



Aruba 650 Series Controller



Installation Guide

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This hardware product is protected by the standard Aruba warranty of one year parts/labor. For more information, refer to the ARUBACARE SERVICE AND SUPPORT TERMS AND CONDITIONS.

Altering this device (such as painting it) voids the warranty.



www.arubanetworks.com

1322 Crossman Avenue
Sunnyvale, California 94089

Phone: 408.227.4500
Fax 408.227.4550

	Preface.....	5
	General Overview	5
	Related Documentation.....	5
	Contacting Aruba Networks	6
Chapter 1	Aruba 650 Series Hardware Overview	7
	About the Aruba 650 Series Controller.....	7
	Minimum Software Requirements	7
	Package Checklist.....	7
	Hardware Model Overview	8
	Front View	8
	1000Base-X (SFP) Ports.....	8
	10/100/1000Base-T Gigabit Ethernet Ports	8
	Serial Console Port.....	9
	Serial Console Port Adaptor	10
	USB Ports.....	10
	Media Eject Button	10
	Rear View	11
	AC Power Socket	11
	ExpressCard Slot.....	11
	Antennae Interfaces (Aruba 651 Only).....	11
	LED Status Indicators.....	11
Chapter 2	Aruba 650 Series Installation.....	13
	Installation	13
	Pre-Installation Requirements.....	13
	Physical Installation.....	13
	Rack Mounting	13
	Tabletop Deployment	15
	Initial Setup and Network Connectivity.....	15
	Removal.....	15
Appendix A	Specifications, Safety, & Compliance.....	17
	Specifications	17
	Physical Specifications	17
	Power Specifications	17
	Operating Specifications.....	17
	Storage Specifications.....	17
	Wireless Radio Specifications (651 Internal AP)	17
	AP type	17
	Operating Frequency	17
	Available Channels	17
	Modulations.....	17
	Transmit Power.....	18
	Association Rates (Mbps).....	18
	802.11n High-Throughput (HT) Support.....	18
	802.11n Packet Aggregation	18
	Antenna (Aruba 651 Internal AP).....	18

Safety and Regulatory Compliance.....	19
FCC Class B Device.....	19
Aruba 650.....	19
Aruba 651.....	19
Proper Disposal of Aruba Equipment.....	20
Waste of Electrical and Electronic Equipment.....	20
European Union RoHS.....	20
China RoHS.....	20

This preface includes the following information:

- An overview of the contents of this manual
- A list of related documentation for further reading
- Aruba support and service information

General Overview

- [Chapter 1, “Aruba 650 Series Hardware Overview” on page 7](#) provides a detailed hardware overview of the Aruba 650 Series.
- [Chapter 2, “Aruba 650 Series Installation” on page 13](#) provides rack mounting and installation instructions.
- [Appendix A, “Specifications, Safety, & Compliance” on page 17](#) includes product technical specifications, safety, and regulatory compliance information.

Related Documentation

The following documentation are referred to in this guide and are considered components of the complete documentation set needed for a successful installation and management of an Aruba Mobility Controller.

- *ArubaOS Quick Start Guide*
- *ArubaOS User Guide*
- *Aruba Mobility Management System User Guide*

Contacting Aruba Networks

Web Site Support	
Main Site	http://www.arubanetworks.com
Support Site	https://support.arubanetworks.com
Software Licensing Site	https://licensing.arubanetworks.com/login.php
Wireless Security Incident Response Team (WSIRT)	http://www.arubanetworks.com/support/wsirt.php
Support Emails	
• Americas and APAC	support@arubanetworks.com
• EMEA	emea_support@arubanetworks.com
WSIRT Email Please email details of any security problem found in an Aruba product.	wsirt@arubanetworks.com

Telephone Support	
Aruba Corporate	+1 (408) 227-4500
FAX	+1 (408) 227-4550
Support	
• United States	800-WI-FI-LAN (800-943-4526)
• Universal Free Phone Service Number (UJFN): Australia, Canada, China, France, Germany, Hong Kong, Ireland, Israel, Japan, Korea, Singapore, South Africa, Taiwan, and the UK.	+800-4WIFI-LAN (+800-49434-526)
• All Other Countries	+1 (408) 754-1200

About the Aruba 650 Series Controller

The Aruba 650 Series controller is an enterprise-class, wireless LAN controller. This controller connects, controls, and integrates wireless Access Points (APs) and Air Monitors (AMs) into a wired LAN system.

