Aruba AP 60/61 Access Point

Installation Guide

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Introduction

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The Aruba AP 60/61 is part of a comprehensive wireless network solution. The device works in conjunction with the Aruba Mobility Controller and can act as a wireless access point or air monitor.

As a wireless Access Point (AP), the Aruba AP 60/61 provides transparent, secure, high-speed data communications between wireless network devices (fixed, portable, or mobile computers with IEEE 802.11a or IEEE 802.11b/g wireless adapters) and the wired LAN.

As a wireless Air Monitor (AM), a feature unique to Aruba products, the Aruba AP 60/61 enhances wireless networks by collecting statistics, monitoring traffic, detecting intrusions, enforcing security policies, balancing wireless traffic load, self-healing coverage gaps, and more.

NOTE: Service to all Aruba Networks equipment must be performed by trained service personnel only.

Front View

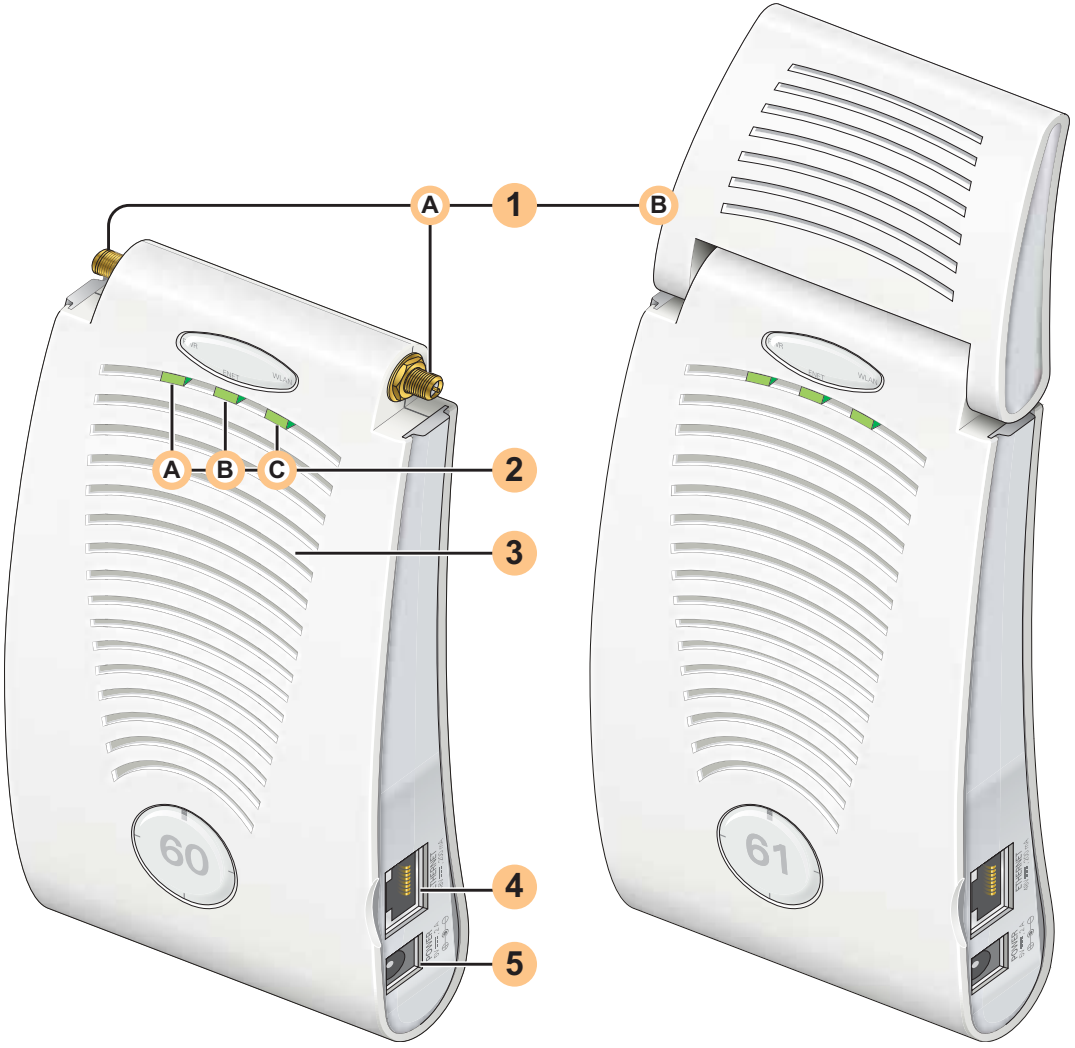

FIGURE 1-1 Aruba AP 60/61 Front View

1 **Antenna fixtures for Wireless Communications**

Depending on the model, the AP will have one of the following:

Ⓐ Aruba AP60–Two Reverse Polarity SMA (RP-SMA) connectors for attaching separate antennas (not included). For details, see "Aruba 60 Detachable Antennas" on page 8. (The AP60 requires that both connectors be used in ArubaOS 2.2 releases or lower. Single antenna operation is supported with ArubaOS 2.3 or higher.)

NOTE: When facing the A60 as shown in Figure 1-1, the antenna connector on the left is for antenna 1, and the connector on the right is for antenna 2 in a diversity configuration.

Ⓑ Aruba AP61–Built-in swivel array with dual, tri-band, omnidirectional antennas

2 Indicator LEDs

During operation, the Aruba AP 60/61 LEDs provide the following information:

TABLE 1-1 Aruba AP 60/61 LEDs

LED	State	Description
Ⓐ PWR	Off	The device is off - no power.
	Green-Solid	The device is powered and operating.
Ⓑ ENET	Off	No link on the FE port. No connection to the network.
	Green-Solid	Ethernet link detected on the FE port.
	Green-Flashing	Transmitting or receiving data across the FE port. Flashing rate is proportional to network activity.
Ⓒ WLAN	Off	The wireless interface is disabled or down.
	Green-Solid	The wireless interface is enabled and functioning as an Access Point.
	Green-Flashing	The wireless interface is enabled and functioning as an Air Monitor.

NOTE: LEDs on the Mobility Controller provide additional status and security information about connected APs.See the *ArubaOS User Guide* for more information.

3 Air Vents

These vents promote proper air circulation for cooling the device. Do not allow these vents to be obstructed by mounting equipment, network cables, or any other material.

4 **FE Port**

This port attaches the Aruba AP 60/61 to a 10Base-T/100Base-TX (twisted-pair) Ethernet LAN segment. This port also supports Serial and Power Over Ethernet (SPOE).

See Appendix 4, “Product Specifications.” for port and cable specifications.

5 **DC Power Socket**

This socket is used to connect the optional AC power adapter (not included). If POE is being used to supply power to the Aruba AP 60/61, the power adapter is not necessary.

