ANTENNA AND CABLE CONFIGURATIONS

Warning: Only the tested cable lengths and antennas provided by EST meet the FCC maximum peak output power requirements. Any other combination of antennas or coax cables is not authorized.

EST offers different types of antennas for indoor, outdoor and mobile configurations.

Part Number: AA191Ep
- Omni-directional, vehicle mount, 5.5dBi gain antenna.
- Mobile vehicle mount applications.
- The AA191Ep antenna must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Part Number: AA20DMp
- Omni-directional direct mount antenna, 5 dBi gain.
- Indoor and outdoor applications.
- The AA20DMp antenna must be fixed-mounted on outdoor permanent structures with a separation distance of at least 20 cm from all persons during normal operation and must not be co-located or operating in conjunction with any other antenna or transmitter.

Part Number: AA20P
- Omni-directional external pole mount antenna, 9 dBi gain.
- Outdoor applications.
- Antenna port B is not used in this configuration.
- AA20DP antenna must be fixed-mounted on outdoor permanent structures with a separation distance of at least 30 cm from all persons during normal operation and must not be co-located or operating in conjunction with any other antenna or transmitter.

Part Number: AA204Ep
- Directional pole mount antenna, 21 dBi gain with 3-ft. integral feedline and connector.
- Point to point applications only.
- Antenna port B is not used in this configuration.
- The AA204Ep antenna must be fixed-mounted on outdoor permanent structures with a separation distance of at least 1.1 meters from all persons during normal operation and must not be co-located or operating in conjunction with any other antenna or transmitter.

Antenna Port A **Antenna Port B**

Notes:

Antenna Port A is a transmit and receive port for use in all applications.

Antenna Port B is a receive only port and is used for dual diversity antennas applications only. This port is not used for point to point applications.

ANTENNA DIVERSITY

The dual diversity antenna configuration on the ESTeem Model 195Ep allows the radio to operate more efficiently in areas with high reflections (such as indoors or in a city) and without direct line of sight (LOS) between the antennas. One of the most difficult conditions to control in a radio system is the effect of a destructive reflected radio signal called mutipathing. Multipathing occurs when waves emitted by the transmitter travel along a different path and interfere destructively with waves traveling on a direct line-of-site path. The phenomenon occurs because waves traveling along different paths may be completely out of phase when they reach the antenna, thereby canceling each other out. The dual diversity antenna configuration places a physical distance between the antennas where one reflected signal will be out of phase, but the second will be not. The ESTeem Model 195Ep will sample both antennas and select the best receive signal.

ANTENNA PORT SELECTION

The antenna ports on the Model 195Ep must be configured for either a single receive antenna (external mount antennas) or dual diversity antenna setup. To access the port configuration open ESTeem Web page using your computer's Web Browser as per instructions in Chapter 4. Select Advanced from the menu items and Radio Settings-wlan0 device (Figure 1).

