Aruba AP-85 Outdoor Access Point Series

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Contents

Preface

This preface includes the following information:

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

Guide Overview

- Chapter 1, "AP-85 Series Hardware Overview" on page 7 provides a detailed hardware overview of the three AP-85 models: the AP-85TX, the AP-85FX, and the AP-85LX.
- Chapter 2, "Outdoor Planning and Deployment Considerations" on page 15 provides key questions to ask and items to consider when deploying an outdoor wireless network.
- Chapter 3, "AP-85 Series Installation" on page 21 describes the multi-step process for successful installation and deployment of an AP-85.
- Appendix A, "Understanding Antennas" on page 33 provides key tools that will help you understand Aruba antenna specifications.
- Appendix B, "Product Specifications" on page 43 includes product technical specifications and safety and regulatory compliance information.

Related Documents

The following documents are referred to in this guide and are considered components of the complete documentation set needed for successful AP deployment and management:

- *ArubaOS Quick Start Guide*
- *ArubaOS User Guide*
- *Aruba Mobility Management System User Guide*
- Aruba Outdoor Antenna Specifications

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 (UIFN): 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 AP-85 Series

The AP-85 Series consists of resilient, environmentally hardened, outdoor rated, dual-band IEEE 802.11a/b/g devices, which can be configured for deployment as a wireless access point, air monitor, mesh point, or mesh portal. This outdoor access point series is part of Aruba's comprehensive wireless network solution. The AP-85 Series works only in conjunction with an Aruba Mobility Controller and each AP can be centrally managed, configured, and upgraded through the controller.

The AP-85 Series consists of the following models:

- AP-85TX (Ethernet)
- AP-85FX (Multi-mode Fiber)
- AP-85LX (Single-mode Fiber)

AP-85 Series Operation

- Wireless access point (IEEE 802.11 a/b/g)
- Wireless air monitor (IEEE 802.11 a/b/g)
- Wireless access point with wireless backhaul support*
- Enterprise mesh point (MP; Mesh license required)*
- Enterprise mesh portal (MPP; Mesh license required)*
- Protocol-independent networking functionality
- IEEE 802.3af Power over Ethernet (PoE) compatible (AP-85TX only)

NOTE	Items noted with a asterisk (*) require a secure enterprise mesh license. Contact your Aruba sales representative for a complete listing of available software licenses.
CAUTION	Aruba access points must be installed by trained service personnel. These installers are responsible for ensuring that grounding is available and it meets applicable local and national electrical codes.
WARNING	Do not work on an AP and do not connect or disconnect cables during periods of lightning activity.

Minimum Software Requirements

The AP-85 Series requires ArubaOS 3.2.0 or later.

ArubaOS software builds prior to version 3.2.0 do not support the AP-85 Series. If your network currently runs on a software build prior to 3.2.0, you must upgrade the software on your master and local controllers to 3.2.0 or later prior to installing an AP-85 in your existing network.

Package Checklist

Included with all three AP-85 models:

- Aruba AP-85 outdoor access point (TX, FX, or LX model)
- AP-85 wall/pole/mast mount kit (fixture with hardware)
- 8-foot DC outdoor rated power cable
- Weatherproof connector shell for RJ-45 terminated CAT 5 cable
    - LTW P/N LTWRJS-00PFFA-SL8001
- *Aruba AP-85 Outdoor Access Point Installation Guide*

Included with the AP-85FX/LX models only:

- 8-foot AC outdoor rated power cable (for FX/LX models only; US and EU options available)
- Fiber Optic Termination Kit
    - AP-85FX: Tyco P/N 1828618-1
    - AP-85LX: Tyco P/N 1828618-2

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

N O T E	Optional accessories are available for use with the AP-85 and are sold separately. Refer to "Optional Accessories" on page 14 for further details.

Hardware Model Overview

AP-85 Series Front View

The front of the AP-85 Series has LED status indicators (see Figure 1). For descriptions of the LEDs and their behavior, refer to "LED Status Indicators" on page 13.

Figure 1 *AP-85 Series Front View*

LED
Status Indicators
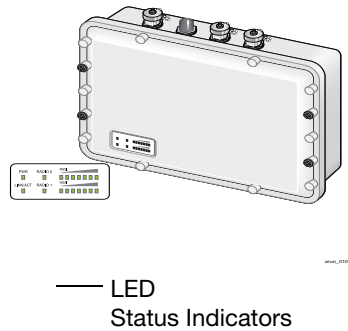
AP-85 Series Rear View

The rear of the AP-85 Series has four mounting holes (see Figure 2). Refer to Chapter 3, "AP-85 Series Installation" on page 21 for mounting and installation instructions.

Figure 2 *AP-85 Series Rear View*

Mounting Holes
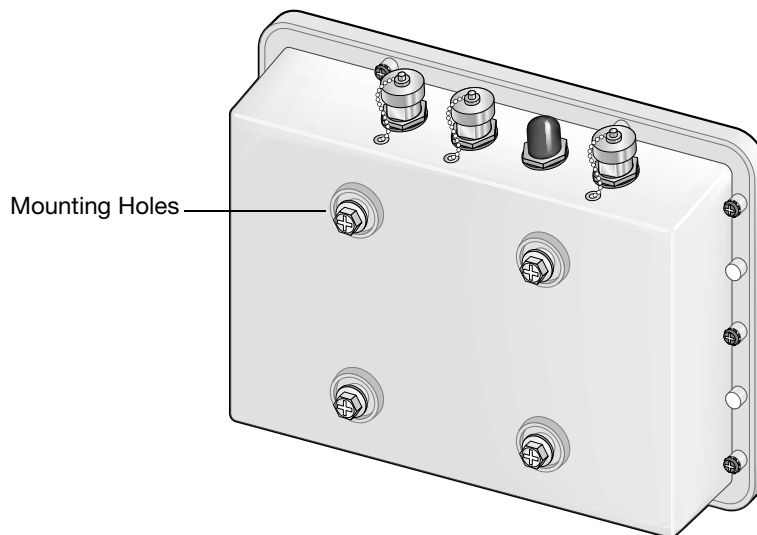
AP-85 Series Top View

The top of the AP-85 Series consists of four, female N-type antenna interfaces (see Figure 3).

Figure 3 *AP-85 Series Top View*

Four, Female N-Type
Antenna Interfaces.

RADIO 0 supports 2.4 Ghz;
RADIO 1 supports 5 GHz
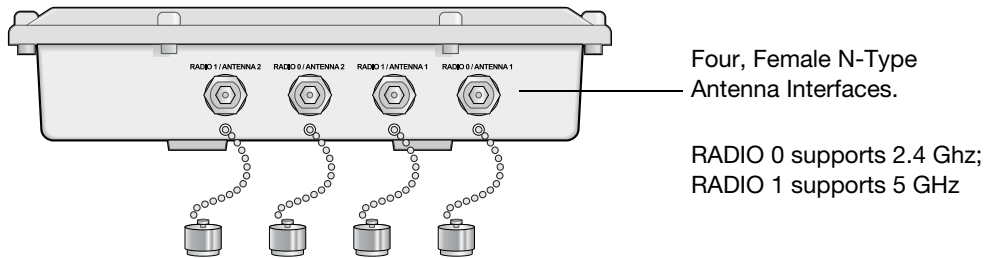
The AP-85 Series requires the use of detachable, outdoor rated antennas. Select the correct antenna type to support the required frequency band (2.4 or 5 GHz) and the desired coverage pattern.

The four, female N-type antenna interfaces on the AP-85 models are grouped into diversity pairs, one pair is marked as RADIO 0 and the other pair is marked as RADIO 1. RADIO 0 supports 2.4 GHz frequency band antennas and RADIO 1 supports 5 GHz frequency band antennas.

To select the correct antenna type for the deployment, download and read Aruba's outdoor antenna specifications: http://www.arubanetworks.com/products/access-points/antennas.php.

For further details, see Appendix A, "Understanding Antennas" on page 33.

> ⚠ **CAUTION**
>
> An Aruba Lightning Arrestor, AP-LAR-1, must be installed on each antenna port for protection against lightning induced surges. Failure to use an AP-LAR-1 can void the warranty of an Aruba outdoor AP model and renders the AP susceptible to failure from lightning induced surges.

AP-85TX Bottom View

The bottom of the AP-85TX unit (see Figure 5) has the following ports and connections:

- DC PWR 12 VDC, 2 A: The AP is capable of accepting DC power in the range of 8 to 16 VDC. If the AP-85TX is not connected to a PoE source, the AP must be powered via a DC power source. An outdoor rated, two-wire, 8-foot long DC power cable (wiring harness) is supplied with the unit. For proper installation instructions, see "DC and AC Power Cables" on page 30.

- LAN/POE 48 VDC, 350 mA: Also known as a 10/100Base-T Fast Ethernet (RJ-45) port, which is IEEE 802.3 BaseT and 802.3u 100BaseTX compliant. This port supports IEEE 802.3af Power over Ethernet (PoE), accepting 48 VDC as a standards-defined powered device (PD) from a power sourcing equipment (PSE), such as a PoE midspan injector. The AP-85TX also supports SPoE (Serial Power over Ethernet).

Figure 4 10/100Base-T Fast Ethernet (RJ-45) Port Pin-Out
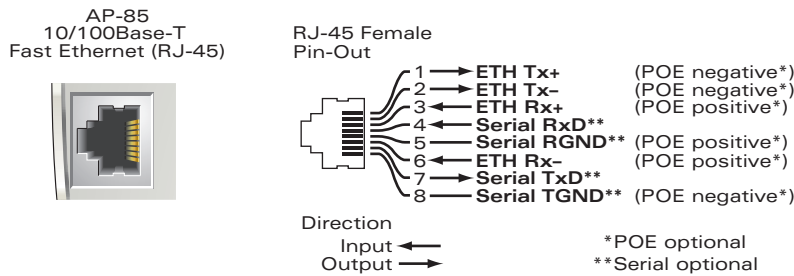
- Grounding Point

⚠ CAUTION	It is important that the AP-85TX be properly grounded and a grounding point is provided on the bottom of the AP-85TX model. A professional installer should ensure that grounding is available and meets applicable local and national electrical codes.

Figure 5 *AP-85TX Bottom View*
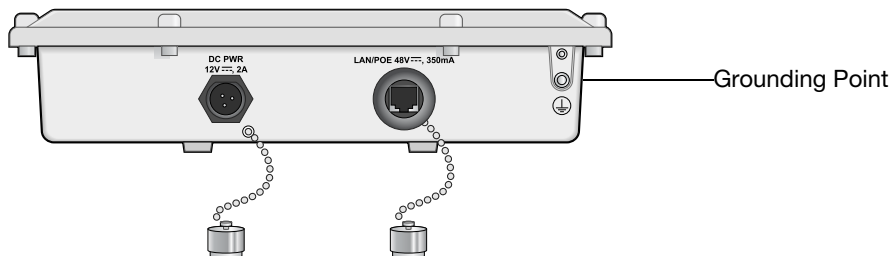
AP-85FX/LX Bottom View

The bottom of the AP-85FX/LX unit (see Figure 5) has the following ports and connections:

- DC PWR 12 VDC, 2 A: The AP can accept DC power in the range of 8 to 16 VDC. If the AP-85FX/LX is not connected to an AC power source, the AP must be powered by a DC power source. An outdoor rated, two-wire, 8-foot long DC power cable (wiring harness) is supplied with the unit. For proper installation instructions, see "DC and AC Power Cables" on page 30.

- LAN - OPTICAL:
  - AP-85FX: This model has a 100BASE-FX data uplink port for multi-mode, dual-fiber network connectivity. A **multi-mode**, fiber patch cable with a duplex LC connector is required for use. The cable is not included and must be purchased separately.
  - AP-85LX: This model has a 100BASE-LX data uplink port for single-mode, dual-fiber network connectivity. A **single-mode**, fiber patch cable with a duplex LC connector is required for use. The cable is not included and must be purchased separately.

- CONSOLE: A serial console port is provided for connection to a terminal, allowing direct local management.

Figure 6 *Serial Console Port Pin-Out*
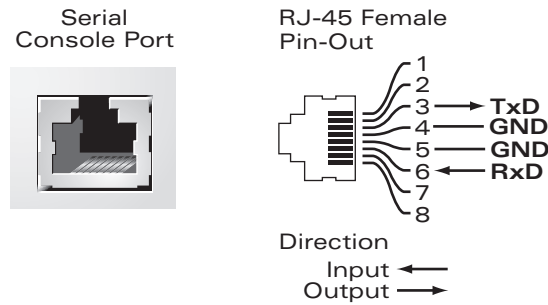
Communication settings for the serial console port are listed in Table 1.

