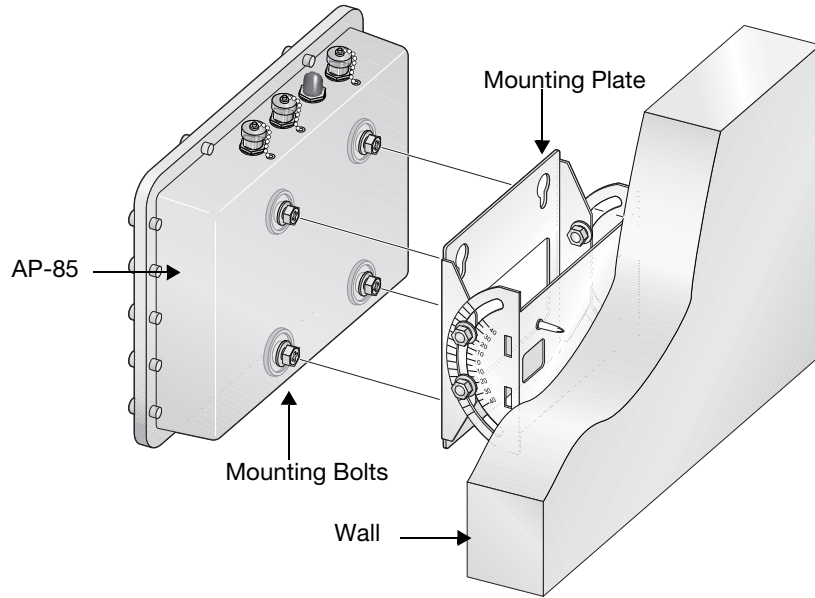


2. Seat the AP-85 into the four keyholes on the mounting plate and tighten down the four mounting bolts (M8 bolts) to secure the AP-85 in place (see [Figure 12](#)). The mounting plate should rest between the captive flat washer on each of the mounting bolts and the rear of the AP-85.



The positioning of the keyholes on the mounting plate supports horizontal or vertical mounting of the AP-85, which is achieved by rotating the device by 90 degrees and securing it to the mounting plate.

Figure 12 Wall Mounting the AP-85

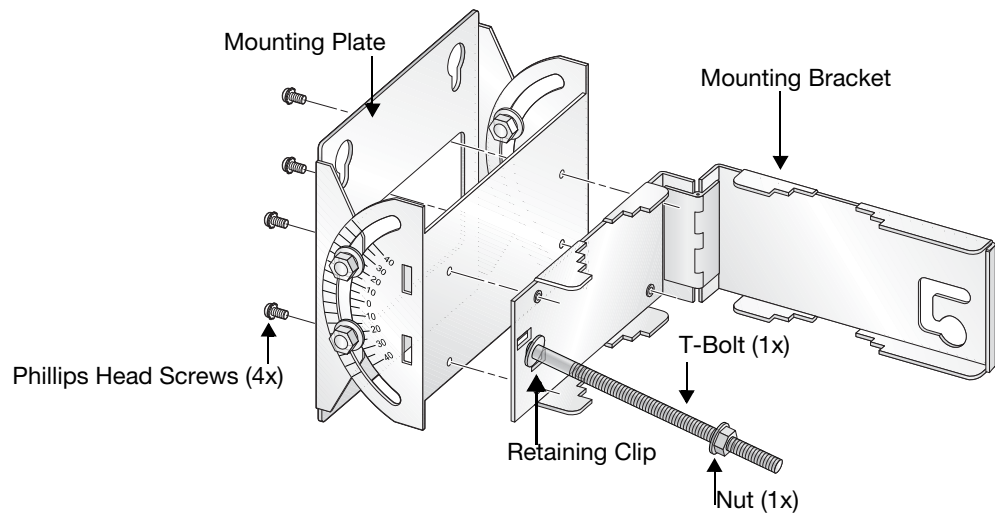


Pole Mounting the AP-85 (1.5" to 3.5" Diameter)

To mount an AP-85 to a pole with a diameter of 1.5" to 3.5":

1. Slide the long T-bolt through the opening in the mounting bracket (see [Figure 13](#)).
2. Attach the included retaining clip to the T-bolt (see [Figure 13](#)).
3. Screw the included nut onto the end of the T-bolt (see [Figure 13](#)).
4. Secure the mounting plate to the mounting bracket using the four included phillips head screws (see [Figure 13](#)).

