

### ANTENNA AND CABLE CONFIGURATIONS

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

EST offers different types of antennas for both indoor and outdoor configurations. This device has been designed to operate with the antennas listed below, and having a maximum gain of 22 dBi. Antennas not included in this list or having a gain greater than 22dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

**Part Number: AA20DMa**

- Omni-directional direct mount antenna, 4.5 dBi gain.
- Indoor and outdoor applications.
- There must be a minimum separation distance of 23 cm. from the antenna to the user. *See Warnings.*

**Part Number: AA20Ea**

- Omni-directional external pole mount antenna, 10 dBi gain with 18 inch integral feedline and connector.
- Outdoor applications.
- There must be a minimum separation distance of 23 cm. from the antenna to the user. *See Warnings.*

**Part Number: AA205Ea**

- Directional linear panel, pole mount antenna, 22 dBi gain with 18 inch integral feedline, bandpass filter and connector.
- Point to point and point to multi-point outdoor applications.
- There must be a minimum separation distance of 50 cm. from the antenna to the user. *See Warnings.*

**Antenna  
Port A**



**Warnings:**

*Only pre-made coax cables from the factory used in conjunction with either the omni-directional and directional antennas meet all FCC Section 15.247(b) EIRP maximum power requirements.*

*To comply with the FCC exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna and all persons.*

This radio transmitter (ESTeem 195Ea - 2163A-195EA) has been approved by Industry Canada to operate with the antenna types listed above with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

*(Le présent émetteur radio (ESTeem 195Ea – 2163A-195EA) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés au-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.)*

### ASSEMBLING THE AA195PM TWO HOLE OUTDOOR POLE MOUNTING KIT

The AA195PM mounting kit contains everything required for pole mounting and weatherproofing the ESTeem Model 195E for outdoor installations. The 195E with AA195PM mounting kit can be directly mounted to a round pole from 1.25” to a diameter of 2.25” OD. Any mounting structure greater than 2” requires hose clamp strapping run through the Pole Mount Brackets. The mounting kit requires the following assembly:



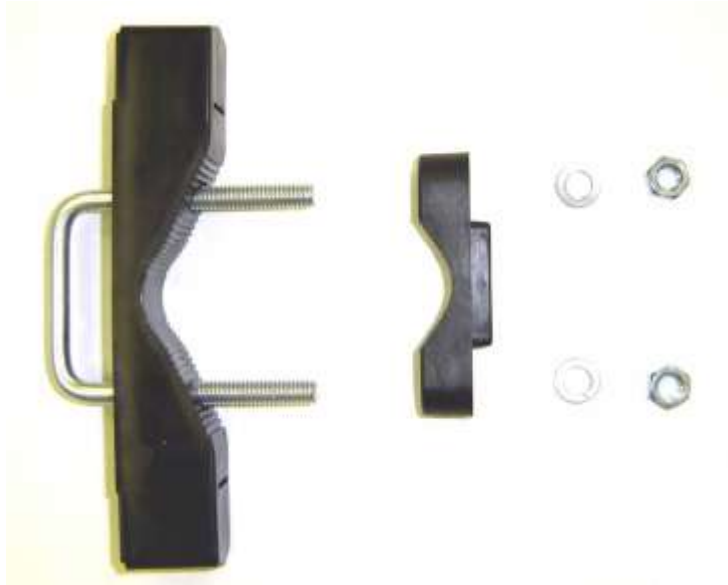
**Figure 1: Packet Box Contents**

1. If you purchased an AA195PM mounting kit with your Model 195E, 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) Two-Hole Face Plate Cover (with single port cover installed), 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.



**Figure 2: AA195PM Hardware Contents**

3. Inventory the AA195PM Hardware bag for all the components listed in Figure 2.
4. Assemble the two Pole Mounting Brackets with the included U-bolts, hardware and Pole Mount Clamps. Reference Figure 3.