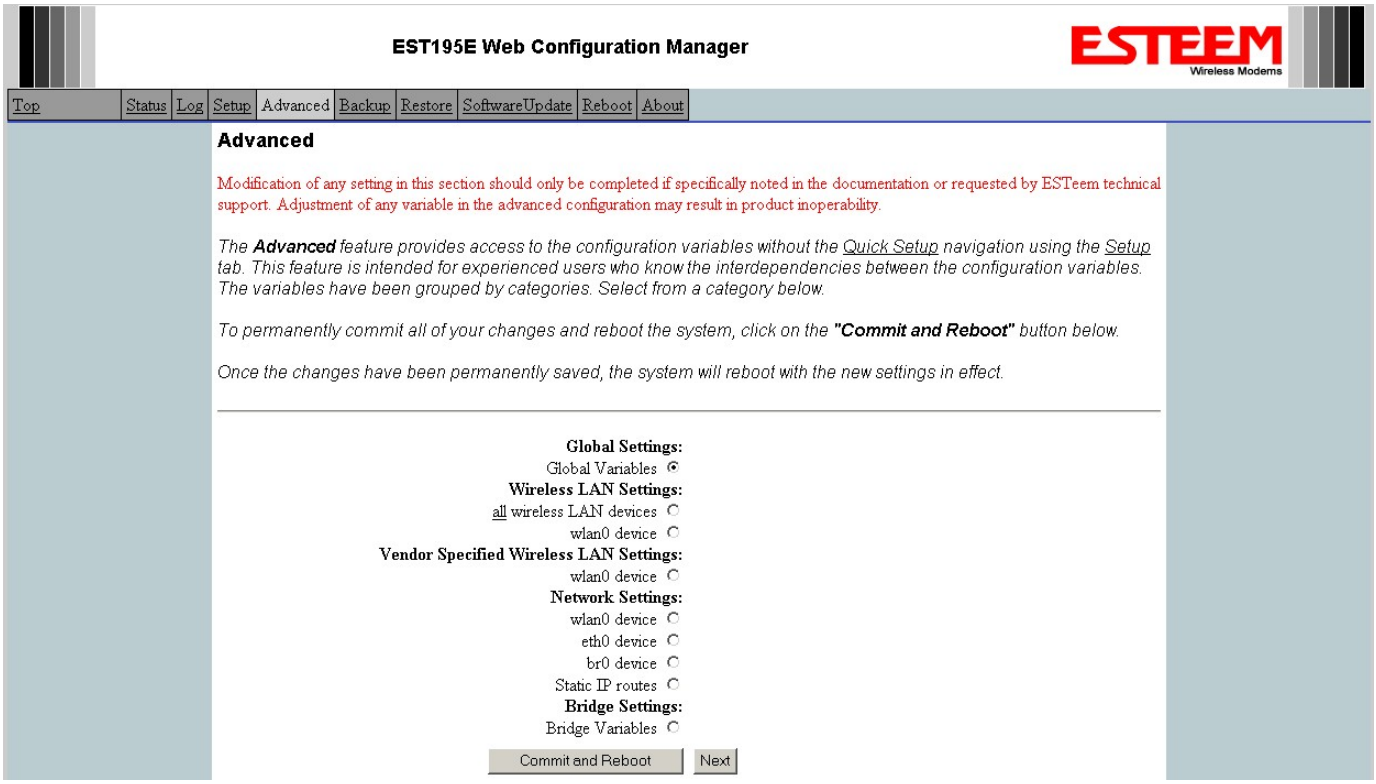


Figure 1: Advanced Settings Menu

Press the next button and Figure 2 will be displayed. The receive antenna is configured by selecting the wlan0_dot11CurrentRXAntenna drop down (Figure 2) and selecting the receive antenna. A value of 0 = Dual diversity (Both antenna Ports A & B will be used to receive). A value of 1 = Single receive source (Antenna Port A only).

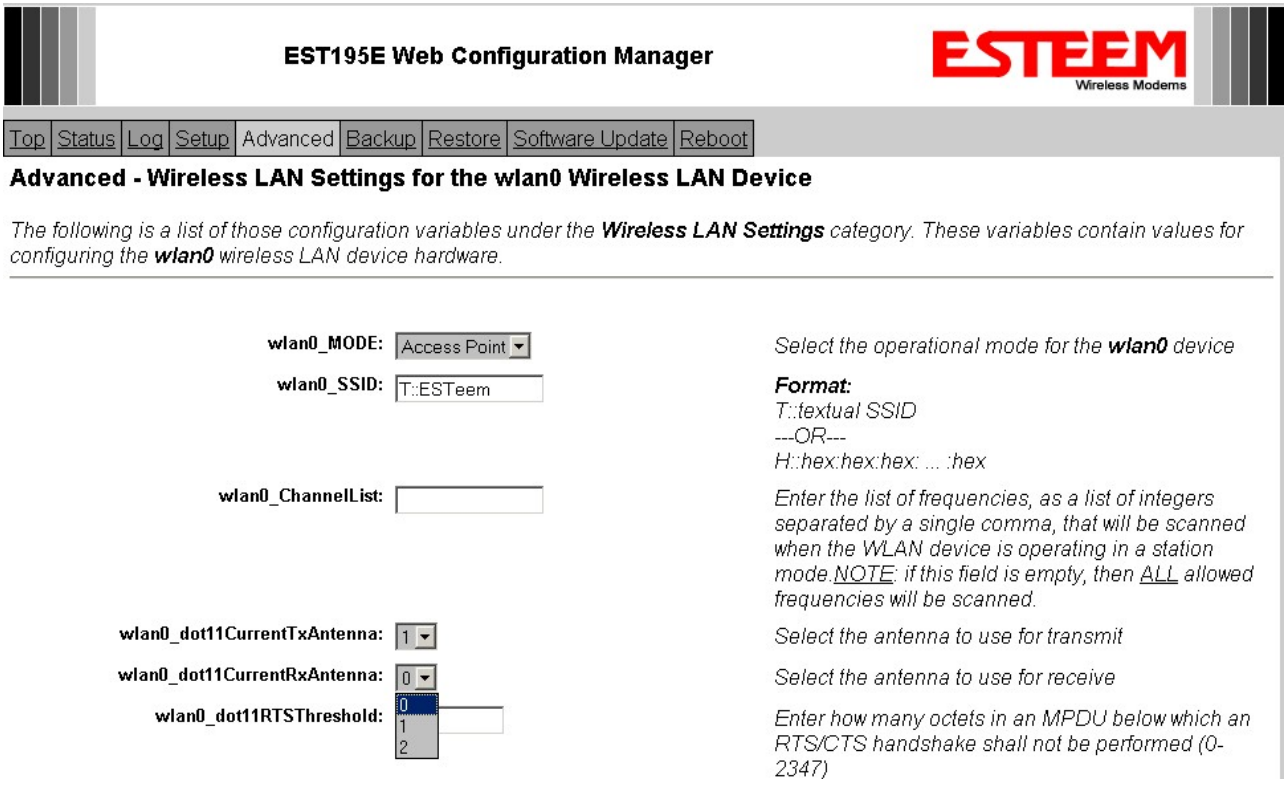


Figure 2: Receive Antenna Settings Menu

COAXIAL CABLE ATTENUATION

Listed below are representative cable losses in db/100 ft at the 4.9 GHz frequency range:

Feedline Type	Attenuation (dB/100 ft.) @ 4.9 GHz
RG-8 (Solid)	>9.9
LMR 600	6.5
3/8" Heliax	8.78
1/2" Heliax	5.49
7/8" Heliax	3.41

Note: *A -3 dB loss means you have lost 1/2 of your signal or transmitter power. A +3 dB gain means you have doubled (x2) your signal or transmitter power.*

Example:

A 6 dB antenna will increase the radiated output power of a 1 watt transmitter to 4 watts {times 4 = 3 dB (x2) + 3 dB (x2)} and increase the received signal strength to receiver times 4

