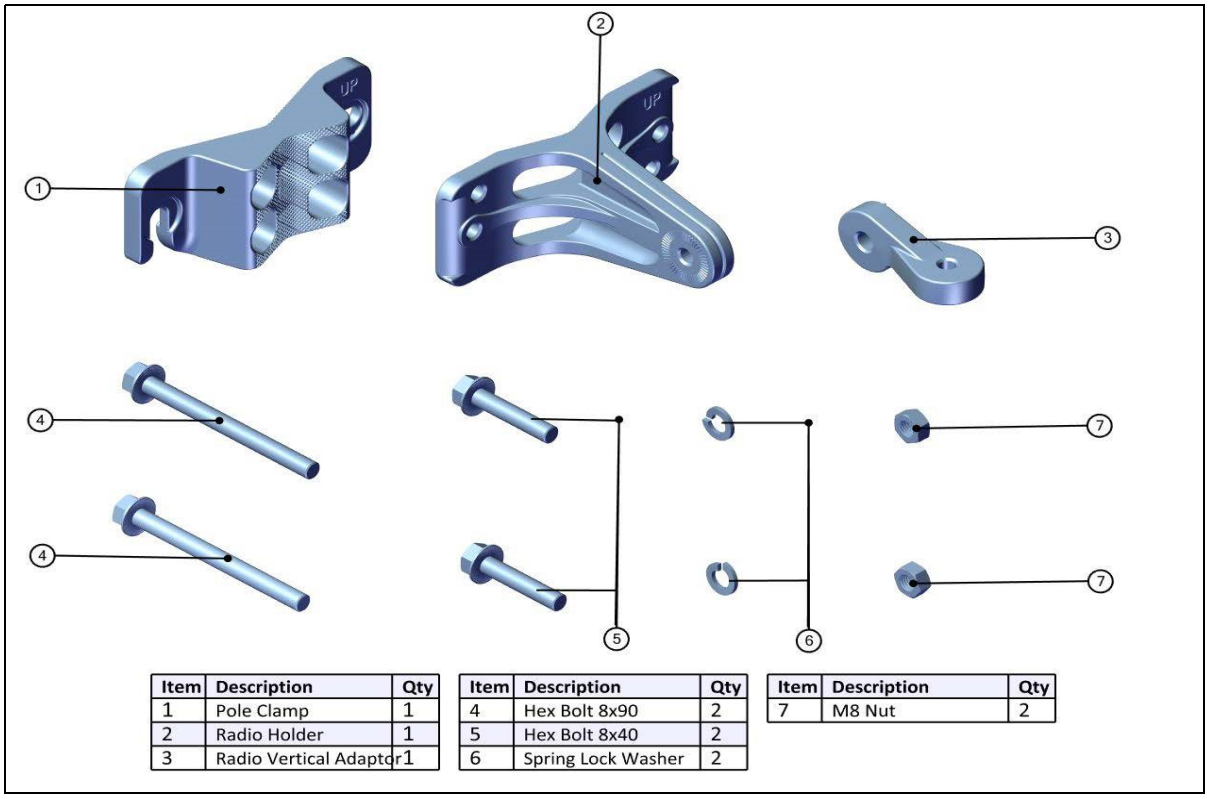
- External PoEs
- Airmux-GSUs
- External antennas (with mounting kit adaptor)

The SU *PRO/AIR* EMB has its own mounting kit: see *Install Mounting Kit for the SU PRO/AIR EMB* on page *2-16*.




| Item | Description | Qty |
|---|---|---|
| 1 | Pole Clamp | 1 |
| 2 | Radio Holder | 1 |
| 3 | Radio Vertical Adaptor | 1 |

| Item | Description | Qty |
|---|---|---|
| 4 | Hex Bolt 8x90 | 2 |
| 5 | Hex Bolt 8x40 | 2 |
| 6 | Spring Lock Washer | 2 |

| Item | Description | Qty |
|---|---|---|
| 7 | M8 Nut | 2 |

*Figure 2-8: Mounting Kit Contents*

***Note*** *Tighten all bolts with a torque of 15Nm.*

The mounting kit can be used on a vertical or horizontal pole or on a wall:

| | |
|---|---|
| *Vertical Pole* | *page 2-12* |
| *Horizontal Pole* | *page 2-14* |
| *Wall* | *page 2-16* |

## Vertical Pole

The mounting kit can be used on a thin, medium, or thick pole.

| | | |
|---|---|---|
| *Thin Pole* | Dia. 3/4" -1 1/2" | *page 2-12* |
| *Medium Pole* | Dia. 2 - 3 | *page 2-13* |
| *Thick Pole* | Dia. > 3 | *page 2-13* |

### Thin Pole

1. Diameter 3/4" to 1 1/2" (2cm to 4cm): Position the pole clamp as shown in the following figures. Do not tighten the bolts all the way.

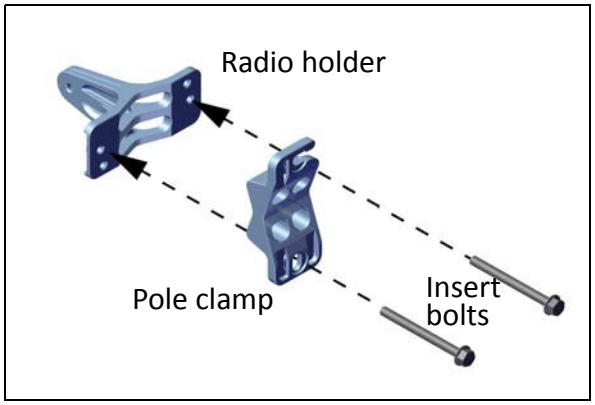



*Figure 2-9: Connect Pole Clamp to Radio Holder*

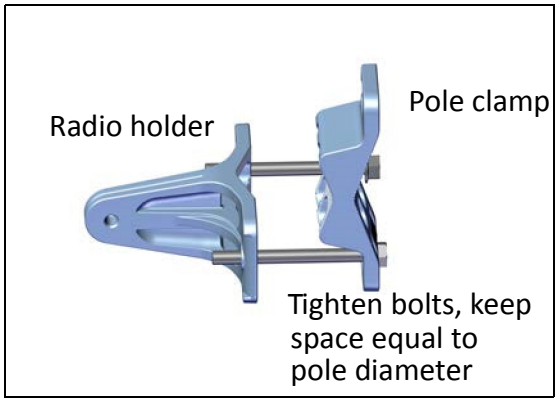



*Figure 2-10: Partially tighten bolts*

2. Place this assembly on the pole where you want to mount the device. Once it is in place, rotate the pole clamp as shown, then tighten both bolts.

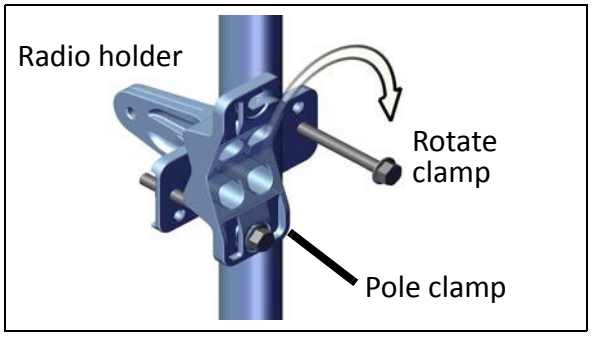



*Figure 2-11: Rotate Clamp and tighten bolts*

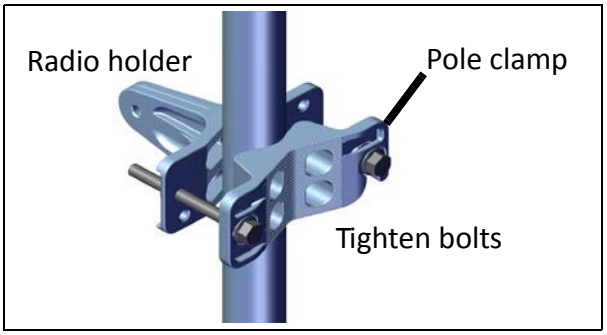



*Figure 2-12: Completely tighten bolts*

## Medium Pole

1. Diameter 2” to 3” (5cm to 7.5cm): Position the pole clamp as shown in the following figures. Do not tighten the bolts all the way.

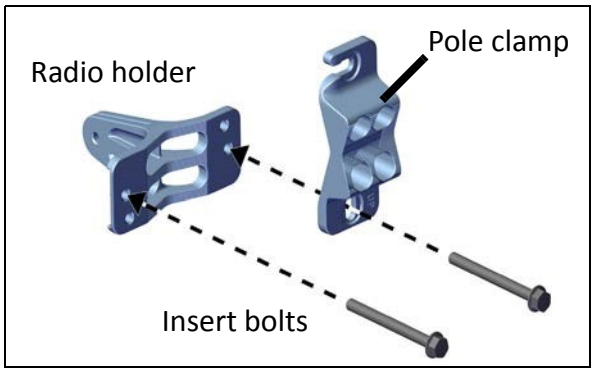



*Figure 2-13: Connect Pole Clamp to Radio Holder*

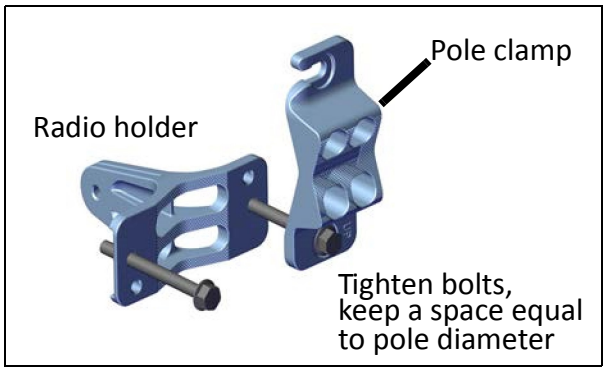



*Figure 2-14: Tighten bolts*

2. Place this assembly on the pole where you want to mount the device. Once it is in place, rotate the pole clamp as shown, then tighten both bolts.

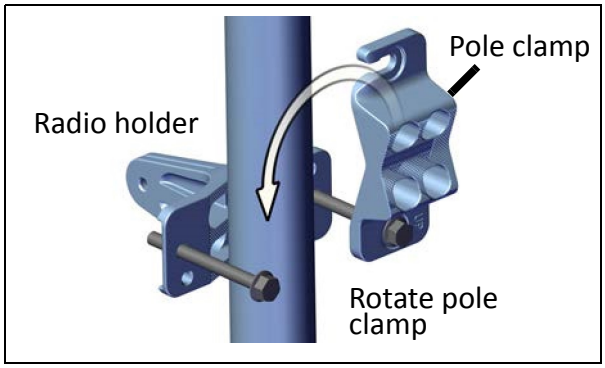



*Figure 2-15: Rotate Clamp*

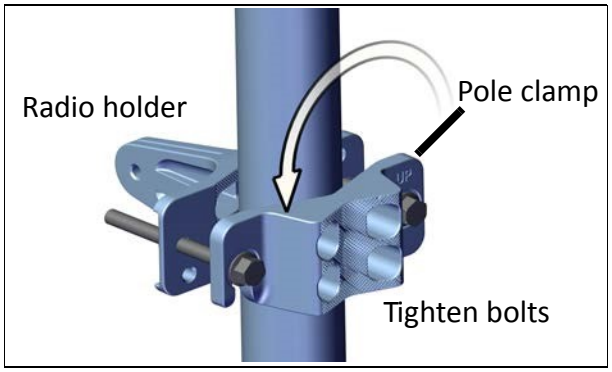



*Figure 2-16: Completely tighten bolts*

## Thick Pole

1. Diameter larger than 3” (7.5cm) : Use worm drive clamps (not supplied), threaded through the holes as shown:

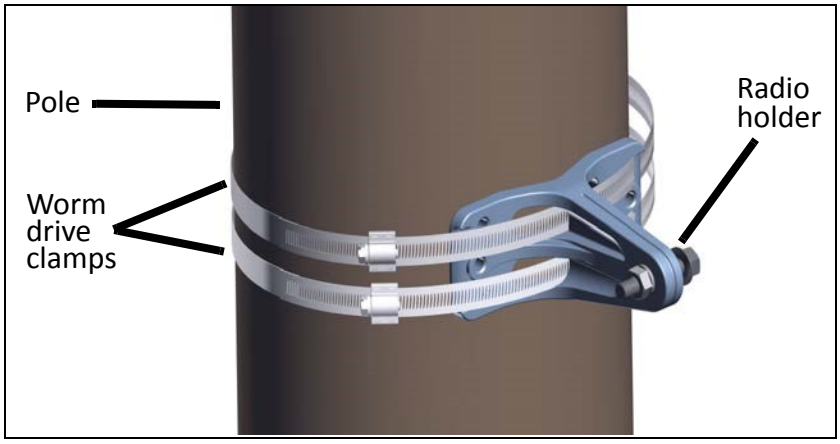



*Figure 2-17: Mounting kit on a thick pole*

The pole clamp is not needed.

