

# **INSTALLATION GUIDE**

## **RADWIN 5000 HPMP**

Release 4.9.30  
Cat.No. DQ0193780/0.6

# **RADWIN**

**FOR REGULATORY APPROVAL ONLY**

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# Chapter 1: Introduction

## 1.1 Scope of This Document

This document shows how to configure RADWIN 5000 radios and sectors. For a detailed description of how to physically install RADWIN 5000 radios, see the [RADWIN 5000 Installation Manual](#).

This document shows how to install RADWIN 5000 radios.

For a detailed description of how to configure RADWIN 5000 radios and sectors, see the [RADWIN 5000 Configuration Guide](#).

## 1.2 Notifications

Notifications consist of Notes, Cautions, and Warnings:



Caution

**Caution:** Risk of damage to equipment or of service degradation

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Warning

**Warning:** Risk of danger to persons operating near the equipment

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Note

The purpose of a **Note** is to:

- Draw your attention to something that may not be obvious
  - Emphasize a special feature
  - Provide additional background
-



## 1.3 RADWIN 5000 Overview

### 1.3.1 Sector

The RADWIN 5000 system consists of a “sector” that includes a base station, and at least one subscriber unit. The subscriber units are installed and work opposite the base stations.

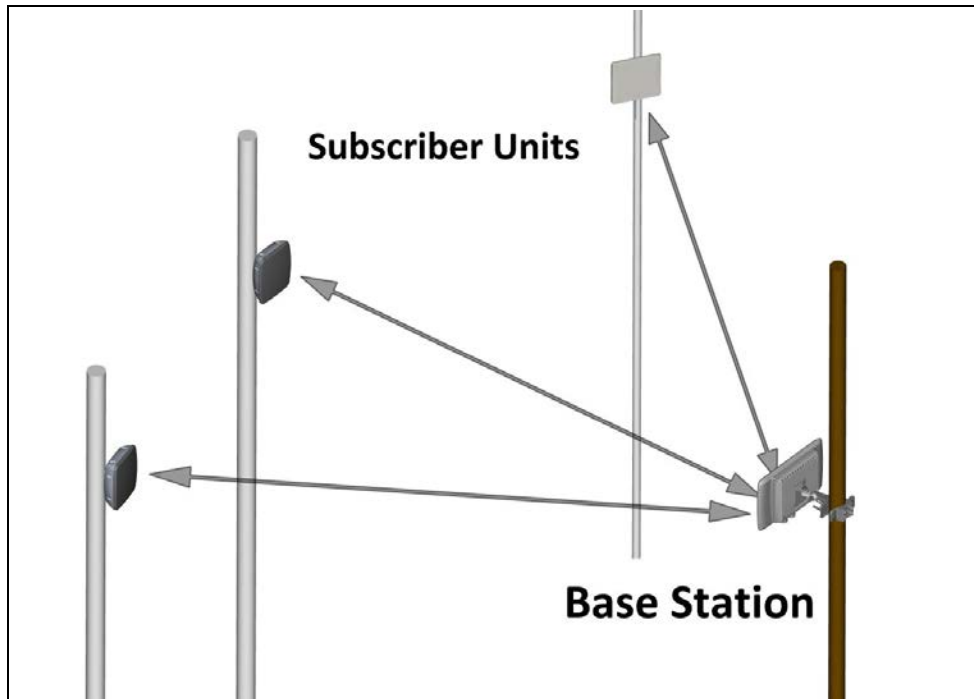


Figure 1-1: A RADWIN 5000 Sector

### 1.3.2 Base Station

There are **two** types of base stations, all of which are High Capacity Base Stations (HBS):

- **Large Form Factor (LFF)** - With an integrated or external antenna



Figure 1-2: LFF base station with integrated antenna



Figure 1-3: LFF base station connectorized for external antenna

- **Beamforming (JET)** - With an integrated antenna



Figure 1-4: RADWIN 5000 JET

- **Beamforming (DUO)** - With an integrated antenna



Figure 1-5: RADWIN JET DUO

### 1.3.3 Subscriber Unit

There are two types of RADWIN 5000 subscriber units:

- **High Capacity Subscriber Unit (HSU)**
- **SU PRO/AIR units**

#### High Capacity Subscriber Unit (HSU)

An HSU can have one of the following resource allocations:

- **CIR** - Committed Information Rate: receives a guaranteed percentage of resources
- **BE** - Best Effort: receives resources according to availability

In addition, an HSU can have one of the following form factors:

- **Large Form Factor (LFF)** - Its external appearance is similar to a Large Form Factor HBS, and can have an integrated or external antenna.



Figure 1-6: LFF subscriber unit with integrated antenna



Figure 1-7: LFF subscriber unit connectorized for external antenna

- **Small Form Factor (SFF)** - As its name implies, this unit is smaller than an LFF unit, but can also have an integrated or external antenna.



Figure 1-8: SFF subscriber unit with integrated antenna



Figure 1-9: SFF subscriber station connectorized for external antenna

### SU PRO/AIR units

- SU PRO - Can operate using the CIR or BE resource type
- SU AIR - Operates using the BE resource type only.
- Uses a smaller form-factor than that of the HBS or HSU.
- Can use an integrated antenna, the Turbo Gain antenna or a separate, non-integrated, external antenna.



Figure 1-10: SU PRO/AIR unit



Figure 1-11: SU PRO/AIR unit with Turbo Gain antenna

### 1.3.4 Method of Work

Both the base stations and the subscriber units communicate respectively, with the service provider and users through PoE devices. The communication protocol for both the service provider and the users is Ethernet.

See figure 1-12, RADWIN 5000 Connection Scheme:

- A PoE device (or IDU-H<sup>1</sup>) is connected to power and the communications network:
  - On the base station side, the PoE is connected to the backhaul network
  - On the subscriber unit side, the PoE is connected to end-user equipment: routers, WiFi devices, etc.
  - The RADWIN JET DUO can have traffic and management via either its PoE port, or its SFP data port, but must still receive voltage via a PoE.
- Using CAT-5e cables, the radio units are connected to power and the communications network via a Power-over-Ethernet (PoE) device.
- The radio units and PoE devices are also connected to ground.
- The Base Station communicates with the Subscriber Unit or Units via the air interface.