ASSEMBLING THE AA195PM OUTDOOR POLE MOUNTING KIT

The AA195PM mounting kit contains everything required for pole mounting and weatherproofing the ESTeem Model 195Ep for outdoor installations. The 195Ep with AA195PM mounting kit can be directly mounted to a round pole up to a maximum diameter of 2" OD. Any mounting structure greater than 2" requires hose clamp strapping run through the Pole Mount Brackets. The mounting kit requires the following assembly:

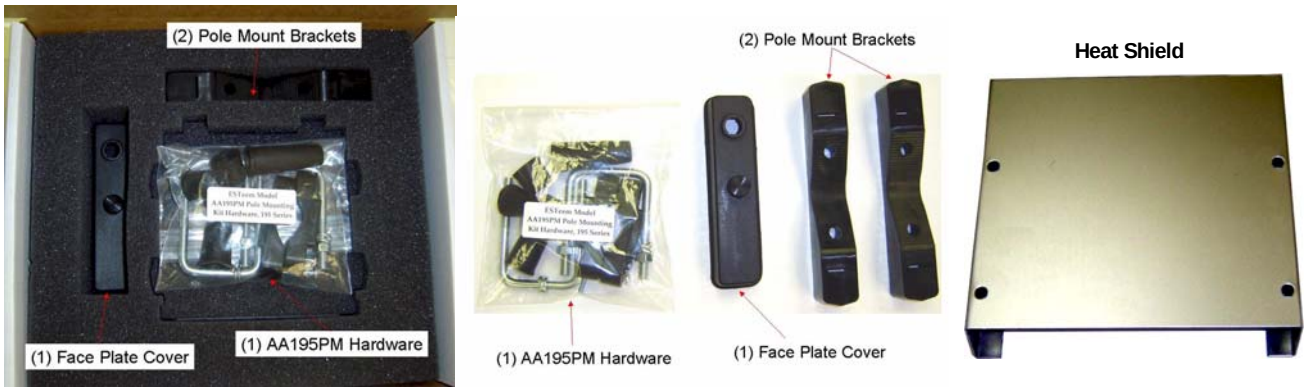


Figure 1: Packet Box Contents

1. If you purchased an AA195PM mounting kit with your Model 195Ep, the kit will be packed in the same packing box as the ESTeem (Figure 1).

2. Remove and inventory the two (2) Pole Mounting Brackets, one (1) Face Plate Cover, one (1) Heat Shield and (1) AA195PM Hardware bag from the packing box (Figure 1). Report any missing or damaged items to ESTeem Customer Support (509-735-9092 Phone) as soon as possible for replacement.

3. Inventory the AA195PM Hardware bag for all the components listed in Figure 2.

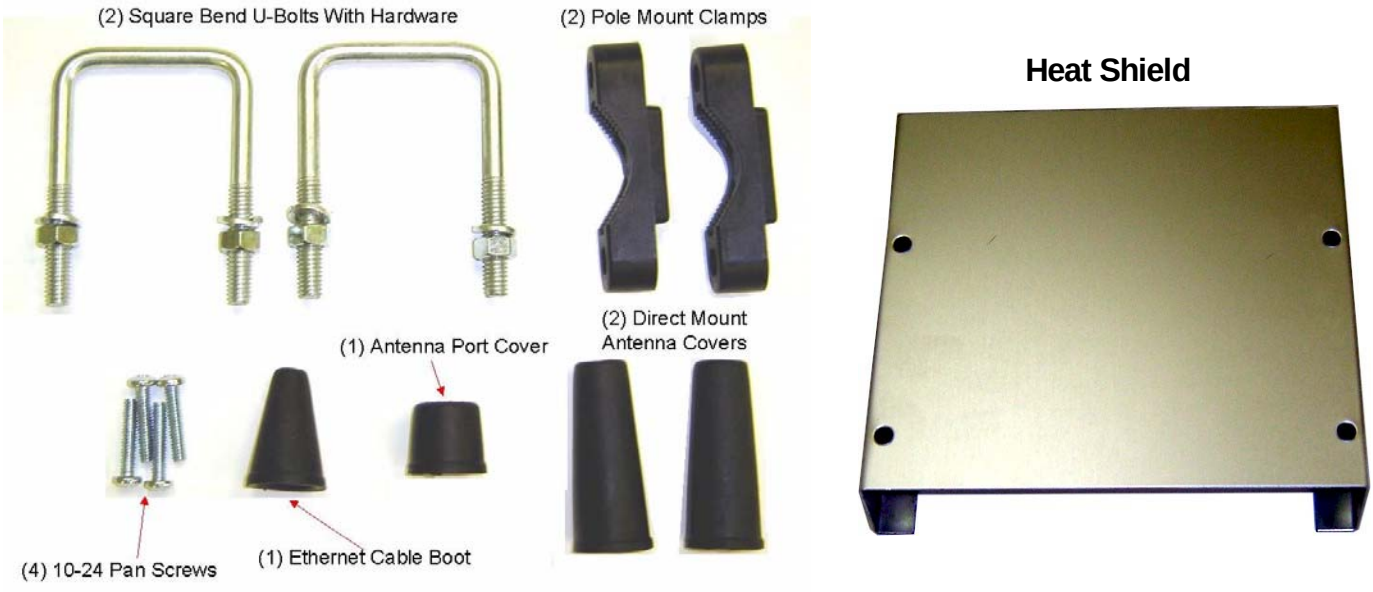


Figure 2: AA195PM Hardware Contents

4. Assemble the two Pole Mounting Brackets with the included U-bolts, hardware and Pole Mount Clamps. Reference Figure 3.