### Radio Vertical Adaptor - on a Vertical Pole

The radio vertical adaptor is needed when mounting a 5000i or 5000D radio unit on a vertical pole (see *Figure 2-27 on page 2-21* and *Figure 2-28 on page 2-22*). Use the radio vertical adaptor as shown:

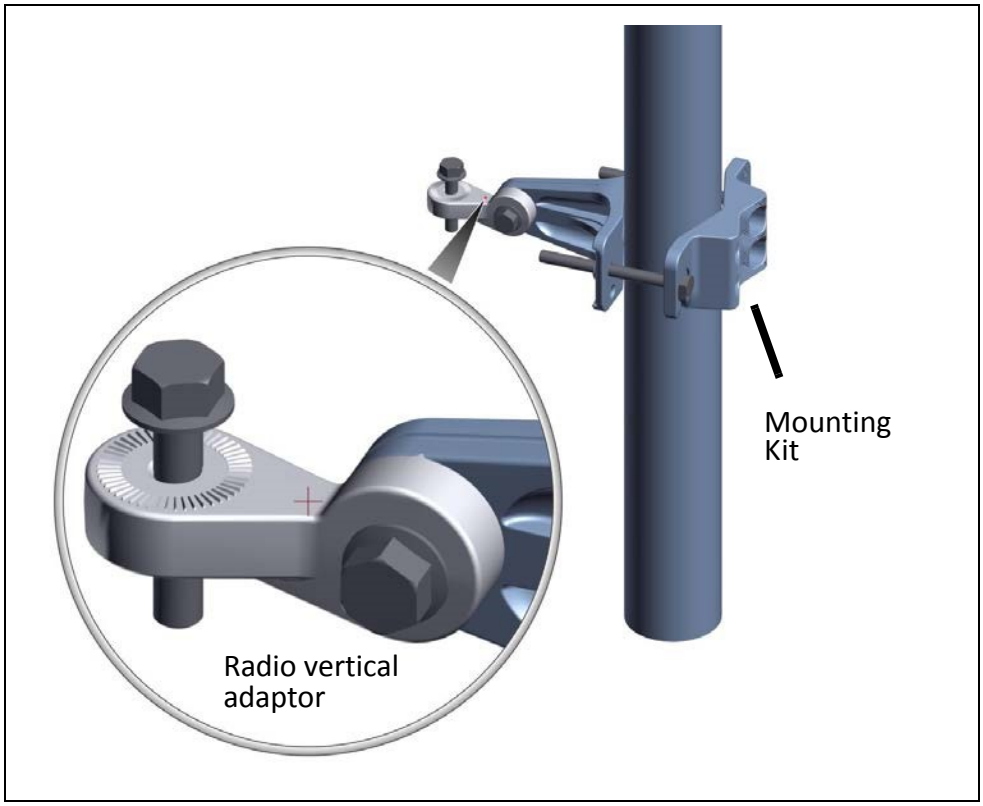



*Figure 2-18: Using the radio vertical adaptor on a vertical pole*

## Horizontal Pole

Installing the mounting kit on a horizontal pole is done in a similar manner to that on a vertical pole (thin, medium, or thick sizes):

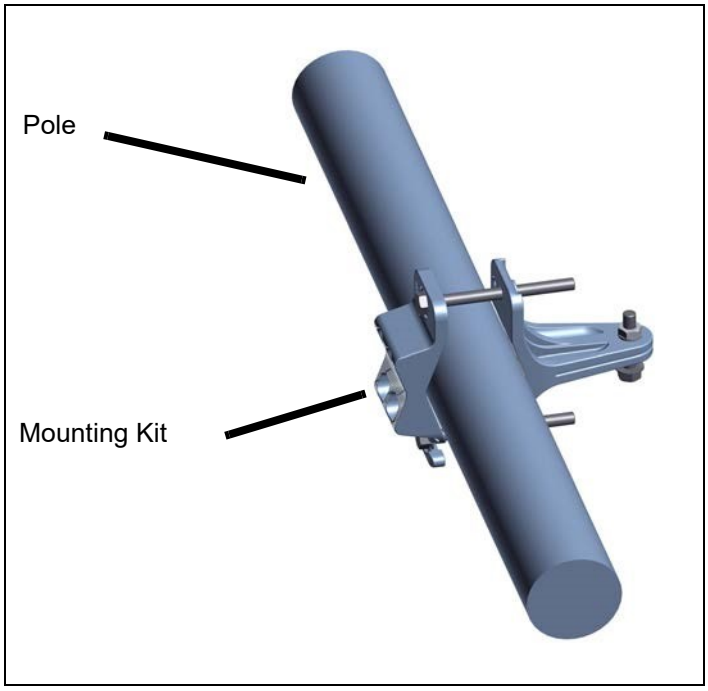



*Figure 2-19: Mounting Kit on a horizontal pole*

### Radio Vertical Adaptor - Horizontal Pole

The radio vertical adaptor is needed when mounting an LFF, SFF, PoE, GSU, or SU *PRO/AIR* INT on a horizontal pole (see *Figure 2-26, Mounting an SFF radio unit on a horizontal pole, on page 2-20*). Use the radio vertical adaptor as shown:

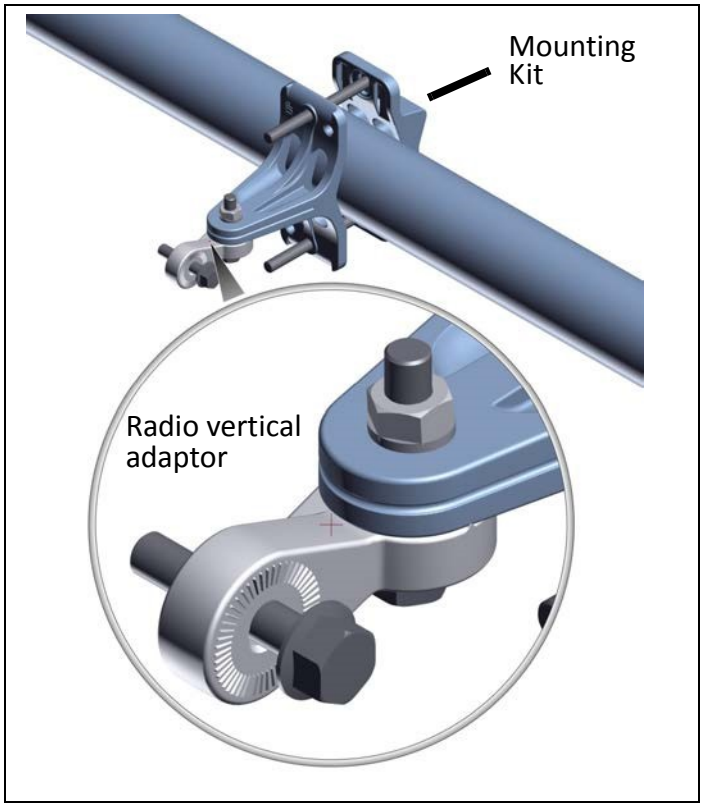



*Figure 2-20: Using the radio vertical adaptor on a horizontal pole*

When mounting a 5000i or 5000D radio unit on a horizontal pole, the vertical adaptor is not needed (see *Figure 2-29, 5000i radio unit mounted on a horizontal pole, on page 2-22* and *Figure 2-30, 5000D radio unit mounted on a horizontal pole, on page 2-23*).

## Wall

Use two mounting screws (not included) appropriate for the type of wall to install the mounting kit on a wall. Make sure you use the indicated holes.

The pole clamp is not needed.

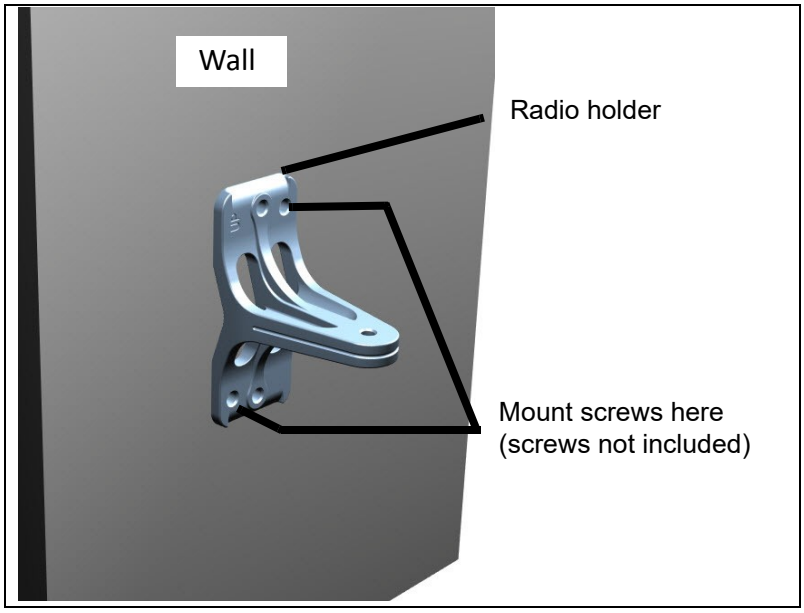
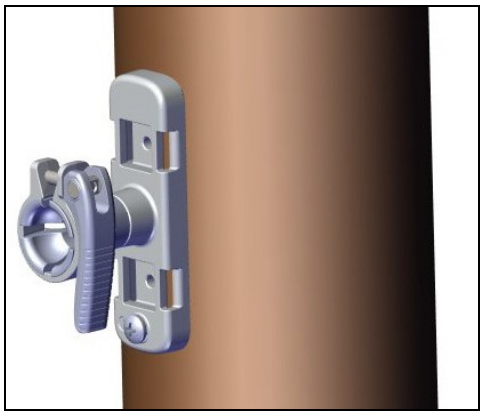



*Figure 2-21: Mounting kit on a wall*

## 2.7 Install Mounting Kit for the SU *PRO/AIR* EMB

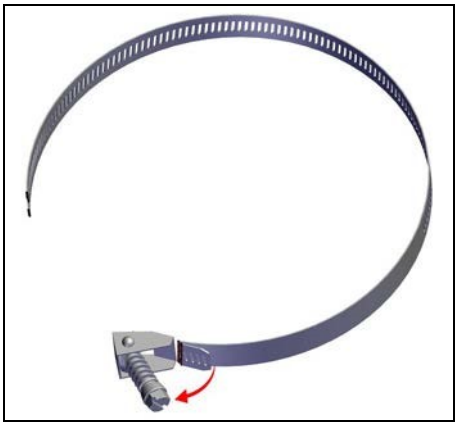
The SU *PRO/AIR* EMB has its own mounting kit. Mount this unit as shown in the steps below:

1. Place the mount on a pole or wall:



2. Secure the mount using the worm drive clamps. These are “quick-release” clamps, and work as follows:

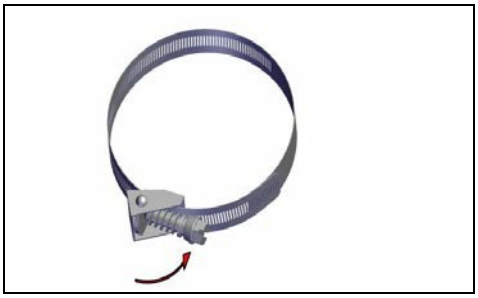
a. Open the clamp:



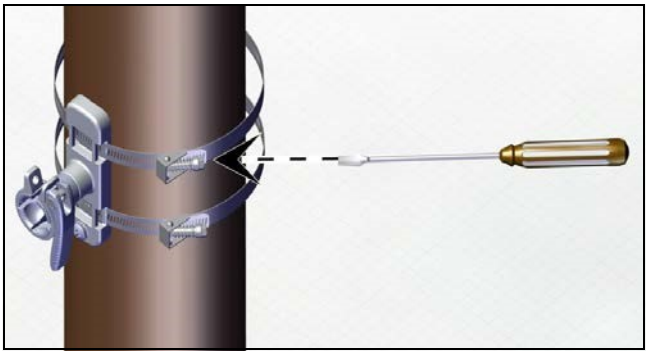
b. Slide the metal band through the mount:

c. Slide the metal band through the clamp:

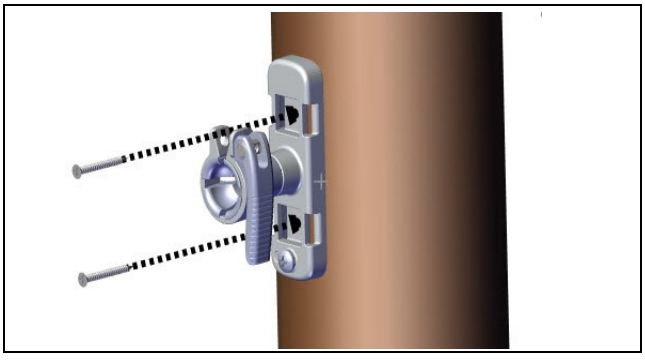
d. Adjust the radius of the band, and lock it with the clamp:



e. Once the band is at the correct radius, close the clamp and tighten with a screwdriver (make sure the tops of the screws face away from the mount):



3. Alternatively, you can fasten the mount with screws (not included) appropriate for the surface being used:



## 2.8 Mounting a Unit with the Standard Mounting Kit

Fasten an LFF (large form-factor), SFF (small form-factor), SU *PRO/AIR* INT units, as well as external PoEs, and Airmux-GSUs, and external antennas to the mounting kit as shown in *Figure 2-22* to *Figure 2-25*:

(if mounting a flat-panel antenna, see *page 2-25*).