For simplicity, Lightning Protection Units (LPU) are not shown in Figure 1-12, but these are recommended. See “Mounting the Lightning Protection Units” on page 2-27 for directions on how to install the LPUs.

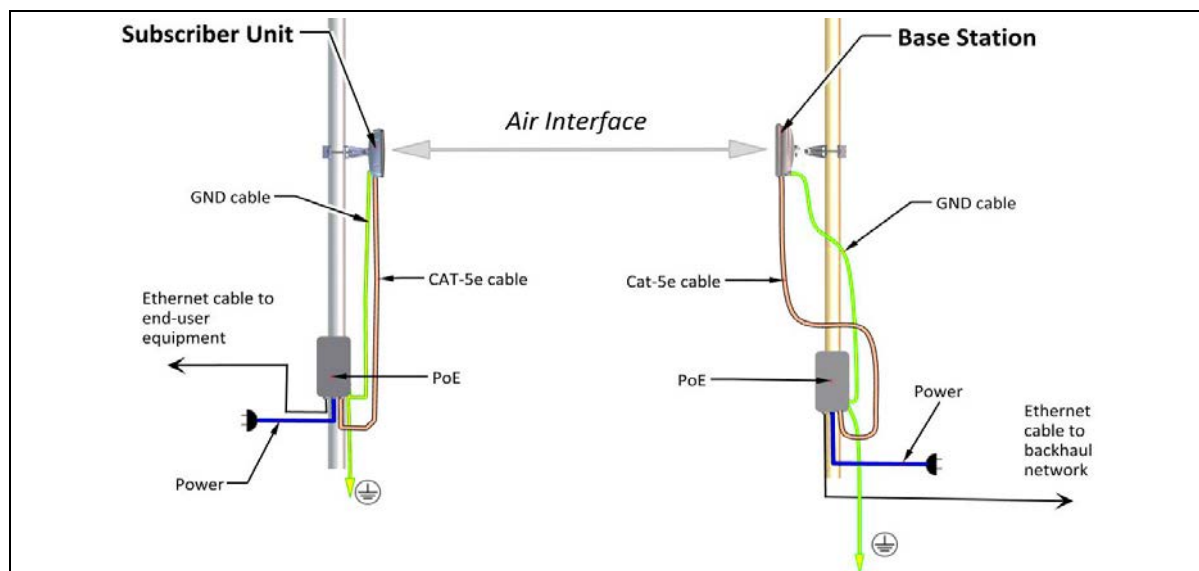


Figure 1-12: RADWIN 5000 Connection Scheme

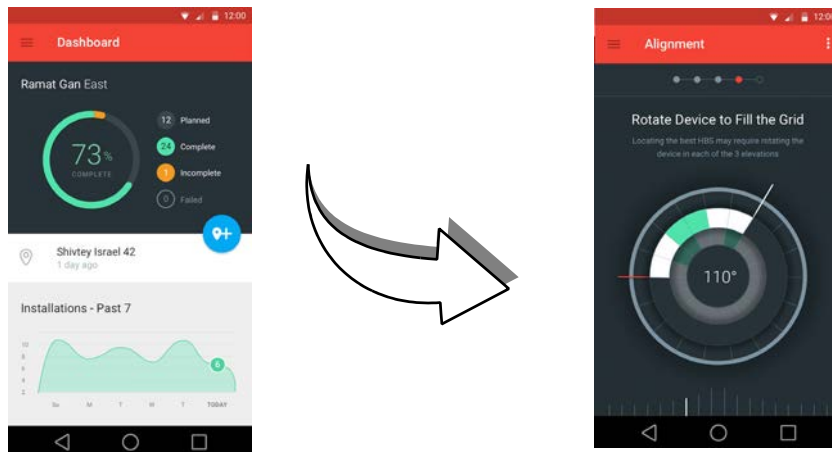
1. The IDU-H does not support beam-forming radios: JET or DUO



## 1.3.5 Sector Management Tools

### WINTouch

WINTouch is a mobile application that guides you in installing and aligning SU *PRO/AIR* devices, as well as base stations that work with them.



### RADWIN Web Interface

The Web Interface enables you to carry out basic unit and/or sector management functions using a Web browser. It is an easy way to rapidly configure and setup a link.

It may be used to -

- Set or change basic radio unit parameters in the field
- Establish a sector on a minimal basis
- Check link parameters and make basic changes
- View the link Inventory
- Inspect the Recent Events logs



The Web Interface for the SU *PRO/AIR* and for legacy HBS and HSU radios are different.

### RADWIN Manager

The RADWIN Manager is an SNMP-based management application which manages a complete sector over a single IP address.

## 1.4 Key Features of RADWIN 5000

### 1.4.1 General

- » Ethernet connectivity
- » Advanced OFDM & MIMO 2x2 for nLOS and NLOS performance
- » Enhanced interference mitigation capability
- » Inter & intra site sync to reduce self interference
- » Multiband radios: Different frequencies in the same radio unit
- » Dedicated Bandwidth ensuring SLA & latency
- » Regulations supported - FCC/IC/ETSI/WPC/MII/Universal
- » Up to 64 Subscriber Units per base station
- » Fully integrated with RADWIN Legacy solutions:
  - Base station can coexist with RADWIN 2000 and WinLink 1000 products
  - [Common RADWIN Manager](#)
- » Nomadic support (standard in all base station models)

### 1.4.2 Beamforming Solutions (optional)

#### **RADWIN 5000 JET and RADWIN JET DUO**

- » Smart beamforming antenna, integrated in dedicated base station
- » On-the-fly beamforming capability reduces interference, increases efficiency
- » Narrow beam
- » Support for ethernet-based synchronization
- » Integrated GPS synchronization capability

#### **RADWIN JET DUO**

- » [Dual-band platform for 3.x and 5.x GHz bands](#)
  - [Available configuration offers a single band selection only](#)
  - [Future upgradeable to concurrent dual-bands](#)
- » 2 x 750Mbps when operated as a dual-band solution (software upgradeable by 2018)
- » Up to QAM 256, 2 x 80MHz
- » Exceptional interference immunity through 2nd gen. beamforming antenna with exceptionally small side lobes
- » Support 64 customers, upgradeable to 2x 64 (software upgradeable by 2018)
- » Interfaces: Fiber (SFP) and GbE

## 1.5 What's New in Release 4.9.30

- » [New product: the RADWIN JET DUO dual carrier base station: ability to work in either the 3.x GHz band or 5.x GHz band, user-configurable](#)



For complete and comprehensive characteristics of the specific model you are working with, refer to its Data Sheet.