Table 1 *Console Terminal Settings*

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

- AC PWR 90-228 V~, 500 mA: The AP can accept AC power at the limits specified on the unit. If the AP-85FX/LX is not connected to a DC power source, the AP must be powered by an AC power source. An outdoor rated, three-wire, 8-foot long AC power cable (wiring harness) is supplied with the unit. Some installation locations are in the scope and under the authority of the National Electric Code (NEC or NFPA 70), and some are not, as indicated in Article 90.2. The NEC applies where:
  - The product must be grounded reliably using the external screw, as shown in this installation guide, and not solely depend on the ground provided in the power supply cord.
  - The power cord should be less than 15" long.
  - The plug for the power cord should be installed in a dry location, such as with the use of an NRTL listed receptacle box with cover that is weatherproof with the power plug inserted into the receptacle (such as the MultiMac model from Taymac Corp).

  The NEC does not apply when:
  - The installation must follow all regulations and established practices that are applicable for the particular installation environment.

  For international outdoor use:
  - The product must be grounded reliably using the external screw, as shown in this installation guide, and not solely depend on the ground provided in the power supply cord. Considerations should include selection of weatherproofing means (IP67 or better), proper strain relieving for the power cord, and adherence to all applicable regulations and local practices.
  - The plug for the power cord should be installed in a dry location, such as with the use of a suitable certified receptacle box with a cover, which is weatherproof (IP67 or better) with the power plug inserted into the receptacle.
- Grounding Point

> ⚠️ **CAUTION**
>
> It is important that the AP-85FX/LX be properly grounded; a grounding point is provided on the bottom of the AP-85FX/LX model. The installer (trained service personnel) should ensure that grounding is available and that the grounding meets applicable local and national electrical codes.

Figure 7 *AP-85FX/LX Bottom View*

Grounding Point
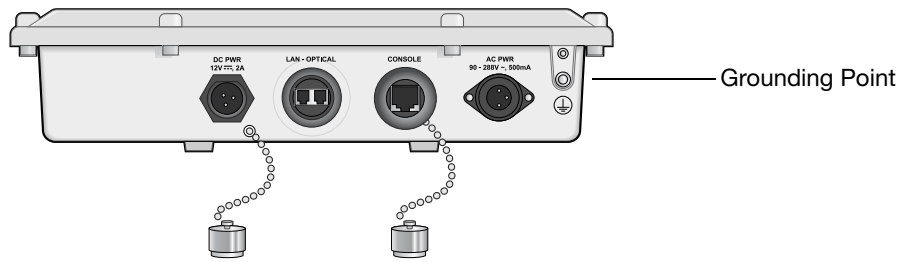
LED Status Indicators

All AP-85 models include visual indicators for power, link, and radio status. Additionally, each radio has a seven-LED array that indicates received signal strength (RSSI).

NOTE The RSSI LED indicators represent varying degrees in the RSSI level. The absence of a signal is indicated by no LED response, and full signal strength is indicated when all seven LEDs are active and lit.

Table 2 lists the meanings of the LEDs on the AP-85 outdoor access points.

Table 2 *AP-85 LED Status Indicators*

LED	Function	Indicator	Status
PWR	AP Power/Ready Status	Off	No power to AP
		Flashing	Device booting, not ready
		On	Device ready
LINK/ACT (applicable to the AP-85TX only)	LAN/Network Link Status	Off	Ethernet link unavailable
		On (Yellow)	10 Mbs Ethernet link negotiated
		On (Green)	100 Mbs Ethernet link negotiated
		Blinking	Traffic on Ethernet link
LINK/ACT (applicable to the AP-85FX/LX models only)	LAN/Network Link Status	Off	Ethernet link unavailable
		On (Green)	100 Mbs Ethernet link negotiated
		Blinking	Traffic on Ethernet link
RADIO 0	Radio 0 Status	Off	Radio 0 disabled
		On (Green)	Radio 0 enabled in WLAN mode
RADIO 1	Radio 1 Status	Off	Radio 1disabled
		On (Green)	Radio 1 enabled in WLAN mode

Table 2 *AP-85 LED Status Indicators (Continued)*

LED	Function	Indicator	Status
RSSI (Radio 0)	RSSI Level for Radio 0	Off	RSSI disabled/no signal
		7 Step Progressive Bars 3/6/9/12/15/21/27 dB RSSI	Each bar represents a progressive increase in signal strength, with 7 bars representing maximum signal strength (100%). Minimum data rate: Two lit LEDs Maximum data rate: Six lit LEDs
RSSI (Radio 1)	RSSI Level for Radio 1	Off	RSSI disabled/no signal
		7 Step Progressive Bars 3/6/9/12/15/21/27 dB RSSI	Each bar represents a progressive increase in signal strength, with 7 bars representing maximum signal strength (100%). Minimum data rate: Two lit LEDs Maximum data rate: Six lit LEDs

Optional Accessories

The following items are available for use with AP-85 outdoor access points and are sold separately. Contact your Aruba sales representative for details and assistance.

- Aruba 85 Field Replaceable Mount Kit: P/N AP-85-MNT-S
- Aruba 85 Low-Profile Wall Mount Bracket: P/N AP-85-MNT-2
- Aruba 85 Streetlight Power Tap Adapter (8 ft): P/N AP-85-PT-1
- Aruba 85 AC Power Provisioning Cable (3 ft; indoor rated): P/N AP-85-CBL-1
- Aruba 85 Antenna Mount Bracket: P/N AP-85-MNT-1
- Aruba 85 AC Power Cable (8 ft): P/N AP-85-CBL-2-US-S or AP-85-CBL-2-EU-S
- Aruba 85 AC Power Cable (40 ft): P/N AP-85-CBL-3-US-S or AP-85-CBL-3-EU-S
- Aruba 85 DC Power Cable (8 ft): P/N AP-85-CBL-4-S
- Aruba Lightning Arrester: P/N AP-LAR-1

NOTE — AC power cables are available for use with the AP-85FX/LX models only.

Planning and Deployment Considerations

Prior to deploying an outdoor wireless network, the environment must be evaluated to plan for a successful Aruba WLAN deployment. Successfully evaluating the environment enables the proper selection of Aruba APs and antennas and assists in the determination of their placement for optimal RF coverage. This process is considered WLAN or RF planning and Aruba's system engineers can assist in the outdoor planning process.

Scale Requirements

The potentially immense scale of outdoor deployments requires consideration of factors that may not be as important in a typical indoor deployment:

- Range (distance): Range or distance between APs must be taken into account during the planning phase. Available AP mounting locations are often far less flexible in an outdoor environment. Regardless of these outdoor restrictions, the desired goal is to achieve results similar to an indoor deployment: a "dense" RF deployment that supports advanced Aruba features, such as ARM, efficient client roaming, and failover.

- Elevation: Proper consideration and planning for elevation differences between APs (AP to AP) and AP to Client can be *critical* to success. To plan for these differences in elevation, it is important to understand the 3D coverage pattern provided by the antennas that will be deployed in the environment.

- Non-Fixed Considerations: The RF environment might change on a day to day basis. Keep non-fixed items, such as shipping containers, vehicles, and future building construction, in mind when planning for an outdoor deployment.

Identifying Known RF Absorbers/Reflectors/Interferences Sources

Identifying known RF absorbers/reflectors/interference sources while out in the field during the installation phase is critical. Even though outdoor environments consist of fewer RF absorbers/reflectors/interference sources compared to indoor environments, ensure that these sources are identified and taken into consideration when installing and mounting an AP to its fixed outdoor location.

RF Absorbers

- Cement/Concrete
- Natural Items: Trees/vegetation
- Brick

RF Reflectors

- Metal Objects: Roof-installed air-conditioning equipment, chain link fences (depending on aperture size), other wire fences, or water pipes

RF Interference Sources

- Other 802.11a/b/g or broadband access equipment operating nearby
- Industrial RF welding equipment or other Industrial, Scientific and Medical (ISM) equipment that utilizes RF to heat or alter the physical properties of materials
- Military, Commercial Aviation or Weather Radar Systems

Line of Sight (Radio Path Planning)

AP-85 Series access points are capable of performing as one of the following:

- Enterprise mesh point (MP)
- Enterprise mesh portal (MPP)

N O T E	To configure the AP-85 as a mesh point or mesh portal, you must install a mesh software license on a Mobility Controller as a software license key. Contact your sales account manager or authorized reseller to obtain the software license. There are several mesh software licenses available that support different maximum number of APs. The licenses are cumulative; each additional license installed increases the number of APs (mesh nodes) supported by the Mobility Controller.

A wireless bridge or mesh link requires a "radio line of sight" between the two antennas for optimum performance. The concept of radio line of sight involves the area along a link through which the bulk of the radio signal power travels. This area is known as the first Fresnel Zone of the radio link. For a radio link, no object (including the ground) must intrude within 60% of the first Fresnel Zone.

Figure 8 illustrates the concept of a good radio line of sight.

Figure 8 *Line of Sight*
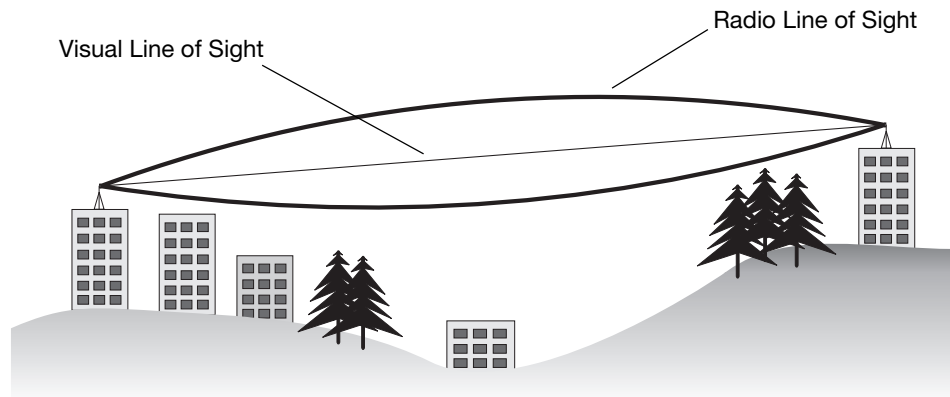
If there are obstacles in the radio path, there may still be a radio link but the quality and strength of the signal will be affected. Calculating the maximum clearance from objects on a path is important as it directly affects the decision on antenna placement and height. It is especially critical for long-distance links, where the radio signal could easily be lost.

When planning the radio path for a wireless bridge or mesh link, consider these factors:

- Avoid any partial line of sight between the antennas
- Be cautious of trees or other foliage that may be near the path, or may grow and obstruct the path.
- Be sure there is enough clearance from buildings and that no building construction may eventually block the path.
- For very long distance links, the curvature of the earth (20 cm per km) may need to be considered in the calculation of relative heights.

- Check the topology of the land between the antennas using topographical maps, aerial photos, or even satellite image data (software packages are available that may include this information for your area)
- Avoid a path that may incur temporary blockage due to the movement of cars, trains, or aircraft.

Antenna Height

A reliable wireless bridge or mesh link is usually best achieved by mounting the antennas at each end high enough for a clear radio line of sight between them. The minimum height required depends on the distance of the link, obstacles that may be in the path, topology of the terrain, and the curvature of the earth (for links over 3 miles).

For long-distance links, the AP may have to be mounted on masts or poles that are tall enough to attain the minimum required clearance. Use the following table to estimate the required minimum clearance above the ground or path obstruction (for 5 GHz bridge links).

Table 3 *Antenna Minimum Height and Clearance Requirements*

Total Link Distance	Max Clearance for 60% of First Fresnel Zone at 5.8 GHz	Approximate Clearance for Earth Curvature	Total Clearance Required at Mid-point of Link
0.25 mile (0.402 km)	4.6 ft (1.4 m)	0.007 ft (0.002 m)	4.6 ft (1.4 m)
0.5 mile (0.805 km)	6.2 ft (1.9 m)	0.03 ft (0.010 m)	6.2 ft (1.9 m)
1 mile (1.6 km)	8.9 ft (2.7 m)	0.13 ft (0.04 m)	8.9 ft (2.7 m)
2 miles (3.2 km)	12.5 ft (3.8 m)	0.5 ft (0.15 m)	13.1 ft (4.0 m)
3 miles (4.8 km)	15.4 ft (4.7 m)	1.0 ft (0.3 m)	16.4 ft (5.0 m)
4 miles (6.4 km)	17.7 ft (5.4 m)	2.0 ft (0.6 m)	19.7 ft (6.0 m)
5 miles (8 km)	20 ft (6.1 m)	3.0 ft (0.9 m)	23 ft (7.0 m)
7 miles (11.3 km)	23.6 ft (7.2 m)	6.2 ft (1.9 m)	30 ft (9.1 m)
9 miles (14.5 km)	27 ft (8.2 m)	10.2 ft (3.1 m)	37 ft (11.3 m)
12 miles (19.3 km)	30.8 ft (9.4 m)	18.0 ft (5.5 m)	49 ft (14.9 m)
15 miles (24.1 km)	34.4 ft (10.5 m)	28.0 ft (8.5 m)	62.7 ft (19.1 m)

NOTE

To avoid any obstruction along the path, the height of the object must be added to the minimum clearance required for a clear radio line of sight. Consider the following simple example, illustrated in Figure 9.