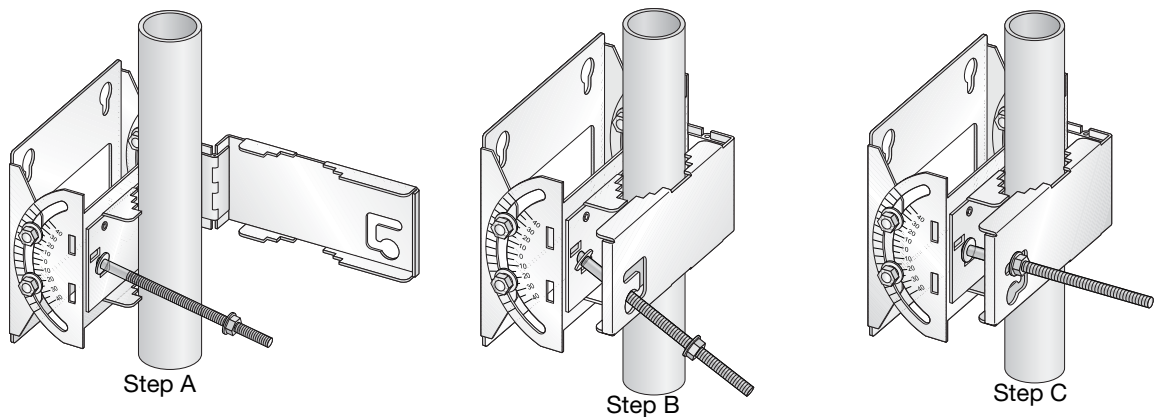
Figure 13 Assembling the Pole Mounting Bracket



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5. Wrap the pole mounting bracket around a 1.5” to 3.5” 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. Ensure 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 *Securing the Pole Mounting Bracket*



6. 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 15](#)). The mounting plate should rest between the captive flat washer on each of the mounting bolts and the rear of the AP-85.



The pole mounting bracket can be secured to a horizontal or vertical pole. The positioning of the keyholes on the bracket supports horizontal or vertical mounting of the AP-85 on either pole type, which is achieved by rotating the device by 90 degrees and securing it to the bracket. Refer to [Figure 15](#) and [Figure 16](#) for details.