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# Chapter 2: Installation Steps

To install and establish a basic connection with a radio unit, carry out the steps shown below. Print out this list, and place a checkmark next to a completed task.

Table 2-1: Installation Check-List

Step	Action	Page	Done?
	<b>Before deploying at installation site</b>		
1.	Prepare Laptop	page 2-2	
2.	Connect Laptop to Radio Unit	page 2-2	
3.	Update Connectivity Parameters of Radio Unit	page 2-5	
4.	Check items to be installed	page 2-7	
5.	Prepare Tools	page 2-7	
	<b>Installation</b>		
6.	Install Standard Mounting Kit	page 2-8	
7.	Install Mounting Kit for the SU PRO/AIR Radio Unit	page 2-15	
8.	Mounting a Unit with the Standard Mounting Kit	page 2-17	
9.	Ground Radio Unit	page 2-22	
10.	Mounting the SU PRO/AIR Radio Unit	page 2-25	
11.	Mounting the Lightning Protection Units	page 2-27	
12.	Connect External Antenna (if applicable)	page 2-30	
13.	Waterproofing	page 2-32	
	<b>Commissioning</b>		
14.	Connect Radio (External Connections)	page 2-33	
15.	Check Connectivity to Radio	page 2-39	
16.	Activate Base Station	page 2-39	
17.	Align Subscriber Unit	page 2-40	

## 2.1 Prepare Laptop

Configure IP address and subnet mask of laptop as follows:

- Control Panel -> Network and Internet -> Network and Sharing Center -> Change Adapter settings -> click on Network Interface Card name
- Properties -> Select Internet Protocol Version 4 (TCP/IPv4) -> Properties -> set IP address to 10.0.0.100 and Subnet mask to 255.255.0

## 2.2 Connect Laptop to Radio Unit

Connect PoE to power, connect the laptop's ethernet port to the IN (or LAN) socket on the PoE, then connect the OUT (or PoE) socket on the PoE to the appropriate socket on the radio unit. Make sure you are using the appropriate PoE for your specific radio unit.

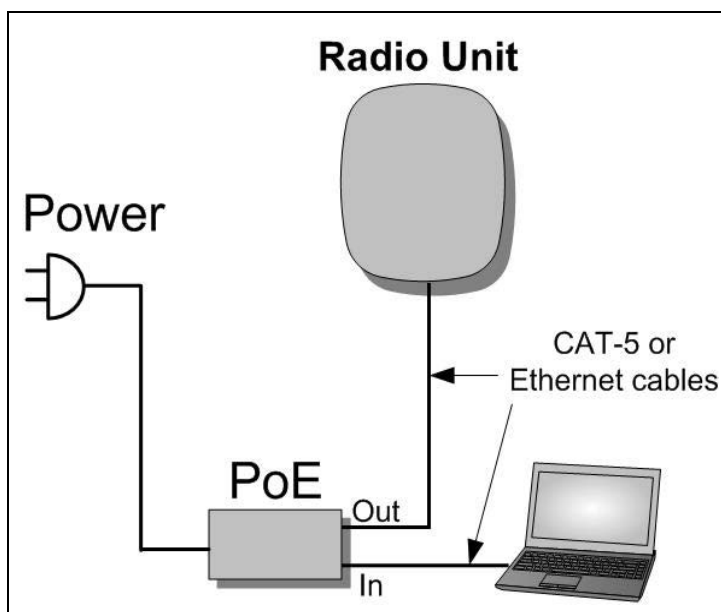


Figure 2-1: Connecting laptop to a radio unit



## 2.2.1 RADWIN 5000 (LFF and SFF) Units

Connect to socket labeled -> "IDU"

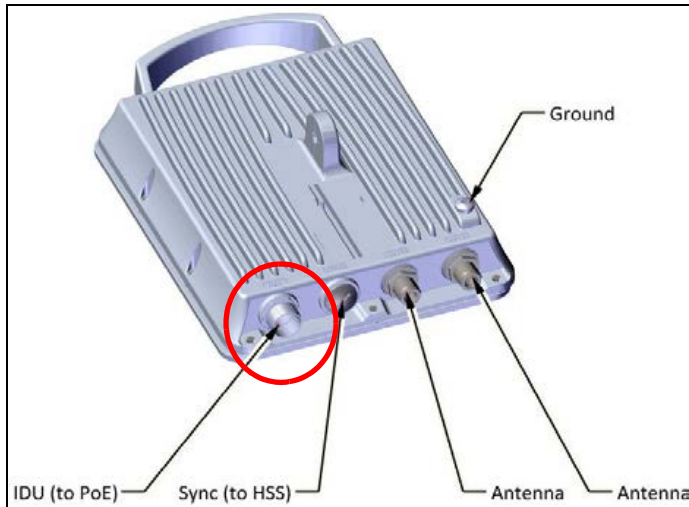


Figure 2-2: Laptop/network port: LFF radio unit (connectorized unit shown)

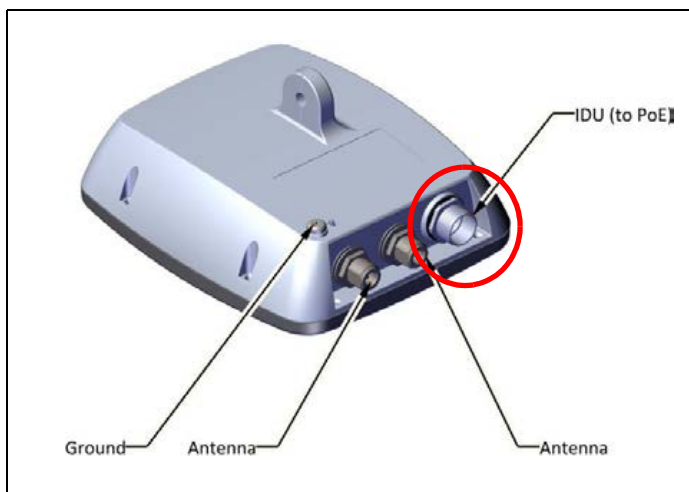


Figure 2-3: Laptop/network port: SFF radio unit (connectorized unit shown)