Back View

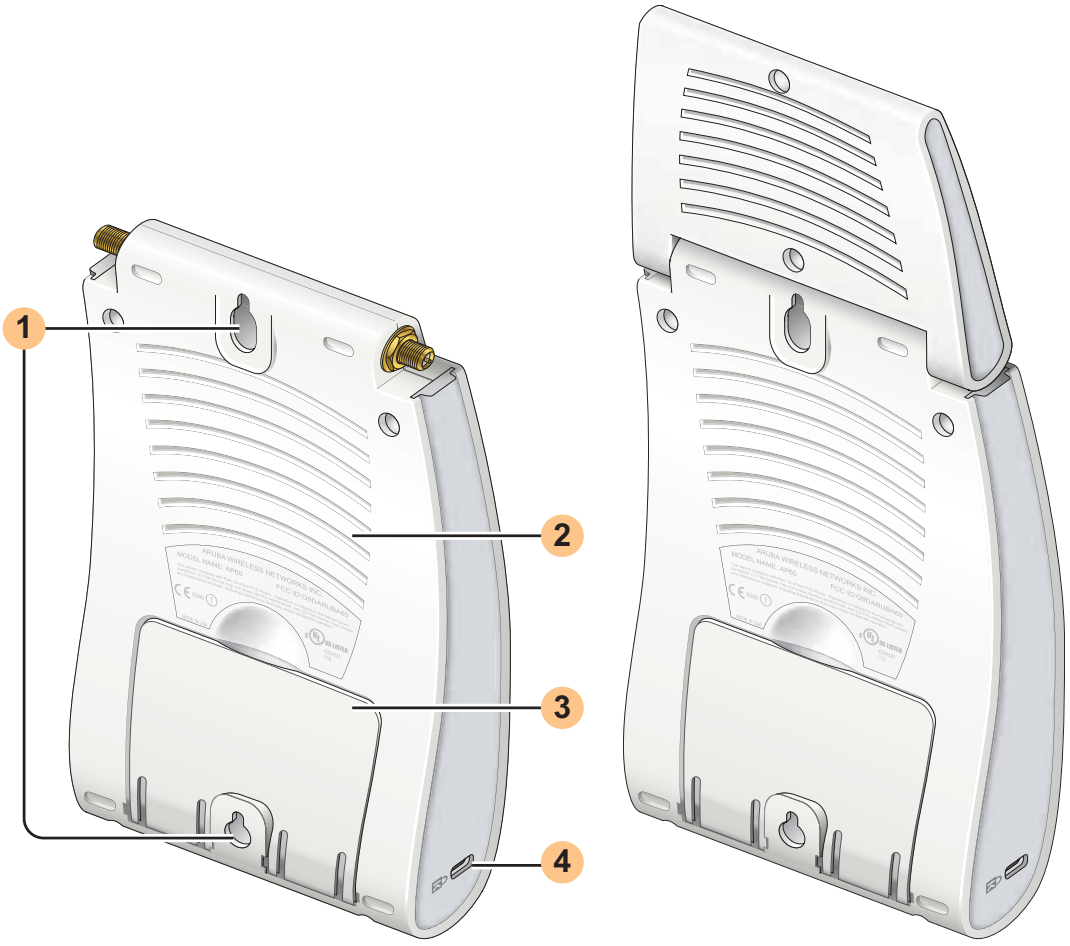

FIGURE 1-2 Aruba AP 60/61 Back View

1 Mounting Slots

The keyhole-shaped slots on the back of the chassis are used for mounting the Aruba AP 60/61.

2 Air Vents

These vents promote proper air circulation for cooling the device. Do not allow these vents to be obstructed by mounting equipment, network cables, or any other material.

3 **Fold-Out Stand**

This fold-out stand allows the Aruba AP 60/61 to be stood upright on a table or shelf.

4 **Kensington Security Slot**

This slot is compatible with a Kensington MicroSaver Security Cable (not included) which can be used to prevent the unauthorized removal of the Aruba AP 60/61 from its installed location. To secure the Aruba AP 60/61, wrap a security cable around an immovable object, insert the cable's lock into the Kensington Security Slot, and turn the key.

NOTE: The serial number and model number are on the bottom of the unit.

The Aruba AP Setup Process

Setting up an Aruba AP typically consists of four stages:

WLAN Planning—The administrator determines how many Aruba APs will be needed for their wireless network strategy and where they will be deployed. This can be easily accomplished using Aruba's automated RF Plan site-survey software (available separately).

AP Provisioning—Provisioning provides each Aruba AP with initial settings that allow it to locate the host Aruba Mobility Controller. Depending on the network topology and services, AP provisioning can be performed manually for each AP or plug-and-play for batches of APs.

AP provisioning is discussed in Appendix 2, "Provisioning Access Points."

AP Deployment—Once provisioned, the AP can be physically installed at its intended place of operation.

AP deployment is covered in Chapter 2, "AP Deployment".

AP Configuration—The administrator defines the operational behavior for each Aruba AP, such as RF characteristics and security features.

For AP configuration information, refer to the *ArubaOS User Guide.*

AP Deployment 2

This chapter covers the following topics:

- Physical mounting of the Aruba AP 60/61
- Connecting the required cables

Mounting the Aruba AP 60/61

When provisioning is complete, mount the Aruba AP 60/61 at its intended service location.

The Aruba AP 60/61 Access Points with or without external antennas are intended only for installation in Environment A as defined in IEEE 802.3.af. All interconnected equipment must be contained within the same building, including the interconnected equipment's associated LAN connections. (When using an external antenna, 5.150 to 5.250 MHz are blocked.)

Select a location as close as possible to the center of the intended coverage area. If necessary, use the Aruba RF Plan site survey tool to determine the optimum locations for your access points and air monitors.

The service location should be free from obstructions or obvious sources of interference. Normally, the higher you place an access point or air monitor, the better its performance.

If external antennas are used, make sure that they and their associated wiring are located entirely indoors. The Aruba AP 60/61 and any optional external antennas are not suitable for outside use.

The Aruba AP 60/61 can be mounted **on a wall or suspended from above (not shown) using one of the optional mounting kits (dimensions vary)** in the following ways:

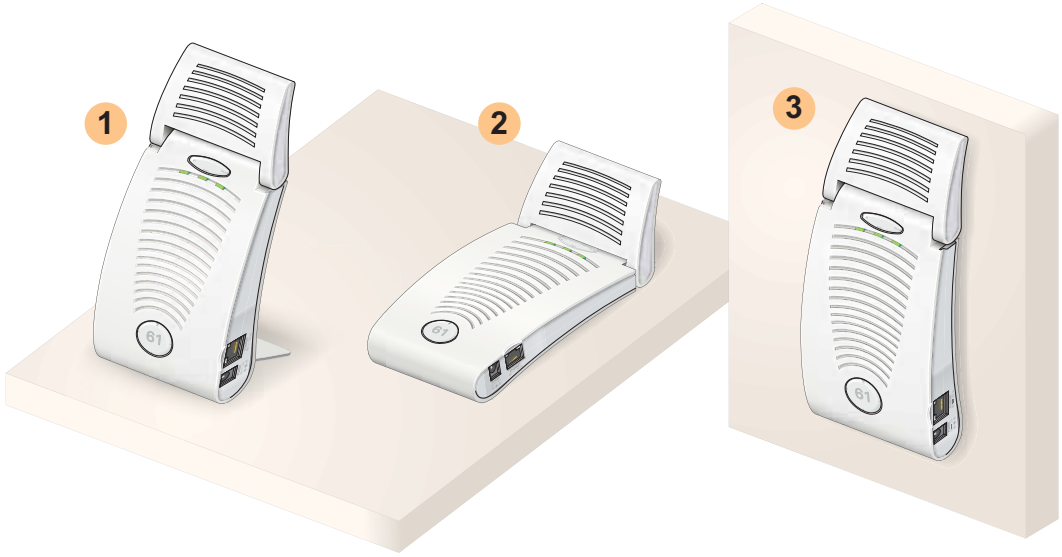

FIGURE 2-1 Aruba AP 60/61 Mounting Options

NOTE: For dimensions, see Appendix 4, "Product Specifications". Allow 5 cm (2") additional space on the right-hand side for cables. Measurements for the Aruba 60 depend on attached antennas, which vary.