Figure 9 *Antenna Height and Line of Sight*
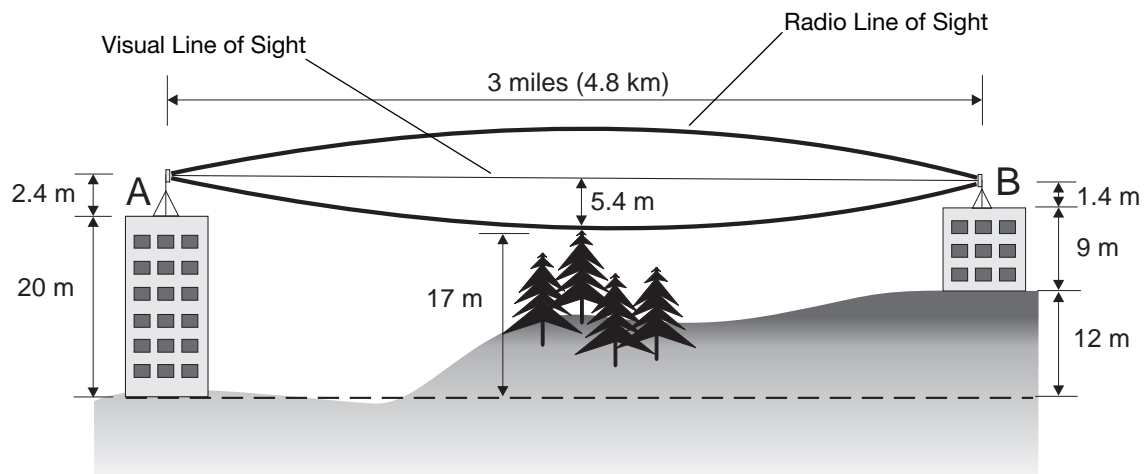
A wireless bridge or mesh link is deployed to connect building A to building B, which is located three miles (4.8 km) away. Mid-way between the two buildings is a small tree-covered hill. From the above table it can be seen that for a three-mile link, the object clearance required at the mid-point is 5.3 m (17.4 ft). The tree tops on the hill are at an elevation of 17 m (56 ft), so the antennas at each end of the link need to be at least 22.3 m (73 ft) high. Building A is six stories high, or 20 m (66 ft), so a 2.3 m (7.5 ft) mast or pole must be constructed on its roof to achieve the required antenna height. Building B is only three stories high, or 9 m (30 ft), but is located at an elevation that is 12 m (39 ft) higher than building A. To mount an antenna at the required height on building B, a mast or pole of 1.3 m (4.3 ft) is needed.

⚠ CAUTION	Never construct a radio mast, pole, or tower near overhead power lines.

📝 NOTE	Local regulations may limit or prevent construction of a high radio mast or tower. If your wireless bridge or mesh link requires a high radio mast or tower, consult a professional contractor for advice.

Antenna Position and Orientation

Once the required antenna height has been determined, other factors affecting the precise position of the wireless bridge or mesh link must be considered:

- Be sure there are no other radio antennas within 2 m (6 ft) of the wireless bridge or mesh link. These include other WiFi radio antennas.
- Place the wireless bridge or mesh link away from power and telephone lines.
- Avoid placing the wireless bridge or mesh link too close to any metallic reflective surfaces, such as roof-installed air-conditioning equipment, tinted windows, wire fences, or water pipes. Ensure that there is at least 5 feet clearance from such objects.
- The wireless bridge or mesh link antennas at both ends of the link must be positioned with the same polarization direction, either horizontal or vertical. Proper alignment helps to maximize throughput.

Radio Interference

The avoidance of radio interference is an important part of wireless link planning. Interference is caused by other radio transmissions using the same or an adjacent channel frequency. You should first scan your proposed site using a spectrum analyzer to determine if there are any strong radio signals using the 802.11a/b/g channel frequencies. Always use a channel frequency that is furthest away from another signal.

If radio interference is still a problem with your wireless bridge or mesh link, changing the antenna direction may improve the situation.

Weather Conditions

When planning wireless bridge or mesh links, you must take into account any extreme weather conditions that are known to affect your location. Consider these factors:

- Temperature: The wireless bridge or mesh link is tested for normal operation in temperatures from
  -. Operating in temperatures outside of this range may cause the unit to fail
- Wind Velocity: The wireless bridge or mesh link can operate in winds up to. You must consider the known maximum wind velocity and direction at the site and be sure that any supporting structure, such as a pole, mast, or tower, is built to withstand this force.
- Lightning: Rain: The wireless bridge or mesh link is weatherproofed against rain. However, it is recommended to apply

⚠️ CAUTION	An Aruba Lightning Arrestor, AP-LAR-1, must be installed on each antenna port for protection against lightning induced surges. Failure to use an AP-LAR-1 can void the warranty of an Aruba outdoor AP model and renders the AP susceptible to failure from lightning induced surges.

  weatherproof sealing tape around the Ethernet port and antenna connectors for extra protection. If moisture enters a connector, it may cause a degradation in performance or even a complete failure of the link.
- Snow and Ice: Falling snow, like rain, has no significant effect on the radio signal. However, a buildup of snow or ice on antennas may cause the link to fail. In this case, the snow or ice has to be cleared from the antennas to restore operation of the link.

Ethernet Cabling

When a suitable antenna location has been determined, you must plan a cable route from the wireless bridge or mesh link outdoors to a suitable power and/or network source.

Consider these points:

- The Ethernet cable length should never be longer than 90 m (295 ft).
- Determine a building entry point for the cable (if applicable).
- Determine if conduits, bracing, or other structures are required for safety or protection of the cable.
- For lightning protection at the power injector end of the cable, consider using a lightning arrestor immediately before the cable enters the building

Grounding

It is important that the wireless bridge or mesh link, cables, and any supporting structures are properly grounded. Each AP-85 Series access point includes a grounding screw for attaching a ground wire. Be sure that grounding is available and that it meets local and national electrical codes. Ground the access point first using the external ground stud on the unit before making any other connection.

Pre-Installation Network Setup

When WLAN planning is complete and the appropriate products and their placement have been determined, the Aruba Mobility Controller(s) must be installed and initial setup performed before the Aruba Outdoor Access Points. are deployed.

For initial setup of the Mobility Controller, refer to the *ArubaOS Quick Start Guide* for the software version installed on your controller.

Pre-Installation Checklist

Before installing your AP-85, be sure that you have the items listed in Table 4.

Table 4 *AP-85 Pre-Installation Checklist*

AP-85TX	AP-85FX/LX

● Fast Ethernet (FE) cable of required length
● IEEE 802.3af compliant PoE source (Aruba Mobility Controller or Midspan device) or DC power source
● Aruba Mobility Controller configured and installed on the network
● Layer 2/3 network connectivity to your AP-85
● One of the following network services:
  1. Aruba Discovery Protocol (ADP)
  2. DNS server with an "A" record
  3. DHCP Server with vendor specific options
	● Fiber patch cable of required length:
	  1. Single-mode fiber patch cable for the AP-85LX
	  2. Multi-mode fiber patch cable for the AP-85FX
	● AC or DC power source
	● Aruba Mobility Controller configured and installed on the network
	● Layer 2/3 network connectivity to your AP-85
	● One of the following network services:
	  1. Aruba Discovery Protocol (ADP)
	  2. DNS server with an "A" record
	  3. DHCP Server with vendor specific options

Access Point Setup

NOTE

It is important that you follow the guidelines in the previous section, "Pre-Installation Network Setup" on page 21, before attempting to set up and install an AP-85.

Successful setup of an AP-85 consists of five tasks, which must be performed in the following order:

1. Verify pre-installation connectivity
2. Provision the AP-85
3. Install the AP-85
4. Verify post-installation connectivity
5. Configure the AP-85

	Aruba Networks, in compliance with governmental requirements, has designed the AP-85 such that only authorized network administrators can change configuration settings. For more information about AP configuration, refer to the *ArubaOS Quick Start Guide* and *ArubaOS User Guide*.
N O T E	

	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.
CAUTION	

Verifying Pre-Installation Connectivity

Before you install APs in a network environment, make sure that the APs will be able to locate and connect to the Mobility Controller when they are powered on.

Specifically, you must verify the following conditions:

- When connected to the network, each AP is assigned a valid IP address.
- APs can locate the Mobility Controller (Mobility ControllerDiscovery).

Refer to the *ArubaOS Quick Start Guide* for instructions on locating and connecting to the Mobility Controller.

Provisioning the AP

Each AP has unique provisioning parameters. These local AP parameters are initially configured on the Mobility Controller. The Mobility Controller pushes the parameters out to the specific AP, where they are stored. Aruba recommends that you configure the provisioning settings using the ArubaOS Web UI only. Refer to the *ArubaOS User Guide* for complete details.

	If the AP-85 is to be deployed in a mesh networking environment, the AP-85 must be provisioned as a mesh portal or a mesh point before deployment.
N O T E	

Installing the AP-85

	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 13.8 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.
CAUTION	

|	Aruba Access Points, AP-LAR-1 lightning arresters, and cable termination kits must be installed by trained service personnel. These installers are responsible for ensuring that grounding is available and that grounding meets applicable local and national electrical codes.
CAUTION	

WARNING   Do not work on an AP and do not connect or disconnect cables during periods of lightning activity.

Mounting the AP-85

Preparing the AP-85 for Installation

1. Install the provided mounting bolts (M8 bolts with captive flat washer) into the four mounting holes on the rear of the AP-85 (see Figure 10). Leave approximately two to three threads showing on each mounting bolt.

Figure 10 *Installing the Mounting Bolts*

Mounting Holes

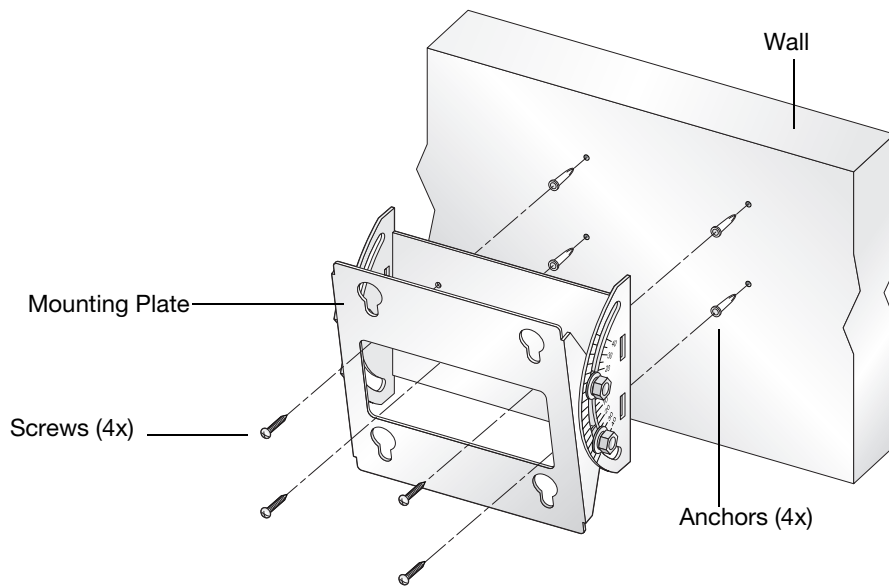Mounting Bolts
(M8 bolts, 4x)
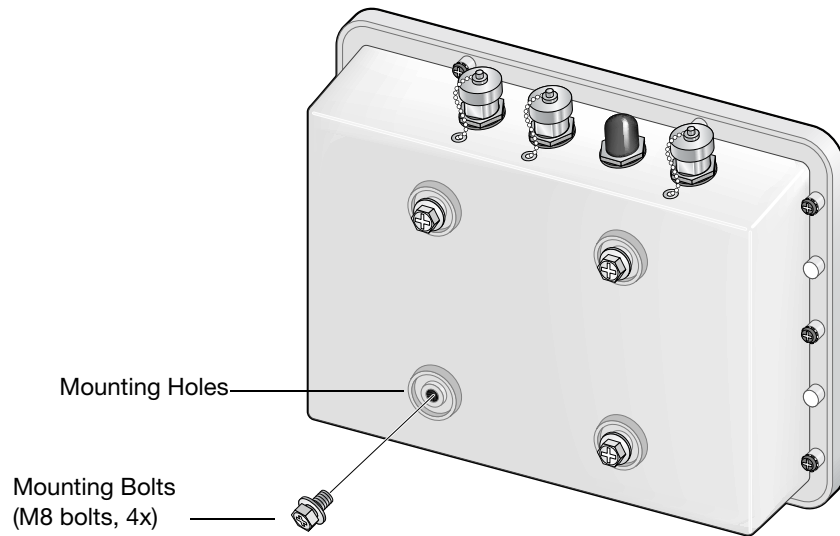
Wall Mounting the AP-85

To wall mount an AP-85:

1. Secure the mounting plate to a flat wall using the appropriate screws and anchors for your mounting application (see Figure 11).