- Aruba 650 Series controller

The Aruba 650 is capable of supporting up to 16 external, campus connected APs.

- 650: no built-in external AP support; optional Aruba AP upgrade licenses are available.
- 650-8: includes built-in campus connected AP support for up to 8 APs; optional Aruba AP upgrade licenses are available.

The Aruba 651 is capable of supporting up to 16 external, campus connected APs in addition to its single, internal AP.

- 651-1: includes a single, internal AP; no built-in external AP support; optional Aruba AP upgrade licenses are available.
- 651-9: includes a single, internal AP, as well as, built-in campus connected AP support for up to 8 APs; optional Aruba AP upgrade licenses are available.



Feature related AP licenses are counted independently and in addition to the Aruba AP upgrade licenses. Contact your Aruba sales representative for complete details regarding software licensing options and support capacity.

Minimum Software Requirements

The Aruba 650 Series controller requires ArubaOS 3.4.0 or later.

ArubaOS software builds prior to version 3.4.0 does not support the Aruba 650 Series controller. If your network currently runs a software build prior to 3.4.0, you must upgrade the software on your master and local controllers to 3.4.0 or later prior to installing an Aruba 650 Series Mobility Controller in your existing network.



The master controller, its redundant master controller, and all of its local controllers must run on the same code of ArubaOS. Once you upgrade your network and install an Aruba 650 Series Mobility Controller into your network, verify that the software version on your controller matches the rest of your network. If the code shipped on the controller is prior to the version that you upgraded your network to, you must upgrade the code on the controller to match the rest of the network.

Package Checklist

- Aruba 650 Series Mobility Controller
- AC Power Cord (country-specific)
- Rack Mount Brackets with Hardware (for rack mounting)
- Left Side Bezel (not installed)
- Right Side Bezel (not installed)

- Rubber Feet (for table top deployments)
- Flat Serial Cable (RJ-45)
- Serial Cable Port Adapter (RJ-45 to DB9)
- ArubaOS Software Documentation CD
- Dual-band, High-gain, Omni-directional Detachable Antennae (3x)
- ArubaOS Quick Start Guide
- End User License Agreement (EULA)

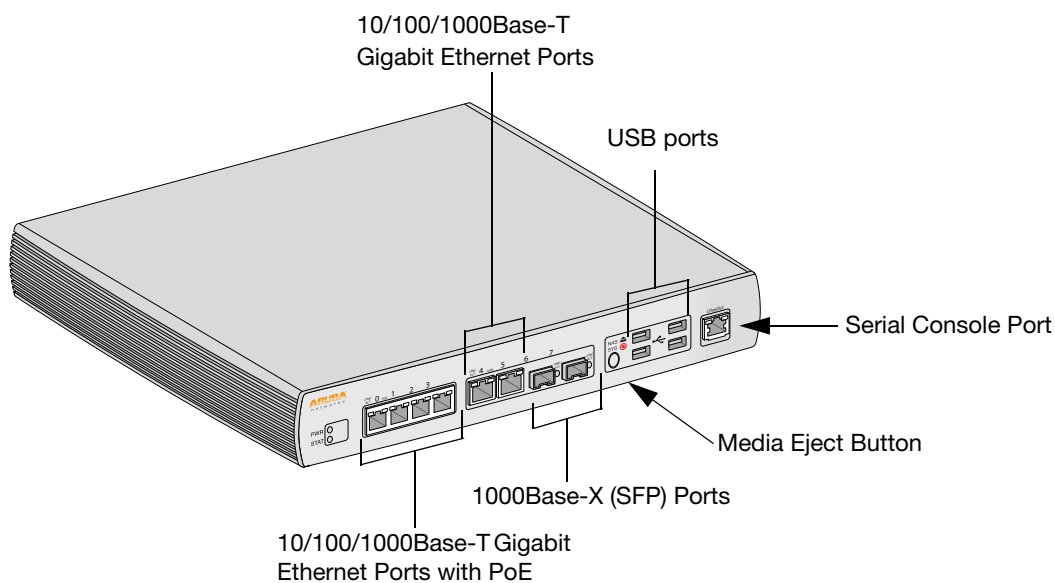


Inform your supplier if there are any incorrect, missing, or damaged parts. If possible, retain the carton, including the original packing materials. Use these materials to repack and return the unit to the supplier if needed.