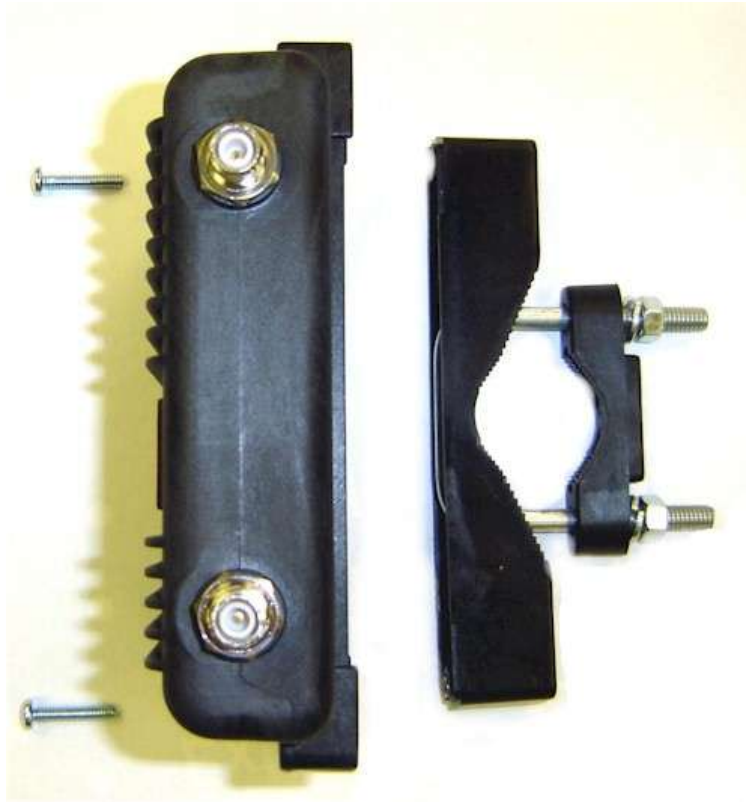
**Figure 3: Pole Mount Assembly**

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 top of the ESTeem 195E (Figure 4).



**Figure 4: Heat Shield Attachment**

6. Attach the two Pole Mounting Brackets to the ESTeem Model 195E with the 10-24 x 1" Phillips Pan Head screws through the



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

top of the heat shield. Reference Figure 5 (Heat Shield removed for detail).

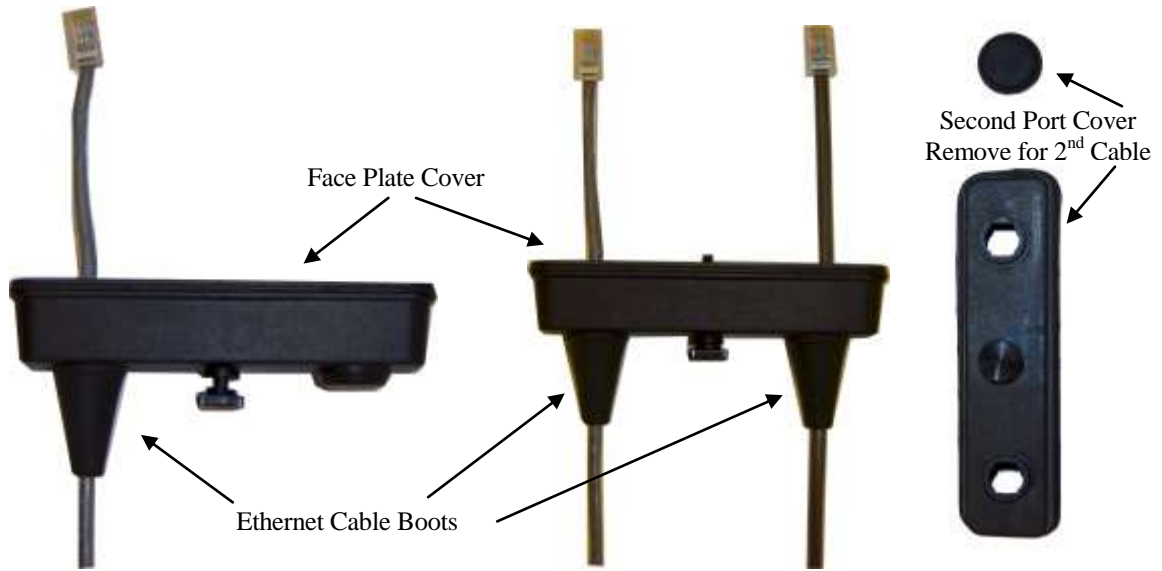
7. Assemble the outdoor rated CAT-5e Ethernet cable (Not Provided) with the supplied Ethernet Cable Boot (Figure 6).