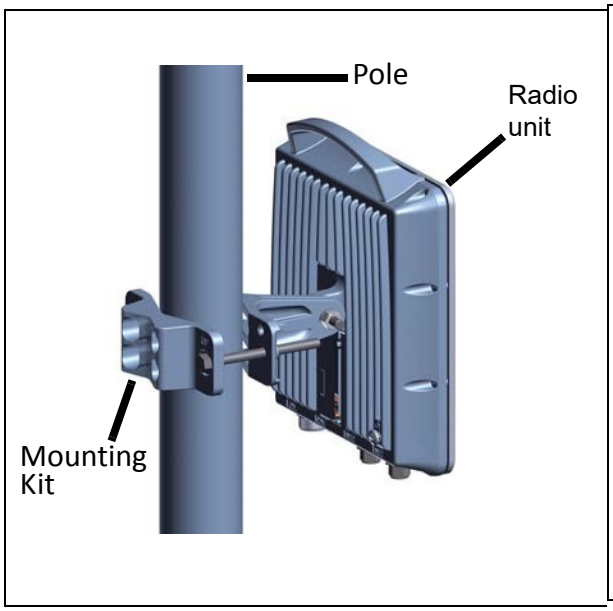



*Figure 2-22: Mounted LFF radio unit*

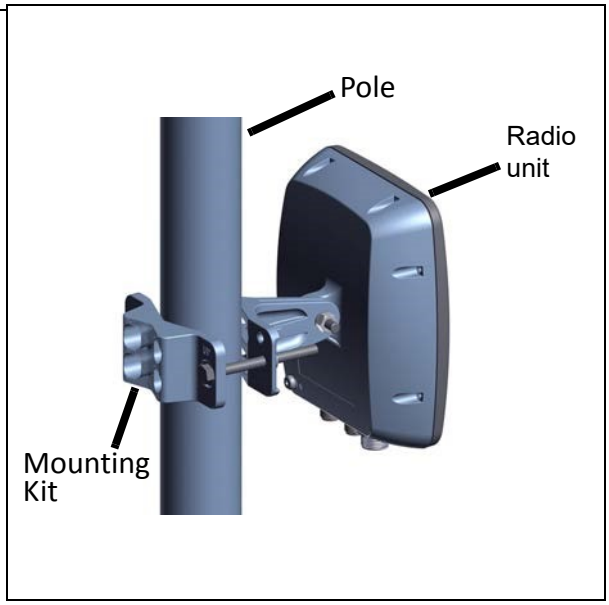



*Figure 2-23: Mounted SFF radio unit or GSU*

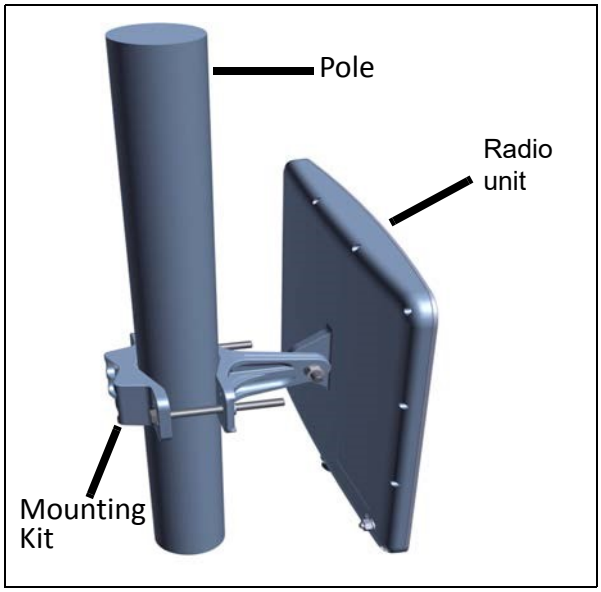



*Figure 2-24: Mounted SU PRO/AIR INT*

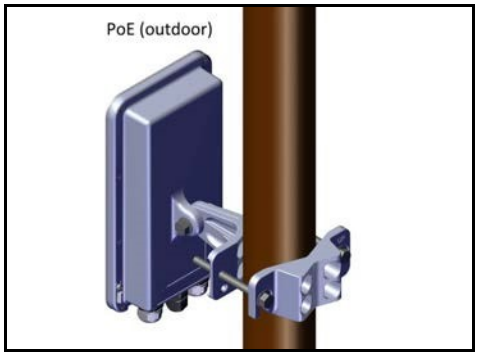



*Figure 2-25: Mounted PoE*

If mounting one of these units on a horizontal pole, use the radio vertical adaptor as shown:

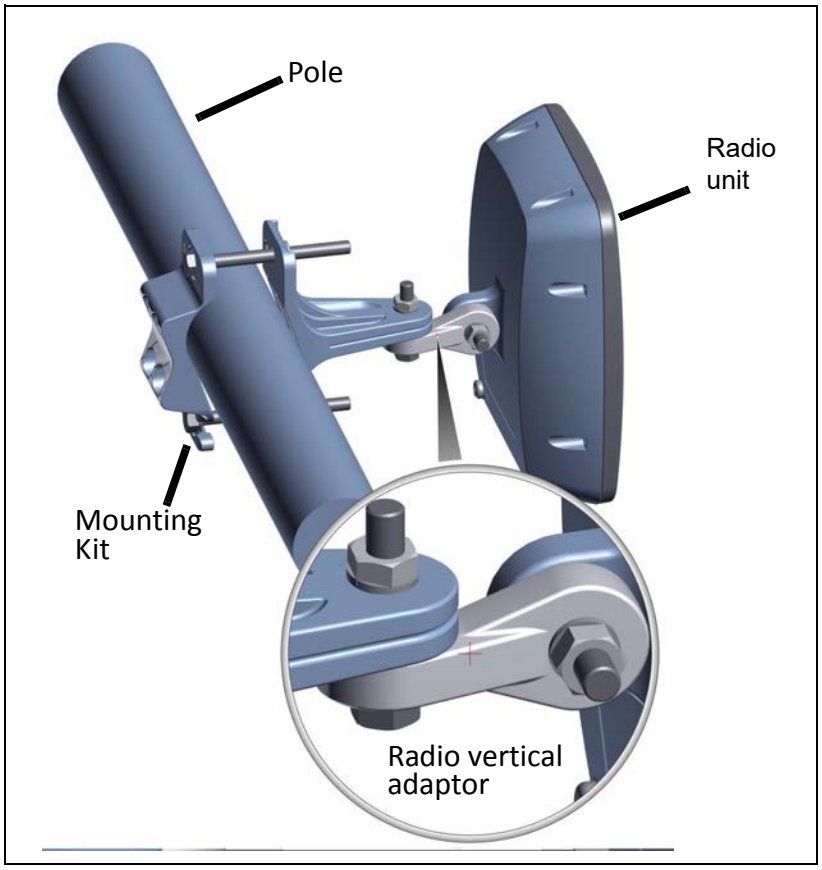



*Figure 2-26: Mounting an SFF radio unit on a horizontal pole*

Use the radio vertical adaptor when mounting a 5000i or 5000D unit on a vertical pole as shown in *Figure 2-27* and *Figure 2-28*:

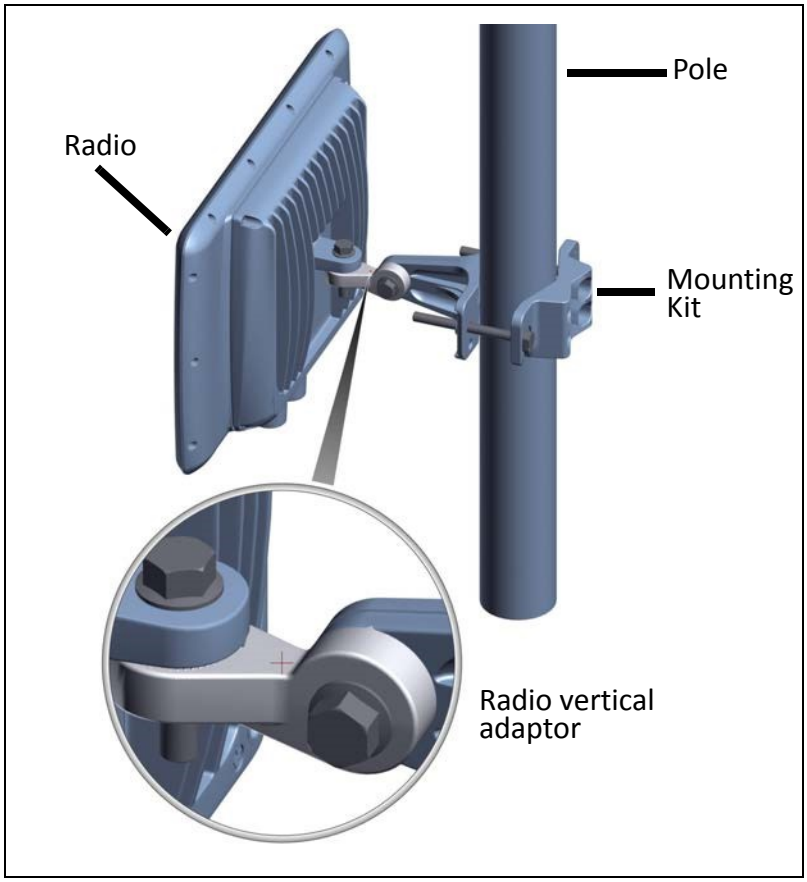



*Figure 2-27: 5000i radio unit mounted on a vertical pole*

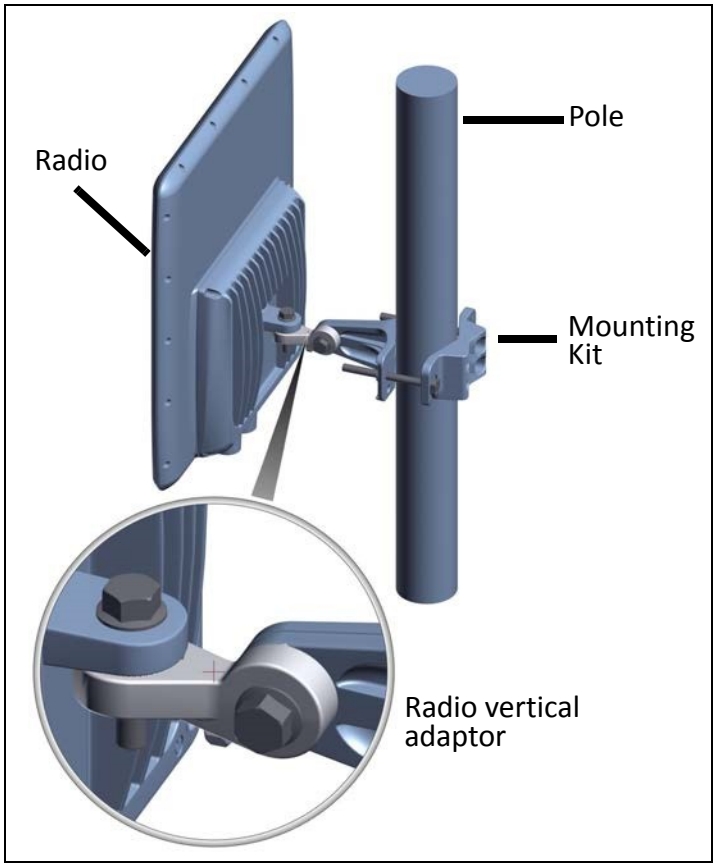



*Figure 2-28: 5000D radio unit mounted on a vertical pole*

When mounting a 5000i or 5000D unit on a horizontal pole, the radio vertical adaptor is not needed:

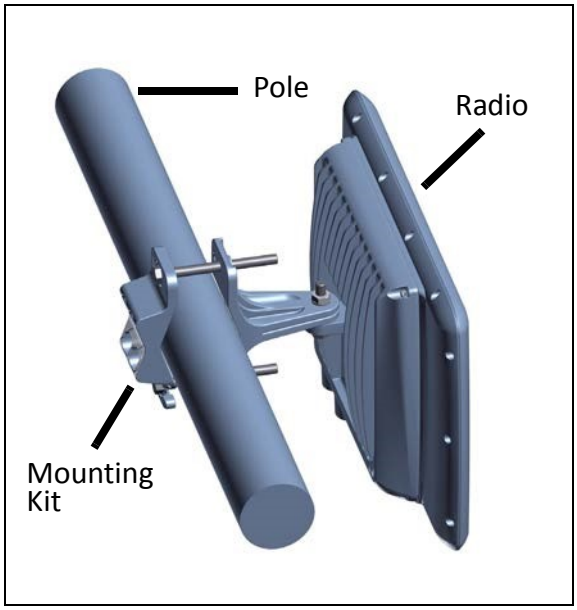



*Figure 2-29: 5000i radio unit mounted on a horizontal pole*

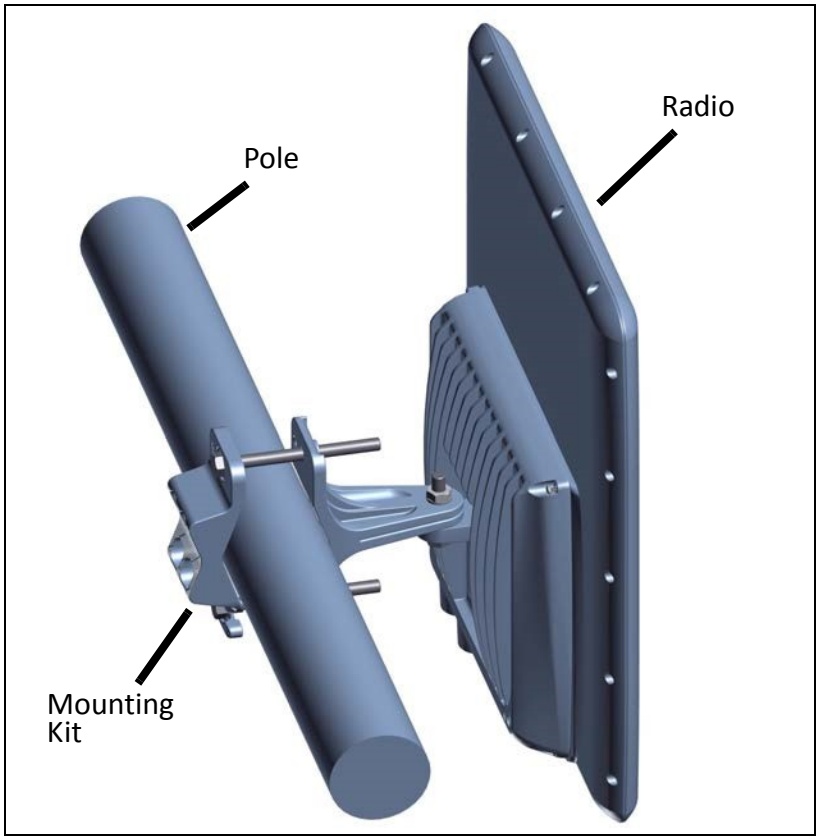



*Figure 2-30: 5000D radio unit mounted on a horizontal pole*

## Flat panel antenna

If mounting a flat panel antenna, a mounting kit adapter is required (see *Figure 2-31*):