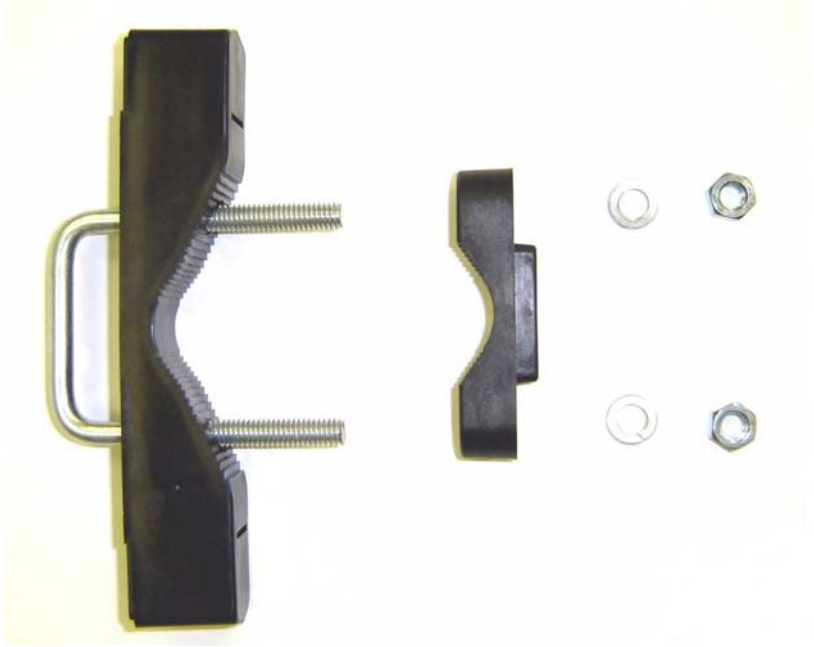


Figure 3: Pole Mount Assembly

5. Place the four supplied 10-24 x 1" Phillips Pan Head screws through the mounting holes of the Heat Shield and attach to the to the top of the ESTeem 195Ep (Figure 4).

Figure 4: Heat Shield Attachment

6. Attach the two Pole Mounting Brackets to the ESTeem Model 195Ep with the 10-24 x 1" Phillips Pan Head screws through the top of the heat shield. Reference Figure 5 (Heat Shield removed for detail).

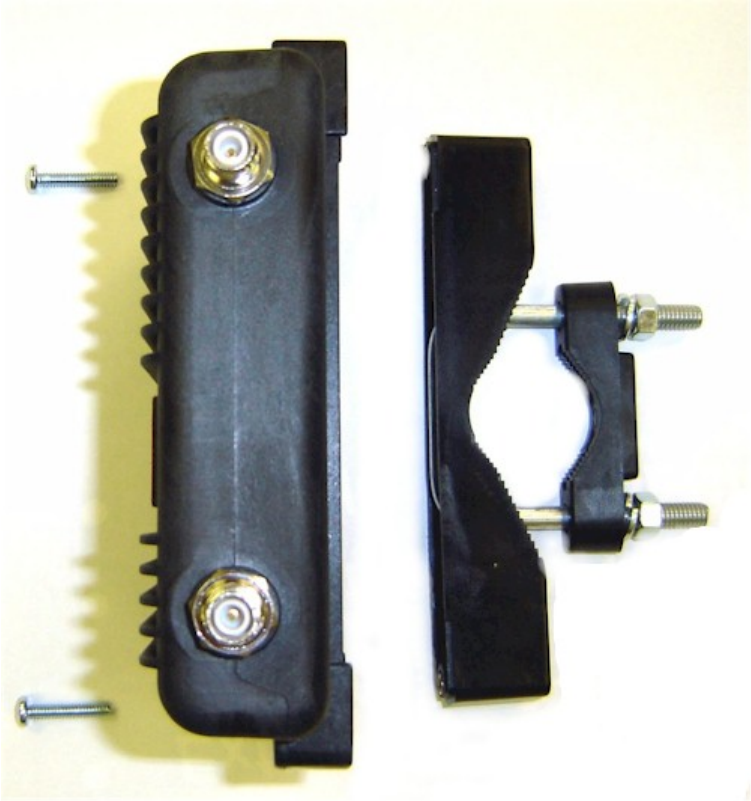


Figure 5: Pole Mount Connection to Case
(Heat Shield Removed for Detail)

7. Assemble the outdoor rated CAT-5e Ethernet cable (Not Provided) with the supplied Ethernet Cable Boot (Figure 6).

Figure 6: Ethernet Cable Assembly

8. Feed the CAT-5e Ethernet connector through the Face Plate Cover and secure the Ethernet Cable Boot to the cover. Reference Figure 7.

Figure 7: Ethernet Cable Routing

9. Route the CAT-5e Ethernet cable through the molded strain-relief fins in the Face Plate Cover (Figure 8) to secure the cable and provide strain-relief for the connector.

Figure 8: Face Plate Cover Strain Relief

10. Plug the CAT-5e Ethernet cable to the Model 195Ep's Ethernet port and secure the Face Plate Cover with the attached thumb screw. Verify that the weatherproof seal on the Face Plate Cover is sealed against the outer rim of the Model 195Ep. Reference Figure 9.

Figure 9: Face Plate Cover

11. Attach the antenna connector boots as show in Figure 10 for either dual attached antennas or external antennas. You are now ready to mount the ESTeem Model 195Ep.