Hardware Model Overview

Front View

Figure 1 Aruba 650 Series Front View



1000Base-X (SFP) Ports

There are two 1000Base-X ports for fiber connectivity only and are intended for use with Aruba SFPs (mini-GBICs). To purchase compatible SFP modules, contact your Aruba sales representative for details and assistance.



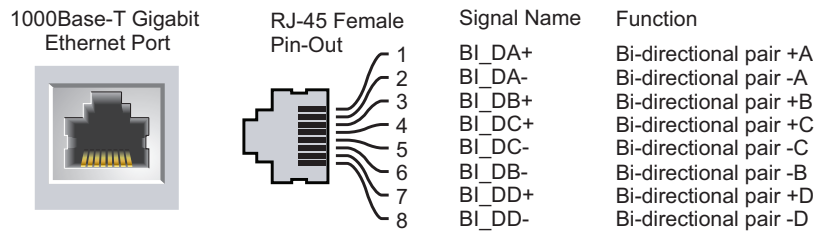
Aruba tests and supports Aruba optics within their controller system. Third party optics are not tested or supported; therefore, Aruba does not guarantee proper functionality of third party optics when used in an Aruba system.

10/100/1000Base-T Gigabit Ethernet Ports

There are six 10/100/1000Base-T Gigabit Ethernet (RJ-45) ports on the Aruba 650 Series. Gigabit Ethernet uses all eight wires and each pair is used in a bi-directional fashion, meaning the same pairs are used for both data transmission and reception.

Figure 2 illustrates the CAT-5 pin-out found on an RJ-45 connector. The CAT-5 pin-out pairs the following pins on a 10/100/1000Base-T Gigabit Ethernet port: 1/2, 3/6, 4/5, and 7/8.

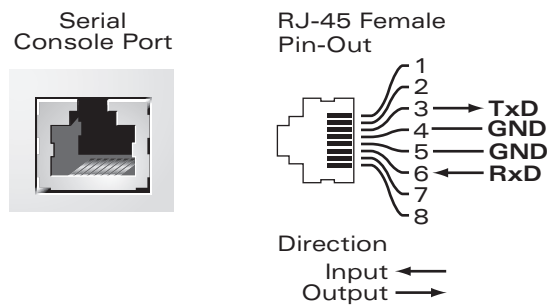
Figure 2 Gigabit Ethernet Port Pin-Out



Serial Console Port

A serial console port is provided for connection to a terminal, allowing for direct local management. The port's RJ-45 female connector accepts an RS-232 serial cable with a male connector.

Figure 3 Serial Console Port Pin-Out



Communication settings for the serial port are indicated in [Table 1](#).

Table 1 Console Terminal Settings

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

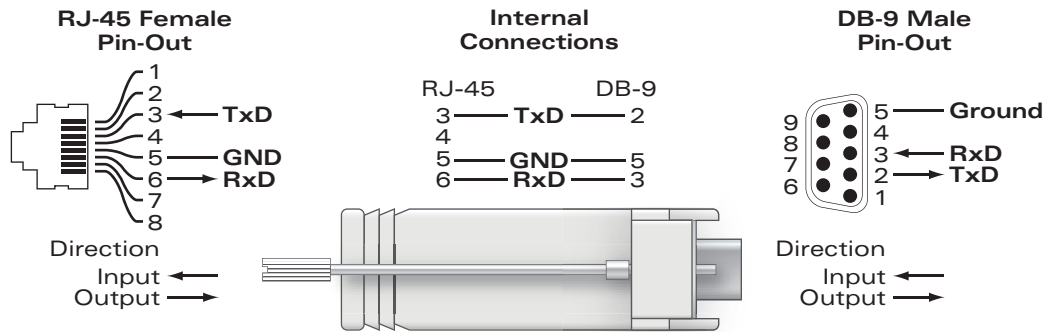


Do not connect an AP to the serial console port. The serial console port is compatible only with RS-232 devices. Non-RS-232 devices, such as APs, are not supported.

Serial Console Port Adaptor

A modular adaptor can be used to convert the RJ-45 (female) connector to a DB9 (male) connector. Refer to [Figure 4](#) for complete details.