Aruba 60 Detachable Antennas

Before deploying the Aruba 60, attach the appropriate antennas (not included). The antenna connections should be tightened by hand to avoid overtightening.

The Aruba 60 has dual Reverse Polarity SMA (RP-SMA) female antenna connectors that accept a variety of high-gain detachable antennas. See Table 2-1 for the list of FCC approved antennas tested for use with the Aruba 60.

Make sure that all external antennas and their associated wiring are located entirely indoors. The Aruba 60 Access Points and their optional external antennas are not suitable for outside use.

FCC-Approved Detachable Antennas

Table 3-1 lists the antennas that are approved for use with the Aruba 60.

TABLE 2-1 FCC-Approved Detachable Antennas

Aruba Part #	Description	Gain dbi	Manufacturer	Man. Part #
MULTI-BAND ANTENNA				
AP-ANT-1	Tri-Band, High-Gain, Omni-Directional Antenna (Indoor) (Swivel Connector)	5	Nearson	T614AH-2.45/5.X-S
2.4Ghz (802.11B/G)				
AP-ANT-2	High-Gain, Omni-Directional Cylindrical (Indoor) with RP-SMA Connector	6	Centurion	IG2450-RPSMA
AP-ANT-3	High-Gain, Bi-Directional Patch Antenna (Indoor) with RP-SMA Connector	5	Centurion	IB2450-RPSMA
AP-ANT-4	High-Gain, Directional Patch Antenna (Indoor) with RP-SMA Connector	9	Centurion	ID240-RPSMA/CAF94379
AP-ANT-5	Down-Tilt, Omni-Directional Patch Antenna (Indoor) with RP-SMA Connector	3.5	Cushcraft	SQ2403PG36RSM
AP-ANT-7	High-Gain Directional Patch Antenna (Indoor / Outdoor) with RP-SMA Connector	11.5	HD Comms. Corp	PCW24-08012-AFL/HD19656

TABLE 2-1 FCC-Approved Detachable Antennas (Continued)

AP-ANT-8	High-Gain, Omni-Directional Cylindrical (Indoor / Outdoor) with RP-SMA Connector	5	Cushcraft	S2403BPX36RSM
5Ghz (802.11A)				
AP-ANT-10	High-Gain, Omni-Directional Cylindrical (Indoor / Outdoor) with RP-SMA Connector	5.5	Cushcraft	S5153WBPX36RSM
AP-ANT-11	Down-Tilt, Omni-Directional Patch Antenna (Indoor) with RP-SMA Connector	3.5	Cushcraft	SQ5153WP36RSM
AP-ANT-12	High-Gain, Directional Patch Antenna (Indoor / Outdoor) with RP-SMA Connector	14	Cushcraft	S52514WP36RSM

Free-Standing Placement

To place the Aruba AP 60/61 indoors on a flat table or shelf:

Flip open the stand located on the back of the Aruba AP 60/61:

FIGURE 2-2 Aruba AP 60/61Fold-Out Stand

Place the device on a sturdy table or shelf.

CAUTION: Do not place the Aruba AP 60/61 in any place where it could fall on people or equipment. For more secure installation, use one of the optional mounting kits.

Orient the antennas.

For best performance, swivel the individual antennas (Aruba 60) or antenna array (Aruba AP61) so that they are oriented vertically. Once mounting is complete, connect the required cables (see instructions on page 14).

Using the Built-In Mounting Slots

The keyhole-shaped slots on the back of the Aruba AP 60/61 can be used to attach the device upright to an indoor wall or shelf.

CAUTION: Do not use the mounting slots to hang the Aruba AP 60/61 from the ceiling, sideways, or in any place where it could fall on people or equipment. For more secure installation, use one of the optional mounting kits.

To hang the Aruba AP 60/61 upright using the mounting slots, perform the following steps.

1. Install two screws in the wall or shelf as shown in Figure 2-3:

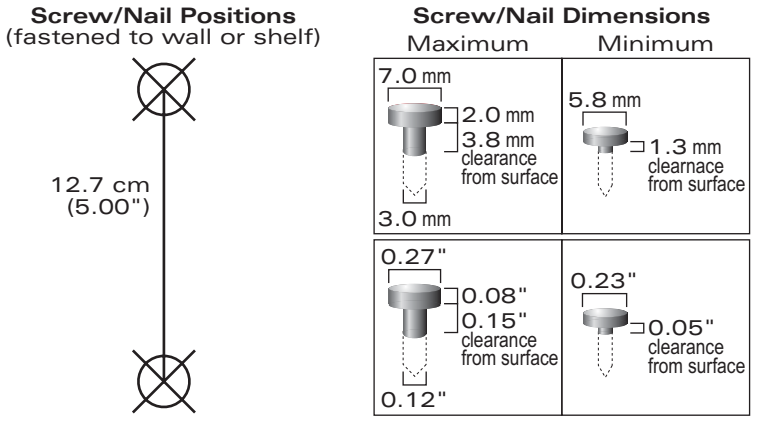

FIGURE 2-3 Mounting Screw Specifications

If attaching the device to drywall, we recommend using appropriate wall anchors (not included) as shown in Figure 2-4 on page 13.