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

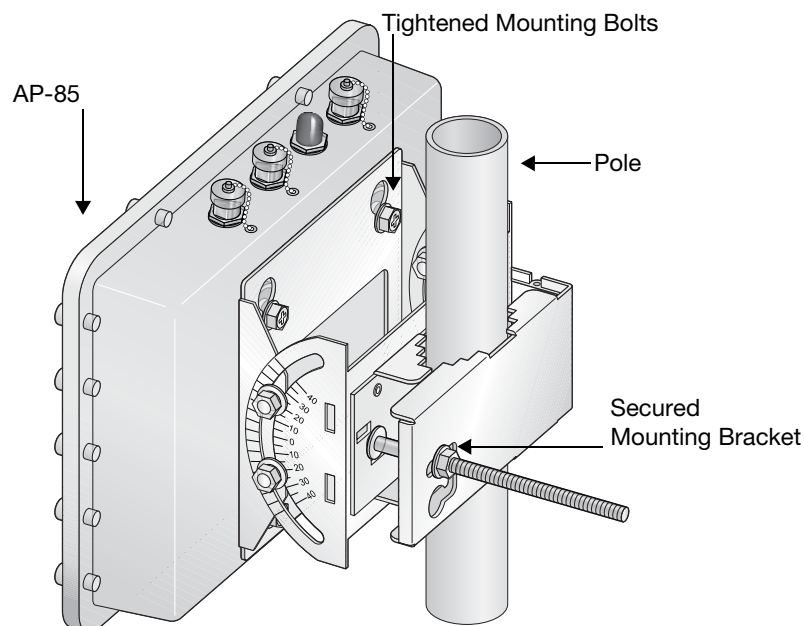
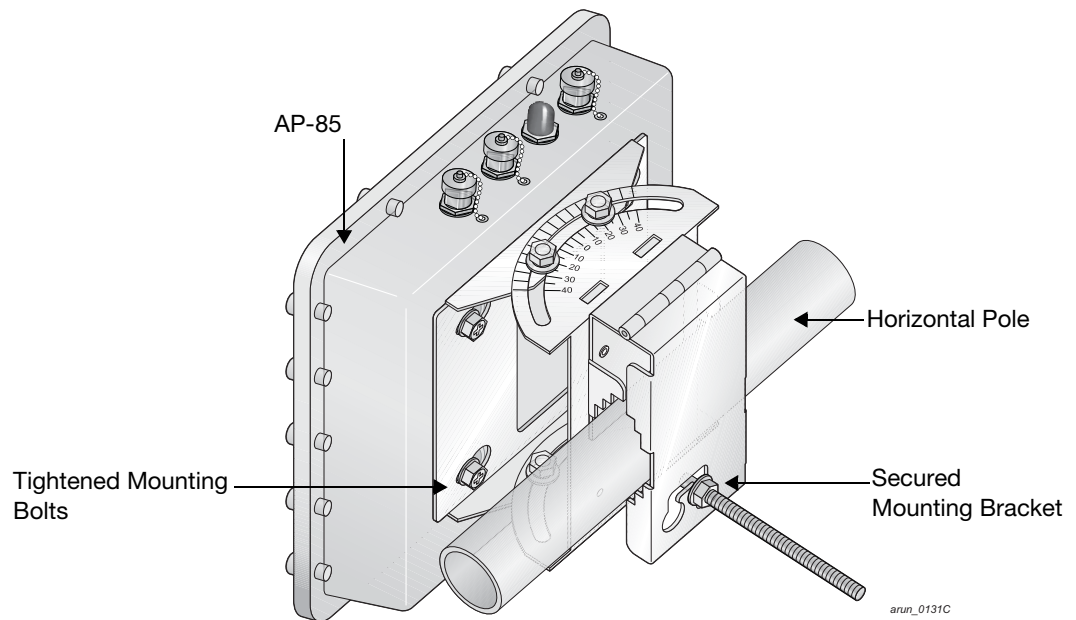


Figure 16 Horizontal Pole Mount Position (1.5" to 3.5" Diameter)



Pole Mounting the AP-85 (>3.5" Diameter)

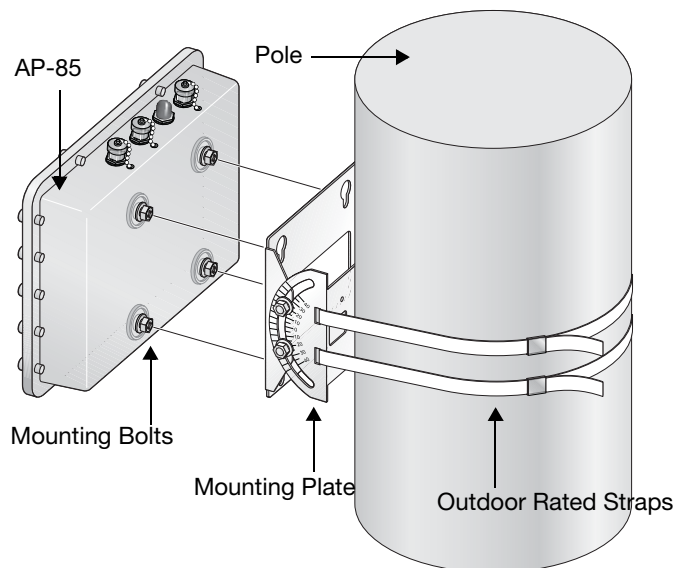
To mount an AP-85 to a pole with a diameter greater than 3.5":

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 of the mounting bolts and the rear of the AP-85.



The mounting plate can be secured to a horizontal or vertical pole. The positioning of the keyholes on the mounting plate supports horizontal or vertical mounting of the AP-85 on either pole type, which is achieved by rotating the device by 90 degrees and securing it to the mounting plate.