NOTE   Wall mount hardware is not included with the mounting plate and must be purchased separately for your mounting application. The mounting plate accepts the following screw or bolt sizes: M4, M5, SAE #8, and SAE #10.
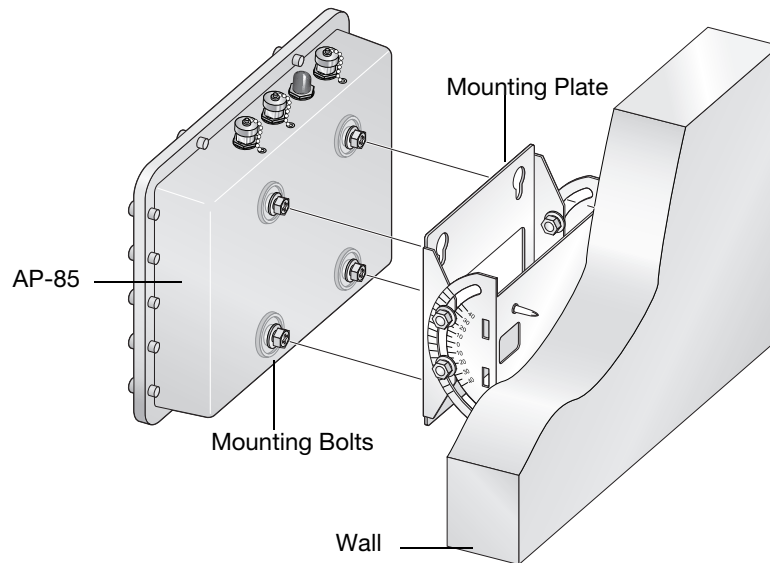
Figure 11 *Attaching the Mounting Plate*

2. Seat the AP-85 into the four keyholes on the mounting plate and tighten down the four mounting bolts (M8 bolts) to secure the AP-85 in place (see Figure 12). The mounting plate should rest between the captive flat washer on each mounting bolt and the rear of the AP-85.

> **NOTE**
>
> Figure 12 shows the AP-85 installed with the antenna jacks at the top of the unit. To install the AP-85 with the antenna jacks at the side, rotate the unit 90 degrees before seating the unit on the mounting plate.

**Figure 12** *Wall Mounting the AP-85*

Pole Mounting the AP-85 (1.5-inch to 3.5-inch Diameter)

To attach an AP-85 to a pole with a diameter of 1.5 inches to 3.5 inches:

1. Assemble the pole mounting bracket:

    a. Slide the long T-bolt through the opening in the mounting bracket (see Figure 13).

    b. Attach the provided retaining clip to the T-bolt (see Figure 13).

   c. Screw the provided nut onto the end of the T-bolt (see Figure 13).

2. Secure the mounting plate to the mounting bracket using the four provided Phillips screws (see Figure 13).

Figure 13 *Assembling the Pole Mounting Bracket*
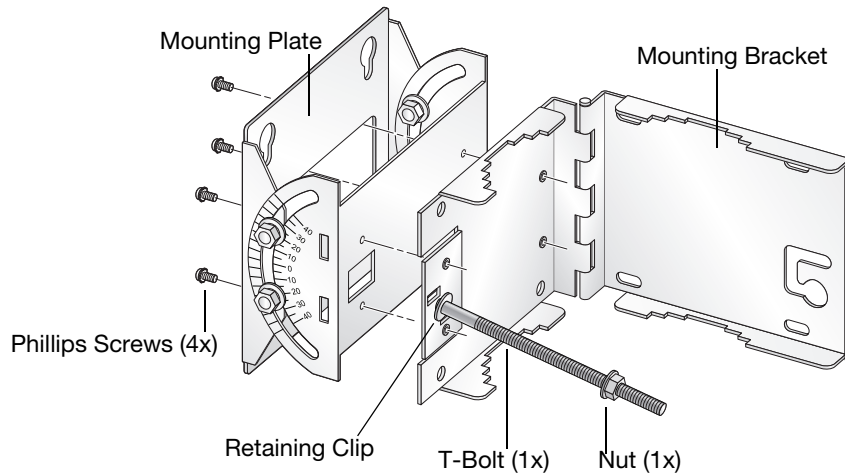
3. Attach the pole mounting bracket assembly to a 1.5-inch to 3.5-inch diameter pole and secure the bracket in place (see Figure 14).

   a. Wrap the pole mounting bracket around the pole.

   b. Slip the end of the T-bolt with nut through the opening in the pole mounting bracket.

   c. Maneuver the T-bolt to the top slot in the pole mounting bracket and tighten down the nut. Verify that the nut is tightly secured and that the bracket cannot move. It must be secure to support the weight of the AP-85.

Figure 14 *Attaching the Pole Mounting Bracket*

Step A   Step B   Step C
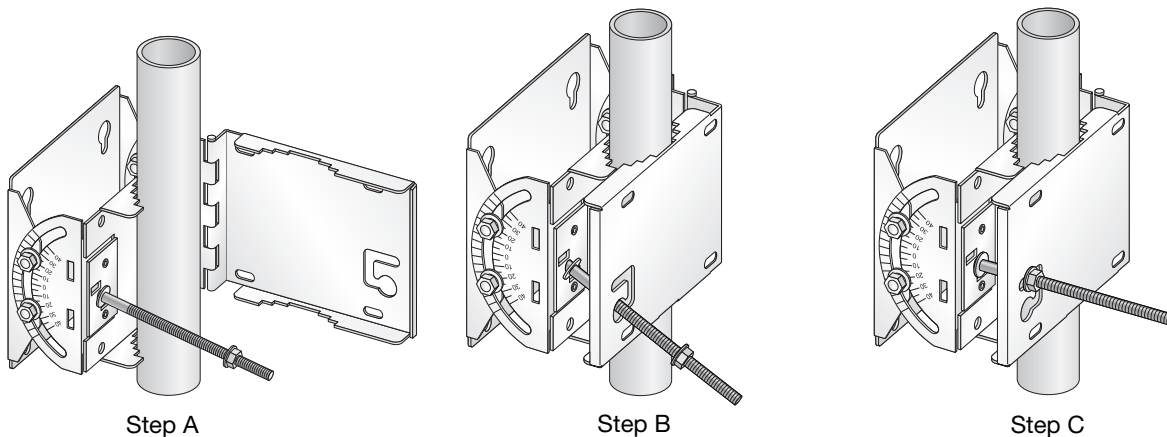
4. Seat the AP-85 into the four keyholes on the mounting plate and tighten the four mounting bolts (M8 bolts) to secure the AP-85 in place (see Figure 15 and Figure 16). The mounting plate should rest between the captive flat washer on each mounting bolt and the rear of the AP-85.

N O T E

The pole mounting bracket can be secured to a horizontal or vertical pole. The position of the keyholes on the mounting plate allows you to mount the AP-85 on either pole type with the antenna jacks at the top or the side. To mount the AP-85 with the antenna jacks at the side, rotate the unit 90 degrees before seating the unit on the mounting plate.

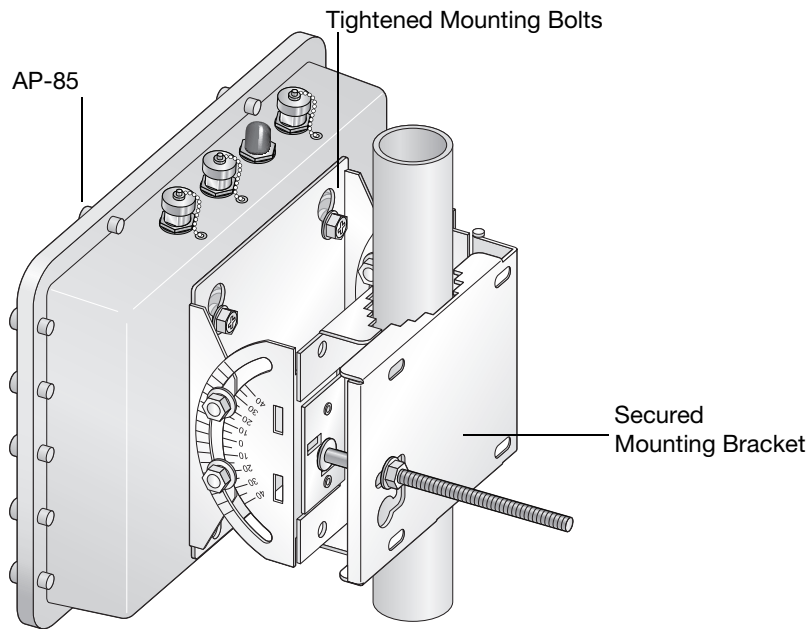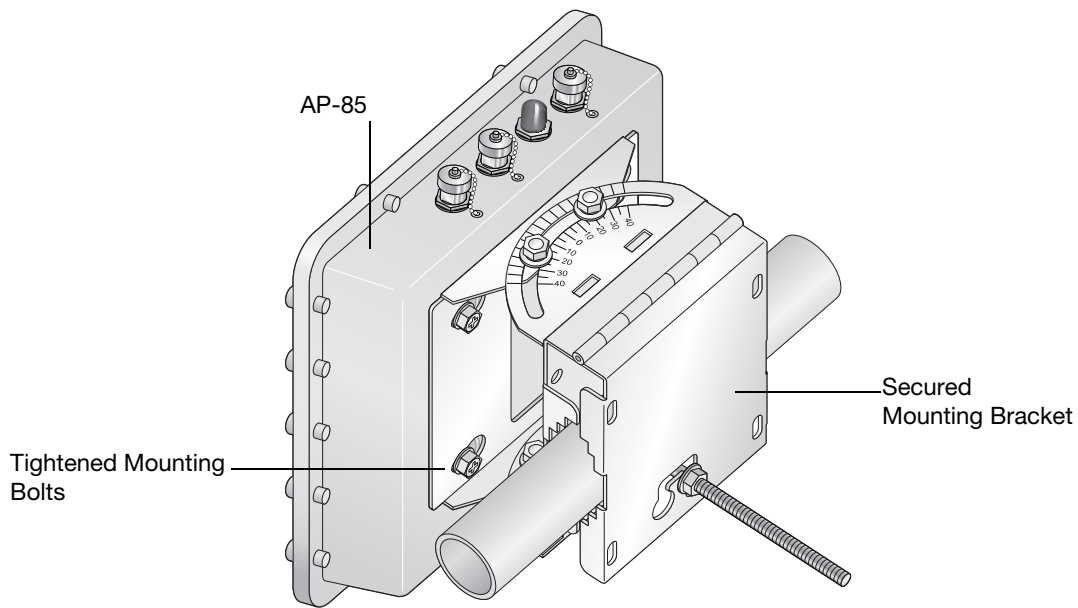**Figure 15** *Vertical Pole Mount Position (1.5-inch to 3.5-inch Diameter Pole)*

Figure 16 *Horizontal Pole Mount Position (1.5-inch to 3.5-inch Diameter Pole)*

**Pole Mounting the AP-85 (Pole Diameter Greater than 3.5-inches)**

To attach an AP-85 to a pole with a diameter greater than 3.5 inches:

1. Attach the mounting plate to the pole using outdoor rated straps (see Figure 17). Outdoor rated straps are not included with the unit and must be purchased separately.

2. Seat the AP-85 into the four keyholes on the mounting plate and tighten down the four mounting bolts (M8 bolts) to secure the AP-85 in place (see Figure 17). The mounting plate should rest between the captive flat washer on each mounting bolt and the rear of the AP-85.

	The mounting plate can be secured to a horizontal or vertical pole. The position of the keyholes on the mounting plate allows you to mount the AP-85 on either pole type with the antenna jacks at the top or the side. To mount the AP-85 with the antenna jacks at the side, rotate the unit 90 degrees before seating the unit on the mounting plate.
NOTE	

Figure 17 *Pole Mounting the AP-85 (Diameter Greater than 3.5 Inches)*
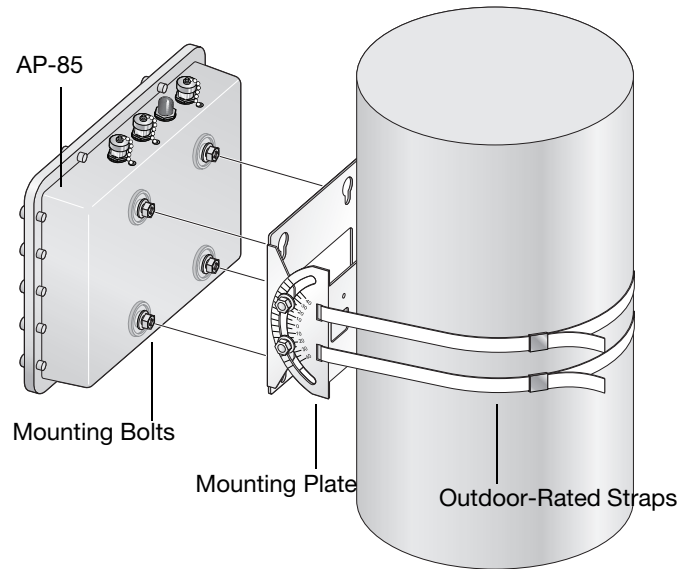
Positioning the AP-85

To adjust the angle of an AP-85 on a vertical pole:

1. Loosen the four M8 bolts on the side of the mounting plate. Rotate the AP to the desired angle and tighten down the M8 bolts (see Figure 18).