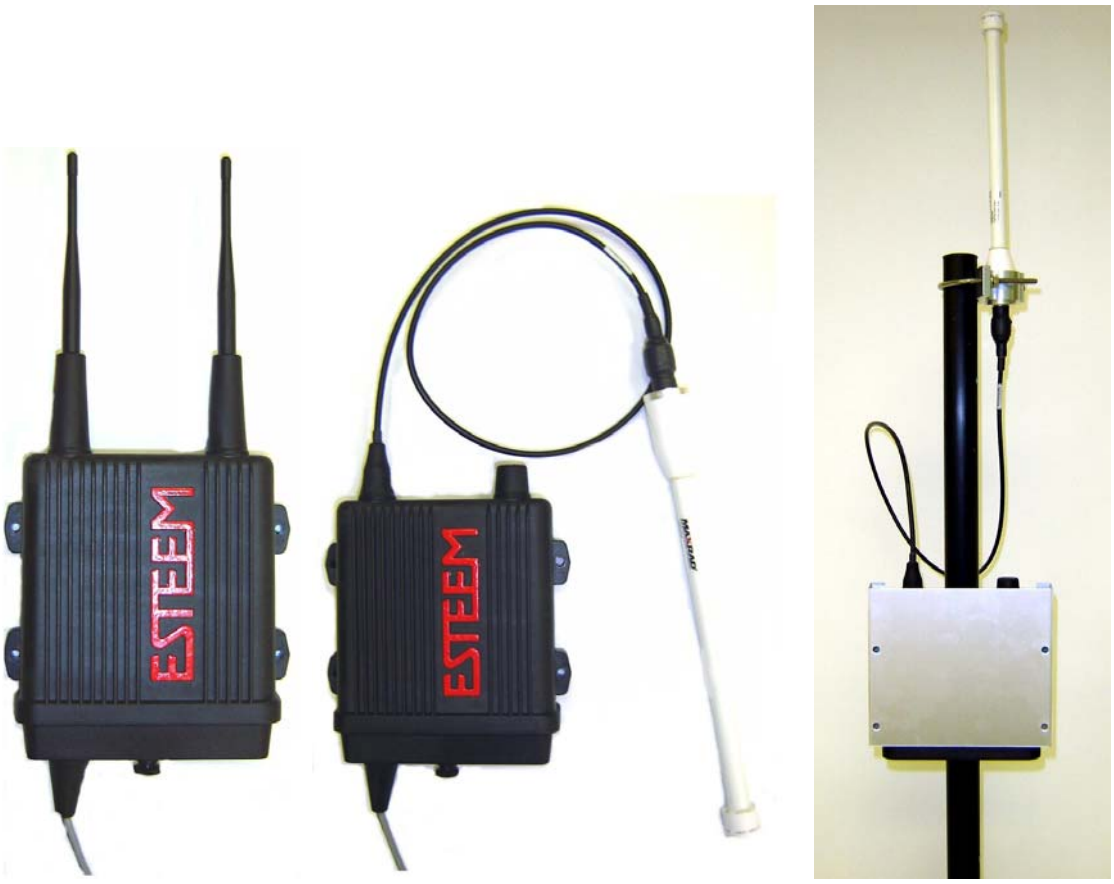
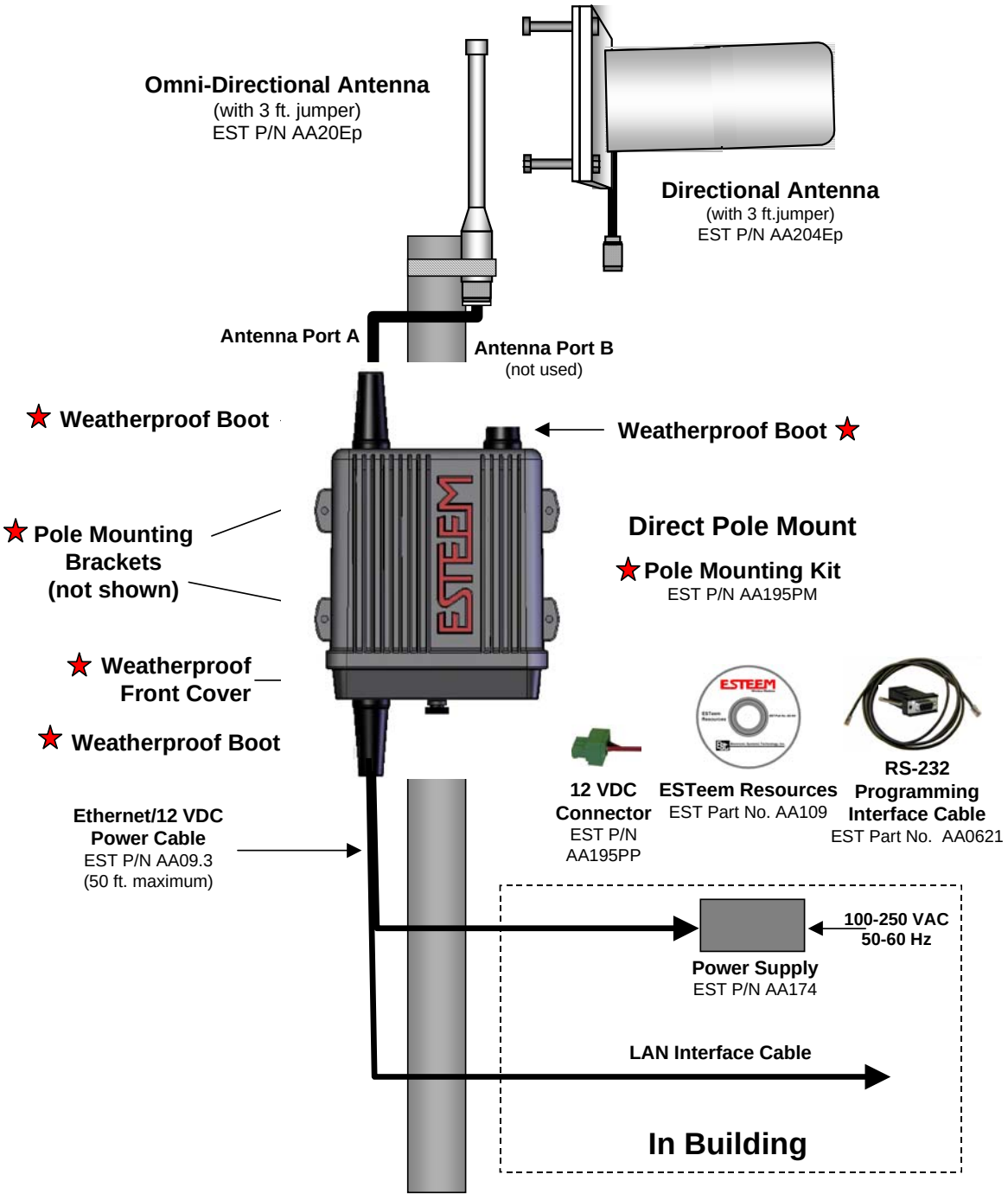