Ethernet Cable Boot

**Figure 6: Ethernet Cable Assembly**

8. Feed the CAT-5e Ethernet connector(s) through the Face Plate Cover and secure the Ethernet Cable Boot to the cover. Reference Figure 7. *NOTE: The Ethernet cable boot must be installed before the RJ-45 end is installed. If using the ESTeem AA09.1 outdoor Ethernet cable, verify that the Ethernet cable boot end is routed toward the ESTeem 195E.*



**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. If a second Ethernet cable is installed, remove the second port cover and route cable.



**Figure 8: Face Plate Cover Strain Relief**

10. Plug the CAT-5e Ethernet cable to the Model 195E'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 195E. Reference Figure 9.



**Figure 9: Face Plate Cover Installed on ESTeem**

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 195E



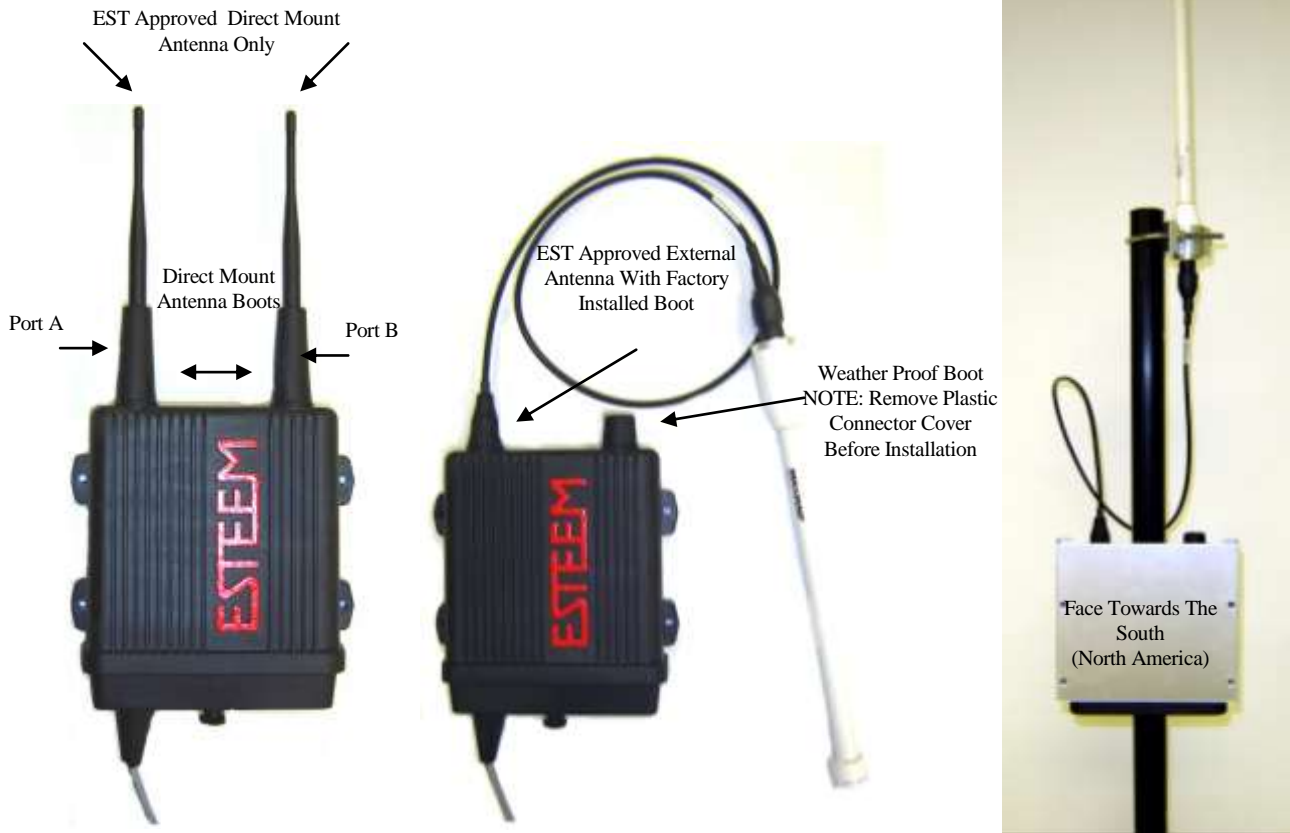


Figure 10: Completed AA195PM Mounts

**Caution:** Outdoor mounting of the 195E requires the use of weatherproof boots. Improper installation could result in radio failure.

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

### 195E POLE MOUNT GROUNDING PROCEDURES

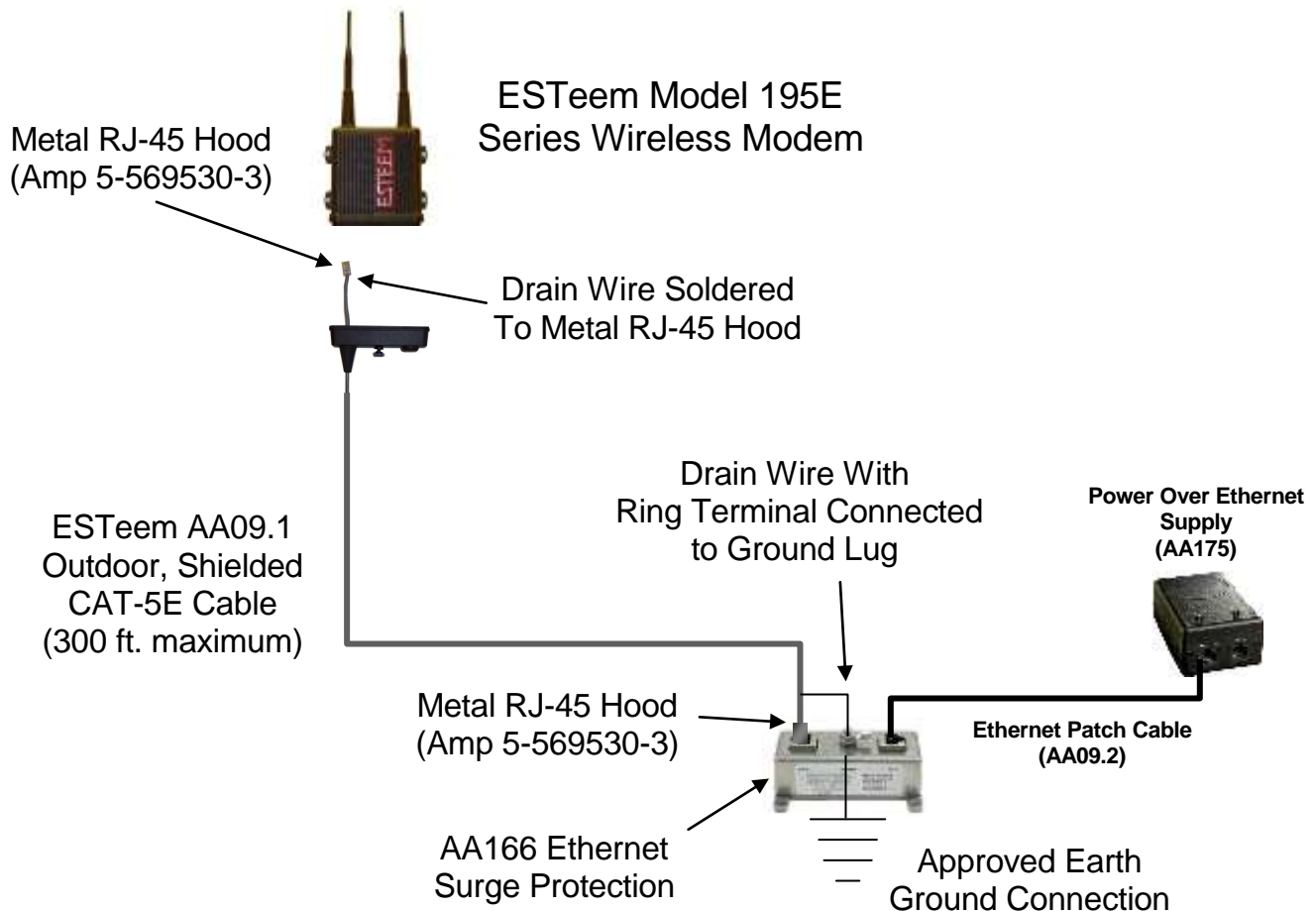
Mounting the 195E series radio modem outdoors requires proper grounding procedures to prevent damage to both the radio hardware and the connected Ethernet and Serial peripherals. The case on the 195E series wireless modem is electrically conductive, but the AA195 Pole Mount kit provides isolation from the connected structure. To bring the 195E case to a ground potential with Earth ground and eliminate any static buildup on the case itself, the shield on the Ethernet cable is used to provide the ground connection.