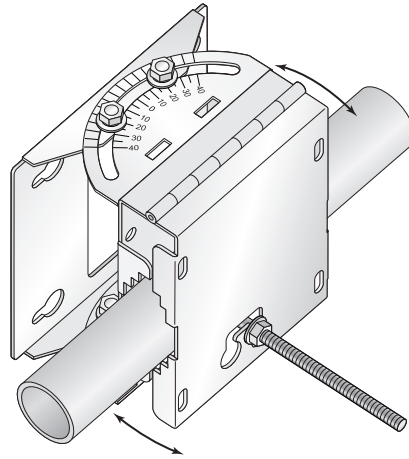**Figure 18** *Positioning the AP-85 on a Vertical Pole*
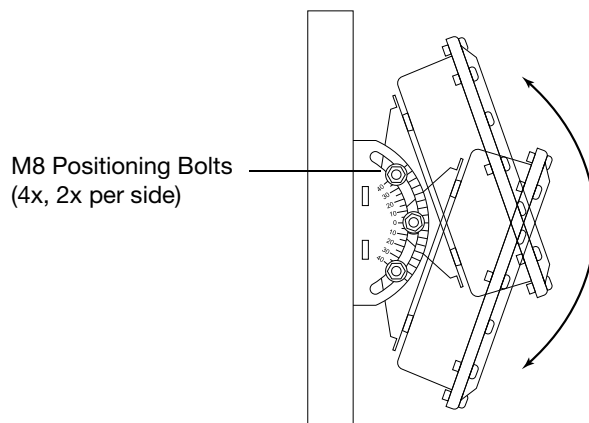
To adjust the angle of an AP-85 on a horizontal pole:

1. Rotate the entire mounting bracket to the desired angle and tighten the bracket into place (see Figure 19).

Figure 19 *Positioning the AP-85 on a Horizontal Pole*

Connecting Required Cables

|	
NOTE	Before connecting other cables, first connect the ground stud to ground reference. See Figure 20 for the location of the ground stud.

RJ-45 CAT 5 Cable

To weatherproof and connect an RJ-45 terminated CAT 5E or better cable to an AP-85 (see Figure 20), perform the following using the contents in the included kit that ships with your unit:

NOTE	The cable is not included and must be purchased separately. Purchase a suitable UV-resistant, outdoor rated, CAT 5E or better RJ-45 cable for use with the AP-85.

1. Slide the cap over the terminated cable.
2. Slide the rubber grommet over the terminated cable.
3. Slide the connector shell over the terminated cable.
4. Slide the washer over the terminated cable.
5. Insert the rubber grommet into the top of the connector shell until the top surface of the grommet is flush with the top edge of the connector shell.
6. Connect the terminated cable to the proper port: LAN/POE port on the AP-85TX model or the CONSOLE port on the AP-85FX/LX models.
7. Screw the connector shell onto the interface on the AP-85.
8. Screw the cap onto the connector shell.

Figure 20 *Weatherproofing and Connecting an RJ-45 Terminated CAT 5 Cable*

Cap

Rubber Grommet

Connector Shell

Washer

Terminated CAT 5E or Better Cable

Ground Stud
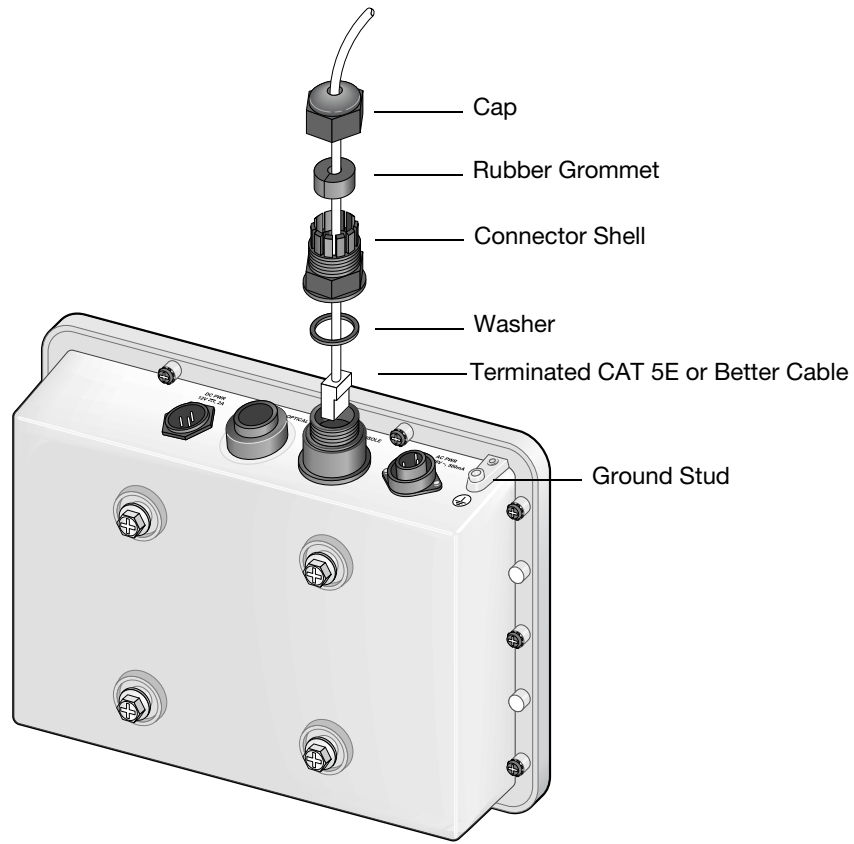
DC and AC Power Cables

To connect the power cables (wiring harnesses):

1. Screw the two-wire, 8-foot long DC power cable (wiring harness) to the DC interface on the AP-85TX, AP-85FX, or AP-85LX model.

2. Screw the three-wire, 8-foot long AC power cable (wiring harness) to the AC interface on the AP-85FX or AP-85LX models only.

WARNING	Disconnect the AC mains before handling the AC power cable and connecting it to the AP-85.

NOTE	All connections made to the unit should conform to all local and national electrical codes. Power cords with lengths longer than 15 ft and cords without plugs should only be installed in appropriate areas. Check the codes for your area to ensure proper use.

Figure 21 *Connecting Power*

DC Power Cable
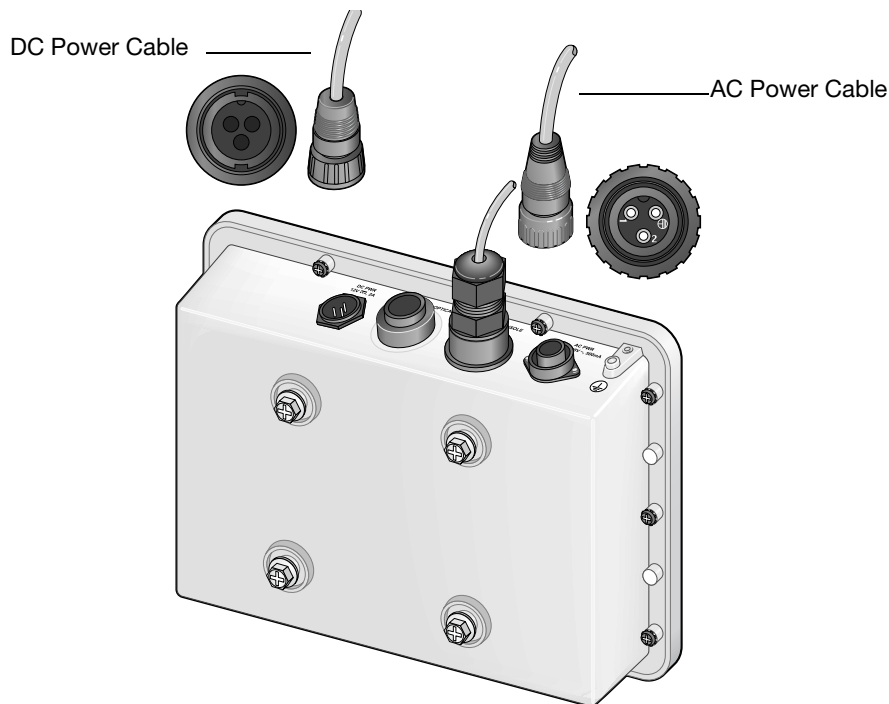
AC Power Cable

NOTE	Always shut power off to the unit to de-energize it before disconnecting any cables.

Table 5 *AC and DC Power Cable Descriptions*

Cable Type	Wire Color	Assignment
DC Power Cable	Red	+12V
	Black	Ground

Table 5 *AC and DC Power Cable Descriptions*

Cable Type	Wire Color	Assignment
AC Power Cable: United States (US)	Black	Line
	White	Neutral
	Green	Ground
AC Power Cable: Europe (EU)	Brown	Line
	Blue	Neutral
	Green/Yellow	Ground

Fiber Optic Cable

To use the fiber optic termination kit that is shipped with the AP-85FX/LX models, follow the instructions in the included Tyco document *Instruction Sheet 408-10079*.

N O T E	Fiber optic cables are not included and must be purchased separately. Purchase a suitable UV-resistant, outdoor rated, multi-mode fiber optic cable for use with the AP-85FX and a single-mode fiber optic cable for use with the AP-85LX.

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

CLASS 1
LASER PRODUCT

CAUTION	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.

Lightning Arrestor Installation

Refer to the instructions that are shipped with the Aruba lightning arrestor (AP-LAR-1).

Antenna Installation

Refer to the instructions that are shipped with your Aruba outdoor rated antenna.

Verifying Post-Installation Connectivity

The LEDs on the AP-85 can be used after installation to verify that the AP is receiving power, that the AP is initializing successfully, and that wireless connectivity is occurring (see "LED Status Indicators" on page 13). Refer to the *ArubaOS Quick Start Guide* for further details on verifying post-installation network connectivity.

Configuring the AP-85

Configuration parameters are network or controller specific and are configured and stored on the Mobility Controller. Network configuration settings are pushed out to the AP(s) but remain stored on the Mobility Controller. Configuration settings can be configured via the ArubaOS Web UI, ArubaOS CLI, or Aruba MMS. Refer to their respective guides for further details: the *ArubaOS User Guide* or *Aruba Mobility Management System User Guide*.

Aruba Antennas

Before you can select the antenna type needed for the deployment, read the basic wireless antenna information provided in this section. This information will help you understand wireless antenna basics and Aruba antenna specifications.

Understanding Wireless Antennas

Omni-Directional vs. Directional Coverage

For optimal performance of your wireless network, it is essential to understand the purpose behind proper antenna selection. Choosing the correct antenna type will ensure that RF energy is being directed to the correct coverage areas. Omni-directional antennas provide equal coverage in all directions (see Figure 22), while directional antennas point RF energy in a specific direction for RF concentration within a targeted area (see Figure 23).
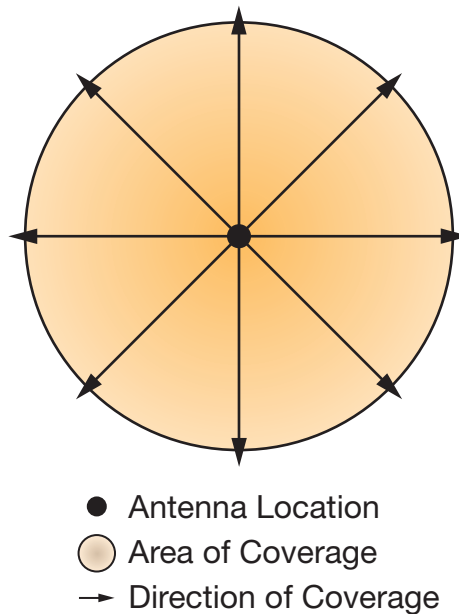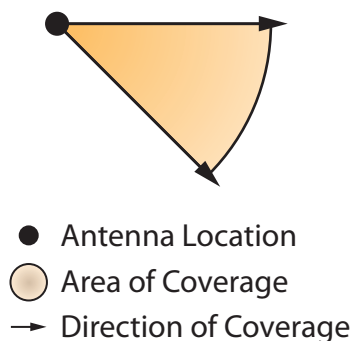
Figure 22 *Omni-Directional Antenna*

● Antenna Location
○ Area of Coverage
→ Direction of Coverage

Figure 23 *Directional Antenna*

● Antenna Location
○ Area of Coverage
→ Direction of Coverage

## Antenna Beamwidth, Pattern, and Gain Considerations

Antenna gain is a relative measure of how the antenna compares to an ideal isotropic radiator. An ideal, isotropic radiator would radiate power in all directions equally over a sphere. The relationship between gain, power, and propagation distance is detailed already in textbooks and Wiki's, so these expressions are not repeated here. Antenna gain is often confused with power gain in amplifiers, but it is important to note that antenna gain only makes a transmitter's power appear to be higher than would be predicted by calculation of the power fed to the antenna and then spread equally over a sphere. Antenna gain itself is a completely passive and bi-directional property, determined only by the shape and construction of the antenna.