Figure 11: Completed AA195PM Mounts

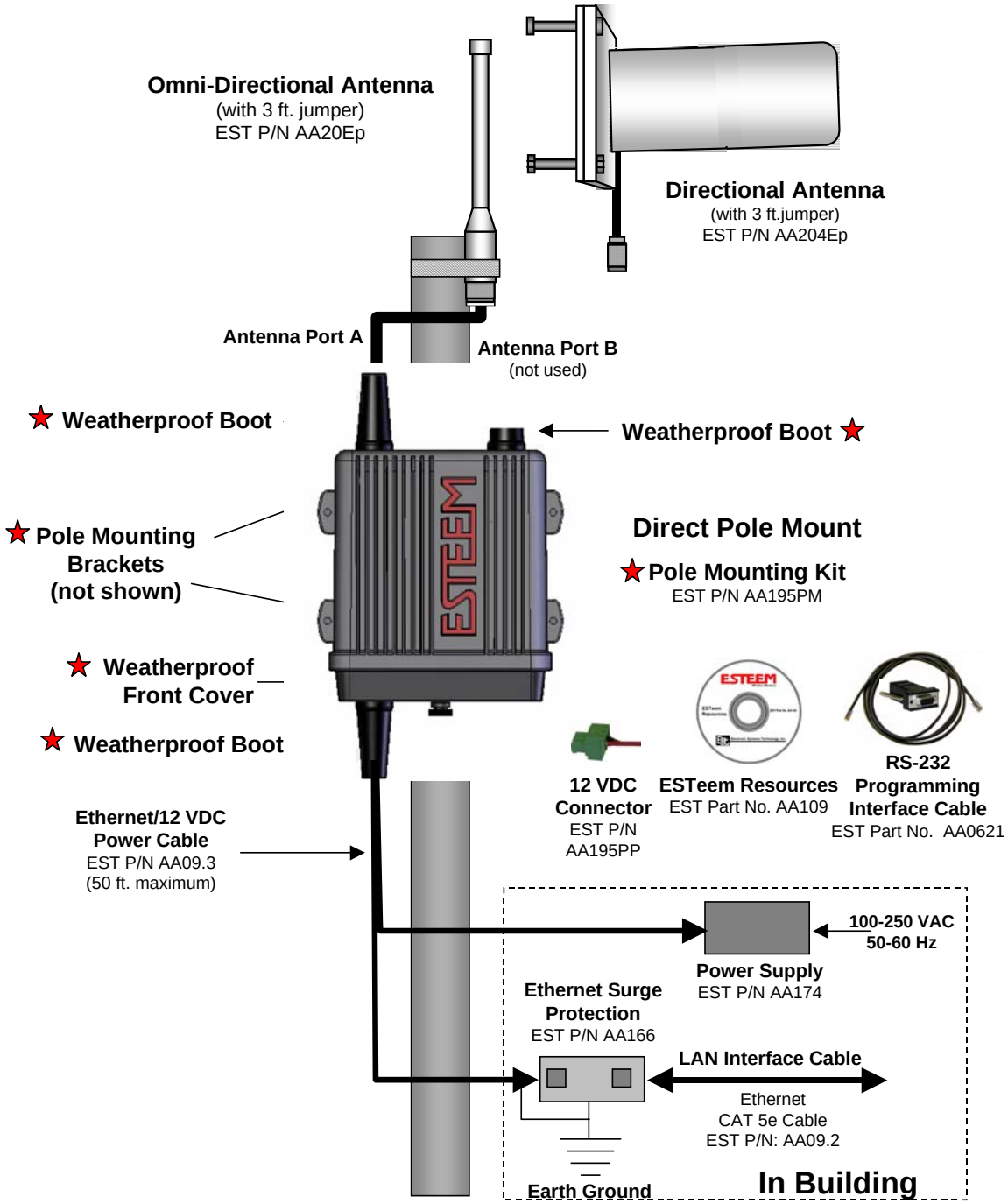
Caution: Always mount the 195Ep vertically with the antenna ports on top.

Model195Ep with External Mount Antennas



Caution: Always mount the 195Ep vertically with the antenna ports on top.