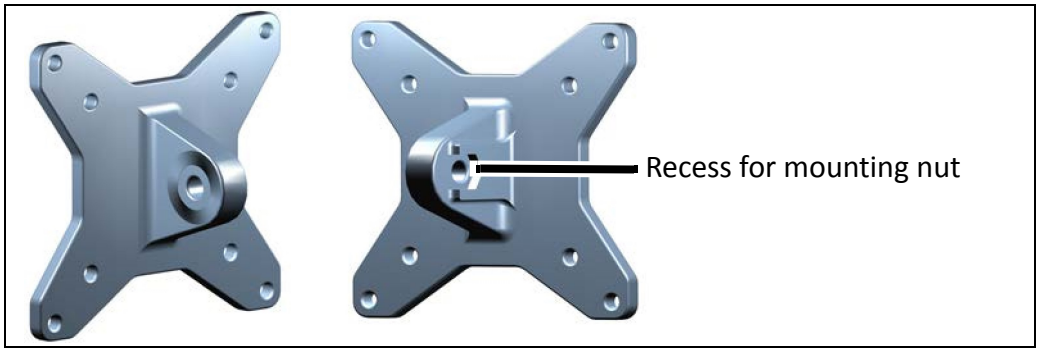



*Figure 2-31: Flat panel antenna mounting kit adapter*

Attach the mounting kit adaptor to the rear of the external antenna as shown:

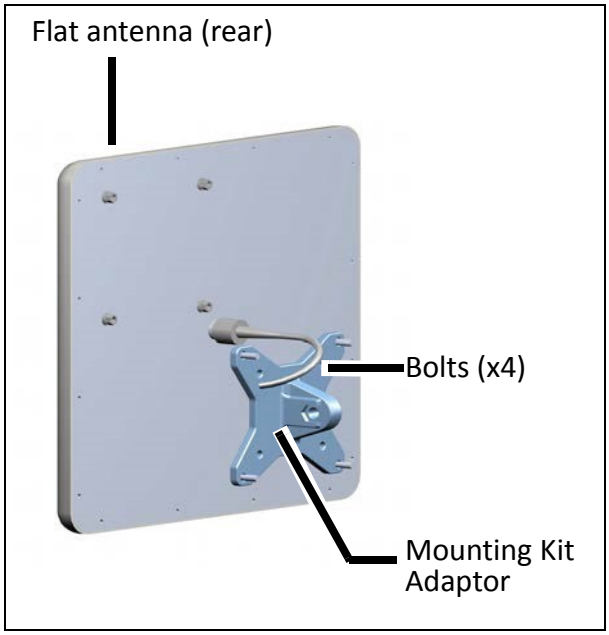



*Figure 2-32: Flat Panel antenna - rear with mounting kit adapter*

Mount the antenna with the adaptor to a vertical or horizontal pole (as shown in *Figure 2-22* to *Figure 2-23*).

*Figure 2-33* shows a mounted antenna. Attach the mounting bolt to the side of the adaptor with the recess, as shown.

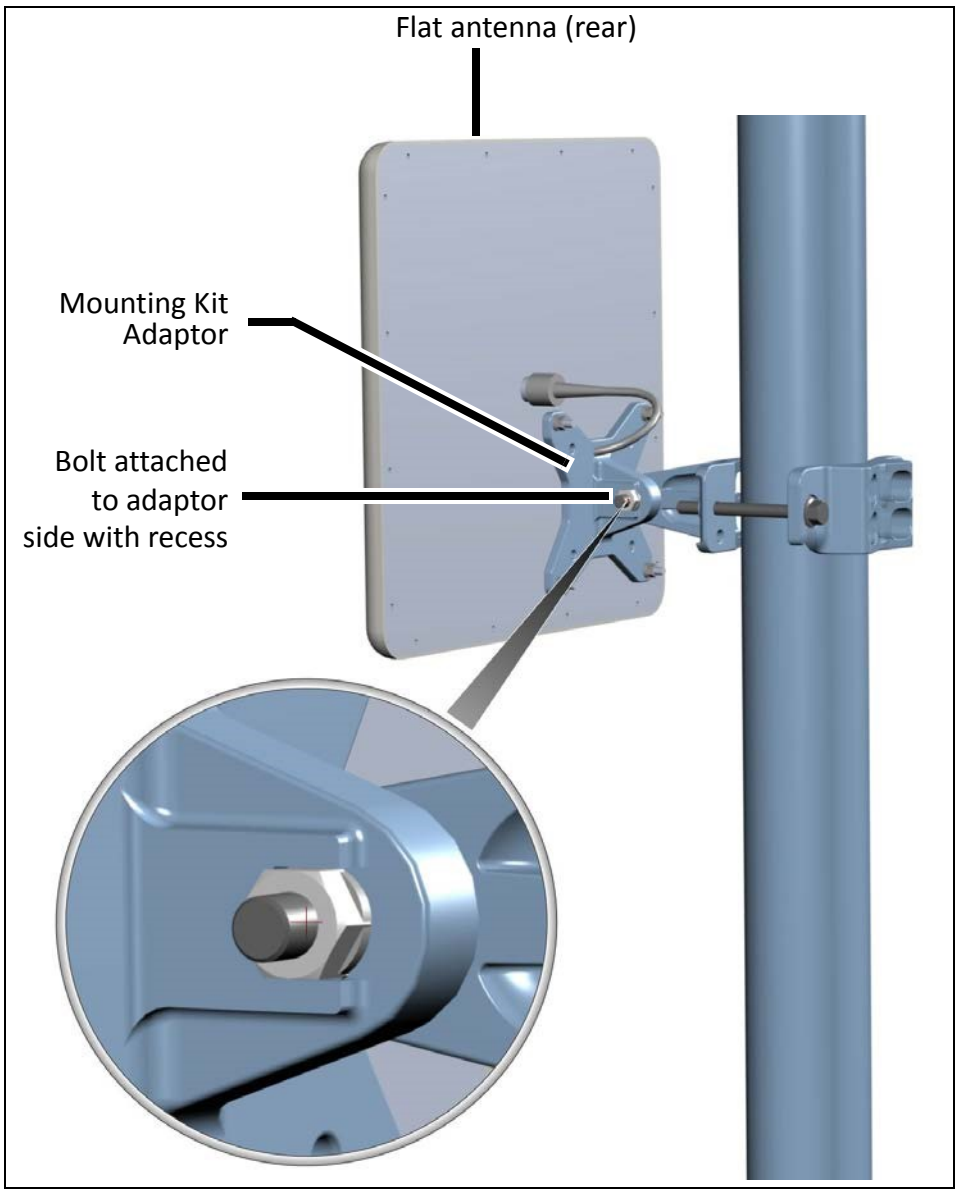



*Figure 2-33: Flat Panel antenna - mounted on a pole*

## 2.9 Ground Radio Unit

Connect a ground cable to the indicated ground connection on the radio unit as shown in the sections below:

## LFF Units

*Figure 2-34: Ground: LFF radio unit*

## SFF Units

*Figure 2-35: Ground: SFF radio unit*

## 5000i Units

*Figure 2-36: Ground: 5000i radio unit*

## 5000D Units

*Figure 2-37: Ground: 5000D radio unit*

## SU *PRO/AIR* INT Units

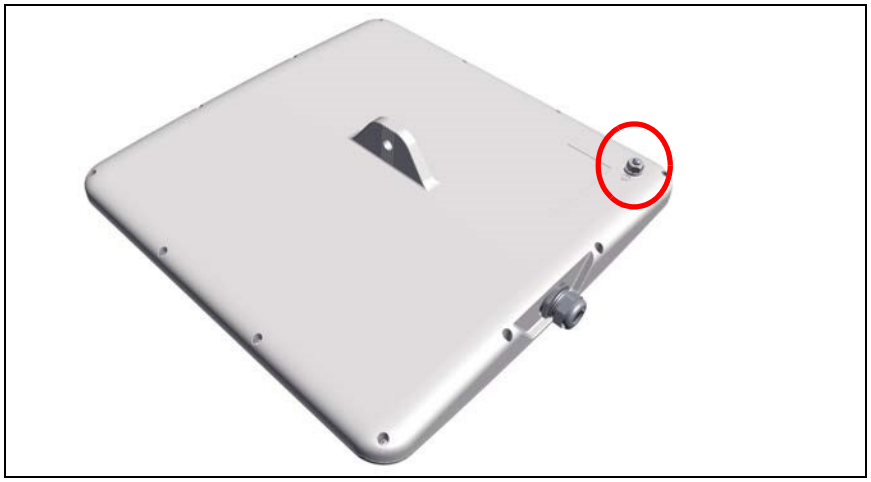


*Figure 2-38: Ground: SU PRO/AIR INT or SU PRO/AIR INT 3.x radio unit*

## SU *PRO/AIR* EMB Units

Since the SU *PRO/AIR* EMB is grounded via its mounting kit, the mounting kit must be grounded before a radio is attached to it.

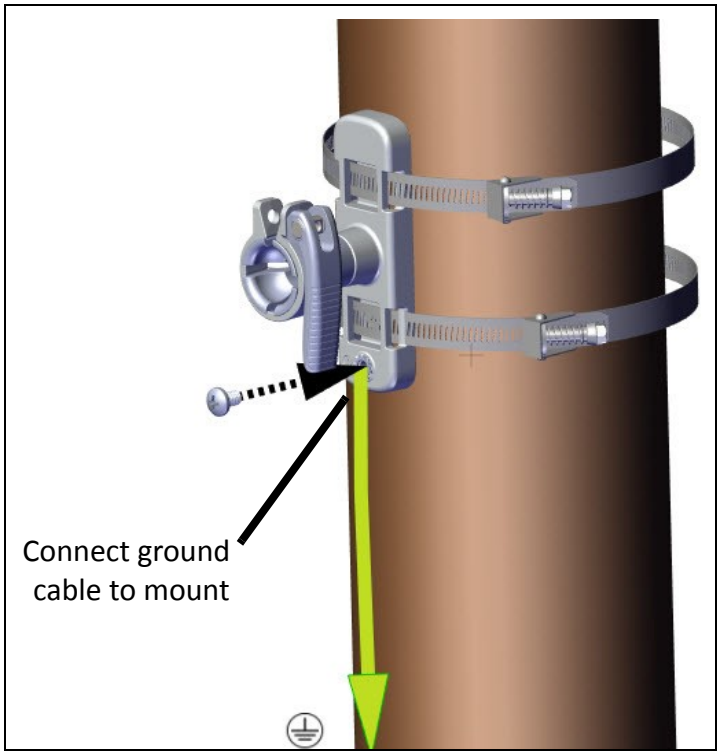
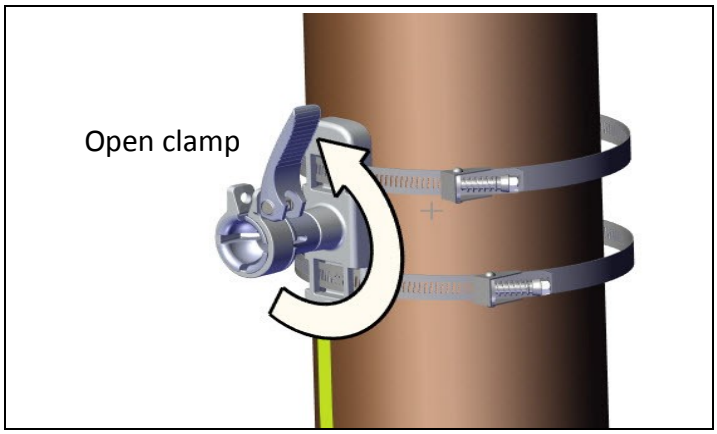