#### Outdoor Ethernet Cable

A critical component of this grounding protection system is the ESTeem AA09.1 outdoor, shielded CAT-5E Ethernet cable. This cable provides three, necessary elements; Ethernet data, DC Power over Ethernet (PoE) applications, and a ground from the 195E case to the AA166 surge protector. The Ethernet cable is outdoor rated and protected from UV breakdown.

#### Installation

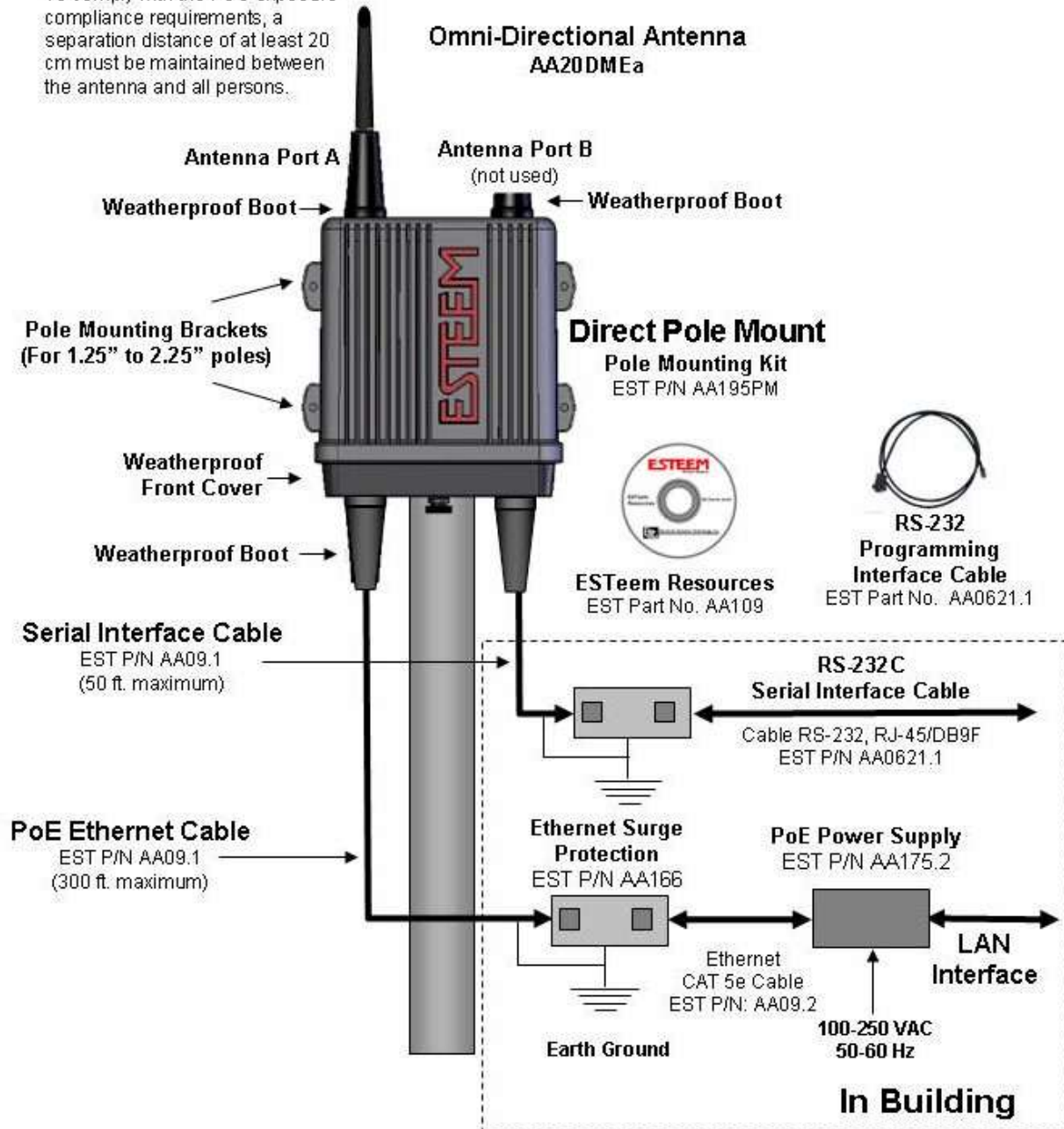
The following diagram outlines all the critical components and connections in the 195E series system. The Earth ground connection to the surge protector must be installed to comply with local Electrical code requirements.