Knowing that gain is only a comparison of the apparent power to the power that would be required if fed to an ideal isotropic antenna, you realize that gain can only be created by distorting the antenna pattern from the ideal spherical pattern. Think of this as focusing the same power that would normally distribute evenly over a sphere into a tighter region of space. Thus, the higher the gain, the more concentrated (in some way) the antenna pattern must be in order to achieve that gain.

Example

To visualize the concept of gain, picture a rubber ball. The surface area of the ball represents the total available power radiated by an ideal isotropic antenna over its sphere of radiation (see Figure 24).

Figure 24 *Equal Signal Strength Radiated in All Directions*

Equal Signal Strength
Radiated over a Sphere
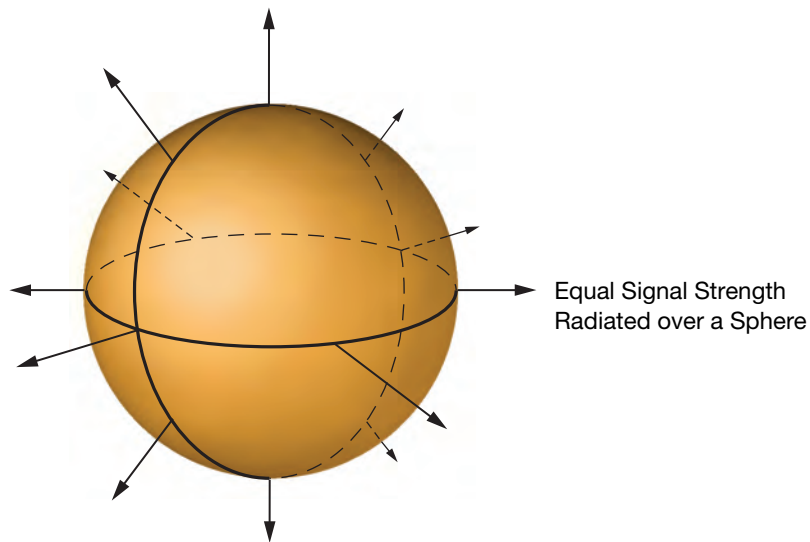
Now, still using the same ball with the same available surface area, how would you be able to stretch the ball farther out? One way is to press down on the top of the ball and squash it down vertically. This would keep the same basic shape in the horizontal plane (round), but it would force the ball to stretch, creating a pancake shape, in the vertical direction (see Figure 25). This represents the concept of the high gain omni-directional antenna, which achieves a greater coverage distance in the horizontal direction at the expense of coverage in the vertical areas of the radiating sphere.

Figure 25 *High Gain Omni-Directional Antenna*

High Gain
Omni-Directional Antenna

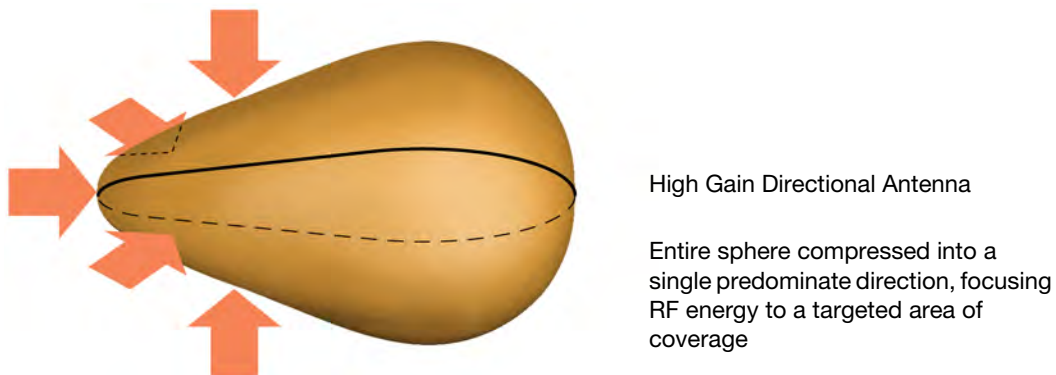Compressed vertical signal, which expands signal horizontally
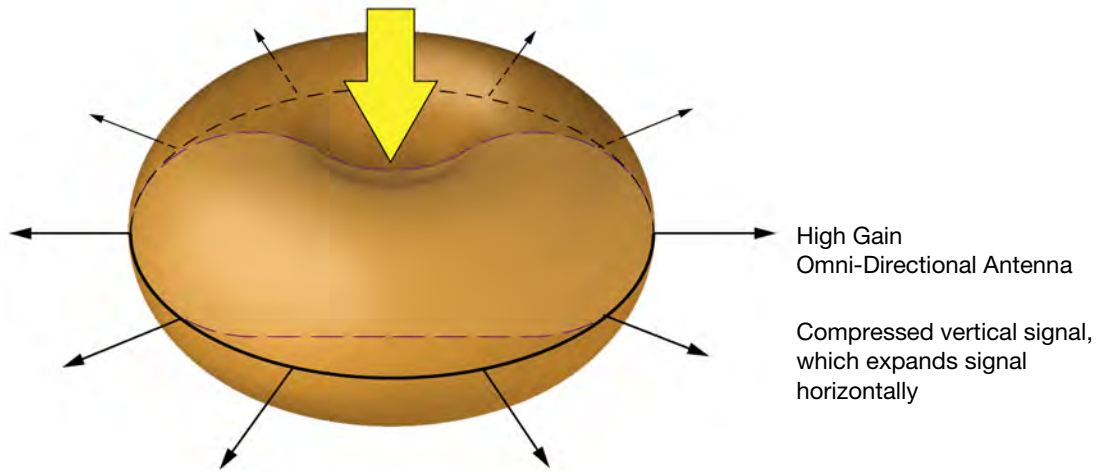
To stretch the ball primarily in one direction (instead of in all directions), push the ball, both vertically and horizontally, on the sides and on the back, to force the ball to deform in a single direction. This action would significantly distort the shape of the original ball both horizontally and vertically, but it will allow you to stretch the same ball a lot farther in one direction (see Figure 26). This represents the concept of the high gain directional antenna, which is designed to compress the entire radiating sphere into a single predominate direction.

NOTE

Gain is created by forcing transmitted power to radiate in a preferred direction rather than radiating in all directions of an ideal sphere. Therefore, a high gain signal is always accompanied by loss of available signal in some other portion of the ideal sphere. High gain directional antennas are ideal for sites requiring directed coverage in a specific area or extended range for bridging applications, but they are not suited for sites requiring uniform coverage in large areas. It is important to keep in mind that both vertical and horizontal coverage can be affected by the use of a higher gain antenna and beamwidth (a measure of coverage) is always inversely related to gain.


Figure 26 *High Gain Directional Antenna*

High Gain Directional Antenna

Entire sphere compressed into a single predominate direction, focusing RF energy to a targeted area of coverage

## Understanding Antenna Pattern Plots and Specifications

Traditional 2-D pattern plots and beamwidth specifications are like mental puzzles waiting to be solved because they only provide a snapshot of the information in two planes. These two planes are often referred to as the azimuth (H-plane or horizontal) and elevation (vertical or E-plane) planes. The azimuth view would be considered the view from directly above, viewing the antenna pattern on the horizontal plane. The elevation view is considered to be a side view, viewing the antenna pattern on the vertical plane. It is helpful to think of these planes as "cuts" of the real antenna pattern, which is actually 3-D. Figure 27 illustrates where these "cuts" are located for a typical omni-directional antenna pattern.

Figure 27 *Antenna Pattern Conventions (Omni-Directional Pattern Shown)*
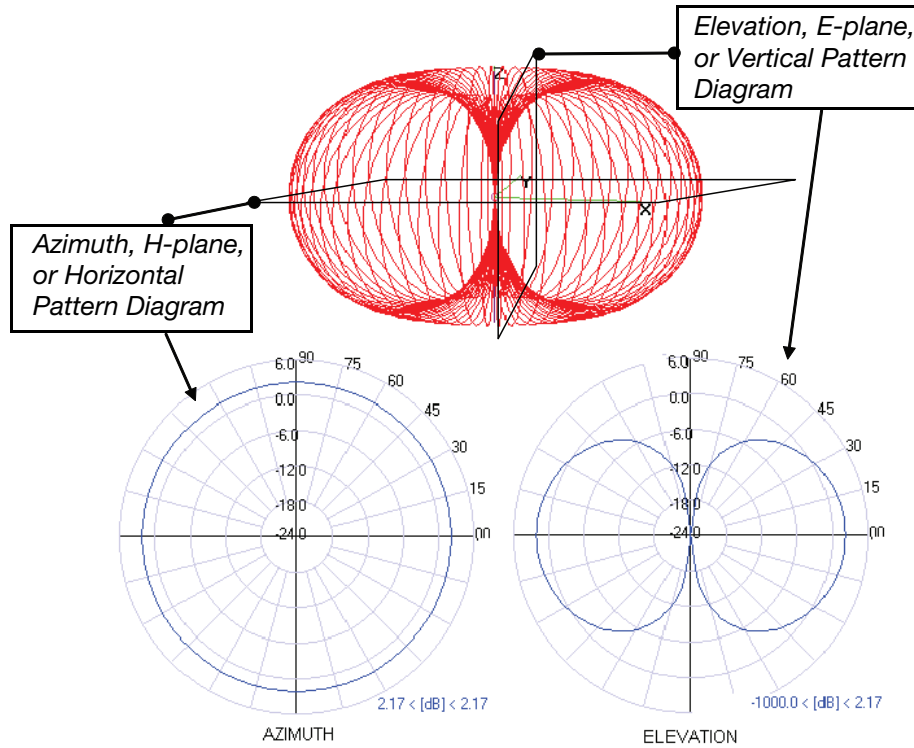
The antenna illustrated by Figure 27 is commonly referred to as the dipole pattern because it is the pattern produced by an ideal dipole antenna. The gain of this antenna is 2.14, which is achieved by compression in the vertical plane (elevation) compared to the ideal sphere. If referring to the true 3D pattern, this compression is sometimes called the donut shape (see Figure 28).

Figure 28 *Donut Shape Compression of an Omni-Directional Antenna*
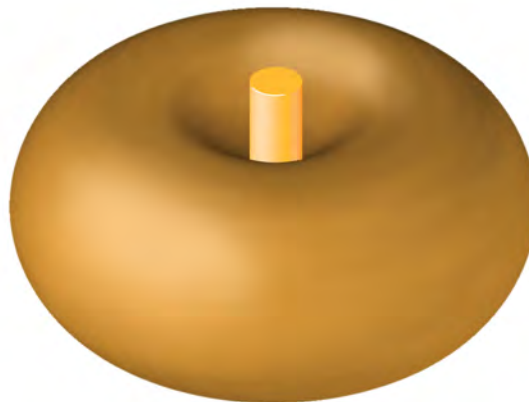
It is evident from Figure 27 that 2-D pattern plots typically provided in antenna specifications are a simplification of the real 3-D situation. Often, 2-D plots are reduced even further to a set of simple specifications based on the antenna gain and 3 dB beamwidth.

Detachable Antenna Selection

Select the correct antenna type to support the required frequency band (2.4 GHz or 5 GHz) and desired coverage pattern.

To select the correct antenna type for the deployment, download and read Aruba's outdoor antenna specifications: http://www.arubanetworks.com/products/access-points/antennas.php.

N O T E	All figures are shown with a 100 meter (328 feet) mounting height above the ground and for a 18 Mbps coverage area.

Detachable Outdoor Antenna Types

These are some of the terms used to describe Aruba's detachable antenna offerings. Terminology and degree of sector in Aruba's antenna specifications are determined by the horizontal 3 dB beamwidth.

- Down-Tilt: An omni-directional antenna that focuses its energy downwards.
- Sector/Patch: A directional antenna that provides a focused sector of coverage from a central point (Example: +/- 45 degrees from a 90 degree center point).
- Panel: A flat formed antenna that directs energy to a sector of coverage. This type of antenna is often ideal for point-to-point WDS bridging or wireless mesh backhaul applications.

Detachable Antenna Selection Tips

- If omni-directional coverage is desired with the greatest possible horizontal range from the AP, select one of Aruba's detachable antennas with high-gain, omni-directional coverage. Due to the tight vertical beamwidth of high-gain, omni-directional antennas, this typically requires mounting the antenna not more than 5 meters (16.5 feet) above the expected client locations in elevation.
- If omni-directional coverage is desired, but only high mounting locations are available (approx. 5 m (16.5 feet) to 10 m (33 feet), consider the use of lower gain (3 dBi to 5 dBi) omni-directional antennas and a denser AP deployment. The lower gain antenna will reduce the maximum horizontal range of the AP, but will provide better vertical coverage.
- For very high mounting locations (>10 m/33 feet) such as light poles or monopoles, consider the use of an omni-directional antenna with electrical downtilt. A downtilt omni-directional antenna is an antennas that has a direction of maximum gain at approximately 45° down from horizontal.

