabilities are available
PoE 802.3bt	n/a	No restrictions and all capabilities are available
PoE 802.3at	disabled	USB disabled (can be overruled in software)
PoE 802.3af	disabled	USB disabled (can be overruled in software), AP in dual radio mode, El o r EO disabled (one without PoE or El), remaining wired port limited to 1G bps.
PoE 802.3at	enabled	All capabilities available (features may be disabled per IPM configuration)
PoE 802.3af	enabled	All capabilities available (features may be disabled per IPM configuration)

Before You Begin

Refer to the sections below before beginning the installation process
FCC Statement: Improper termination of access points installed in the United States configured to non-US model controllers will be in violation of the FCC grant of equipment authorization. Any such willful or intentional violation may result in a requirement by the FCC for immediate termination of operation and may be subject to forfeiture (47 CFR 1.80).

Pre-Installation Checklist
Before installing your <series> access points, ensure that you have the following:

- Cat5E or better UTP cable with network access
- A compatible PoE injector with a power cord

  One of the following network services:
- Aruba Discovery Protocol (ADP)
- DNS server with an “A” record
- DHCP Server with vendor-specific options

NOTE Aruba, in compliance with governmental requirements, has designed the 650 Series access points so that only authorized network administrators can change configuration settings. For more information about AP configuration, refer to the Software Quick Start Guide.

CAUTION Access points are radio transmission devices and as such are subject to governmental regulation. Network administrators responsible for the configuration and operation of access points must comply with local broadcast regulations. Specifically, access points must use channel assignments appropriate to the location in which the access point will be used.

Identifying Specific Installation Locations

Use the access point placement map generated by the Aruba RF Plan software application to determine the proper installation location(s). Each location should be as close as possible to the center of the intended coverage area and should be free from obstructions or obvious sources of interference. These RF absorbers/reflectors/interference sources will impact RF propagation and should be accounted for during the planning phase and adjusted for in the RF plan.
Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.
Identifying Known RF Absorbers/Reflectors/Interference Sources
Identifying known RF absorbers, reflectors, and interference sources while in the field during the installation phase is critical. Make sure that these sources are taken into consideration when you attach an access point to its fixed location.
RF absorbers include:

- Cement/concrete—Old concrete has high levels of water dissipation, which dries out the concrete, allowing for potential RF propagation. New concrete has high levels of water concentration in the concrete, blocking RF signals.
- Natural Items—Fish tanks, water fountains, ponds, and trees
- Brick

  RF reflectors include:
- Metal Objects—Metal pans between floors, rebar, fire doors, air conditioning/heating ducts, mesh windows, blinds, chain link fences (depending on aperture size), refrigerators, racks, shelves, and filing cabinets.
- Do not place an access point between two air conditioning/heating ducts. Make sure that access points are placed below ducts to avoid RF disturbances.

RF interference sources include:

- Microwave ovens and other 2.4 or 5 GHz objects (such as cordless phones)
- Cordless headsets such as those used in call centers or lunch rooms

Access Point Installation

All Aruba access points should be professionally installed by an Aruba-Certified Mobility Professional (ACMP). The installer is responsible for ensuring that grounding is available and meets applicable national and electrical codes.
Failure to properly install this product may result in physical injury and/or damage to property.

For indoor use only. The access point, AC adapter, and all connected cables are not to be installed outdoors. This stationary device is intended for stationary use in partly temperature-controlled weather-protected environments (class 3.2 per ETSI 300 019).

Software

Aruba 650 Series requires ArubaOS or Aruba Instant 8.8 or later. For instructions on choosing operating modes and initial software configuration, refer to the Software Quick Start Guide.
Aruba access points are classified as radio transmission devices and are subject to government regulations of the host country. The network administrator(s) is/are responsible for ensuring that the configuration and operation of this equipment is in compliance with their country's regulations. For a complete list of approved channels in your

country, refer to the Aruba Downloadable Regulatory Table at https://www.arubanetworks.com/techdocs/DRT/Default.htm.

Verifying Post-Installation Connectivity
The integrated LEDs on the access point can be used to verify that the access point is receiving power and initializing successfully (see Table 1 and Table 2). Refer to the AP Software Quick Start Guide for further details on verifying post-installation network connectivity.

Electrical and Environmental Specifications
Electrical

- Ethernet
  - E0: 100/1000/2500Base-T auto-sensing Ethernet RJ-45 Interfaces
  - E1: 100/1000Base-T auto-sensing Ethernet RJ-45 Interfaces
  - Power over Ethernet (IEEE 802.3at and 802.3bt compliant)

If a power adapter other than the Aruba-approved adapter is used in the US or Canada, it should be NRTL listed, with an output rated 48V DC, minimum 0.75A, marked “LPS” and “Class 2,” and suitable for plugging into a standard power receptacle in the US and Canada.

Environmental

- Operating
  - Temperature: 0°C to +50°C (+32°F to +122°F)
  - Humidity: 5% to 93% non-condensing
- Storage
  - Temperature: -40ºC to 70ºC (-40ºF to 158ºF)
  - Humidity: 5% to 93% non-condensing

Regulatory Model Number

For the purpose of regulatory compliance certifications and identification, this product has been assigned a unique regulatory model number (RMN). The regulatory model number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this regulatory model number. The regulatory model number RMN is not the marketing name or model number of the product.
The following regulatory model numbers apply to the 650 Series

- AP-655 RMN: APIN655

Safety and Regulatory Compliance

CAUTION**RF Radiation Exposure Statement:** This equipment complies with RF radiation exposure limits. This equipment should be installed and operated with a minimum distance of 13.78 inches (35cm) between the radiator and your body for 2.4 GHz and 5 GHz operations. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

CAUTIONThe device could automatically discontinue transmission in case of the absence of information to transmit or

operational failure. Note that this is not intended to prohibit the transmission of control or signaling information or the use of repetitive codes where required by the technology.