Figure 4 RJ-45 (female) to DB9 (male) Modular Adaptor Conversion



USB Ports

The Aruba 650 Series has four USB 2.0 interfaces. These interfaces allow the use of EVDO/HSPDA modem, flash or disk storage devices, or a printer

Media Eject Button

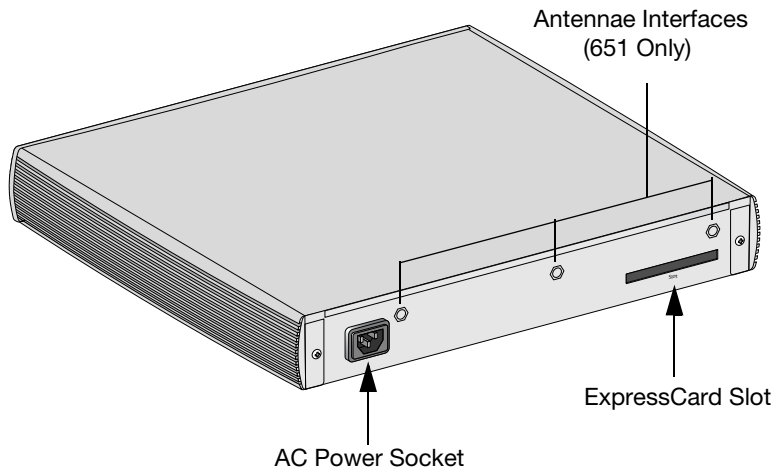
The Aruba 650 Series is equipped with a media eject button, which allows users to eject storage devices safely and place the system in standby. Pushing the media eject button changes the state of the Aruba 650 Series; the table below describes the states and LED behaviors associated with use of the media eject button.

Table 2 Media Eject Button LED Behavior

Initial State	LED State	Action	Status LED	Function	LED Action Completed
NAS Media Operational	Green-solid	Press and hold media eject button for 1 to 5 seconds only	Amber-flashing	Un-mount all NAS media	Amber-solid
NAS Media Unmounted	Amber-solid	Press and hold media eject button for 1 to 5 seconds only	Amber-flashing	Mount all attached NAS devices, and return to fully functional operation	Green-solid
Operational	Green-solid	Press and hold media eject button for more than 5 seconds only	Red-flashing	Controller goes into Standby	Red-solid
Operating with NAS Media un-mounted	Amber-solid	Press and hold media eject button for more than 5 seconds only	Red-flashing	Controller goes into Standby	Red-solid
Standby	Red-solid	Press media eject button	Amber-flashing	Controller wake-up	Green-solid

Rear View

Figure 5 Aruba 650 Series Rear View (651 Shown)



AC Power Socket

The Aruba 650 Series supports integrated AC powering and the AC power socket on the rear of the unit is for use with an AC power cord (country-specific). Refer to "Power Specifications" on page 17 for power specification details.

ExpressCard Slot

The Aruba 650 Series is equipped with one ExpressCard slot.

Antennae Interfaces (Aruba 651 Only)

The Aruba 651 is equipped with an internal Access Point (AP). This AP can operate in 2.4 GHz and 5 GHz bands, in a/b/g or n modes. Each appliance has three RP-SMA interfaces to attach the antennae included in this kit.

LED Status Indicators

Table 3 Aruba 600 Series LED Status Indicators

LED	Label	Function	Indicator	Status
Power	POWER	Input Power Status Indicator	On (Solid Green)	Power on
			Off	No Power
Status	STATUS	Module Status Indicator	On (Solid Green)	Device is operational
			On (Solid Red)	Device failed or is in Standby
			On (Solid Amber)	Device is loading software
			Off	No power

Table 3 Aruba 600 Series LED Status Indicators

LED	Label	Function	Indicator	Status
1000Base-X Ports (SFP)	LNK/ACT	Link Status Indicator	On (Solid Green)	Link has been established
			On (Flashing Green)	Port is transmitting or receiving data
			Off	No link on port
10/100/1000Base-T Ports	LNK/ACT	Link/Activity Status Indicator	On (Solid Green)	Link has been established
			On (Flashing Green)	Port is transmitting or receiving data
			Off	No link on port
	1000	Interface Speed	On (Solid Green)	1000 Mbps
			Off	10/100 Mbps
10/100/1000Base-T Ports with PoE	LINK/ACT	Link/Activity Status Indicator	On (Solid Green)	Link has been established
			On (Flashing Green)	Port is transmitting or receiving data
			Off	No link on port
	PoE	PoE Status Indicator	On (Solid Green)	PoE is being provided
			On (Solid Amber)	The attached device has requested PoE, but PoE is not being provided by the port
			Off	PoE is not being provided
802.11 a/b/g/n AP (Aruba 651 Only)	WLAN	AP Status	On (Solid Amber)	Radio enabled in WLAN mode
			On (Solid Green)	Radio enabled in 802.11n mode
			On (Flashing Amber)	Air monitor mode
			Off	Radio is disabled

Installation

Pre-Installation Requirements

The following tools and equipment are required for installation of an Aruba 650 Series controller.