Figure 17 Pole Mounting the AP-85 (>3.5" Diameter)

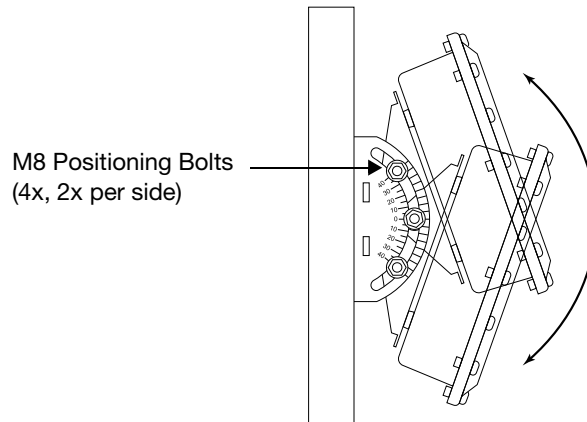


Positioning the AP-85

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 and rotate the AP to the desired angle and tighten down the M8 bolts (see [Figure 18](#)).

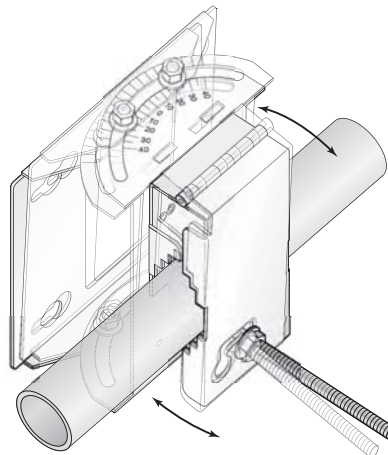
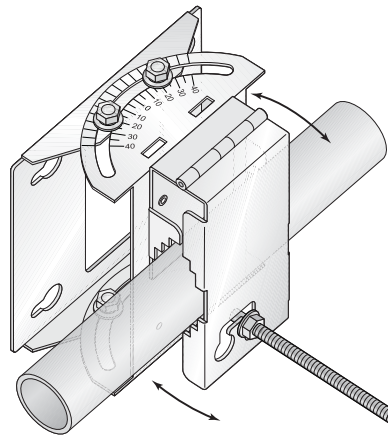
Figure 18 Positioning the AP-85 on a Vertical Pole



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



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Connecting Required Cables

RJ-45 CAT 5 Cable

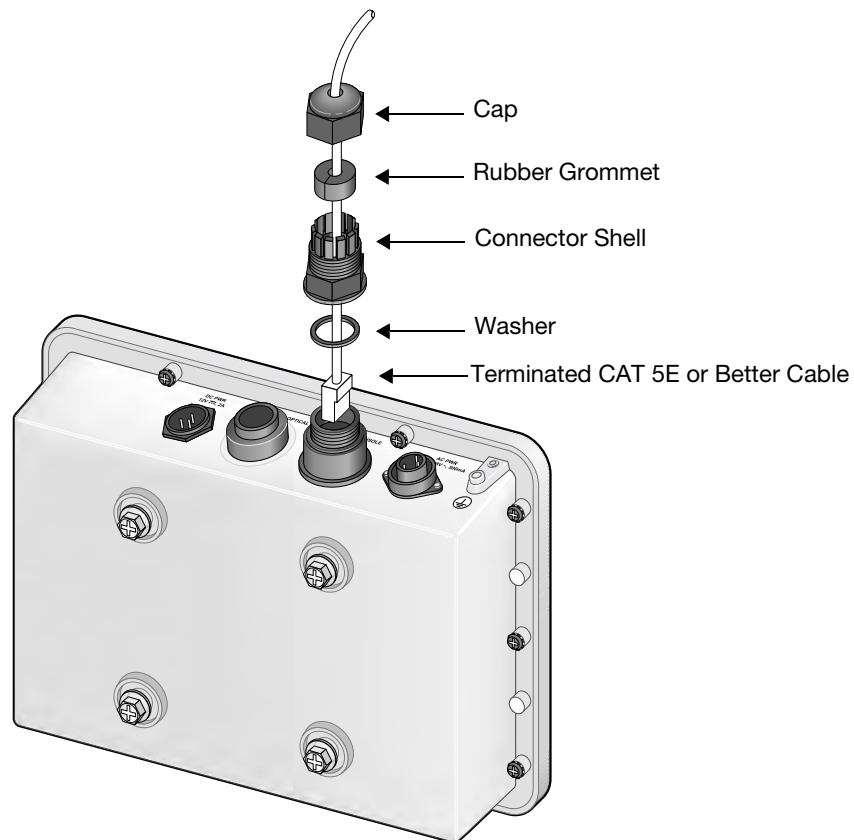
To weatherproof and connect an RJ-45 terminated CAT 5E or better cable to an AP-85 (see [Figure 20](#)), perform the following using the contents in the included kit that ships with your unit:



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



DC and AC Power Cables

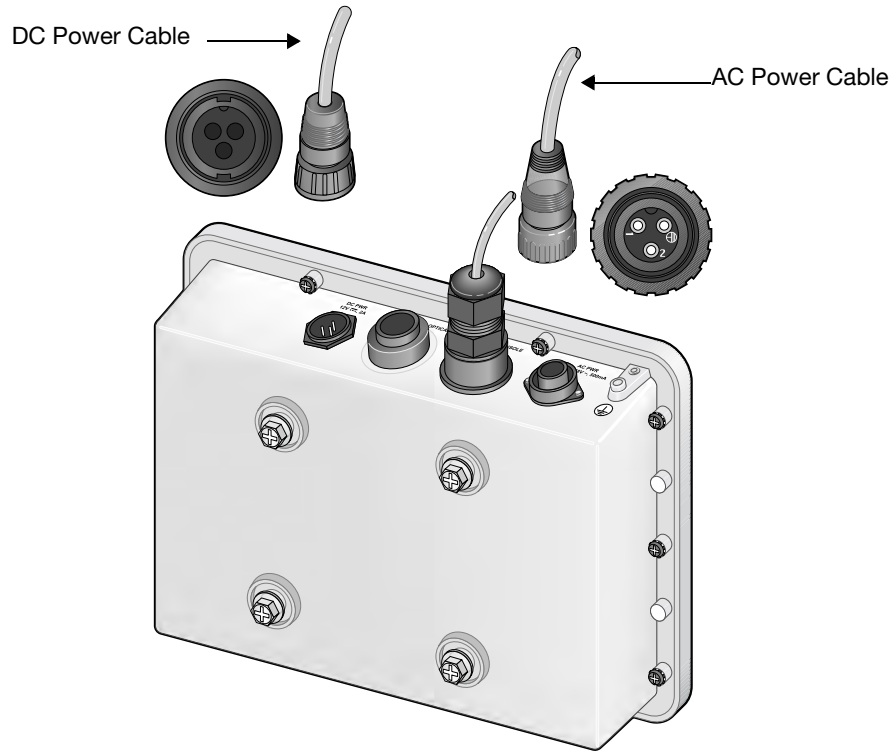
To connect the power cables (wiring harnesses):

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.



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

Figure 21 *Connecting Power*



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Table 5 *AC and DC Power Cable Descriptions*

Cable Type	Wire Color	Assignment
DC Power Cable	Red	+12V
	Black	Ground
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 utilize the fiber optic termination kit that ships with the AP-85FX/LX models:

1. Follow the instructions in the included Tyco document: Instruction Sheet 408-10079.



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.

Lightning Arrestor Installation

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

Antenna Installation

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

4. Verifying Post-Installation Connectivity

The integrated LEDs on the AP-85 can be used after installation to verify that the AP is receiving power, is initializing successfully, and that wireless connectivity is occurring (see [LED Status Indicators on page 12](#)). Refer to the *ArubaOS Quick Start Guide* for further details on verifying post-installation network connectivity.