## 2.2.2 JET and DUO Units

Connect to socket labeled -> "PoE In"

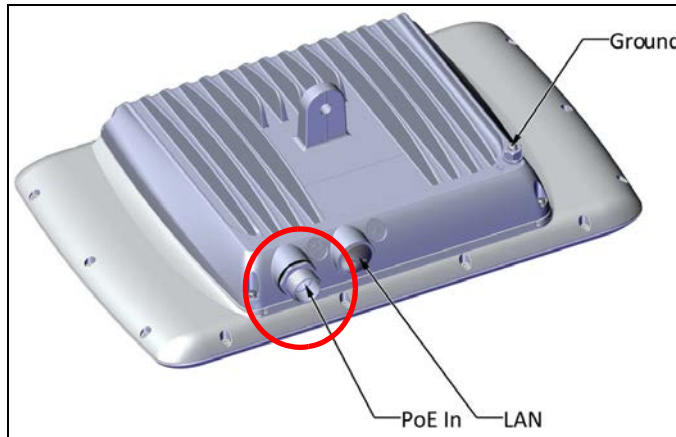


Figure 2-4: Laptop/network port: JET radio unit

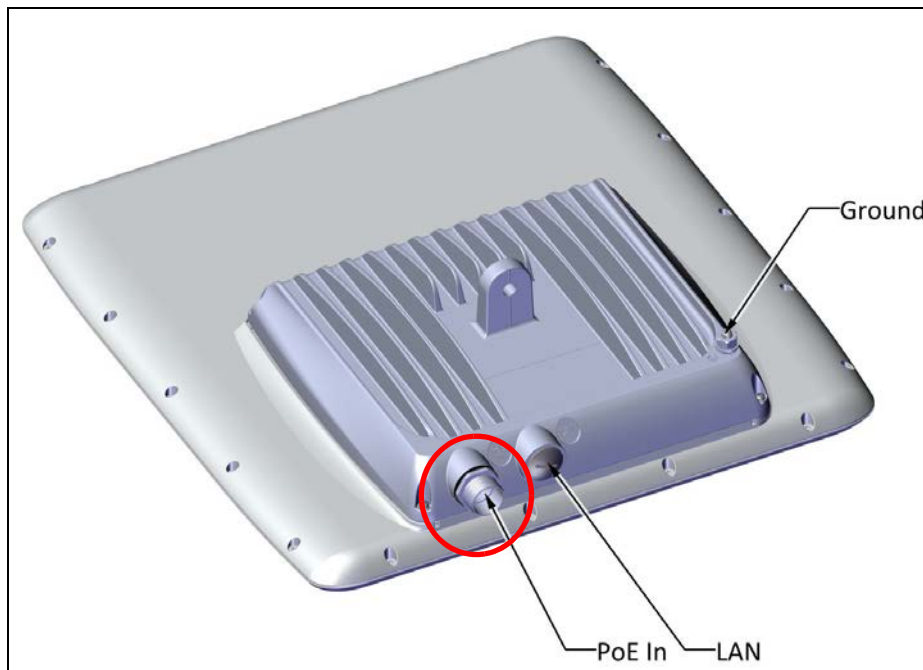


Figure 2-5: Laptop/network port: DUO radio unit

## 2.2.3 SU PRO/AIR Units

Connect to -> Input socket (not labeled)

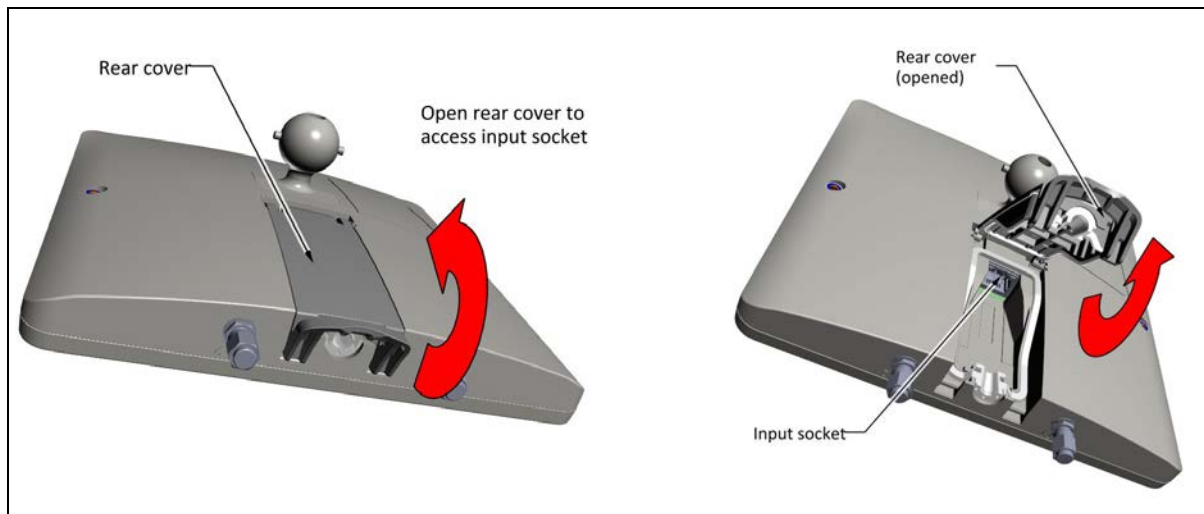


Figure 2-6: Laptop/network port: SU PRO/AIR radio unit

## 2.3 Update Connectivity Parameters of Radio Unit

1. In an internet browser, enter `http:// 10.0.0.120`
2. Enter User Name **admin** and Password **netman**.
3. Click **Log In**.
4. Continue according to the type of radio unit you are using:

### 2.3.1 HSU: RADWIN 5000 (LFF or SFF radio units)



- a. Click **Config**.
- b. Click **Management**.
- c. Enter new IP Address, Subnet Mask, and Default Gateway.
- d. Click **Save** and exit browser.
- e. From a command line, ping radio unit using new IP address to verify change.