- Rack Mount Bracket (x2, not used for tabletop installation)
- 6-32 x 1/4" Phillips Flat Head Screws (4x, included with rack mount brackets)
- 12-24 x 5/8" Phillips Flat Head Screws (4x, 19-inch (48.26 cm) rack system mount screws).
- Suitable Screwdrivers for both screw types.
- AC Power Cord (country-specific)
- Left and right side bezels (not used for rack mounting)

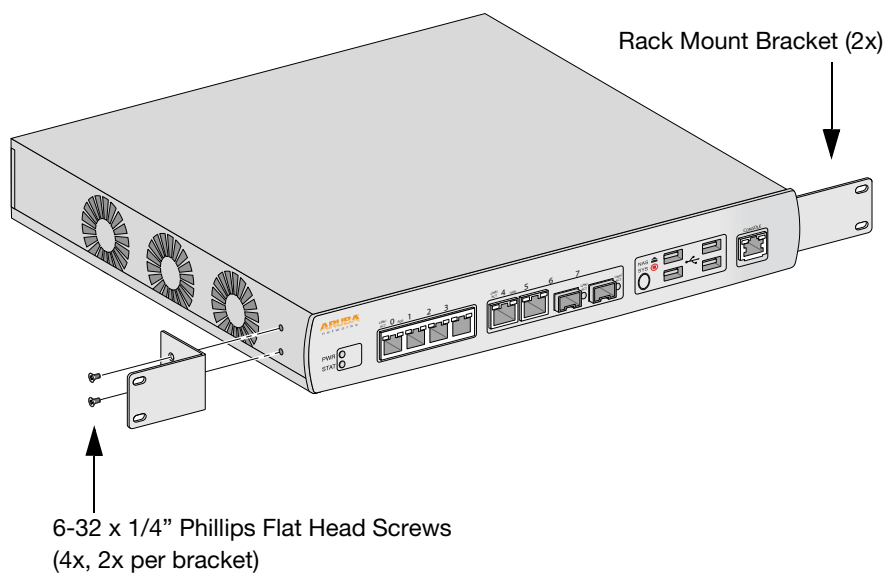
Physical Installation

Rack Mounting

To install an Aruba 650 Series controller into a 19-inch (48.26 cm) rack system:

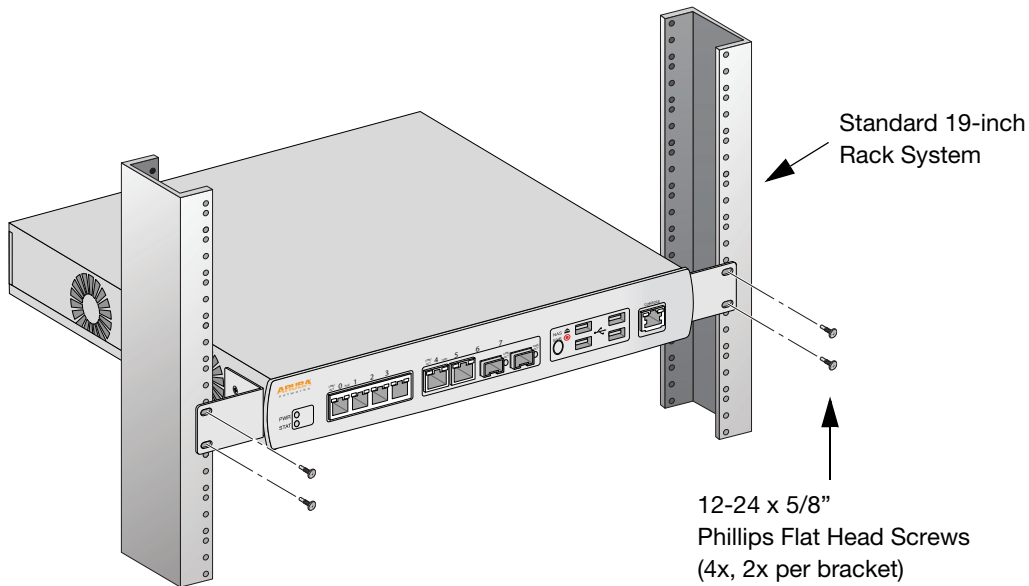
1. Place a rack mount bracket over the mounting holes on one side of the controller (see [Figure 6](#)).
2. Secure the bracket to the controller using two 6-32 x 1/4" phillips flat head screws and a suitable screwdriver.
3. Repeat these steps on the opposite side of the controller.