### Model 195Ea Direct Mount Antenna w/Surge Protection

**Caution**

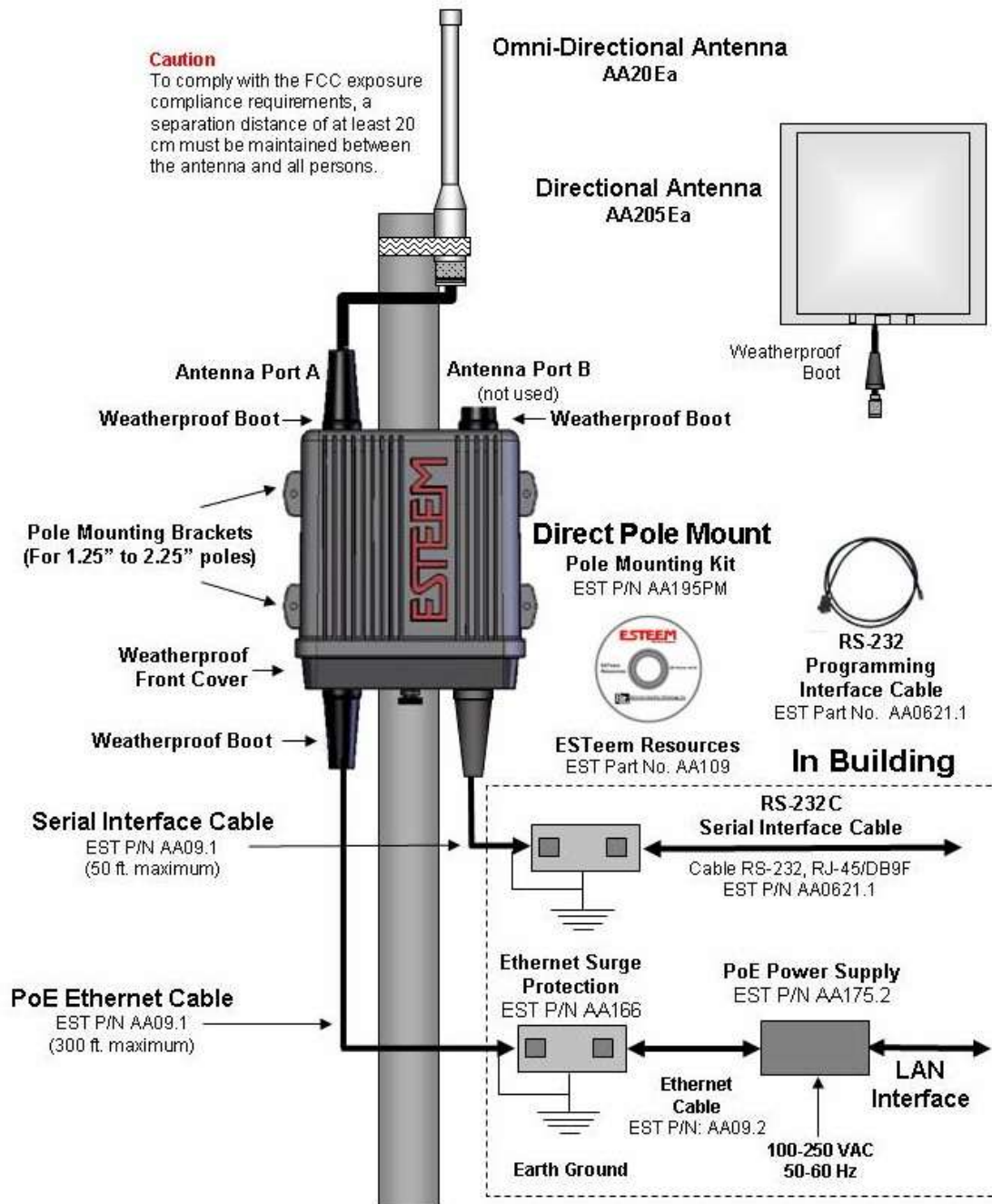
To comply with the FCC exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna and all persons.