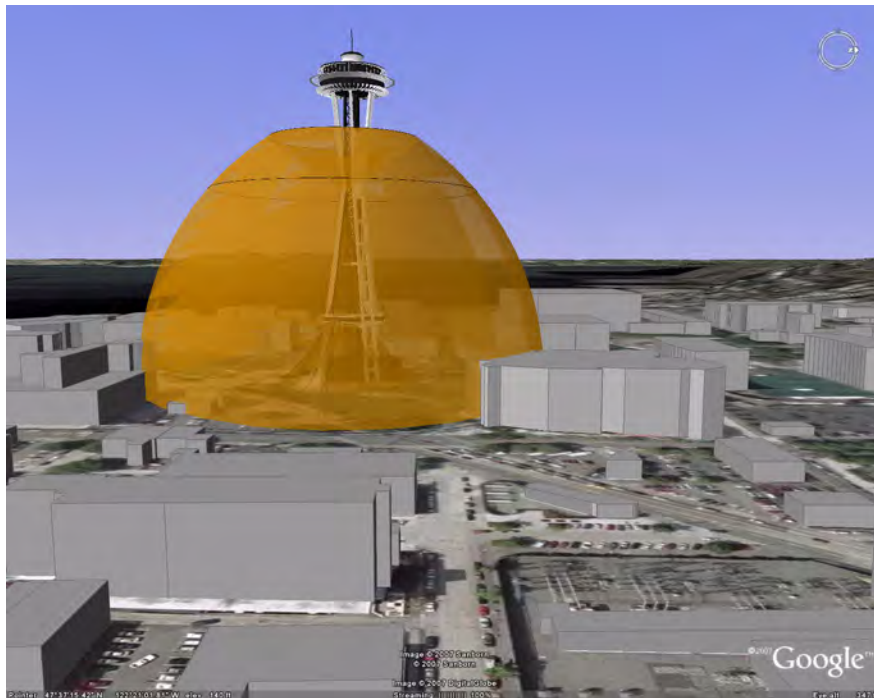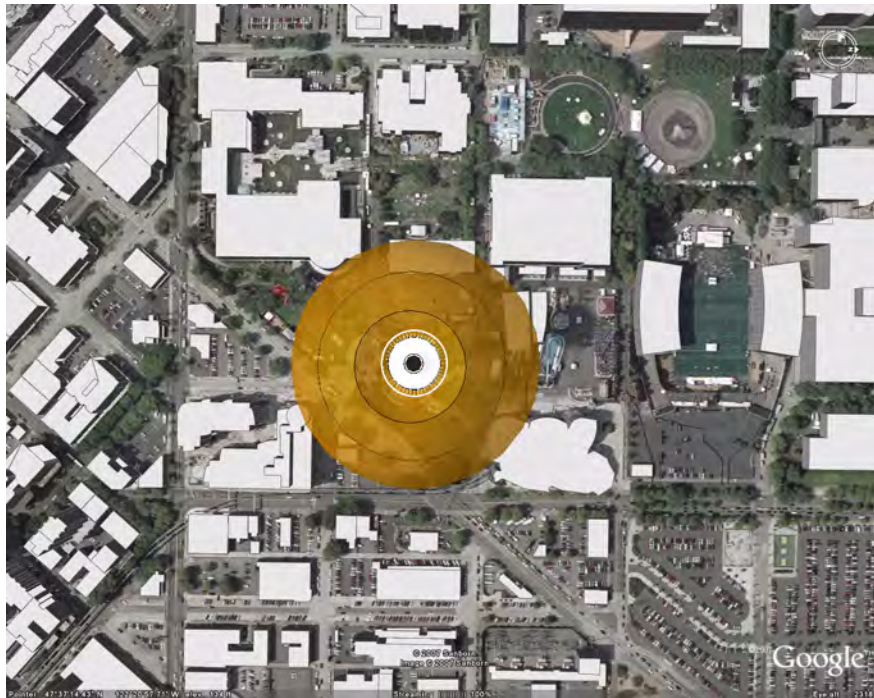**Figure 29** *AP-ANT-90 E-Plane View (Side View)*

Figure 30 *AP-ANT-90 H-Plane View (Top View)*

- Alternatively, for high mounting locations, high-gain sector antennas may be used with mechanical downtilt. This will typically require the use of multiple access points per mounting location to provide omni-directional coverage.
- If a directional antenna is required to direct RF coverage, the detachable antenna must be capable of supporting all of the frequency bands that require support (2.4 GHz and/or 5 GHz).
- Directional antennas are selected to focus RF energy more efficiently to a targeted area.
- Directional antennas are also useful in areas where the surrounding materials have high amounts of RF attenuation or reflection and the RF signal needs to be guided in the direction of the least amount of attenuation or reflection. For

example, when mounting antennas on the outside surfaces of a building to provide coverage to outdoor spaces in front of the building, a directional antenna can be used to direct the coverage away from the building.
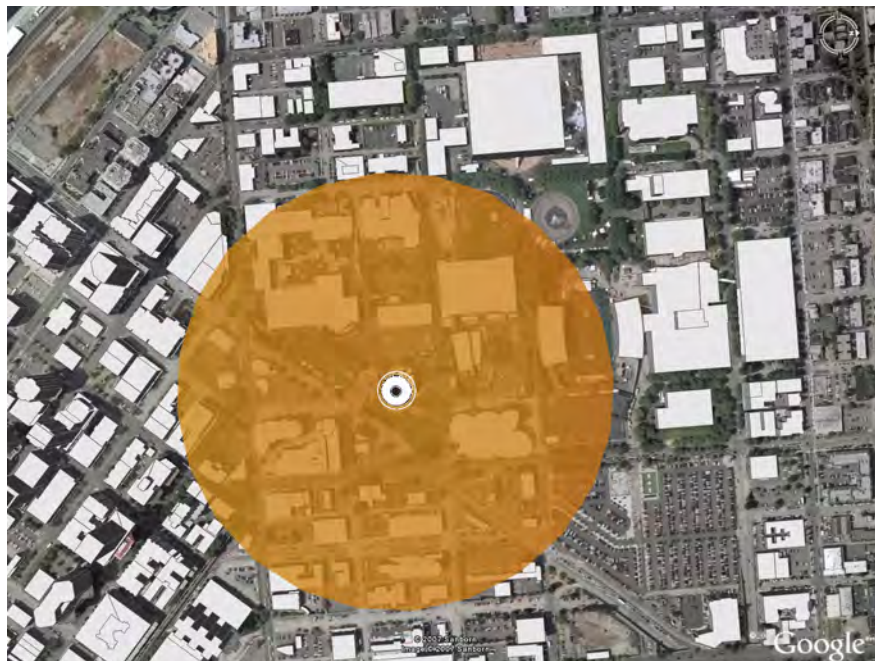
High Mounting Omni-Directional Antenna Scenario (AP-ANT-80 vs. AP-ANT-90)

The AP-ANT-80 shows greater horizontal range due to its higher gain (8 dBi vs. 3 dBi) antenna, but in this very high mounting situation, the AP-ANT-90 may be a better choice for ground level coverage because the direction of maximum gain is directed downward toward the ground. This situation could potentially be improved if a lower mounting elevation was available for the AP-ANT-80, ideally about
5 m above Ground.

Figure 31 *AP-ANT-80 E-Plane View (Side View)*

Figure 32 *AP-ANT-80 H-Plane View (Top View)*

High Mounting Directional Antenna Scenario

The AP-ANT-82 is a high gain (12 dBi), directional antenna with a 90 degree 3 dB beamwidth in azimuth. For this high mounting condition, this antenna provides a long range in the direction of maximum gain, but it would require mechanical downtilt for ground level coverage.
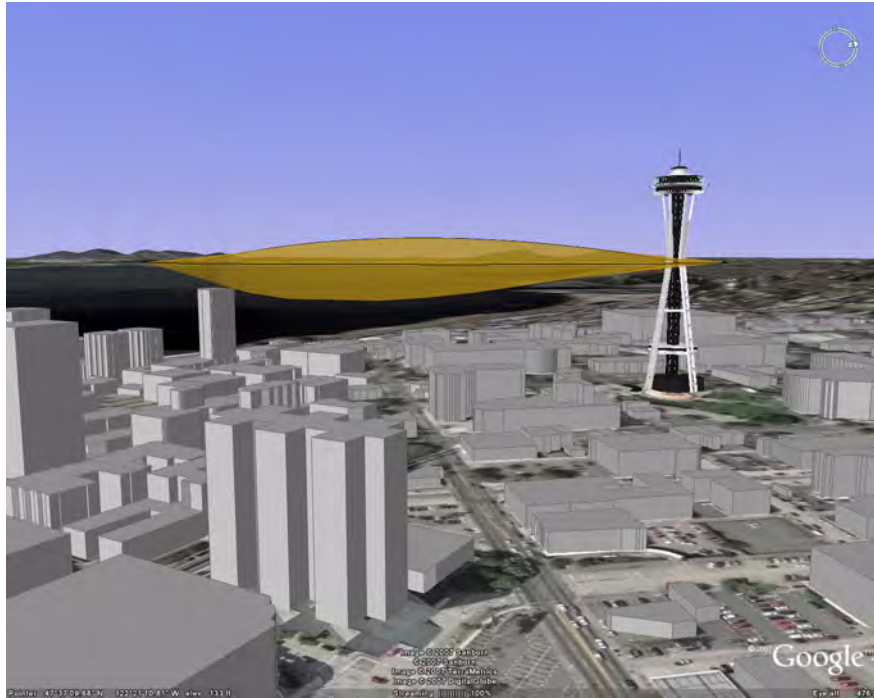
Figure 33 *AP-ANT-82 E-Plane View (Side View)*

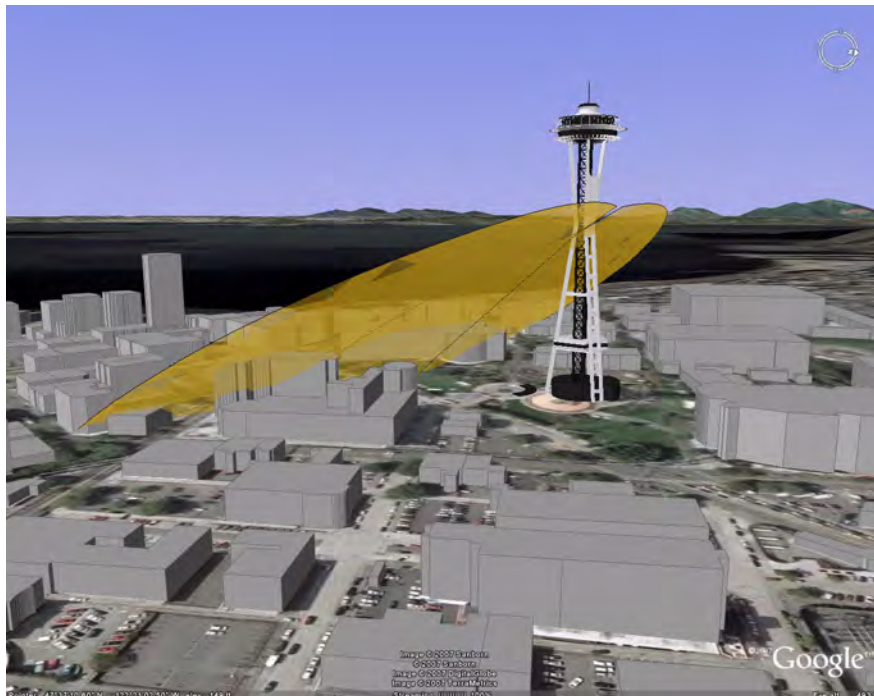**Figure 34** *AP-ANT-82 with 30 Degree Downtilt E-Plane View (Side View)*