2. Align the Aruba AP 60/61 mounting slots to capture the surface screws.

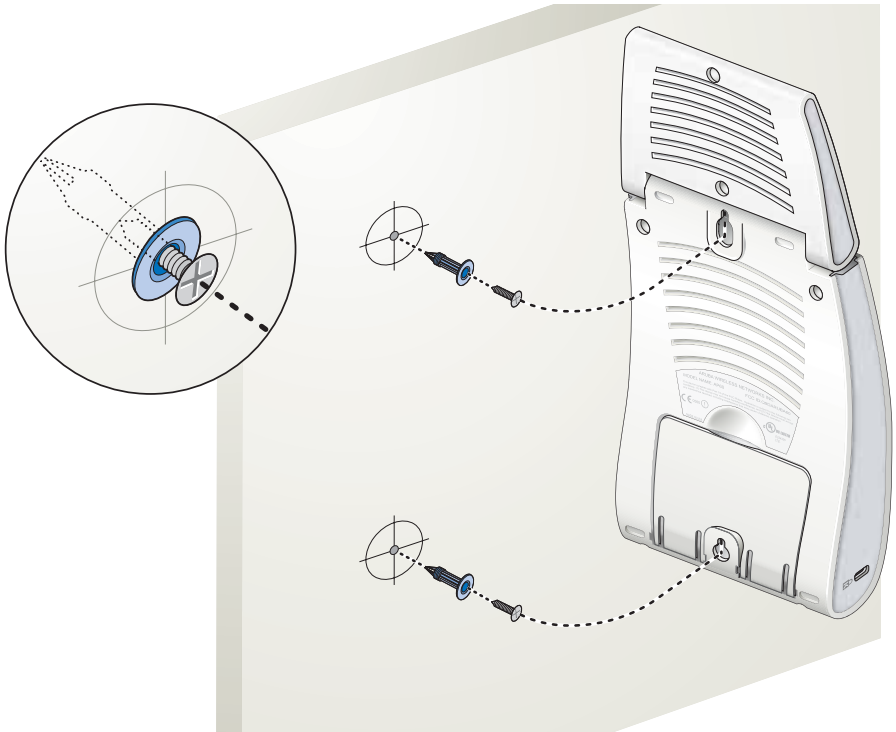

FIGURE 2-4 Hanging the Aruba AP 60/61 on Screws

3. Secure the Aruba AP 60/61, if desired.

To prevent the unauthorized removal of the Aruba AP 60/61 from its installed location, use a Kensington MicroSaver Security Cable (not included). Wrap the security cable around an immovable object, insert the cable's lock into the Kensington Security Slot on the back of the Aruba AP 60/61, and turn the key.

4. Orient the antennas.

For best performance, swivel the individual antennas (Aruba 60) or antenna array (Aruba AP61) so that they are oriented vertically (see Figure 2-1 on page 8). Once mounting is complete, connect the required cables (see instructions on page 14).

Using the Optional Mounting Kits

Use the optional mounting kit to attach the Aruba AP 60/61 to a wall, shelf, or ceiling. For installation, see the *Aruba AP 60/61 Mounting Kit Installation Notes* (P/N 0500037-01) provided with each kit.

Connecting Required Cables

The Aruba AP 60/61 Access Points with or without external antennas are intended only for installation in Environment A as defined in IEEE 802.3.af. All interconnected equipment must be contained within the same building, including the interconnected equipment's associated LAN connections.

Selecting an FE Cable

The 10/100 Mbps Ethernet (FE) port is used to connect the AP to a 10Base-T/100Base-TX (twisted-pair) Ethernet LAN segment. The appropriate FE cable depends on the features required of the FE port:

- SPOE

  When connecting the AP to a device that supports Serial and Power Over Ethernet (SPOE), use an 8-conductor, Category 5 UTP, straight-through FE cable.

  The Aruba 5000 (with Line Card LC-5000-24FE-2GE-SPOE), the Aruba 2400, and the Aruba 800 support SPOE.

- POE

  If the connecting device supports only Power Over Ethernet (POE), use a 4- or 8-conductor, Category 5 UTP, straight-through FE cable.

- Network Only

  If the connecting device does not support POE, use a 4- or 8-conductor, Category 5 UTP, FE cable. The port detects MDI/MDX and automatically adjusts for straight-through or crossover cables.

The maximum length for FE cables is 100 meters (325 feet).

When the Aruba AP 60/61 is installed in an air-handling space, such as above suspended ceilings, as described in National Electrical Code (2002) Article 300.22(C), and Canadian Electrical Code, Sections 2-128, 12-010(3) and 12-100, Part 1, CSA C22.1, POE is required. Also, any FE cable installed in such spaces should be suitable under NEC Article 800.50 and marked accordingly for use in plenums and air-handling spaces with regard to smoke propagation, such as CL2-P, CL3-P, MPP, or CMP.

Use the built-in antenna (for the AP61). For the Aruba 60, use Aruba AP-ANT-1. For all other antennas, make sure the antenna cable is UL listed and suitable for use in plenums and air-handling spaces, such as CL2-P, CL3-P, MPP, or CMP, and mount the antenna outside of the air-handling space.

Install cables in accordance with all applicable local and national regulations and practices.

For more port and cable details, see Appendix 3, “Port Specifications.”

Connecting Cables & Power

CAUTION: To prevent personal injury or damage to equipment, be sure to comply with electrical grounding standards during all phases of installation and operation of the AP. Do not allow the Aruba AP 60/61 or its attachments to be connected to or make contact with metal or power outlets on a different electrical ground than the device to which it is connected. Also, never connect the AP or Mobility Controller to external storm grounding sources.

1. Connect one end of the FE cable directly to the Aruba AP 60/61 FE port.
2. Connect the other end of the FE cable to one of the following:
   - (A) To a network port on the Mobility Controller, or
   - (B) To a network hub, router, or switch that has a routable path to the Mobility Controller.

NOTE: If the connecting device supplies POE, a straight-through cable must connect the Aruba AP 60/61 directly to the powering device without any intervening hubs, routers, or other networking equipment.

3. Connect power, if necessary.

The Aruba AP 60/61 can receive electrical power using the following options:

- POE

  If connecting the Aruba AP 60/61 to a device that supplies IEEE 802.3af compliant POE no additional power connection is necessary.

- Power Outlet

  NOTE: When the Aruba AP 60/61 is installed in an air-handling space, as described in NEC (2002) Article 300.22(C), POE must be used instead of a power outlet.

If local regulations and practices permit, connect the optional AC power adapter (not included) to the DC power socket on the Aruba AP 60/61 and plug it into an appropriate power outlet.

CAUTION: To prevent personal injury or damage to equipment, use only the AC power adapter certified for this device in the country where it is used.

Selecting an Antenna

There are three ways to select an AP60 antenna:

1. From the AP console (serial or telnet) enter **set_antenna 0|1|2** where 0 specifies auto mode, and 1 or 2 chooses a specific antenna. The antenna selection is not persistent and the AP will loose the antenna selection, if rebooted.
2. From the AP boot prompt (apboot>) enter **a_antenna 0|1|2** or **g_antenna 0|1|2** to specify an antenna. Enter a save command before booting the AP to save the antenna configuration in the AP's Flash memory, along with other provisioning parameters.
3. For releases 2.3 and higher, you can provision the antenna selection from the Mobility Controller.

Maintenance

The AP60 and AP61 require no maintenance beyond keeping the AP clean and dust free. To clean the Aruba AP 60/61, use a static-free, dry cloth.

Aruba recommends that these units be inspected annually for damage, dust buildup, and to verify that all connections are secure.

FE Port

The 10/100 Mbps Ethernet (FE) port is located on the right-hand side of the Aruba AP 60/61 and has an RJ-45 female connector. The port pin-outs are shown in Figure B-1:

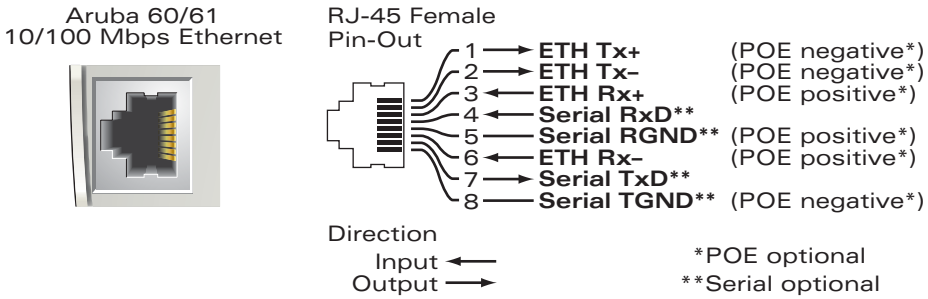

FIGURE B-1 Aruba AP 60/61 FE Port

The appropriate cable depends on the level of connectivity required of the FE port:

- If the connecting device supports Serial and Power Over Ethernet (SPOE), use an 8-conductor, Category 5 UTP, straight-through FE cable with a male RJ-45 connector.