5. Configuring the AP-85

AP Configuration

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*

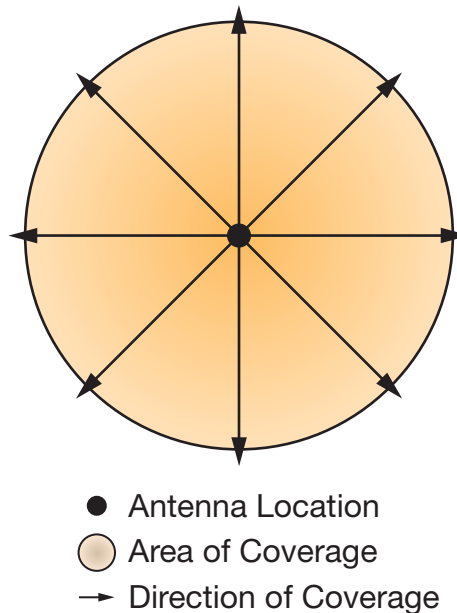
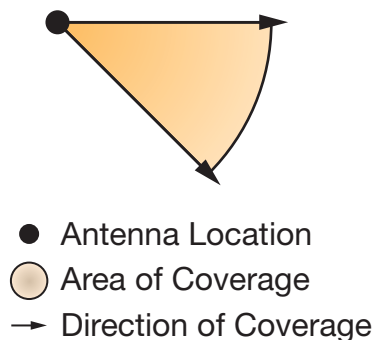


Figure 23 *Directional Antenna*



Antenna Beamwidth, Pattern, and Gain Considerations

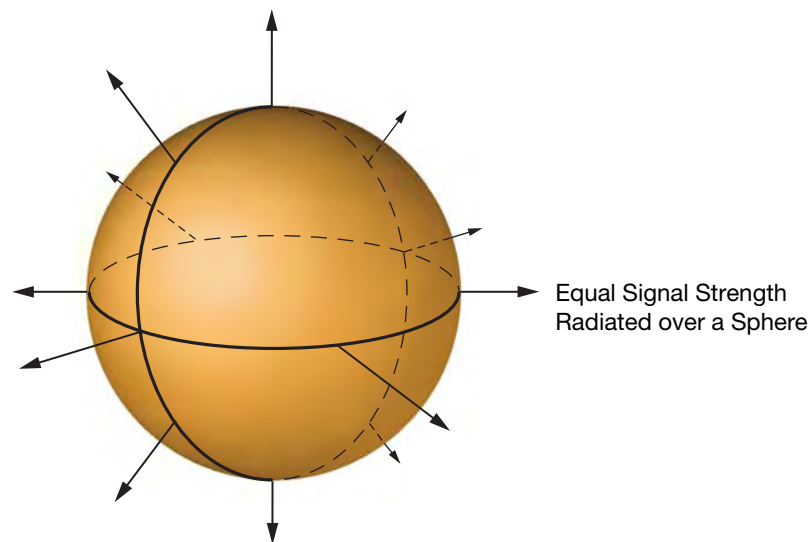
Antenna gain is a relative measure of how the antenna compares to an ideal isotropic radiator. An ideal, isotropic radiator would radiate power in all directions equally over a sphere. The relationship between gain, power, and propagation distance is detailed already in textbooks and Wiki's, so these 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

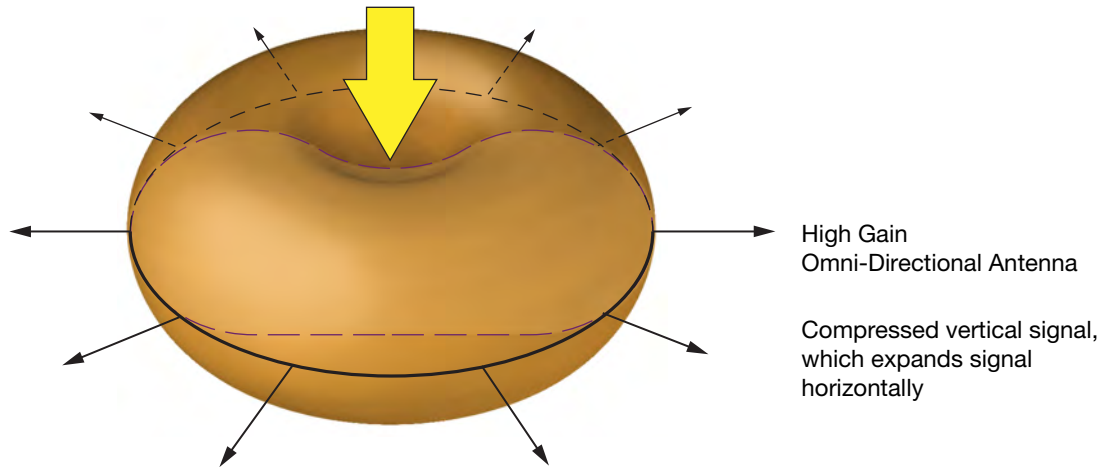
To visualize the concept of gain, picture a rubber ball. The surface area of the ball represents the total available power radiated by an ideal isotropic antenna over its sphere of radiation (see [Figure 24](#)).