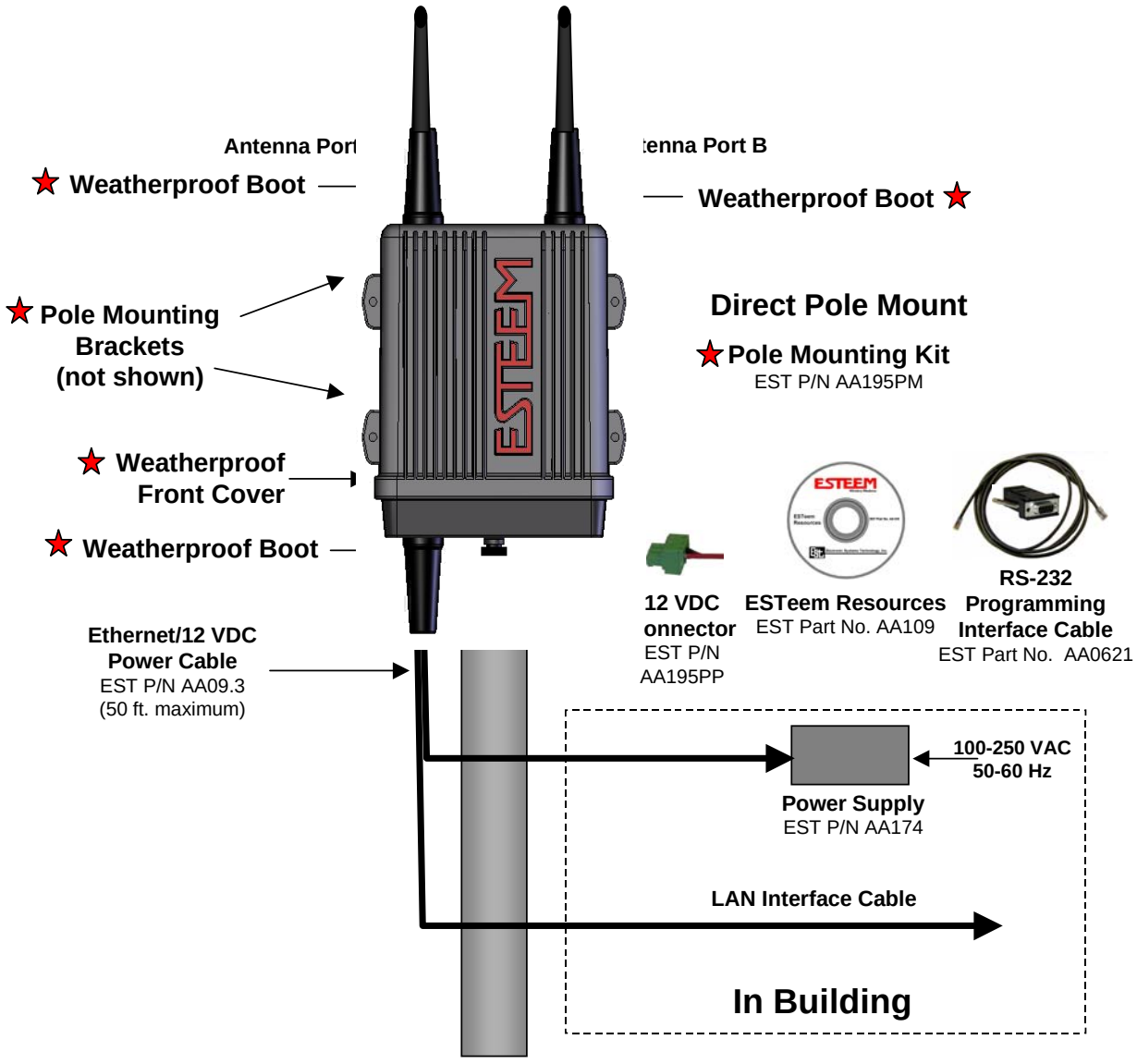
Model195Ep with External Mount Antennas and Surge Protection



Caution: Always mount the 195Ep vertically with the antenna ports on top.