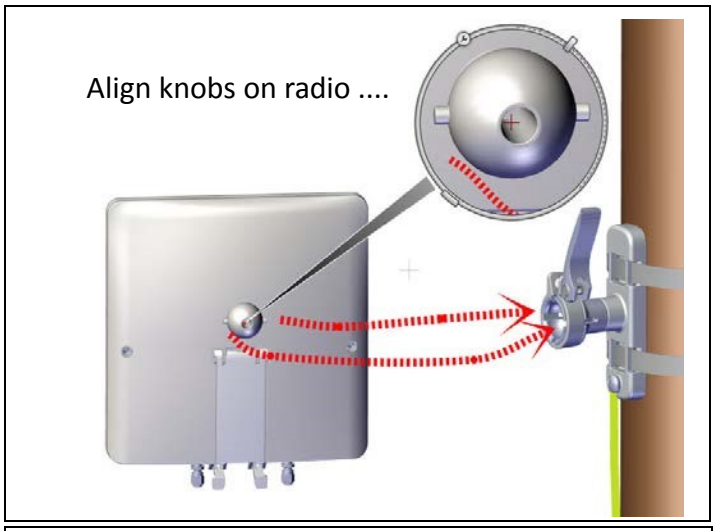

*Figure 2-39: Ground: SU PRO/AIR EMB radio unit*

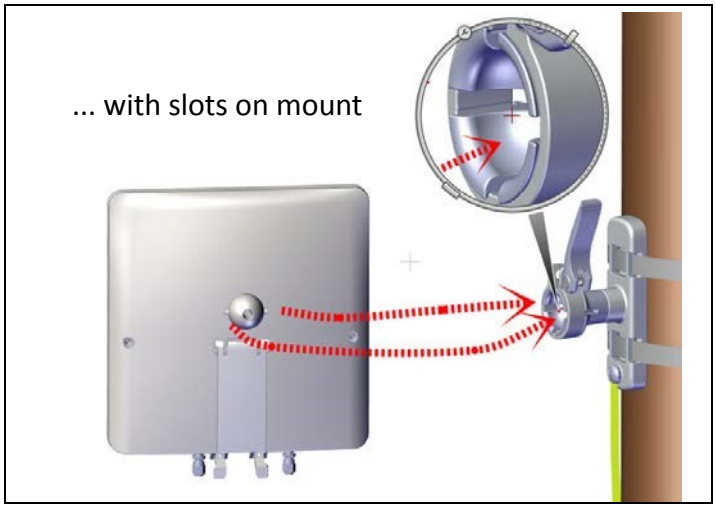
## 2.10 Mounting the SU *PRO/AIR* EMB

1. Open the clamp (for radio unit):

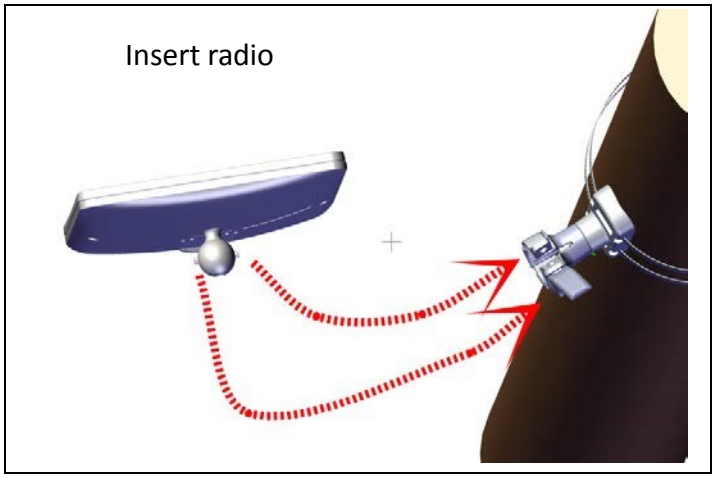


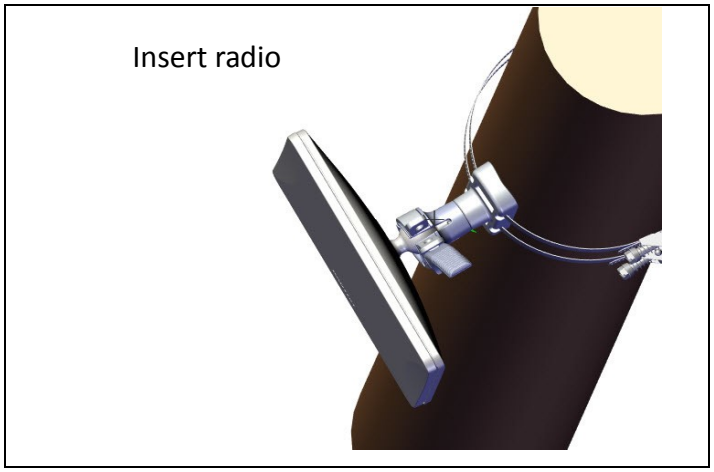

2. Position the radio unit so that the knobs on the mounting ball on the rear are opposite the slots on the mount:



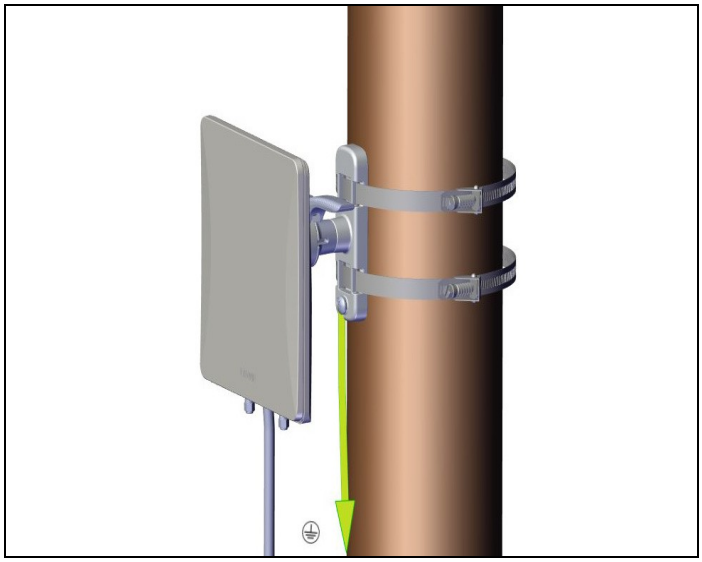



3. Firmly place the radio unit into the mount until you hear a click:




4. Close the clamp half-way:



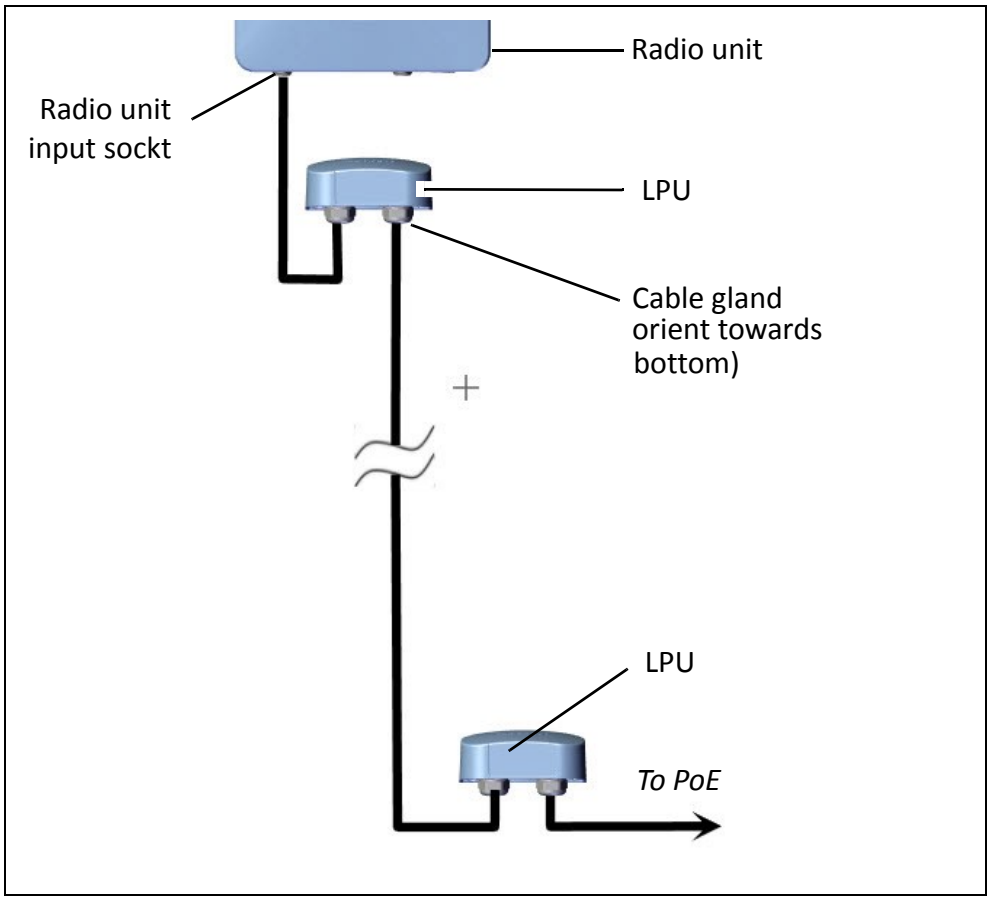
5. Keep the clamp half-closed until the alignment procedure is complete.

## 2.11 Mounting the SU *PRO/AIR* INT

The SU *PRO/AIR* INT unit is mounted in the same way as the LFF or SFF radio see *Mounting a Unit with the Standard Mounting Kit* on page *2-19*.

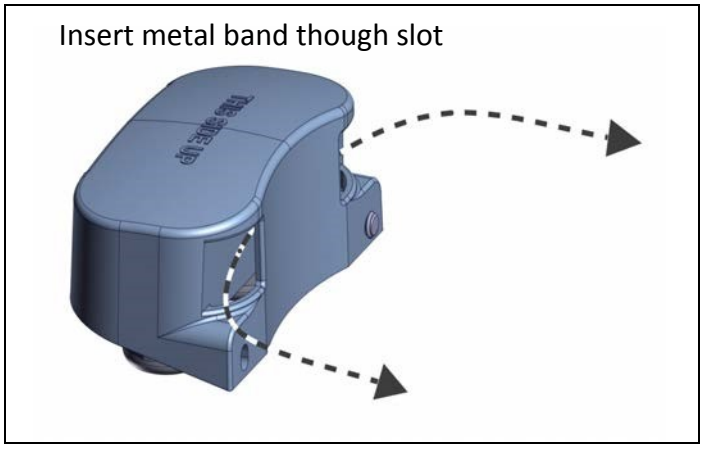
## 2.12 Mounting the Lightning Protection Units

- We recommend using two lightning protection units (LPUs) for each radio unit installation: One near the radio unit and one near the PoE.
- The LPU can be mounted on a pole or on a wall.
- Make sure the LPU is oriented with the cable glands oriented towards the bottom.
- Mount one LPU near the radio unit, and the second near the PoE:

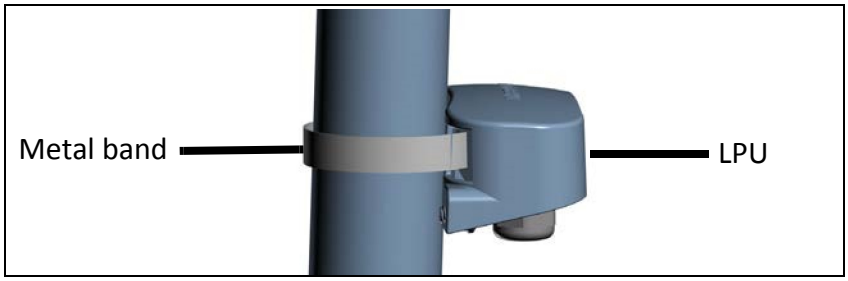



### Mounting the LPU on a pole

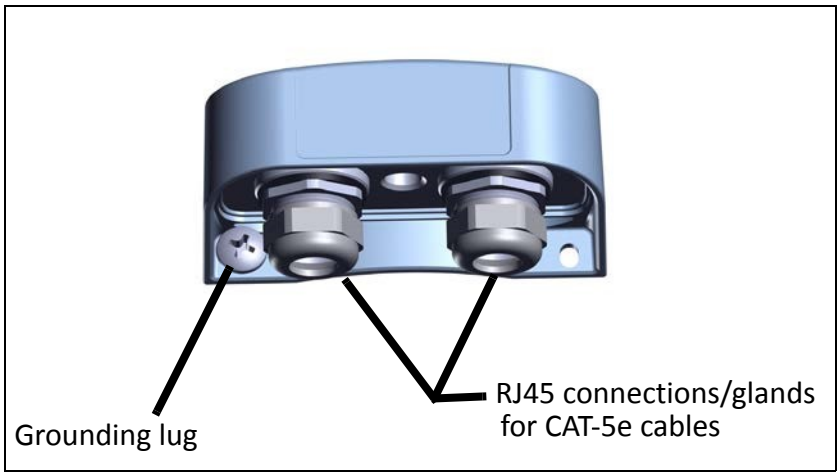
1. Insert the metal band through the slots on the LPU as shown:



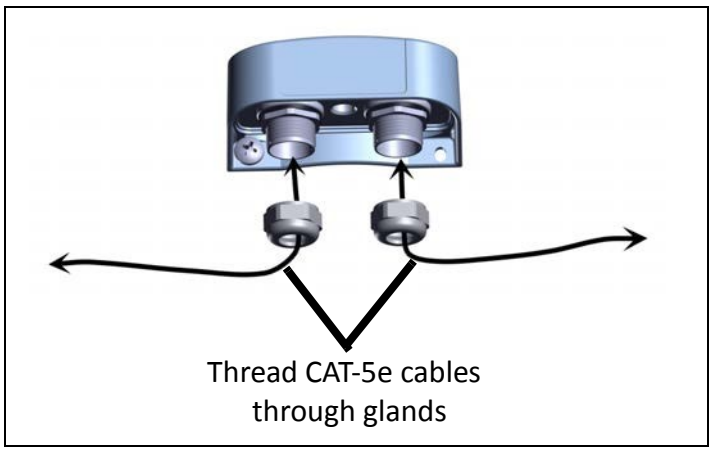

2. Tighten the metal band.



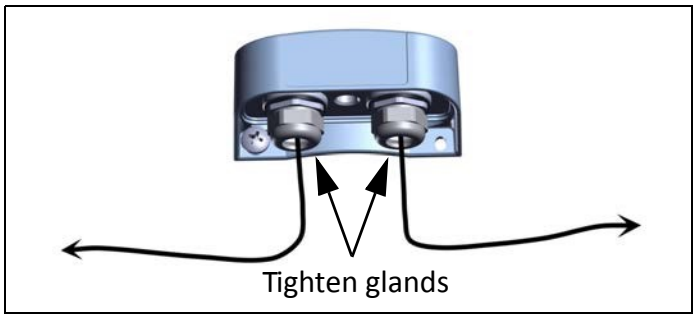

3. Connect the grounding lug to a ground source.



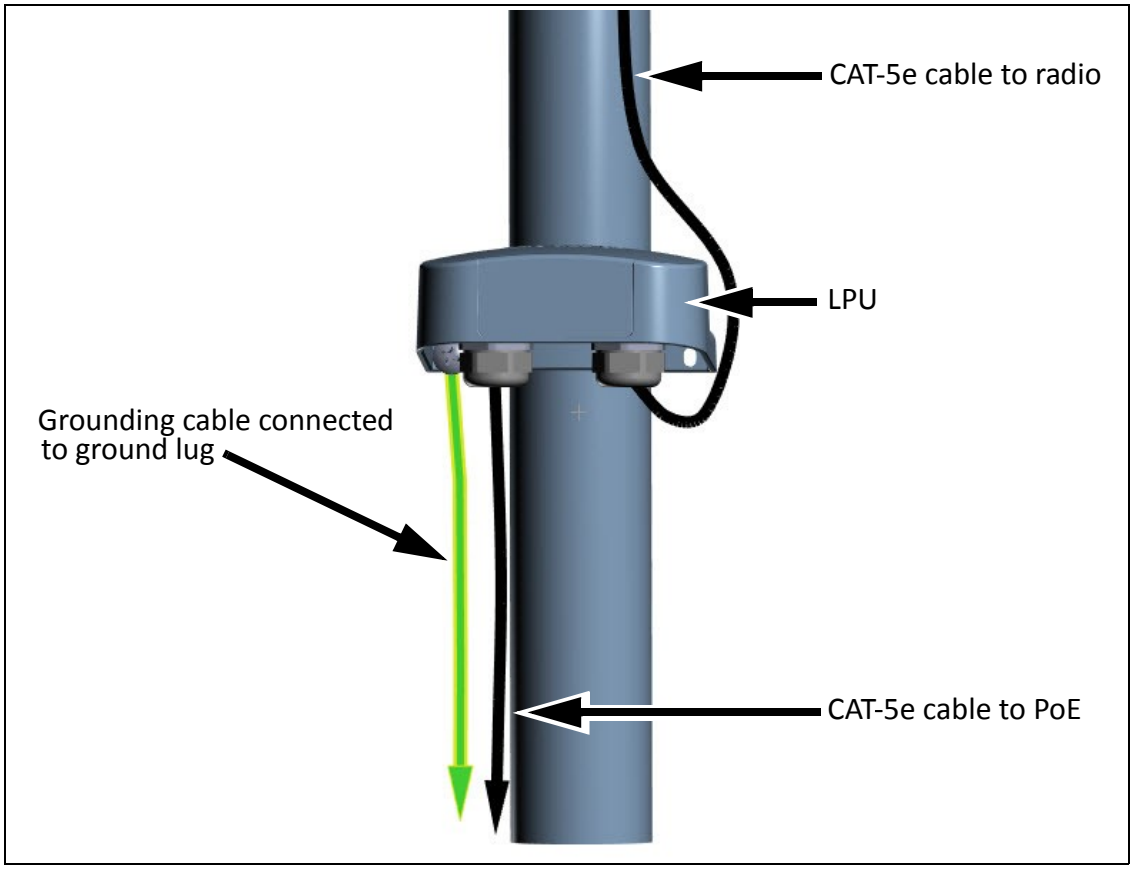

4. Remove the cable glands, and thread the CAT-5e cables through them:




5. Connect the cables to the LPU's sockets, and the glands around the cables as shown:

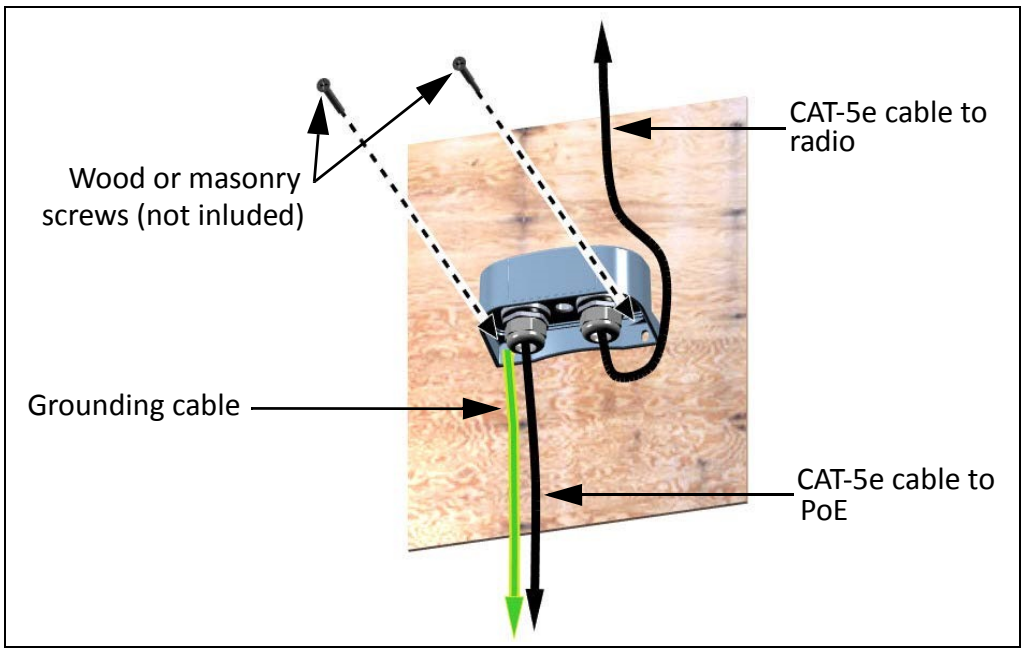



6. Route one CAT-5e cable up to the radio unit, and the other down to the PoE (via the lower LPU). An LPU installed on a pole is shown below:




## Mounting the LPU on a wall

1. Remove the grounding lug.
2. Fasten the LPU to the wall using screws appropriate for the wall (screws not included).
3. Connect the left screw (where the grounding lug was located) to a grounding source via a grounding cable.
4. Attach the CAT-5e cables as shown in Steps *4.* and *5.* above.



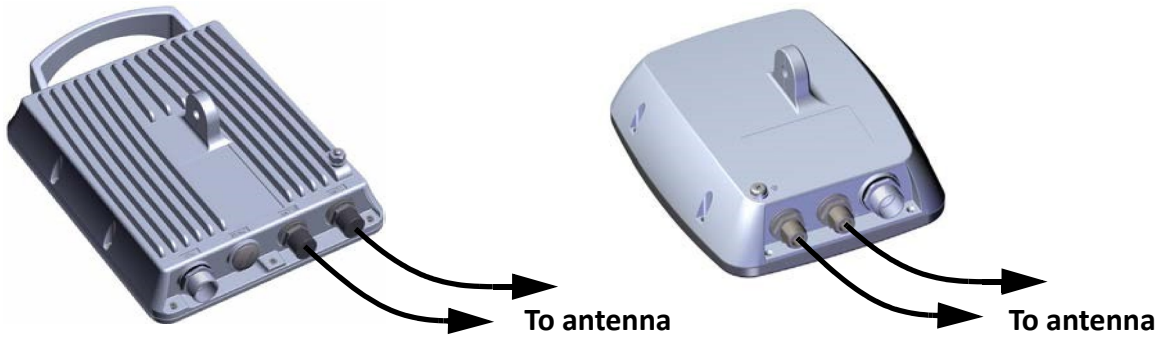

## 2.13 Connect External Antenna (if applicable)

An external or supplemental antenna can be used for these units:

- Connectorized LFF (large form-factor) radio units
- Connectorized SFF (small form-factor) radio units
- SU *PRO/AIR* EMB radio units

### LFF and SFF Units

Connect the external antenna to the antenna connections on the radio as shown.




Mount the radio unit using a standard mounting kit (see *Mounting a Unit with the Standard Mounting Kit* on page *2-19*), as well as the external antenna (needs its own mounting kit).

It does not matter if the V or H connection of the antenna is connected to either the ANT 1 or ANT 2 connection of the radio, but what is important is that you preserve the same connection

scheme throughout the sector (eg: V is always connected to ANT 1, H is always connected to ANT 2).

## SU *PRO/AIR* EMB Units

### Turbo Gain antenna

Fasten the Turbo Gain antenna on the SU *PRO/AIR* EMB unit using these steps::

a. Connect the cables to the radio (use a 5/16 wrench with 0.9 N-m torque)

b. Seal the cables (see *Waterproofing* on page *2-37*)

c. Connect the Turbo Gain antenna

d. Close the screws of the Turbo Gain antenna

e. Seal the connectors on the Turbo Gain antenna using the sealing tape.

Connect cables

Prepare sealing tape

Apply sealing tape - 1

Apply sealing tape - 2

Sealing tape applied

Connect Turbo Gain antenna

Connect cables to Turbo Gain

Sealing tape for Turbo Gain

Tape applied on Turbo Gain - 2

**Note** *You may need to re-align the unit.*

### External, non-integrated antenna

Follow these steps to connect an external, non-integrated to the SU *PRO/AIR* EMB unit:

a. Connect the cables to the radio

b. Seal the cables using Scotch™ 23 splicing tape or similar.

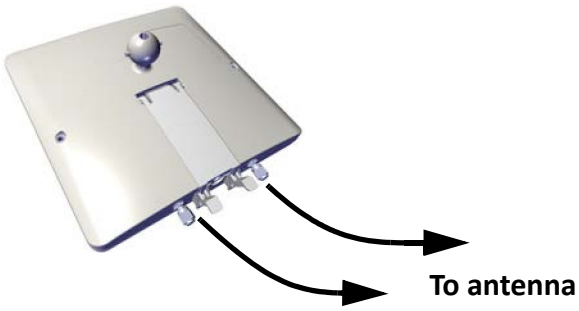
c. Mount an external, non-integrated antenna using the standard mounting kit (see *Mounting a Unit with the Standard Mounting Kit* on page *2-19*).

d. Connect the cables to the external, non-integrated antenna

e. Seal the connectors on the external, non-integrated antenna (see *Waterproofing* on page *2-37*)

**Note** *Re-configure the unit as having an external antenna (see the Airmux-5000 Operation Manual).*

*You may need to re-align the antenna.*




It does not matter if the V or H connection of the antenna is connected to either the ANT 1 or ANT 2 connection of the radio, but what is important is that you preserve the same connection scheme throughout the sector (eg: V is always connected to ANT 1, H is always connected to ANT 2).

## 2.14 Waterproofing

Protect all outdoor connections[1] from rain, dust, moisture and salt by taping the cable/gland connection with an appropriate sealant tape. We recommend using Scotch™ 23 splicing tape or similar.

1. This is not required for the SU *PRO/AIR* EMB unit

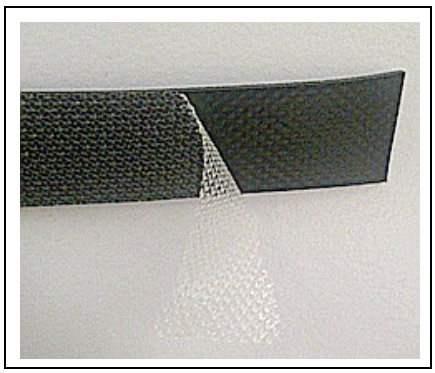


*Figure 2-40: Sealant tape*

Add tape as shown below.

*Figure 2-41: Applying sealant tape to an external connection*

## 2.15 Connect Radio (External Connections)

### LFF, SFF, SU *PRO/AIR* INT, and 5000i Units

1. Connect a CAT-5e cable to the input port of the radio as shown:

*Figure 2-42: Input port: LFF unit (connection label: "IDU")*

*Figure 2-43: Input port: SFF unit (connection label: "IDU")*

*Figure 2-44: Input port: 5000i unit (connection label: "PoE In")*

*Figure 2-45: Input port: SU PRO/AIR INT unit (no label)*

## 5000D Units

1. Connect a CAT-5e cable to the "PoE IN" port of the radio as shown. This connection provides power to the unit and can also serve as a management and data connection. It is referred to as "LAN1" in the 5000D Web user interface :

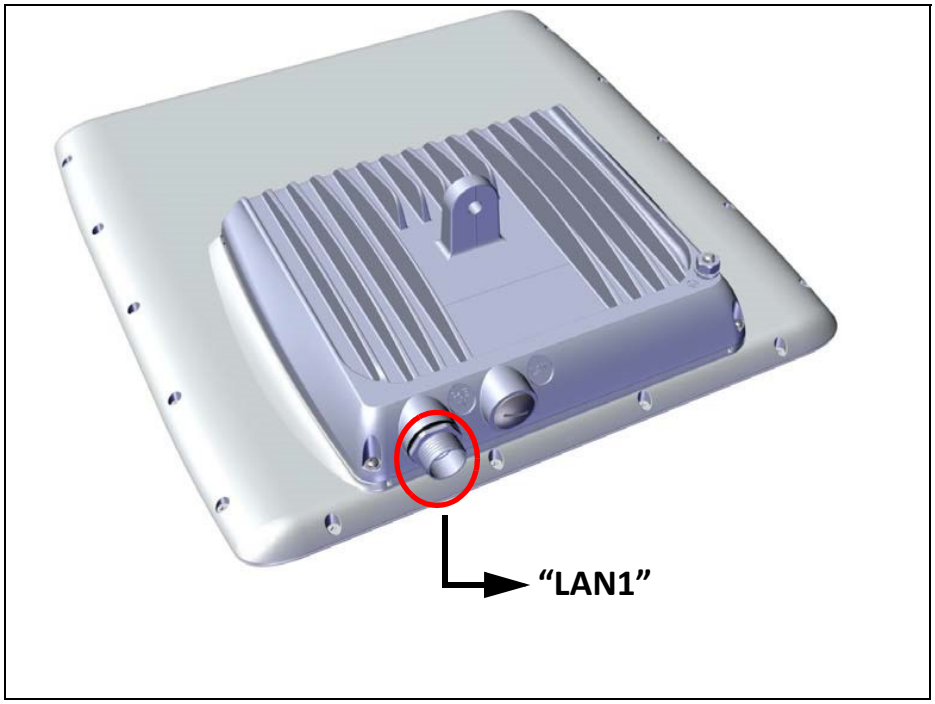



*Figure 2-46: Input power and data port: 5000D unit (“PoE IN” = LAN1)*

2. Alternatively, you can use the SFP connection, which provides management and data connection only (no power). Note that you must still connect a CAT-5e cable to “PoE In” to provide power:

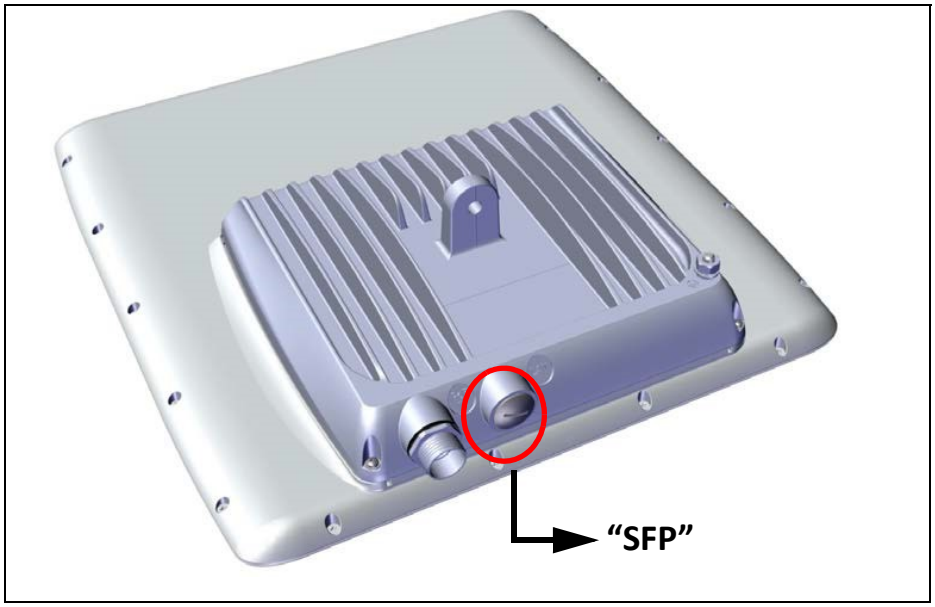



*Figure 2-47: Input data port: 5000D unit (“SFP”)*

3. Add sealant tape to the connections (see *"Waterproofing" on page 2-37.*)
4. Route the CAT-5e and ground cables down from the radio to a PoE via 2 LPUs: one near the radio, one near the PoE. Fasten CAT-5e cable connections with a cable gland, add sealant tape.