Figure 6 Rack Mount Brackets



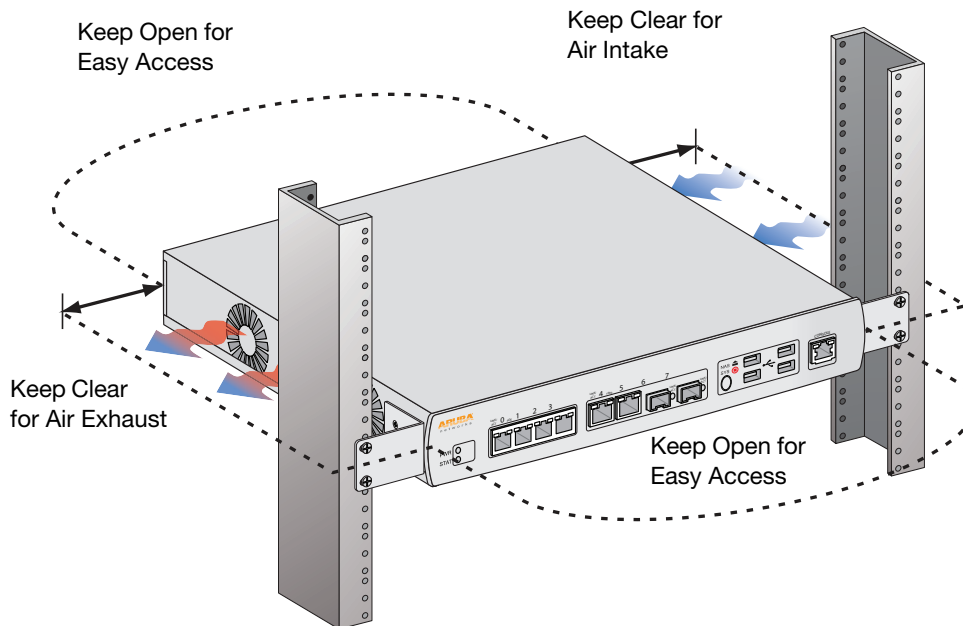
4. Mount the controller within your organization's rack system using four 12-24 x 5/8" phillips flat head screws and suitable screwdriver (see [Figure 7](#)).

Figure 7 Rack Mount Installation



5. Leave a minimum of four inches (10cm) of space on the left and right side of the unit for proper air flow and ventilation (see [Figure 8](#)).
6. Leave additional space in front and back of the unit to access power cords, network cables, and LED status indicators (see [Figure 8](#)).

Figure 8 Air Flow Requirements



7. Connect the AC power cord (country-specific) to the rear of the unit.
8. Plug the opposite end of the power cord into an electrical outlet to power the controller.



Aruba 650 Series controller does not have a switch for turning power to the unit on or off. Power to the unit is controlled by connecting or disconnecting the plug on the power cord to or from an electrical outlet.

Tabletop Deployment

To deploy an Aruba 650 Series controller on a flat surface, such as a tabletop:

1. Insert the four rubber mounting feet to the bottom of the unit.
2. Attach side bezels by snapping them into place.
3. Place the unit on a hard flat surface.

Initial Setup and Network Connectivity

Once the physical installation is complete, run the initial setup on the controller to configure the IP address and other basic system information. For complete details and instructions, refer to the *ArubaOS Quick Start Guide* for the software version installed on your controller.

Removal

To remove an Aruba 650 Series controller from a 19-inch (48.26 cm) rack system:

1. Disconnect the power to the controller by unplugging the power cord from the electrical outlet.
2. Loosen the four rack mount screws securing the controller to your organizations rack system.
3. Remove the controller from the rack system.