  The Aruba 5000 (with Line Card LC-5000-24FE-2GE-SPOE), the Aruba 2400, and the Aruba 800 support SPOE.

- If the connecting device supports only Power Over Ethernet (POE, including IEEE 802.3af POE as well as “inline” or “midspan” POE devices), use an 8- or 4-conductor, Category 5 UTP, straight-through FE cable with male RJ-45 connectors.
- If the connecting device does not support Serial or POE, use a 4- or 8-conductor, Category 5 UTP, FE cable with male RJ-45 connectors. The port detects MDI/MDX and automatically adjusts for straight-through or crossover cables.

The maximum length for FE cables is 100 meters (325 feet).

When the Aruba AP 60/61 is installed in an air-handling space, as described in NEC (2002) Article 300.22 (C), POE is required. Also, any FE cable installed in such spaces should be suitable under NEC Article 800.50 and marked accordingly for use in plenums and air-handling spaces with regard to smoke propagation, such as CL2-P, CL3-P, MPP or CMP.

Install cables in accordance with all applicable local regulations and practices.

Serial Breakout Adapter

The optional serial breakout adapter is used to separate the serial communications lines from the Aruba AP 60/61 FE+SPOE port. This allows the administrator to connect a local serial console directly to the AP and access the apboot prompt for manual provisioning.

The serial breakout adapter pin-outs are shown in Figure B-2:

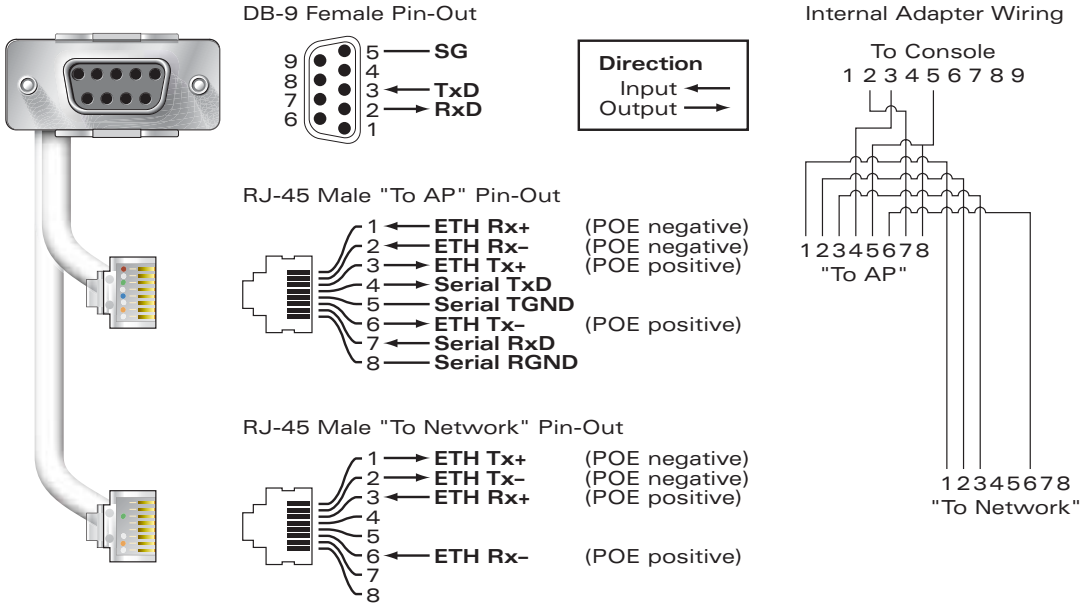

FIGURE B-2 Aruba Serial Breakout Adapter

DB-9 Specification

The DB-9 connector attaches to the serial port of a console terminal. Communication settings for the port are specified in Table B-1:

TABLE B-1 Console Terminal Settings

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

"To AP" Specifications

The RJ-45 connector labeled "To AP" attaches to the Aruba AP 60/61 FE port either directly (if the AP is physically available) or indirectly (if the AP is already deployed).

When connecting indirectly, use a straight-through FE coupler to attach the "To AP" connector to the FE cable leading directly to the AP's FE port with no intervening hubs, routers, or other network equipment. The cable must be 8-conductor, Category 5 UTP, straight-through FE cable with a maximum length of 100 meters (325 feet).

The Aruba AP 60/61 and serial breakout adapter are plenum rated. When is installed in an air-handling space, as described in NEC (2002) Article 300.22(C), any connecting FE cable should be suitable under NEC Article 800.50 and marked accordingly for use in plenums and air-handling spaces with regard to smoke propagation, such as CL2-P, CL3-P, MPP or CMP.

Install cables in accordance with all applicable local regulations and practices.

"To Network" Specifications

The RJ-45 connector labeled "To Network" attaches to an FE LAN segment. This connection is optional unless IEEE 802.11af Power Over Ethernet (POE) is used to power the AP during manual provisioning.

A straight-through FE coupler may be used to attach the "To Network" connector to a LAN FE cable. The appropriate cable depends on the level of connectivity required of the FE port:

- If the connecting device supports IEEE 802.3af Power Over Ethernet (POE), use a 4- or 8-conductor, Category 5 UTP, straight-through FE cable with male RJ-45 connectors.

  The Aruba 5000 (with Line Card LC-5000-24FE-2GE-SPOE), the Aruba 2400, and the Aruba 800 support SPOE.

- Otherwise, use a 4- or 8-conductor, Category 5 UTP, FE cable with male RJ-45 connectors. The port detects MDI/MDX and automatically adjusts for straight-through or crossover cables.

NOTE: Only IEEE 802.3af Power Over Ethernet is supported for manual provisioning. "Inline" or "midspan" POE devices will not work with the Aruba serial breakout adapter.

The maximum length for FE cables is 100 meters (325 feet).

The Aruba AP 60/61 and serial breakout adapter are plenum rated. When is installed in an air-handling space, as described in NEC (2002) Article 300.22(C), the connecting FE cable should be suitable under NEC Article 800.50 and marked accordingly for use in plenums and air-handling spaces with regard to smoke propagation, such as CL2-P, CL3-P, MPP or CMP.

Install cables in accordance with all applicable local regulations and practices.

Compliance

This section lists compliance information on a country-by-country basis.

United States

The following compliance statements apply for use of this product in the United States.

FCC - Class B

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 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 receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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

RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for fixed indoor use only. This equipment should be installed and operated with a minimum distance of 38.5 centimeters (15.2 inches) 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.

Radio Frequency Interference Requirements

This device is restricted to indoor use due to its operation in the 5.15 to 5.25 GHz frequency range. The FCC requires this product to be used indoors to reduce the potential for harmful interference to co-channel Mobile Satellite systems. High power radars are allocated as primary users of the 5.25 to 5.35 GHz and 5.65 to 5.85 GHz bands. These radar stations can cause interference with and/or damage this device.