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

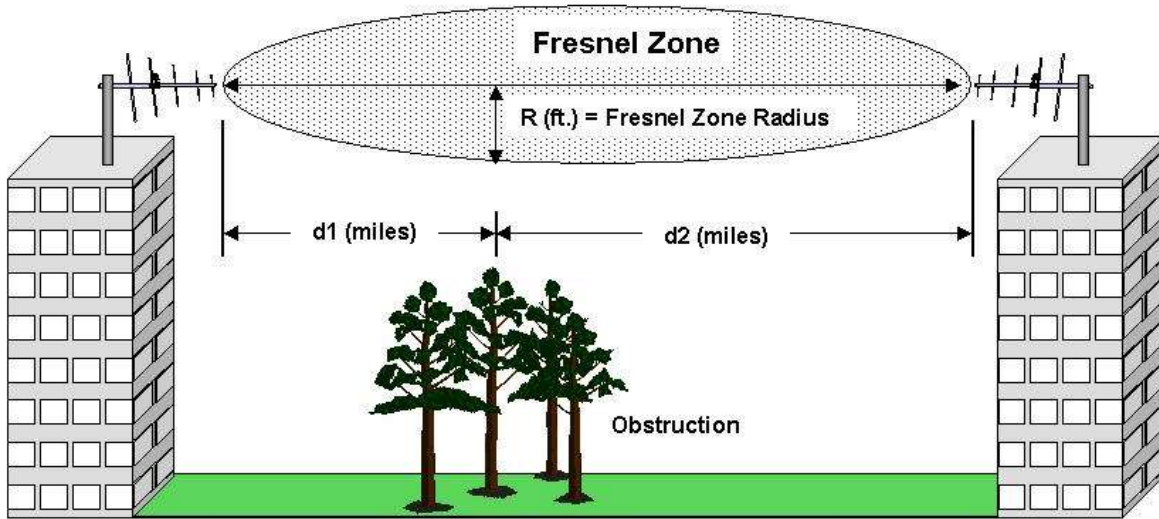


### Model 195Ea External Mount Antenna w/Surge Protection



**Caution:** Always mount the 195Ea 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.

$$\text{Fresnel Zone Radius} = 72.1 \text{ SQRT} [(d_1 d_2) / (F(d_1 + d_2))]$$

#### Units

Fresnel Zone Radius in feet.

$d_1$  and  $d_2$  in statute miles

$F$  in GHz