## 2.3.2 HBS: RADWIN 5000, JET, or DUO radio units



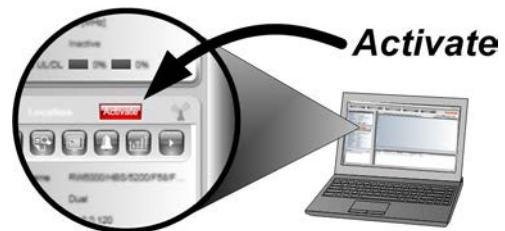
- a. Install the RADWIN Manager application from: <http://www.radwin.com/download>, or use the QR code:



- b. Log on to the RADWIN Manager as an “Installer” and enter the default IP address (<http://10.0.0.120>) and password: **wireless**.

Log on →

- c. From the RADWIN Manager, click **Activate**, and follow the instructions in the wizard.
- d. During the course of the wizard, enter the new management IP Address, Subnet Mask, and Default Gateway, Sector ID, operating channel, and channel bandwidth.
- e. From a command line, ping radio unit using new IP address to verify change.
- f. Once you are finished with the steps above, disconnect the radio unit and prepare it for deployment in the field.



### 2.3.3 SU PRO/AIR Units



- a. Click **Configure**
- b. Click **Network**
- c. Enter new IP Address, Subnet Mask, and Default Gateway.
- d. Click **Apply All** and exit browser.
- e. From a command line, ping radio unit using new IP address to verify change.
- f. Once you are finished with the steps above, disconnect the radio unit and prepare it for deployment in the field.



Alternatively, you can use the WINTouch smartphone application to change the IP address. Log on to WINTouch and follow the instructions.

## 2.4 Check items to be installed

- Radio unit + mounting kit
- 2 LPUs for each radio (recommended)
- PoE (if outdoor, requires mounting kit)
- CAT-5e cables
- Grounding cables (10 AWG) for radio unit, LPUs and outdoor PoE (if used)
- External antenna + mounting kit (if using an external antenna for LFF or SFF units)
- RF cables (if using an external antenna for LFF or SFF units)
- Turbo Gain antenna (if using this antenna for the SU PRO/AIR unit)

## 2.5 Prepare Tools

- Crimping tool
- Spanner/wrench 13mm (1/2")
- Cable ties
- Sealing material
- Waterproofing tape (like Scotch 23)



## 2.6 Install Standard Mounting Kit

### 2.6.1 Standard Mounting Kit

Use the standard mounting kit for:

- LFF (large form-factor) radio units
- SFF (small form-factor) radio units
- JET radio units
- DUO radio units
- External PoEs
- RADWIN GSUs
- External antennas (with mounting kit adaptor)

The SU PRO/AIR has its own mounting kit: see [Install Mounting Kit for the SU PRO/AIR Radio Unit](#) on page 2-15.

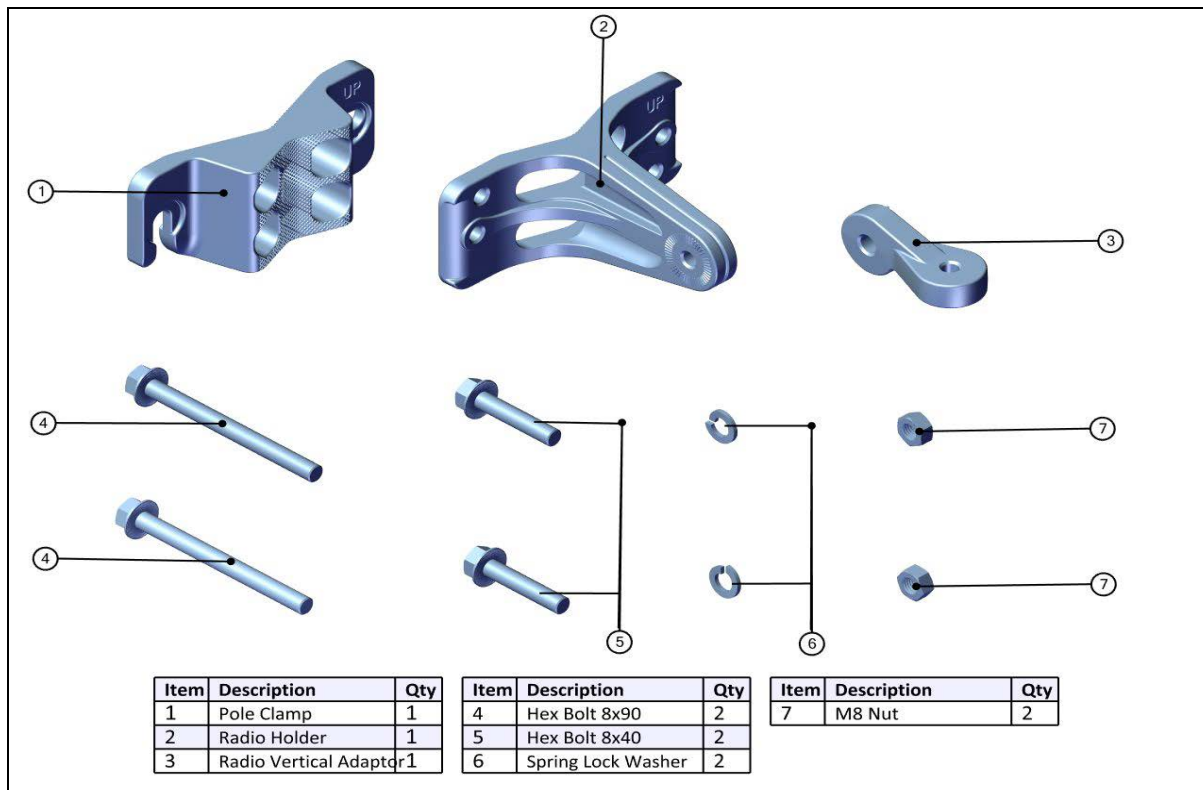


Figure 2-7: Mounting Kit Contents



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 2-9
Horizontal Pole	page 2-12
Wall	page 2-14