Canada

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled “Digital Apparatus,” ICES-003 of the Department of Communications.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe B prescrites dans la norme sur le matériel brouilleur: “Appareils Numériques,” NMB-003 édictée par le ministère des Communications.

The use of this device operating either partially or completely outdoors may require the user to obtain a license for the system according to the Canadian regulations. For further information, contact your local Industry Canada office.

RSS-210

This device, when operated in the 5150-5250 MHz frequency range, is only for indoor use.

CAUTION: High power radars are allocated as primary users (meaning they have priority) in the 5250-5350 MHz and 5650-5850 MHz frequency ranges, and these radars could cause interference and/or damage to LE-LAN devices.

RSS-Gen

This device has been designed to operate with the antennas listed at Table 2-1 on page 9, and having a maximum gain of 15.0 dBi for 2.4 GHz and 14.0 dBi for 5 GHz. Antennas not included in this list or having a gain greater than 15.0 dBi for 2.4 GHz and 14.0 dBi for 5 GHz are strictly prohibited for use with this device. The required antenna impedance is 50 Ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that permitted for successful communication.

Operation 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 of the device.

Japan

Indoor Restriction for 5GHz Frequency Range

この製品は法律により、5GHz帯での屋外使用を禁じられています。

VCCI - Class B

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＢ情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると受信障害を引き起こすことがあります。
取り扱い説明書に従って正しい取り扱いをして下さい。

Europe

WARNING: This is a Class B product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

This product complies with Directive 1999/5/EC as well as with EN55022 Class B and EN55024 standards.

Underwriter Labs

These products have been Listed and tested for fire resistant and low-smoke-producing characteristics, and are suitable for use in environmental air space, such as above suspended ceilings, in accordance with Section 300-22(C) of the National Electrical Code, and Sections 2-128, 12-010(3) and 12-100 of the Canadian Electrical Code, Part 1, CSA C22.1.

Peut être utilisé dans des gaines transportant de l'air traité, conformément à la section 300-22(c) du National Electrical Code et aux articles 2-128, 12-010(3) et 12-100 du Code Canadien de l'électricité, Première partie, CSA C22.1.

EMC Compliance and Warning Statement

This equipment has been tested and found to comply with the limits of the standard for medical devices, IEC 60601-1-2:2001. The unit also complies with the requirements of EN 60601-1-2:1998, providing the presumption of compliance to the European Union's Medical Device Directive 93/42/EEC. The limits are designed to provide reasonable protection against harmful interference in a typical medical 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 other devices in the vicinity. However, there is no guarantee that interference will not occur in a particular installation. If this equipment causes interference with other devices, which may be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the device receiving the interference.
- Increase the separation between the equipment.
- Connect the equipment into an outlet on a circuit different from that to which the other device(s) are connected.
- Consult the manufacturer or field service technician for help.

Aruba Networks provides a multi-language document containing country specific restrictions, additional safety and regulatory information for the enclosed Access Point. You may find this reference on our website at:

www.arubanetworks.com/pdf/0510272-01.pdf

Certifications

Item	Measurement
Electromagnetic Compatibility	FCC Part 15 Class B, FCC Part 15 Class C (15.207/15.247) FCC Part 15 Class E 15.407 RSS 210 (CAN) ICES-003 Class B VCCI Class B TELEC ARIB STD-T66 AS/NZS 3548 Class B EN 61000-3, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11, EN 55022, EN 55024 IEC 60601-1-2:2001(AP 60) EN 60601-1-2:2001 (AP 60) CE The CE approval mark on back of the product indicates that it meets European Directives 73/23/EEC and 89/336/EEC R&TTE Directive: EN 300 328, EN 301 489, EN 301 893 Medical: EN 60601-1-2
Safety	UL Listed (UL60950) UL Listed (Canadian Electrical Code/CSA 22.2 No. 60950) EN60950 / IEC60950 National Electrical Code Section 300-22(C) Canadian Electrical Code, Part 1, CSA C22.1 Sections 2-128, 12-010(3), and 12-100 IEC 60601-1:1988 and Amendments 1 and 2 EN 60601-1-1:2001 UL 2043

Product Label

The product label is affixed to the chassis of the Aruba AP 60/61 The symbols on the label are explained in this chapter.

Product Features

- Wireless dual-band transceiver
- Varied antenna options:
  - The Aruba AP60 has dual Reverse Polarity SMA (RP-SMA) antenna connectors that accept a variety of high-gain detachable antennas (not included).
  - The Aruba AP61 has a built-in swivel array with dual, tri-band, omnidirectional antennas for reception diversity.
- Protocol-independent networking functionality
- Supports IEEE 802.11a or IEEE 802.11b/g operation as an AP
- Supports IEEE 802.11a and IEEE 802.11b/g operation as an AM
- Compatible with IEEE 802.3af Power Over Ethernet (POE)
- Seamless connectivity to wired LANs augment existing networks quickly and easily
- Can be centrally managed, configured, and upgraded through the Mobility Controller to take advantage of network changes and security improvements

Ethernet Compatibility

The Aruba AP 60/61 attaches to 10/100 Mbps Ethernet (FE) LAN segments that utilize 10Base-T/100Base-TX (twisted-pair) wiring. The device appears as an Ethernet node and performs a routing function by moving packets between the wired LAN and remote workstations on the wireless infrastructure.

Radio Characteristics

The Aruba AP 60/61 can be configured to support IEEE 802.11a or IEEE 802.11b/g operation as an AP, and supports both IEEE 802.11a and IEEE 802.11b/g operation as an AM:

- 802.11a provides a high data rate and reliable wireless connectivity

  802.11a operation uses a radio modulation technique known as Orthogonal Frequency Division Multiplexing (OFDM), and a shared collision domain (CSMA/CA). It operates in the 5GHz Unlicensed National Information Infrastructure (UNII) band. Data is transmitted over a half-duplex radio channel operating at up to 54 Megabits per second (Mbps).

- 802.11b provides an alternative to wired LANs that can dramatically cut costs

802.11b operation uses the IEEE 802.11 High-Rate Direct Sequence (HRDS) specification, and a shared collision domain (CSMA/CA). It operates in the 2.4GHz Industrial/Scientific/Medical (ISM) band. The ISM band is available worldwide for unlicensed use. Data is transmitted at speeds of up to 11 Mbps.

- 802.11g provides a high data rate and is backwards compatible with 802.11b.

  802.11g operation uses ODFM and a shared collision domain (CSMA/CA). It operates in the 2.4GHz Industrial/Scientific/Medical (ISM) band. The ISM band is available worldwide for unlicensed use. Data is transmitted at speeds of up to 54 Mbps.

Power Over Ethernet

The Aruba AP 60/61 supports the IEEE 802.3af standard for Power Over Ethernet (POE). With this feature, the Aruba AP 60/61 can accept electrical power from a compatible POE-capable device (such as the Aruba 5000 (with Line Card LC-5000-24FE-2GE-SPOE), Aruba 2400, or Aruba 800) directly over the FE cable. POE eliminates the need to provide separate power outlets in environments that are difficult or undesirable to wire for electricity.