Model 195Ep Series with Direct Mount Dual Diversity Antennas

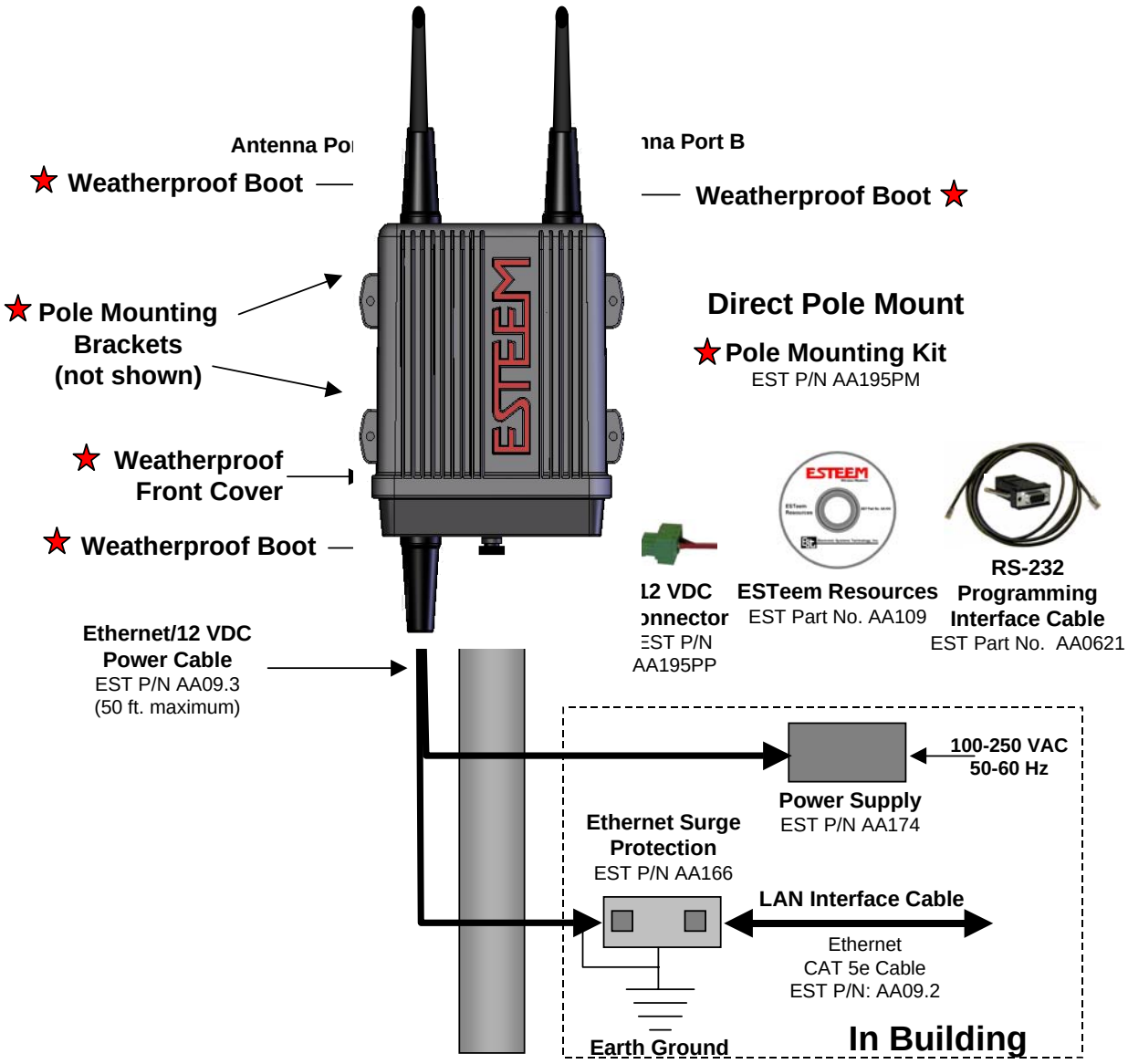
Case Mount Omni-Directional
Dual Diversity Antennas
EST P/N AA20DMEp



Caution: Always mount the 195Ep vertically with the antenna ports on top

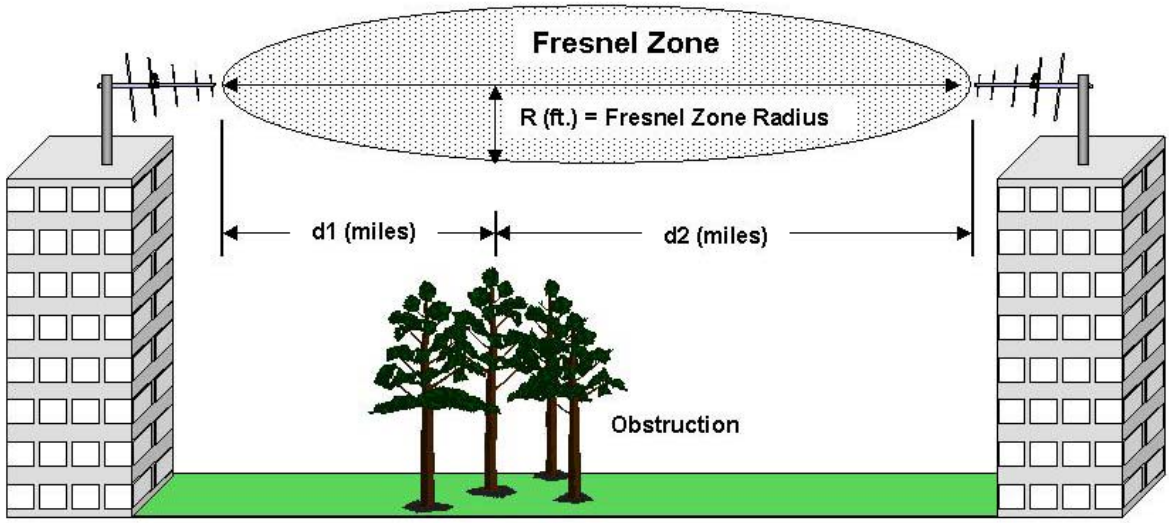
Model 195Ep Series with Direct Mount Dual Diversity Antennas and Surge Protection

Case Mount Omni-Directional
Dual Diversity Antennas
EST P/N AA20DMEp



Caution: Always mount the 195Ep vertically with the antenna ports on top

FRESNEL ZONE



The Fresnel zone shows the ellipsoid spread of the radio waves around the visual line-of-sight after they leave the antenna (see figure above). This area must be clear of obstructions or the signal strength will be reduced due to signal blockage. Typically, 20% Fresnel Zone blockage introduces little signal loss to the link. Beyond 40% blockage, signal loss will become significant. This calculation is based on a *flat earth*. It does not take into account the curvature of the earth. It is recommended for RF path links greater than 7 miles to have a microwave path analysis done that takes the curvature of the earth and the topography of the terrain into account.

Fresnel Zone Radius = 72.1 SQRT [(d1d2) / (F(d1 + d2)]

Units
Fresnel Zone Radius in feet.
d1 and d2 in statue miles
F in GHz