*If you use the "SFP" port for management or data, it must configured properly. See the Operation Manual for more details.*

5. Connect ground cable to ground.
6. Perform final connections via a PoE, depending on the type of PoE you are using, as follows:

## Indoor PoE

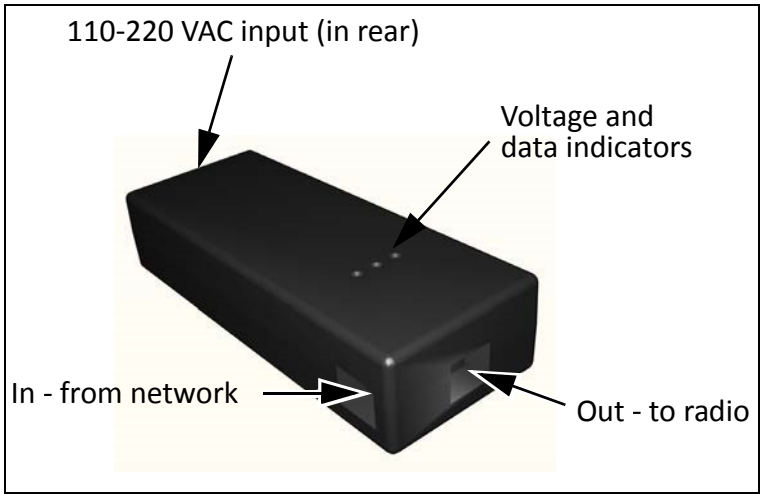



*Figure 2-48: Indoor PoE connections*

a. Connect CAT-5e cable from lower LPU to "Out" port
b. Connect LAN cable to "In" port.
c. Connect power cable

Use only a safety approved PoE according to IEC/EN/UL 60950-1 or 62368-1 with rated output voltage of 24-56VDC and rated current of 1A max

## Outdoor PoE

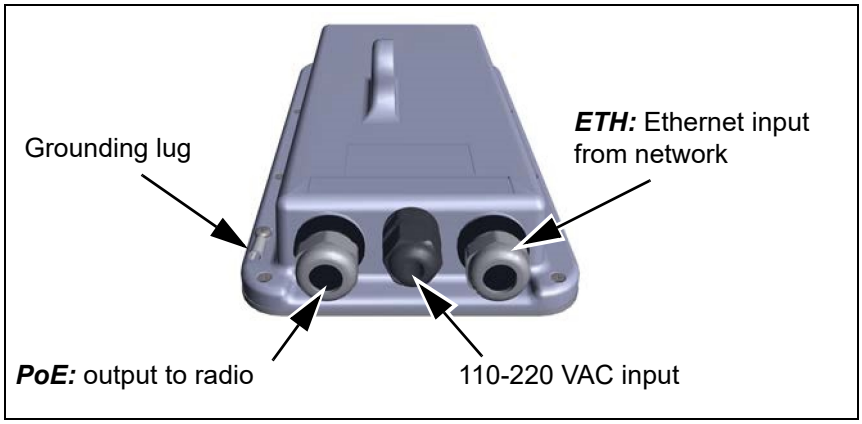



*Figure 2-49: Outdoor PoE*

a. Connect ground cable.

b. Connect LAN cable from the network to the “ETH” port, fasten with cable gland, add tape (see *Waterproofing* on page *2-37*).

c. Connect CAT-5e cable from the radio to the “PoE” port, fasten with cable gland, add tape (see *Waterproofing* on page *2-37*).

d. Connect power cable.

Use only a safety approved PoE according to IEC/EN/UL 60950-1 or 62368-1 with rated output voltage of 24-56VDC and rated current of 1A max

## Airmux-IDUH/2ETH

The Airmux-IDUH/2ETH does not support the 5000D radio.

The Airmux-IDUH/2ETH is an aggregation switch with the functionality of six PoE devices. It is ideal for use at a base station having several collocated radios.

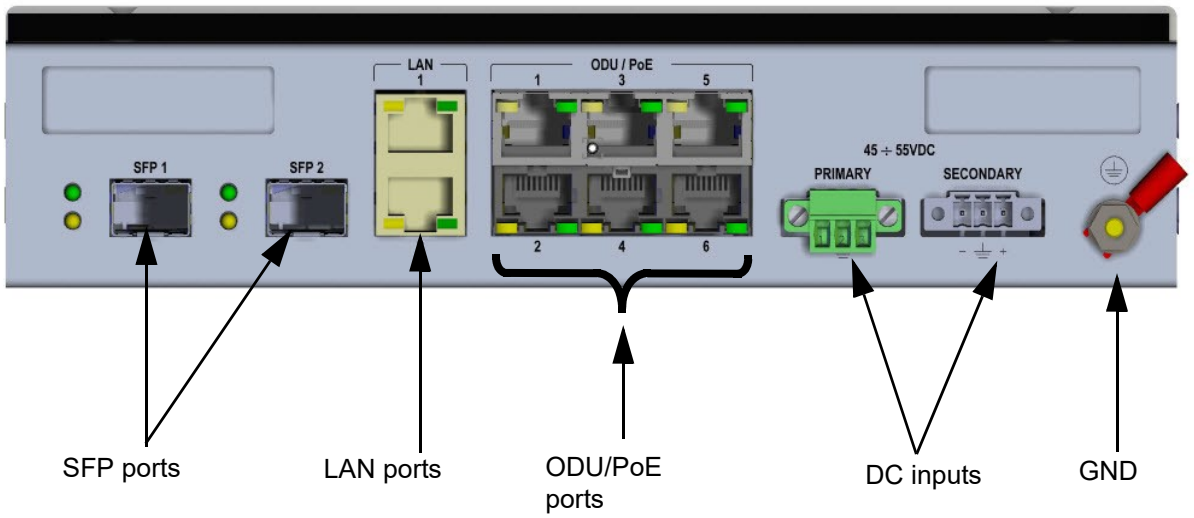



*Figure 2-50: Airmux-IDUH/2ETH*

The Airmux-IDUH/2ETH has the following connections:

- SFP ports
- LAN ports: Ethernet, supporting GbE.
- ODU/PoE ports: Function identically to the LAN-Out port on a PoE device.
- DC Inputs
- Grounding lug
- LED colors: Green = link/activity, Yellow = Duplex/two-way communication

### Installing the Airmux-IDUH/2ETH:

- The Airmux-IDUH/2ETH can sit on a table top, but is best installed in a rack.
- Connect the radio’s input port to any of the six ODU/PoE ports.
- Use either of the two LAN ports as a network connection.
- The Airmux-IDUH/2ETH has redundant power connection circuits. A view of the power connectors is shown below. In this case, only the primary circuit has a power connector:

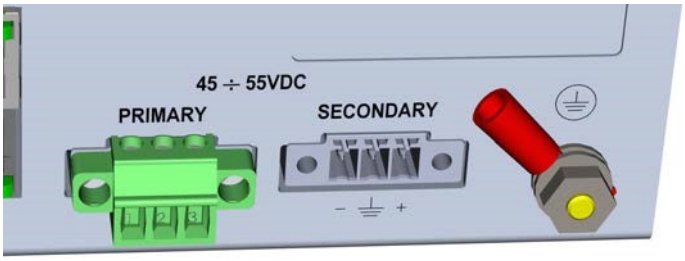
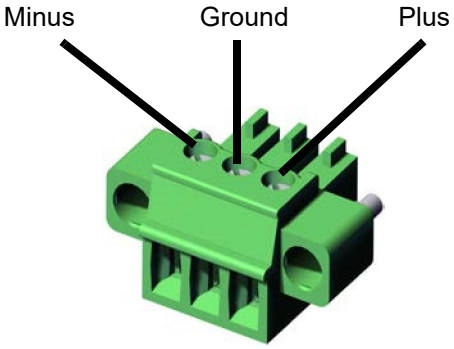



*Figure 2-51: Airmux-IDUH/2ETH power connectors and grounding lug.*

- For direct DC connection: The connectors are 3 pin in line female, with polarities (left to right) minus, ground, plus, as shown:




- For AC connection: To avoid damage to the Airmux-IDUH/2ETH, always use the AC/DC adapter and power plug supplied by RAD.

*Use only a safety approved Airmux-IDUH/2ETH according to IEC/EN/UL 60950-1 or 62368-1 with rated output voltage of 46-55VDC and rated current of 4A max.*

*Ground the unit with a 10 AWG wire before applying power.*

## SU *PRO/AIR* EMB Units

1. Connect a CAT-5e cable to the input port of the radio as shown:

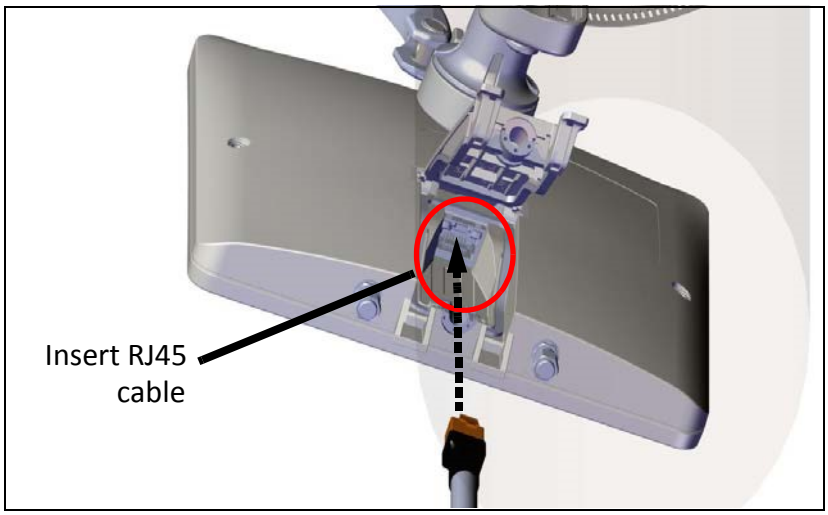
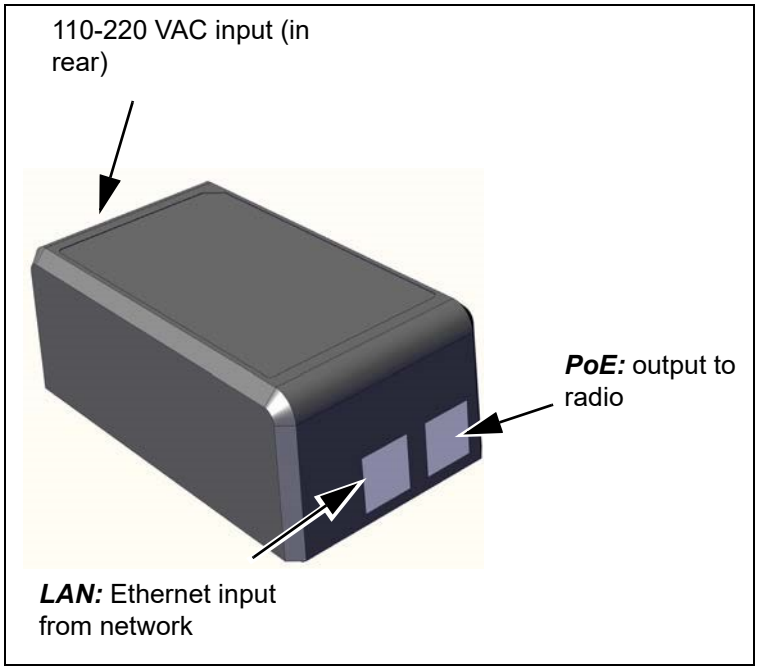



*Figure 2-52: Input port: SU PRO/AIR EMB unit*

Connection label: None

2. Route the CAT-5e and ground cables down from the radio to a PoE.
    - Recommended, although not required: route the CAT-5e cable via 2 LPUs: one near the radio, one near the PoE.
3. Connect ground cable to ground.
4. Perform final connections via the SU *PRO/AIR* EMB PoE:




5. Connect CAT-5e cable from radio via the lower LPU to the “PoE” port.
6. Connect LAN cable to “LAN” port.
7. Connect power cable.

## 2.16 Check Connectivity to Radio

1. Connect to radio unit:
    - From a laptop in the field: Disconnect the PoE from the communications network (LAN connection), and connect the laptop.
    - From the NOC: Keep the PoE connected to the LAN.
    - You can use the SFP connection of the Airmux-5000D (labeled “LAN”) for communications and management purposes only.
2. From a command line, ping radio using radio’s IP address.