The Aruba AP 60/61 also supports “inline” and “midspan” POE devices for normal operation. Inline power is POE that is integrated into FE ports and provides POE directly to devices. Non-POE ports can have POE added by means of a mid-span device that provides POE. The non-POE port is connected to a mid-span POE port, and this mid-span port is connected to the device that requires POE.

Physical Description

Package Contents

The Aruba AP 60/61 package includes:

- One Aruba AP 60/61 Access Point
- Assorted documentation

Inform your supplier if there are any incorrect, missing or damaged parts. If possible, retain the carton, including the original packing materials. Use them to repack the product in case there is a need to return it.

Optional Items

The following optional items can also be ordered for the Aruba AP 60/61:

- Detachable antennas (Aruba AP60 only)
- AC power adapter (5 VDC, 3 A) and power cord

- Serial breakout adapter for direct access to the AP console
- Mounting kit (modular cradle for walls and suspended ceilings)

Check with your Aruba sales representative for the availability of optional items.

The following specifications apply to the Aruba AP60 and Aruba AP61 Access Points.

Aruba AP-60 Access Point

FIGURE B-1 Part Number: AP-60

TABLE B-1 AP-60 802.11 Specifications

Description	802.11a	802.11b	802.11g
Antenna	Dual, diversity supporting Reverse Polarity-SMA (RP-SMA) detachable antenna interfaces suitable for acceptance of single-band or tri-band 802.11a/b/g detachable antennas of various pattern types and gain. For information on third-party antennas, go to the Interoperability section of the Products page at: http://www.arubanetworks.com		
Frequency Band	• 5.250 ~ 5.350 Ghz (middle band) • 5.725 ~ 5.825 Ghz (higher band)	• 2.4 ~ 2.483 Ghz (US, Canada & ETSI) • 2.4 ~ 2.497 Ghz (Japan) Complete country list available at http://www.arubanetworks.com/products/aps/certification	• 2.412 ~ 2.462 Ghz (US, Canada) • 2.412 ~ 2.472 Ghz (ETSI) • 2.412 ~ 2.484 Ghz (Japan) Complete country list available at http://www.arubanetworks.com/products/aps/certification
Radio Technology	Orthogonal Frequency Division Multiplexing (OFDM)	Direct Sequence Spread Spectrum (DSSS)	Orthogonal Frequency Division Multiplexing (OFDM)
Modulation Type	BPSK, QPSK, 16-QAM, 64-QAM	CCK, BPSK, QPSK	CCK, BPSK, QPSK, 16-QAM, 64-QAM
Transmit Power	Configurable by system administrator/ professional installer	Configurable by system administrator/ professional installer	Configurable by system administrator
Media Access Control	CSMA/CA with ACK	CSMA/CA with ACK	CSMA/CA with ACK

TABLE B-1 AP-60 802.11 Specifications (Continued)

Description	802.11a	802.11b	802.11g
Operating Channels	• US & Canada: 8 • ETSI: 13 • Japan: 5 Complete country list available at http://www.arubanetworks.com/products/aps/certification	• US & Canada: 11 • ETSI: 13 • Japan: 13 Complete country list available at http://www.arubanetworks.com/products/aps/certification	• US & Canada: 11 • ETSI: 13 • Japan: 13 Complete country list available at http://www.arubanetworks.com/products/aps/certification
Data Rates	6, 9, 12, 18, 24, 36, 48, 54 Mbps per channel	1, 2, 5.5, 11 Mbps per channel	6, 9, 12, 18, 24, 36, 48, 54 Mbps per channel

TABLE B-2 AP-60 Characteristics

Description	
Maximum Clients	64
Multi-mode Radio Band	Selectable via software
Manageability:	• Management of all 802.11 parameters • Network Wide AP Management via: CLI WEB GUI SNMPv3 • Access Point Profiles, Management by: Geographical Location BSSID Radio Type
Encryption Support (AP and Mobility Controller)	40bit / 64bit / 128bit / 152bit WEP, TKIP, AES

TABLE B-2 AP-60 Characteristics (Continued)

Description	
Physical (HxWxD):	• 159 x 99 x 31 mm / 6.26 x 3.90 x 1.22 in[a] • Weight 198 grams / 7 oz
Interfaces (Electrical):	• 1 x 10/100 Base-TX auto-sensing Ethernet RJ-45 Interface (Auto-sensing MDI/MDX) • Serial and Power Over Ethernet - 48V DC / 200mA Power Over Ethernet (802.3af compliant) • 1 x 5V DC Power Interface
Interfaces (Mechanical):	• Standard Kensington MicroSaver Security Cable Interface (cable not supplied) • Wall and ceiling mount kit (optional - part number AP-60-MNT) interface
Visual Indicators (LEDs)	Ready -- Power Ethernet link status / Activity WLAN Activity
Power	• Optional AC Power Adapter Input— 100-240 AC, 50-60 Hz • Access Point Input— 5 VDC, 3 A (AC adapter), or 48 VDC, 200 mA (POE)
Power Requirements	• 5 VDC / 2 A supplied externally via optional AC adapter kit • 48 VDC / 200 mA Power Over Ethernet (802.3af compliant) • Auto-sensing externally supplied AC power or Power Over Ethernet
Output Power	100 mW maximum (or lower as configured on the Aruba Mobility Controller to comply with local regulatory requirements)
Power Consumption	10 W maximum
Operating Environment	• 0 °C to 50 °C (32 °F to 122 °F) AP • 0 °C to 40 °C (32 °F to 104 °F) AC Mains Power Adapter Kit
Storage Environment	• 0 °C to 70 °C (32 °F to 158 °F) AP • -20 °C to 70 °C (-4 °F to 158 °F) AC Mains Power Adapter Kit

TABLE B-2 AP-60 Characteristics (Continued)

Description	
Humidity	• 5 to 95%, non-condensing AP • 15 to 85% RH AC Mains Power Adapter Kit • 5 to 90% RH Storage Humidity AC Mains Power Adapter Kit
Altitude	3,048 m (10,000 feet) maximum
Standards Compliance	• Ethernet IEEE 802.3 / IEEE 802.3u • Power Over Ethernet IEEE 802.3af • Wireless IEEE 802.11a/b/g
Mains Connections	• Class II (ungrounded equipment)
Protection Against Egress of Water	• The unit is protected against falling liquids with a protection class of IPX0 as defined by IEC 60601-1 and IEC 60529.
Mode of Operation	• As defined by IEC 60601-1, this unit is considered “Continuous Operation” equipment.

a. Measurements indicate only the Access Point chassis. Size and weight do not include other materials (such as detachable antennas, mounting kits, and cables), which may vary