Specifications

Physical Specifications

Device Dimensions (without rack mount brackets)

- Height 1.5" (38 mm)
- Width 13.6" (346 mm)
- Depth 8.9" (226 mm)

Power Specifications

- AC Input Voltage: 100-240 V, Universal Input
- AC Input Frequency: 50-60 Hz
- Maximum power consumption: 126 Watts
- Power over Ethernet total capacity: 78 Watts
- Power over Ethernet capacity per port: 19.5 Watts

Operating Specifications

- Operating Temperature Range: 0°C to 40°C (32°F to 104°F)
- Operating Humidity Range: 5% to 95% (RH), non-condensing

Storage Specifications

- Storage Temperature Range: 0°C to 50°C (32°F to 122°F)
- Storage Humidity Range: 5% to 95% (RH), non-condensing

Wireless Radio Specifications (651 Internal AP)

AP type

- 2x3, 3x3 Multiple-In, Multiple-Out (MIMO)

Operating Frequency

- 2.4-2.5 GHz or 5.150–5.950 GHz

Available Channels

- Mobility Controller-managed, dependent upon configured regulatory domain

Modulations

- 802.11b: Direct-Sequence Spread-Spectrum (DSSS)
- 802.11a/g: Orthogonal Frequency Division Multiplexing (OFDM)
- 802.11n: 802.11n draft 2.0

Transmit Power

- Configurable in increments of 0.5 dBm

Association Rates (Mbps)

- 802.11b: 11, 5.5, 2, 1 with automatic fallback
- 802.11a/g: 54, 48, 36, 24, 18, 12, 9, 6 with automatic fallback
- 802.11n: MCS0 - MCS15 (6.5Mbps - 300Mbps)

802.11n High-Throughput (HT) Support

- HT 20
- HT 40

802.11n Packet Aggregation

- A-MPDU
- A-MSDU

Antenna (Aruba 651 Internal AP)

- Three RP-SMA interfaces for external antenna support (supports up to 3x3 MIMO with spatial diversity)
- Three AP-ANT-1B omni-directional dual-band antennas included

Safety and Regulatory Compliance

Aruba provides a multi-language document containing country specific restrictions and additional safety and regulatory information for all Aruba hardware products. The *Aruba Safety and Regulatory Addendum* can be viewed or downloaded from the following location: www.arubanetworks.com/safety_addendum.



Use of controls or adjustments of performance or procedures other than those specified in this manual may result in hazardous radiation exposure.

This product complies with 21 CFR Chapter 1, Subchapter J, Part 1040.10, and IEC 60825-1: 1993, A1: 1997, A2: 2001, IEC 60825-2: 2000.

For continued compliance with the above laser safety standards, only approved Class 1 modules from our approved vendors should be installed in Aruba products.

FCC Class B Device

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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits. This equipment should be installed and operated with a minimum distance of 13.78 inches (35 cm) 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. 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.

Aruba 650

- EN 55022 Class B
- EN 55024
- IEC/EN 60950
- CE Marking
- cTUVus Marked
- CB Scheme Certified

Aruba 651

- FCC 15.247/15.407
- EU R&TTE Directive 1999/5/EC (EN 300 328, EN 301 893, EN 301 489)
- EU LV Directive 2006/95/EC

- IEC/EN 60950
- CE Marking
- cTUVus Marked
- CB Scheme Certified

For a complete list of Country Specific Regulations please speak with your Aruba Representative.

Proper Disposal of Aruba Equipment

For the most current information on Global Environmental Compliance and Aruba products please see our website at www.arubanetworks.com.

Waste of Electrical and Electronic Equipment



Aruba products at end of life are subject to separate collection and treatment in the EU Member States, Norway, and Switzerland and therefore are marked with the symbol shown at the left (crossed-out wheeled bin). The treatment applied at end of life of these products in these countries shall comply with the applicable national laws of countries implementing Directive 2002/96EC on Waste of Electrical and Electronic Equipment (WEEE).

European Union RoHS



Aruba products also comply with the EU Restriction of Hazardous Substances Directive 2002/95/EC (RoHS). EU RoHS restricts the use of specific hazardous materials in the manufacture of electrical and electronic equipment. Specifically, restricted materials under the RoHS Directive are Lead (including Solder used in printed circuit assemblies), Cadmium, Mercury, Hexavalent Chromium, and Bromine. Some Aruba products are subject to the exemptions listed in RoHS Directive Annex 7 (Lead in solder used in printed circuit assemblies). Products and packaging will be marked with the “RoHS” label shown at the left indicating conformance to this Directive.

China RoHS



Aruba products also comply with China environmental declaration requirements and are labeled with the “EFUP e” label shown at the left.