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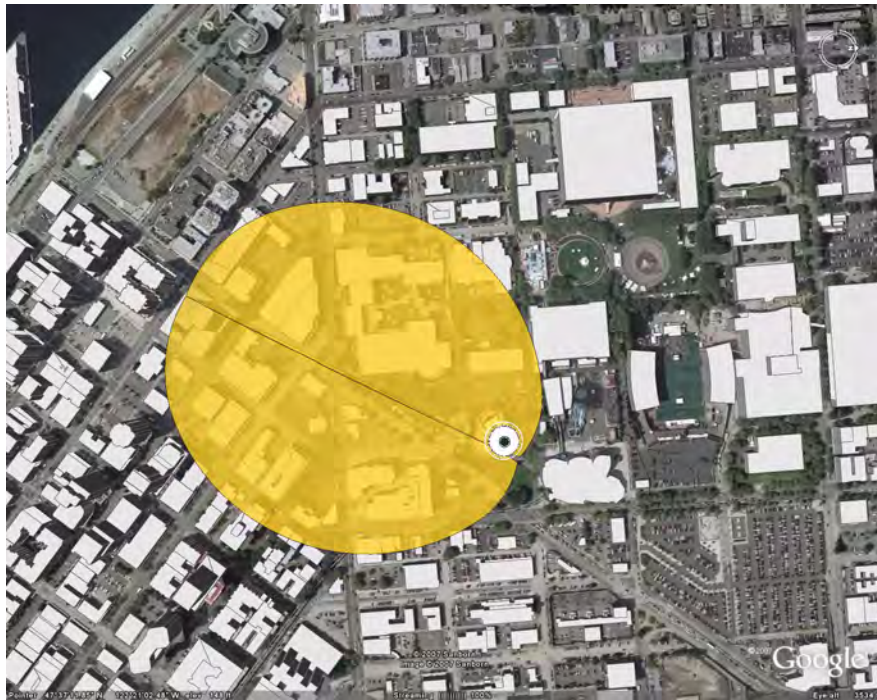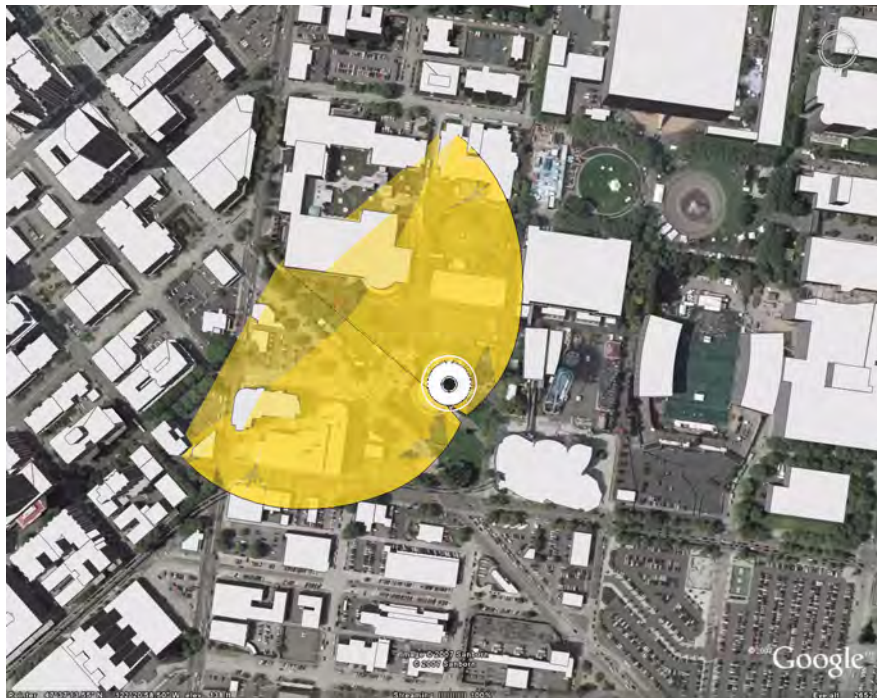**Figure 35** *AP-ANT-82 H-Plane View (Top View)*

Figure 36 *AP-ANT-82 with 30 Degree Downtilt H-Plane View (Top View)*

Product Specifications

Mechanical (AP-85TX, AP-85FX, and AP-85LX)

- Device Dimensions (HxWxD):
    - 10.80" x 12.64" x 3.07"
    - 274 mm x 321 mm x 78 mm
- Device Weight: 7.40 lbs/3.36 kgs
- Device Weight with Mounting Plate: 9.65 lbs/4.38 kgs
- Device Weight with Mounting Plate and Mounting Bracket: 10.85 lbs/4.92 kgs
- IP68 (1 m depth for 8 hrs) under IEC 60529 NEMA type 4X
- Temperature:
    - Operating: -30ºC to 55ºC (-22ºF to 131ºF)
    - Storage: -40ºC to 70ºC (-40ºF to 158ºF)
- Relative Humidity: 0% to 95% non-condensing
- Altitude: 0-3000 m (0-9850 ft)
- Survival Wind Speed: 125 mph (201 km/hr)
- Mounting:
    - Articulating adjustable pole or mast mount kit (included)
    - Antenna mount bracket (optional)
- Antenna: Quad, N-type Female interfaces for external antenna support
- Ground: Electrical safety/ground terminal point
- Visual Status Indicators (LEDs):
    - Onboard LED array for RSSI level reading
    - PWR - Power/Status
    - LINK/ACT - LAN/Network Link Status
    - RADIO 0 - Radio 0 Status
    - RADIO 1 - Radio 1 Status
    - RSSI (Radio 0) - RSSI Level for Radio 0
    - RSSI (Radio 1) - RSSI Level for Radio 1

Electrical

AP-85TX

- 1 x 10/100 Base-T auto-sensing Ethernet (RJ-45) Interface
    - IEEE 802.3 BaseT and 802.3u 100BaseTX compliant
    - PoE 48V DC Power over Ethernet (IEEE 802.3af compliant)
    - Serial over Ethernet (SoE)

- Auto-sensing MDI/MDX
- 1 x 12 V DC / up to 2.0 A power interface (for external solar supplied DC power)
- 1 x Electrical Ground / Safety Terminal
- Fully environmentally hardened connector types (all interfaces)

AP-85FX

- 1 x 100BASE-FX data uplink port for multi-mode, dual-fiber connectivity
    - 1310 nm wavelength, 2 km over MMF Interface
    - LC fiber optic connector type
- 1 x 12 V DC up to 2.0 A power interface (for external solar supplied DC power)
- 1 x 90-228 V~ / 500 mA auto-sensing power interface with transient power surge suppression
- 1 x Serial Console Port
- 1 x Electrical Ground / Safety Terminal
- Fully environmentally hardened connector types (all interfaces)

AP-85LX

- 1 x 100BASE-LX data uplink port for single-mode, dual-fiber connectivity
    - 1310 nm wavelength, 10km over SMF
    - LC fiber optic connector type
- 1 x 12 V DC up to 2.0 A power interface (for external solar supplied DC power)
- 1 x 90-228 V~ / 500 mA auto-sensing power interface with transient power surge suppression
- 1 x Serial Console Port
- 1 x Electrical Ground / Safety Terminal
- Fully environmentally hardened connector types (all interfaces)

Maximum Power Draw

Table 6 *AP-85 Series Maximum Power Draw*

AP Model	Power Source	Measurement Condition	Max Current (Amps)	Max Power (Watts)
AP-85TX	PoE	48 V	0.25	12
AP-85TX, AP-85FX, AP-85LX	DC	12 V	0.8	9.6
AP-85FX, AP-85LX	AC	240 V, 60 Hz	0.18 (RMS)	20.14

- The 12 V DC input power source should be SELV (non-shock hazardous (<30 V DC) under normal and single fault conditions) and limited power source (LPS) as a non-fire-hazardous circuit as defined in IEC 60950-1, or a Class Z power source as defined by the NEC.
- IT power system: Models AP-85FX and AP-85LX are designed for connection to TN or IT power distribution systems.

Wireless LAN

- Network Standards - IEEE 802.11b, IEEE 802.11g and IEEE 802.11a
- Antenna Type - None. Detachable, outdoor rated, 2.4 or 5 GHz antenna options available
- Radio Technology:
    - 802.11a/g - Orthogonal Frequency Division Multiplexing (OFDM)

- 802.11b - Direct Sequence Spread Spectrum (DSSS)
- Radio Modulation Type:
  - 802.11a - BPSK, QPSK,16-QAM, 64-QAM
  - 802.11b - DQPSK/CCK, DQPSK, DBPSK
  - 802.11g - OFDM, DQPSK/CCK, DQPSK, DBPSK
- Media Access Control - CSMA/CA with ACK
- Data Rates:
  - 802.11a - 6, 9, 12, 18, 24, 36, 48 and 54 Mbps per channel
  - 802.11b - 1, 2, 5.5, 11 Mbps per channel
  - 802.11g - 1, 2, 5.5, 6, 9, 11, 12, 22, 24, 33, 36 and 54 Mbps per channel
- Transmit and Available Channels: Determined by country of use and Aruba certifications within country of use

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. This document can be viewed or downloaded from the following location: www.arubanetworks.com/safety_addendum.

| ⚠️ CAUTION | Aruba Access Points and the AP-LAR-1 lightning arrestor are required to be installed by a professional installer. The professional installer is responsible for ensuring that grounding is available and it meets applicable local and national electrical codes. |

| ⚡ WARNING | Do not work on an AP and do not connect or disconnect cables during periods of lightning activity. |

Declaration of Conformity

Aruba Networks, Inc., 1322 Crossman Avenue, Sunnyvale, CA 94089, USA, declares that the Aruba Wireless Access Point, Model: AP-85 conforms to the following European directives:

- R&TTE Directive 99/5/EC
- WEEE Directive 2002/96/EC
- RoHS Directive 2002/95/EC
- ATEX Directive 94/9/EC

R&TTE Directive relevant standards:

- Article 3.2; EN 300 328v1.7.1 and, EN 301 893 v1.4.1
- Article 3.1b; EN 301 489-17 v1.2.1
- Article 3.1a; EN 60950-1, EN60950-22

ATEX Directive standard:

- EN60079-0:2004, EN60079-15:2005

Year Mark first applied: 2008

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directives and Standards.

European Headquarters

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Contact: Albert Benhamou
info-emea@arubanetworks.com

Instructions for Use in a Potentially Explosive Atmosphere

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┌────────────────────────────────────────────────────────────────────────┐
│                    ARUBA NETWORKS, INC.          12V━━━ ; 2A or 48━━━ ; 350mA │
│ MODEL: AP-85TX       1344 Crossman Ave. Sunnyvale, CA 95014, U.S.A.   IP67  TYPE 4X  Manufactured: 2008 │
│ FCC ID: Q9DAP85                                                           │
│ IC: 4675A-AP85    ARU-AP85TX                                             │
│ CE 0681 ①        당해 무선설비는 운영 중 전파혼신 가능성이 있음                          │
│                                        This device complies with Part 15 of the FCC │
│                                        Rules. Operation is subject to the following two │
│ ┌─────┐ ┌──────────────────────┐       conditions: (1) this device may not cause │
│ │ S/N │ │                      │       harmful interference, and (2) this device must │
│ └─────┘ └──────────────────────┘       accept any interference received, including │
│                                        interference that may cause undesired operation. │
│ ┌─────┐ ┌──────────────────────┐                                         │
│ │ MAC │ │                      │  REV: ┌──────────┐       Made In XXXX   │
│ └─────┘ └──────────────────────┘       └──────────┘                     │
└────────────────────────────────────────────────────────────────────────┘
```

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┌────────────────────────────────────────────────────────────────────────┐
│                    ARUBA NETWORKS, INC.                                  │
│   MODEL: AP-85TX     1344 Crossman Ave. Sunnyvale, CA 94089, U.S.A.      │
│                                                                          │
│  ⟨Ex⟩  II 3 G Ex nA T6                                                   │
│        -30°C < Tamb < 55°C                                               │
│        TUVNA 08 ATEX 7155 X                                             │
│                                                                          │
│  WARNING – DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE MAY BE PRESENT.      │
│                                                                          │
│  WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS FOR ANTENNA DETAILS. │
│                                                                          │
│  WARNING – DO NOT ENERGIZE OR DE-ENERGIZE UNIT AT THE UNIT'S POWER CONNECTORS WHEN AN │
│            EXPLOSIVE ATMOSPHERE MAY BE PRESENT.                          │
└────────────────────────────────────────────────────────────────────────┘
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Type of Protection: ⟨Ex⟩ II 3 G Ex nA T6 ; ignition protection category "n" CE

Enclosure: NEMA Type 4X, IP67

Applicable Standards: IEC 60079-0:2004
                             EN 60079-0:2004
                             IEC 60079-15:2005
                             EN 60079-15:2005

WARNING	Do not open the unit when an explosive atmosphere may be present. Do not energize or de-energize the unit at the unit's power connectors when an explosive atmosphere may be present.
WARNING	Potential Electrostatic Charging Hazard.
CAUTION	The antennas installed with the Model AP-85TX should be mounted in a location where they are not subjected to winds, in order to minimize the build up a charge and potential arcing on the antennas.
CAUTION	During all servicing and maintenance activities, the antennas must be handled with extreme caution to minimize possible electrostatic static discharge (ESD) and arcing events. Any cleaning means, in particular, should minimize such events on the plastic surfaces of the antennas, which may contain or produce a charge potential.
CAUTION	Only the Model AP-85TX itself is intended to be used in a potentially explosive environment. The external power adapter, PoE power injector, and power sourcing equipment (PSE, that is, controllers) are intended to be installed only in a safe environment and are not intended for installation in a potentially explosive environment.
CAUTION	The Model AP-85TX is intended to be powered only by the external power adapter or power injector provided with the unit, or by power sourcing equipment (PSE) that is compliant with IEEE802.3af. The product must be powered only by energy-limited circuits, which satisfy the requirements of EN 60079-15. The explosion group is dependent upon the use of an energy-limited supply circuit.

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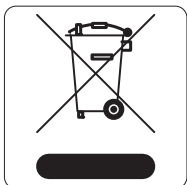
Aruba products at end of life are subject to separate collection and treatment in the EU Member States, Norway, and Switzerland and therefore are marked with the symbol shown at the left (crossed-out wheelie bin). The treatment applied at end of life of these products in these countries shall comply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

European Union RoHS

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

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