CAUTIONChanges or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

United States

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1)this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or TV technician for help.

Improper termination of access points installed in the United States configured to a non-US model controller is a violation of the FCC grant of equipment authorization. Any such willful or intentional violation may result in a requirement by the FCC for immediate termination of operation and may be subject to forfeiture (47 CFR 1.80).


CAUTIONFCC regulations restrict the operation of this device to indoor use only.


CAUTIONThe operation of this device is prohibited on oil platforms, cars, trains, boats, and aircraft, except that operation of this device is permitted in large aircraft while flying above 10,000 feet.


CAUTIONOperation in the 5.9725-7.125GHz band is prohibited for control of or communication with unmanned aircraft systems

Industry Canada

This Class B digital apparatus meets all of the requirements of the Canadian Interference-Causing Equipment Regulations.

In accordance with Industry Canada regulations, this radio transmitter and receiver may only be used with an antenna, the maximum type and gain of which must be approved by Industry Canada. To reduce potential radio interference, the type of antenna and its gain shall be chosen so that the equivalent isotropic radiated power (EIRP) does not exceed the values necessary for effective communication.

This device complies with Industry Canada's license-exempt RSS regulations. Operation of this device is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation.

When operated in the 5.15 to 5.25 GHz frequency range, this device is restricted to indoor use to reduce the potential for harmful interference with co-channel Mobile Satellite Systems.

EU Regulatory Conformance

The Declaration of Conformity made under Radio Equipment Directive 2014/53/EU is available for viewing at: **www.hpe.com/eu/certificates**. Select the document that corresponds to your device's model number as it is indicated on the product label.

Compliance is only assured if the Aruba-approved accessories as listed in the ordering guide are used. https://www.arubanetworks.com/assets/og/OG_650Series.pdf.

Wireless Channel Restrictions

5150-5350MHz band is limited to indoors only in the following countries; Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Iceland (IS), Ireland (IE), Italy (IT), Latvia (LV), Liechtenstein (LI), Lithuania (LT), Luxembourg (LU), Malta (MT), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SL), Spain (ES), Sweden (SE), Switzerland (CH), Turkey (TR), United Kingdom (UK) (NI).

Radio	Frequency Range MHz	Max EIRP
BLE/Zigbee	2402-2480	9 dBm
	2412-2472	20 dBm
	5150-5250	23 dBm
Wi-Fi	5250-5350	23 dBm
	5470-5725	30 dBm
	5725-5850	14 dBm

CAUTION Lower power radio LAN product operating in 2.4 GHz and 5 GHz bands. Please refer to the ArubaOS User Guide/Instant User Guide for details on restrictions.

Medical

1. Equipment not suitable for use in the presence of flammable mixtures.
2. Connect to only IEC 60950-1 or IEC 60601-1 certified product and power sources. The end user is responsible for the resulting medical system that complies with the requirements of IEC 60601-1.
3. Wipe with a dry cloth, no additional maintenance is required.
4. No serviceable parts, the unit must be sent back to the manufacturer for repair.
5. No modifications are allowed without Aruba's approval.

Ukraine

Hereby, Hewlett Packard Enterprise Company declares that the radio equipment type [The Regulatory Model Number [RMN] for this device can be found in the Regulatory Model Number section of this document] is in compliance with Ukrainian Technical Regulation on Radio Equipment, approved by resolution of the CABINET OF MINISTERS OF UKRAINE dated May 24, 2017, No. 355. The full text of the UA declaration of conformity is available at the following internet address: https://certificates.ext.hpe.com/public/certificates.html.

Contacting Support

Table 4: Contact Information

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

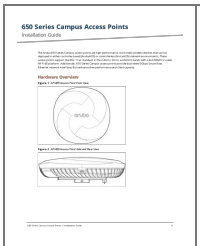
Open Source Code

This product includes code licensed under the GNU General Public License, the GNU Lesser General Public License, and/or certain other open source licenses.
A complete machine-readable copy of the source code corresponding to such code is available upon request.
This offer is valid to anyone in receipt of this information and shall expire three years following the date of the final distribution of this product version by Hewlett Packard Enterprise Company.
To obtain such source code, send a check or money order in the amount of US $10.00 to:
Hewlett Packard Enterprise Company
Attn: General Counsel
6280 America Center Drive
San Jose, CA 94089
USA

Warranty

This hardware product is protected by an Aruba warranty. For more details, visit
www.hpe.com/us/en/support.html

Documents / Resources

	aruba 650 Series Campus Access Points [pdf] Installation Guide APIN0655, Q9DAPIN0655, 650 Series Campus Access Points, 650 Series, Campus Access Points, Access Points, 650 Serise Access Points
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- Security Advisories | Aruba
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- Regulations certificates | Hewlett Packard Enterprise
- HPE Support Center
- Aruba Support Portal
- Aruba Support Portal
- Aruba Support Portal
- Home - Airheads Community
- Home - Airheads Community
- My Networking | HPEÂ® Official Site
- Aruba | Enterprise Networking and Security Solutions
- Aruba | Enterprise Networking and Security Solutions
- End of life | Aruba
- Aruba Edge-to-Cloud Security | Aruba
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