Figure 24 *Equal Signal Strength Radiated in All Directions*



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

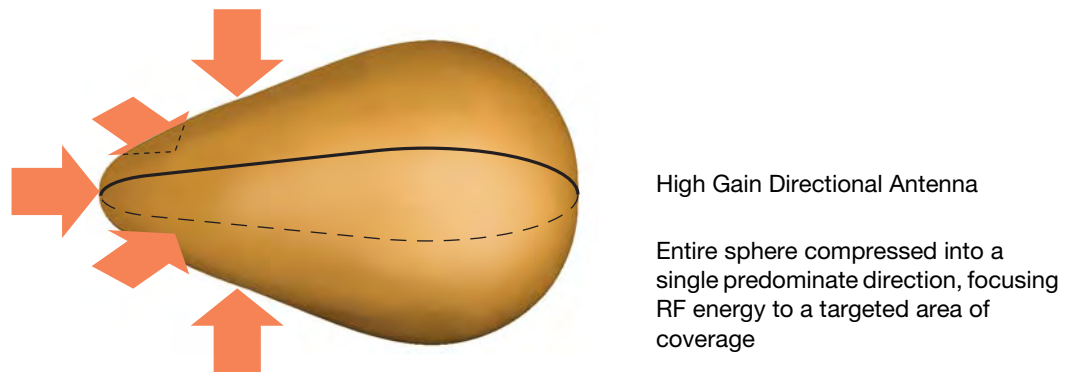


To stretch the ball primarily in one direction (instead of in all directions), push the ball, both vertically and horizontally, on the sides and on the back, to force the ball to deform in a single direction. This action would significantly distort the shape of the original ball both horizontally and 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.



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.

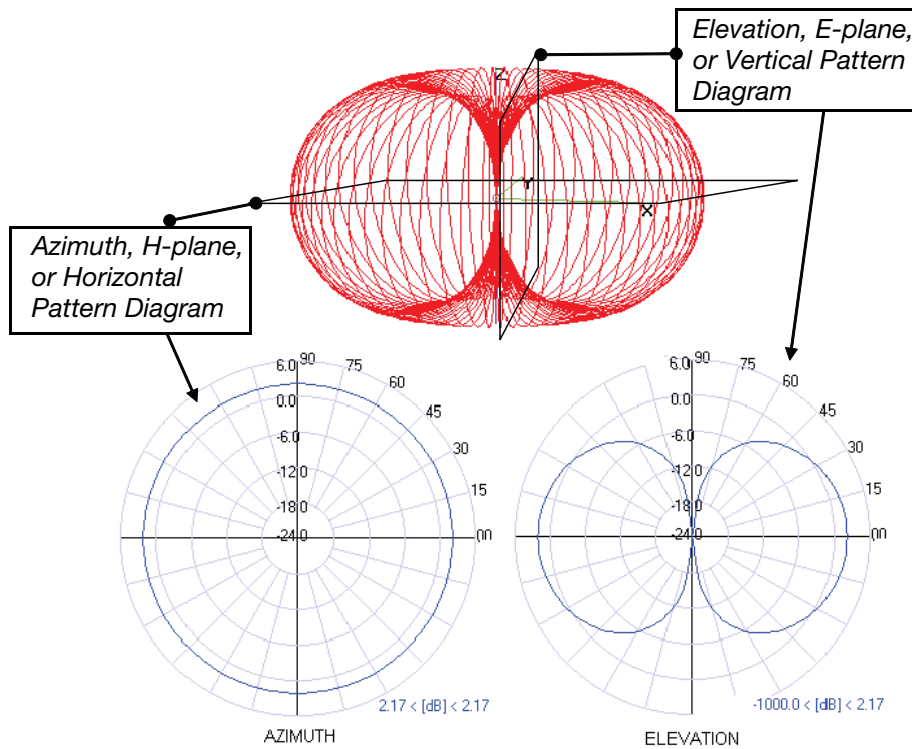
Figure 26 High Gain Directional Antenna



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*