### 2.6.2 Vertical Pole

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

Thin Pole	Dia. 3/4 - 1 1/2	page 2-9
Medium Pole	Dia. 2 - 3	page 2-10
Thick Pole	Dia. > 3	page 2-10

#### Thin Pole

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

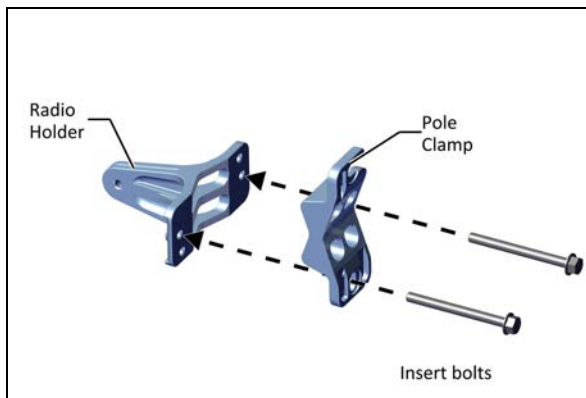


Figure 2-8: Connect Pole Clamp to Radio Holder

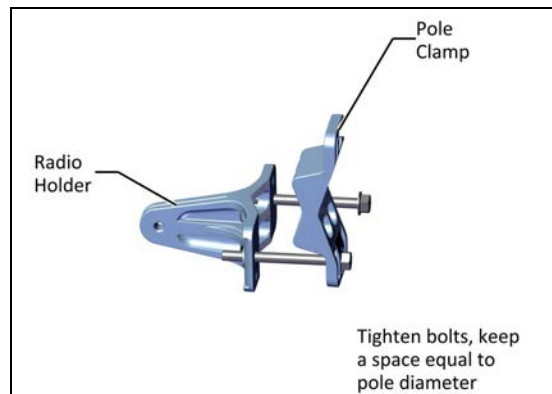


Figure 2-9: Partially tighten bolts

2. Place this “unit” 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.

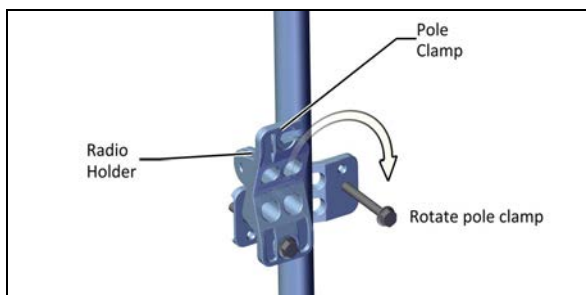


Figure 2-10: Rotate Clamp and tighten bolts

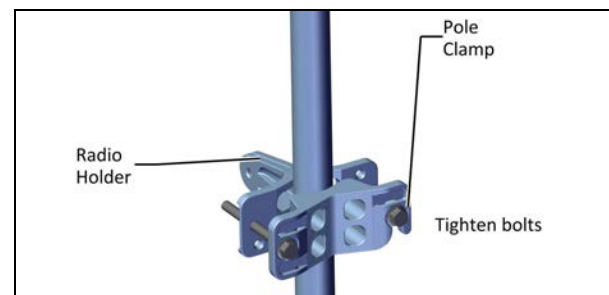


Figure 2-11: Completely tighten bolts

**Medium Pole**

1. Diameter 2 to 3: Position the pole clamp as shown in the following figures. Do not tighten the bolts all the way.

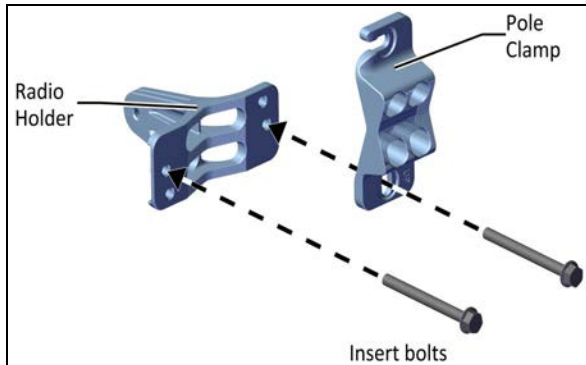


Figure 2-12: Connect Pole Clamp to Radio Holder

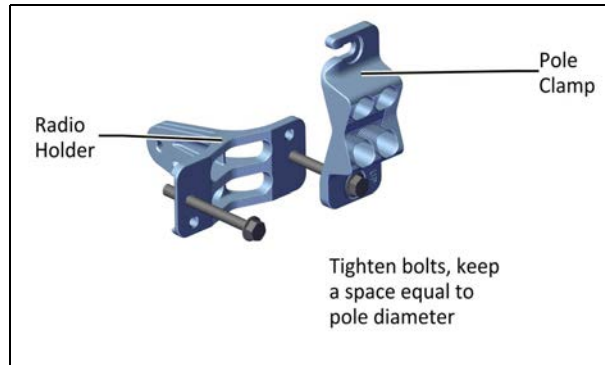


Figure 2-13: Tighten bolts

2. Place this “unit” 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.