## 2.17 Activate Base Station

Applicable only if you are installing a base station.

1. Connect to radio unit:
    - From a laptop in the field: Connect the laptop and power to the PoE, and connect the PoE to the base station (“IDU” for LFF and SFF units, “PoE In” for 5000i and 5000D units).
    - From the NOC: Keep the PoE connected to the LAN, and the PoE connected to the base station.

- You can use the SFP connection of the Airmux-5000D (labeled “LAN”) for communications and management purposes only. But if you do so, you will still need to connect power to the “PoE In” port.

2. For LFF, SFF, and 5000i base stations:
    a. Log on to the Airmux Manager application as “Installer”
    b. Enter IP address of Base Station (HBS), password **wireless**
    c. From main window of the Airmux Manager application, click Activate.
    d. Follow wizard instructions to activate radio.
3. For 5000D base stations:
    a. Enter its IP address in a web browser (default value: 10.0.0.120).
    b. Enter username **admin** and password **netwireless**.
    c. You must activate each carrier separately. For the first carrier, click **Activate** under **Carrier 1** or **Carrier 2**, whichever is appropriate for your deployment (the right panel shows which carrier uses which frequency band)
    d. Enter the Sector ID, Sector Name and Location.
    e. Click **Next**.
    f. The operating channel and channel bandwidth will appear. We recommend you select Automatic Channel Selection, then click **Next**.
    g. Check the parameter values in this window, and change any that need to be changed. Once you are sure the values are correct, click **Activate**.
    h. Repeat the above for the other carrier.

## 2.18 Align Subscriber Unit

- Make sure the subscriber unit’s base station is activated (check with the NOC).
- Point the subscriber unit (or its external antenna) in the general direction of its base station.
- Continue according to the type of unit you are using:

### LFF and SFF Units

1. Align the unit horizontally (in azimuth):
    a. Swivel the unit 90° to the left slowly, 180° to the right, and then 90° back towards the base station.

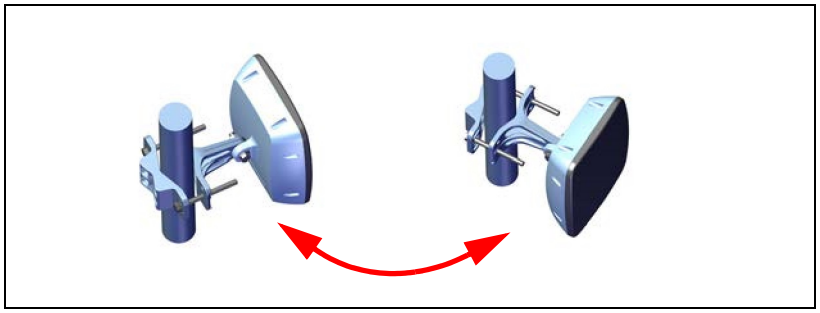
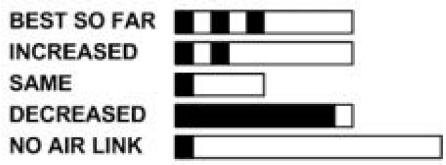


*Figure 2-53: Swivel horizontally (SFF unit shown)*

b. While swiveling the unit, listen to the buzzer beep sequence until optimal alignment is achieved (3 beeps and a pause, as shown below).




2. Repeat the above in elevation.

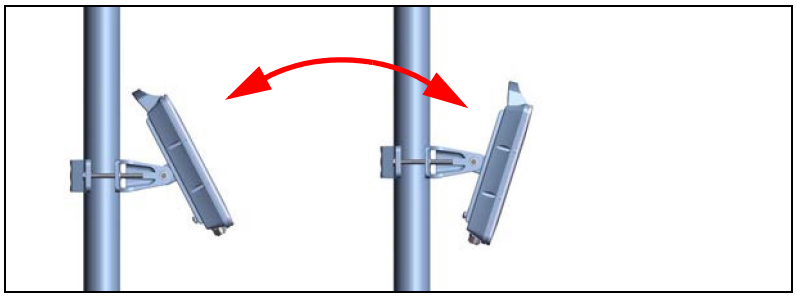
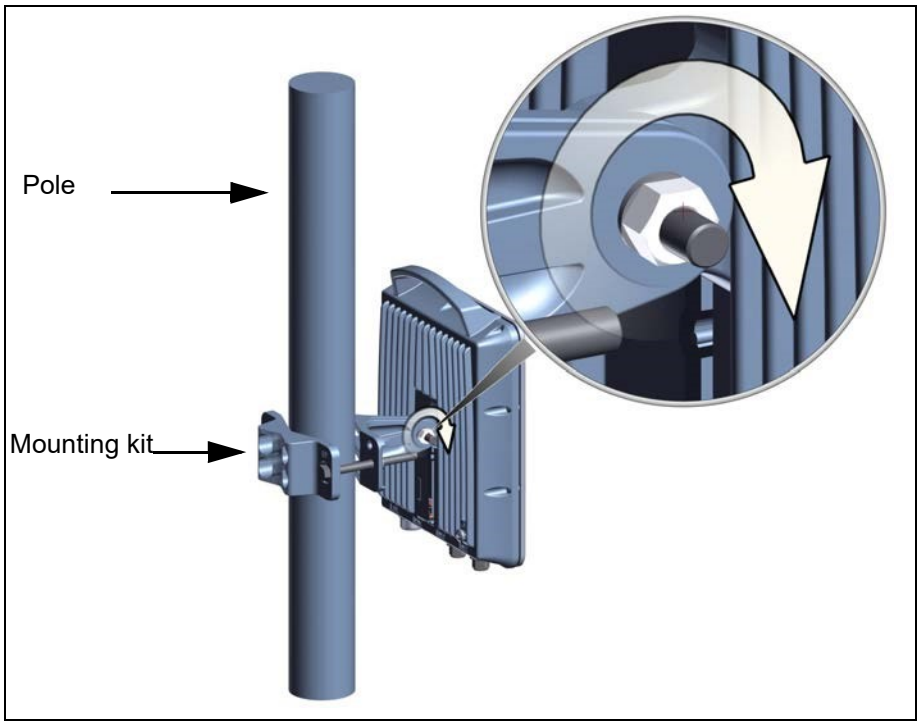


*Figure 2-54: Swivel vertically (LFF unit shown)*

3. Once alignment is complete, tighten the bolt holding the radio on the mounting kit.




- The subscriber unit will stop beeping when it is aligned with the base station, and configured.
- You can manually cease the beeping via the Airmux Manager application.

## SU *PRO/AIR* EMB, SU *PRO/AIR* INT Units

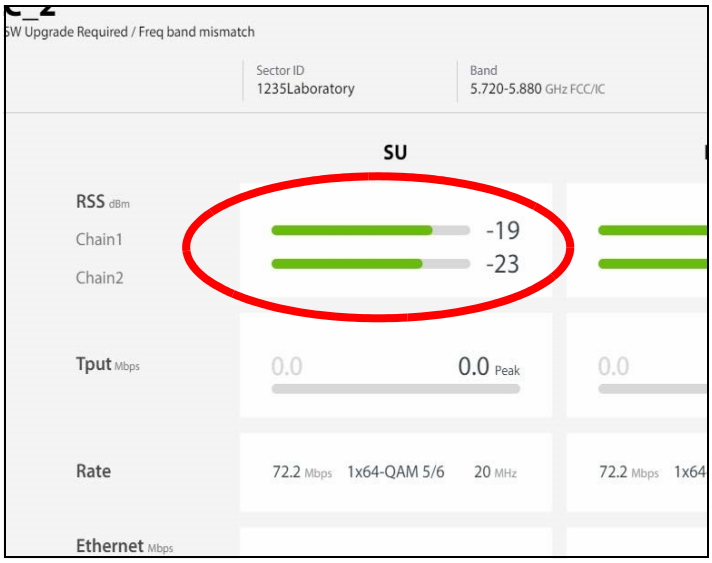
- Using the Web Interface :

  a. Using a PC or laptop: Enter the unit's IP address in a web browser

b. Log in using username admin and password netwireless.

c. From the main window, you can see the RSS (radio signal strength) as a green bar. While referring to this, do the following:

d. Swivel the unit or its external antenna 90° to the right slowly, 180° to the left, and then 90° back towards the base station. Note at which point the RSS value is maximum.




e. Repeat the above in elevation.

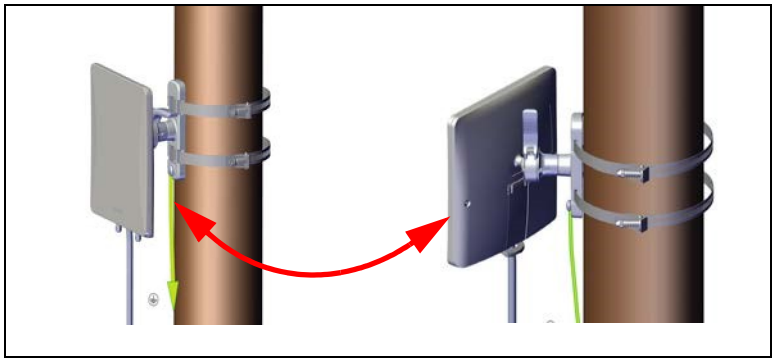


*Figure 2-55: Swivel horizontally*

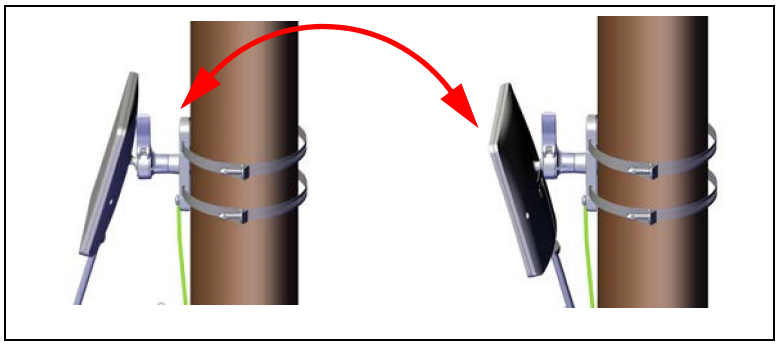


*Figure 2-56: Swivel vertically*

- Once alignment is complete, tighten the arm on the SU *PRO/AIR* EMB mounting kit (see *Figure 2-57* for the SU *PRO/AIR* EMB) or tighten the bolt on the standard mounting kit (see *Figure 2-33* for an external antenna, and *Figure 2-59* for the SU *PRO/AIR* INT).

- If the unit requires more tightening, use the hex screw with a 5mm hex key as shown in *Figure 2-58*.

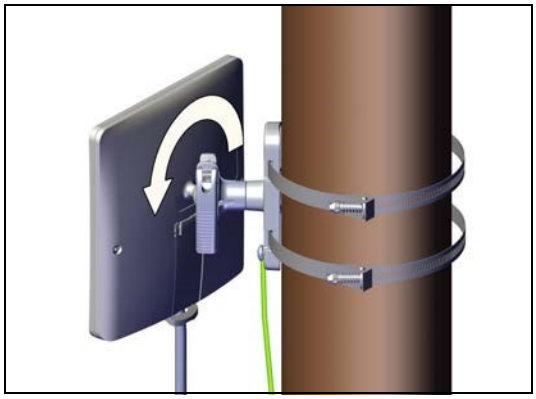


*Figure 2-57: Tighten arm on mount: SU PRO/AIR EMB radio unit*

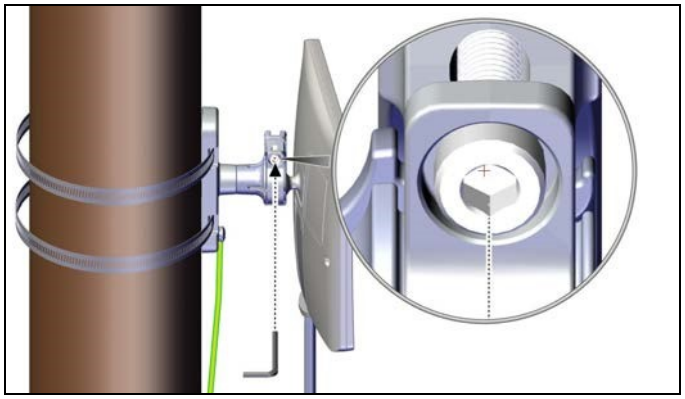


*Figure 2-58: Use hex screw to further tighten arm on mount: SU PRO/AIR EMB radio unit*

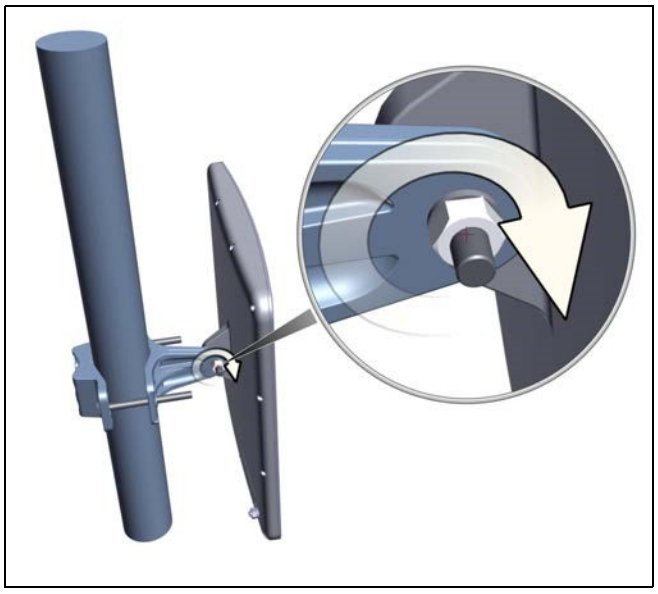


*Figure 2-59: Tighten bolt (SU PRO/AIR INT shown)*