Aruba AP-61 Access Point

FIGURE B-2 AP-61

TABLE 2-3 AP-61 802.11 Specifications

Description	802.11a	802.11b	802.11g
Antenna	Integral, diversity supporting dual, tri-band 802.11a/b/g omni-directional high-gain antennas with 90 degrees rotational movement Integral antenna gain: 2.4 Ghz / 2.8 dBi 5.150-5.350 Ghz / 3.9 dBi 5.6 Ghz / 4 dBi		
Frequency Band	• 5.150 ~ 5.250 Ghz (lower band) • 5.250 ~ 5.350 Ghz (middle band) • 5.725 ~ 5.825 Ghz (higher band)	• 2.4 ~ 2.483 Ghz (US, Canada & ETSI) • 2.4 ~ 2.497 Ghz (Japan) Complete country list available at http://www.arubanetworks.com/products/aps/certification	• 2.412 ~ 2.462 Ghz (US, Canada) • 2.412 ~ 2.472 Ghz (ETSI) • 2.412 ~ 2.484 Ghz (Japan) Complete country list available at http://www.arubanetworks.com/products/aps/certification
Radio Technology	Orthogonal Frequency Division Multiplexing (OFDM)	Direct Sequence Spread Spectrum (DSSS)	Orthogonal Frequency Division Multiplexing (OFDM)
Modulation Type	BPSK, QPSK, 16-QAM, 64-QAM	CCK, BPSK, QPSK	CCK, BPSK, QPSK, 16-QAM, 64-QAM
Transmit Power	Configurable by system administrator/ professional installer	Configurable by system administrator/professional installer	Configurable by system administrator
Media Access Control	CSMA/CA with ACK	CSMA/CA with ACK	CSMA/CA with ACK

TABLE 2-3 AP-61 802.11 Specifications (Continued)

Description	802.11a	802.11b	802.11g
Operating Channels	• US, Canada & ETSI: 12 • Japan: 5 Complete country list available at http://www.arubanetworks.com/products/aps/certification	• US & Canada: 11 • ETSI: 13 • Japan: 13 Complete country list available at http://www.arubanetworks.com/products/aps/certification	• US & Canada: 11 • ETSI: 13 • Japan: 13 Complete country list available at http://www.arubanetworks.com/products/aps/certification
Data Rates	6, 9, 12, 18, 24, 36, 48, 54 Mbps per channel	1, 2, 5.5, 11 Mbps per channel	6, 9, 12, 18, 24, 36, 48, 54 Mbps per channel

TABLE B-4 AP-61 Characteristics

Description	
Maximum Clients	64
Multi-mode Radio Band	Selectable via software
Manageability:	• Management of all 802.11 parameters • Network Wide AP Management via: CLI WEB GUI SNMPv3 • Access Point Profiles, Management by: Geographical Location BSSID Radio Type
Encryption Support (AP and Mobility Controller)	40bit / 64bit / 128bit / 152bit WEP, TKIP, AES

TABLE B-4 AP-61 Characteristics (Continued)

Description	
Physical (HxWxD):	• Antenna up, stand closed—216 x 99 x 31 mm / 8.50 x 3.90 x 1.22 in[a] • Antenna up, stand open—209 x 99 x 74 mm / 8.23 x 3.90 x 2.91 in • Antenna 90°, stand closed— 159 x 99 x 71 mm / 6.26 x 3.90 x 2.80 in • Weight 255 grams / 9 oz
Interfaces (Electrical):	• 1 x 10/100 Base-TX auto-sensing Ethernet RJ-45 Interface (Auto-sensing MDI/MDX) • Serial and Power Over Ethernet - 48 VDC/200 mA Power Over Ethernet (802.3af compliant) • 1 x 5V DC Power Interface
Interfaces (Mechanical):	Standard Kensington MicroSaver Security Cable Interface (cable not supplied) Wall and ceiling mount kit (optional - part number AP-60-MNT) interface
Visual Indicators (LEDs)	Ready -- Power Ethernet link status / Activity WLAN Activity
Power	• Optional AC Power Adapter Input— 100-240 AC, 50-60 Hz • Access Point Input— 5 VDC, 3 A (AC adapter), or 48 VDC, 200 mA (POE)
Power Requirements	• 5 VDC / 2 A supplied externally via optional AC adapter kit • 48 VDC / 200 mA Power Over Ethernet (802.3af compliant) • Auto-sensing externally supplied AC power or Power Over Ethernet
Output Power	100 mW maximum (or lower as configured on the Aruba Mobility Controller to comply with local regulatory requirements)
Power Consumption	10W maximum

TABLE B-4 AP-61 Characteristics (Continued)

Description	
Operating Environment	• 0 °C to 50 °C (32 °F to 122 °F) AP • 0 °C to 40 °C (32 °F to 104 °F) AC Mains Power Adapter Kit
Storage Environment	• 0 °C to 70 °C (32 °F to 158 °F) AP • -20 °C to 70 °C (-4 °F to 158 °F) AC Mains Power Adapter Kit
Humidity	• 5 to 95%, non-condensing AP • 15 to 85% RH AC Mains Power Adapter Kit • 5 to 90% RH Storage Humidity AC Mains Power Adapter Kit
Altitude	3,048 m (10,000 feet) maximum
Standards Compliance	• Ethernet IEEE 802.3 / IEEE 802.3u • Power Over Ethernet IEEE 802.3af • Wireless IEEE 802.11a/b/g

a. Measurements indicate only the Access Point chassis. Size and weight do not include other materials (such as detachable antennas, mounting kits, and cables), which may vary

Related Documents

The following items are part of the complete documentation for the Aruba system:

- *Aruba Quick Start Guide*
- *Aruba AP 60/61 Wireless Access Point Installation Guide* (this document)
- *ArubaOS User Guide*
- *Aruba Mobility Controller installation guide*

For the current versions of these manuals, or to obtain the latest product release notes, visit the support section of the Aruba Web site (see page 38).

Contacting Aruba Networks

Web Site	
■ **Main Site**	http://www.arubanetworks.com
■ **Support Site**	http://www.arubanetworks.com/support
■ **Software Licensing Site**	https://licensing.arubanetworks.com
■ **Wireless Security Incident Response Team (WSIRT)**	http://www.arubanetworks.com/support/wsirt
■ **Support Email**	support@arubanetworks.com
■ **WSIRT Email**	wsirt@arubanetworks.com
Please email details of any security problem found in an Aruba product.	

Telephone Numbers	
■ **Aruba Corporate**	+1 (408) 227-4500
■ **FAX**	+1 (408) 227-4550
■ **Support**	
● United States	800-WI-FI-LAN (800-943-4526)
● France	+33 (0) 1 70 72 55 59
● United Kingdom	+44 (0) 20 7127 5989
● Germany	+49 (0) 69 38 09 77 22 8
● All other countries	+1 (408) 754-1200

Proper Disposal of Aruba Equipment

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

The WEEE Directive 2002/96/EC and RoHS (Restriction of Hazardous Substances) Directive 2002/95/EC sets collection, recycling and recovery targets for various categories of electrical products and their waste.

The Restriction on Hazardous Substances Directive (RoHS) (2002/95/EC), which accompanies the WEEE Directive, bans the use of heavy metals and brominated flame-retardants in the manufacture of electrical and electronic equipment. Specifically, restricted materials under the RoHS Directive are Lead (including Solder used in PCB's), Cadmium, Mercury, Hexavalent Chromium, and Bromine.

Aruba declares compliance with the European Union (EU) WEEE Directive (2002/96/EC). For more information on WEEE, refer to:

http://www.dti.gov.uk/sustainability/weee/