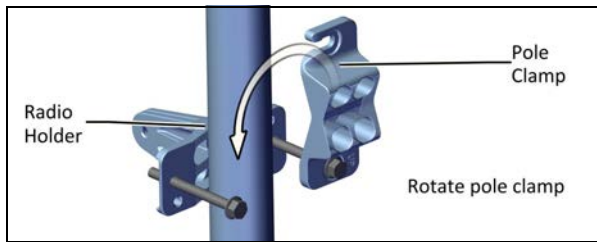


Figure 2-14: Rotate Clamp

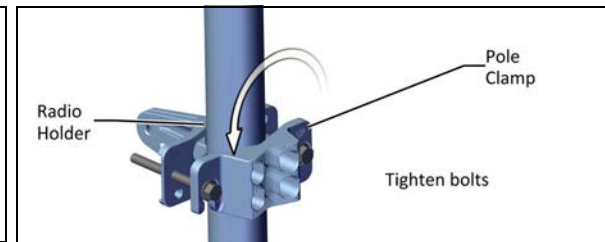


Figure 2-15: Completely tighten bolts

**Thick Pole**

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

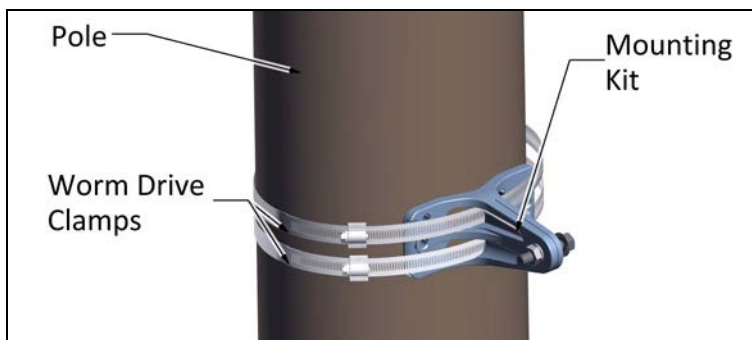


Figure 2-16: Mounting kit on a thick pole

The pole clamp is not needed.

### **JET and DUO Radio Units**

When mounting a JET or DUO radio unit on a vertical pole, use the radio vertical adaptor as shown:

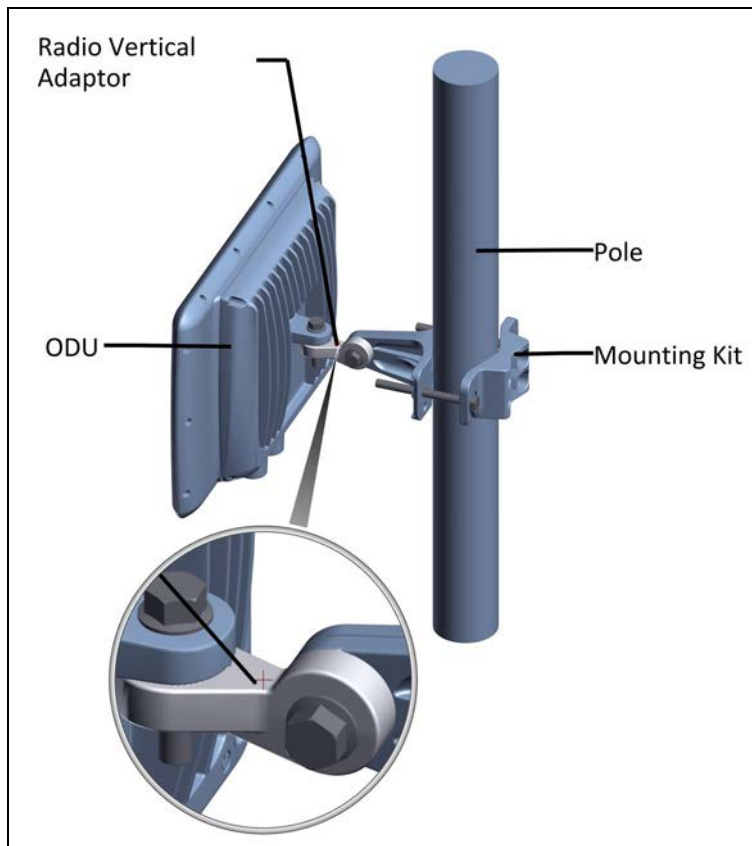


Figure 2-17: JET radio unit mounted on a vertical pole

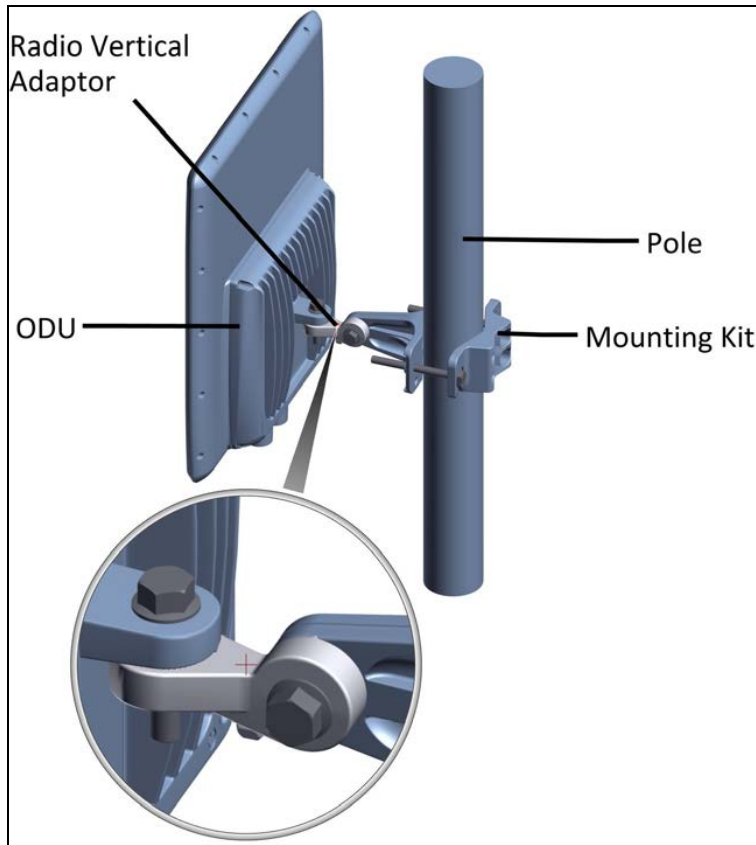


Figure 2-18: DUO radio unit mounted on a vertical pole

### 2.6.3 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):

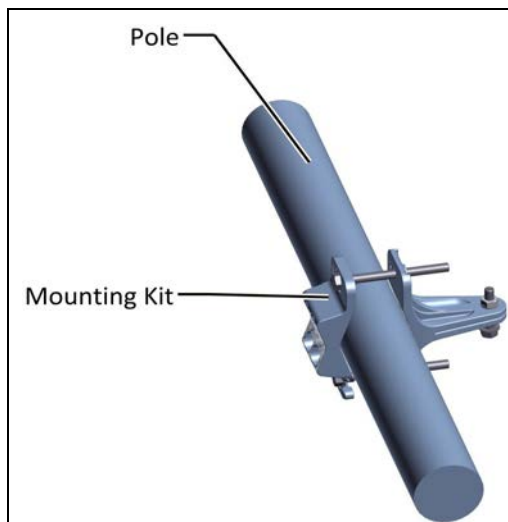


Figure 2-19: Mounting Kit on a horizontal pole

When mounting a Large Form-Factor (LFF) radio unit, Small Form-Factor (SFF) radio unit, GSU, PoE, or external antenna on a horizontal pole, use the radio vertical adaptor:



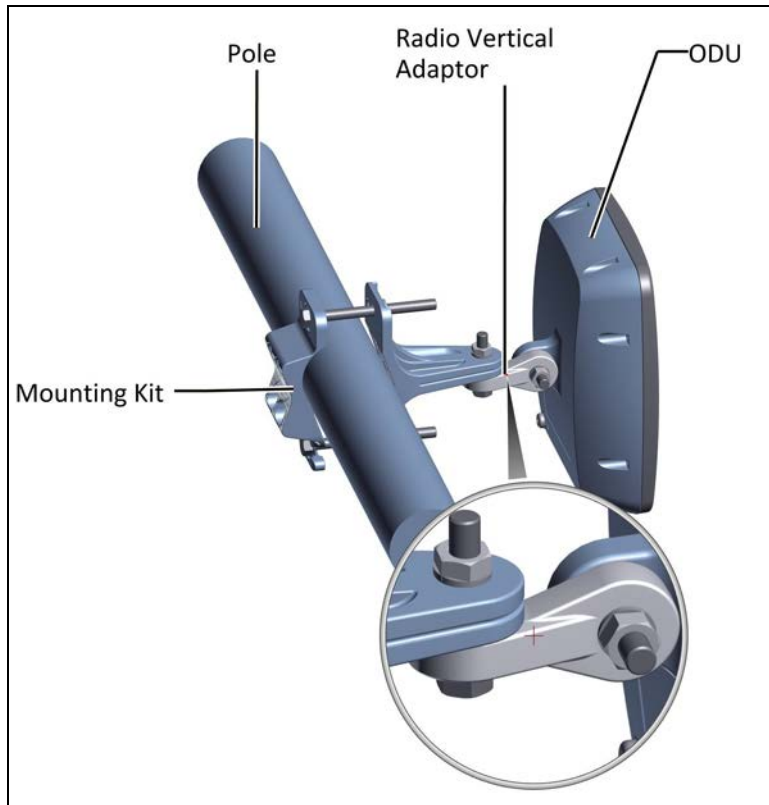


Figure 2-20: Radio unit mounted on a horizontal pole

When mounting a JET or DUO radio unit on a horizontal pole, the vertical adaptor is not needed:

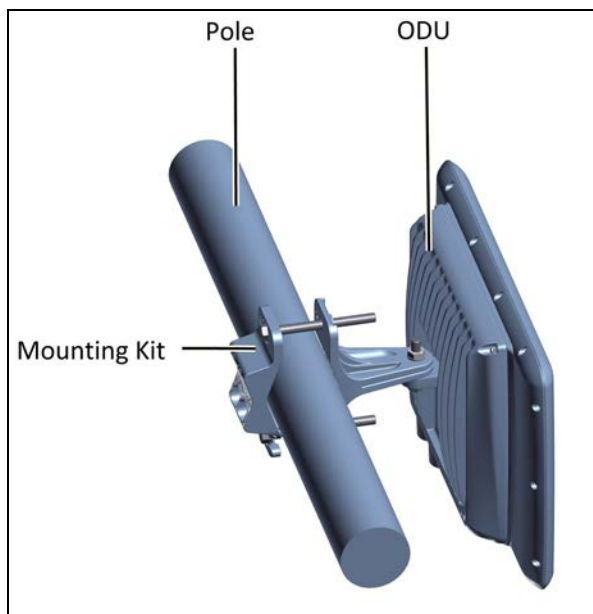


Figure 2-21: JET radio unit mounted on a horizontal pole

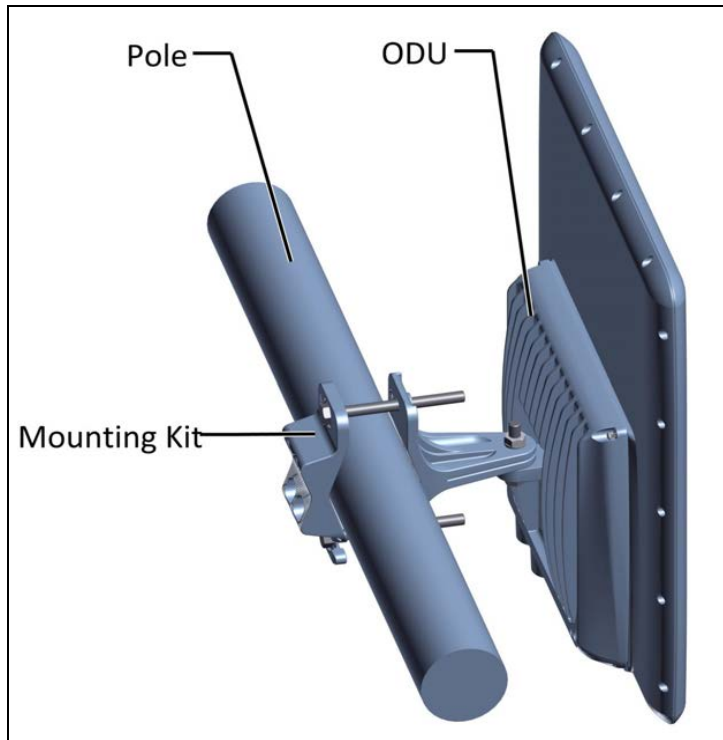


Figure 2-22: DUO radio unit mounted on a horizontal pole

## 2.6.4 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.

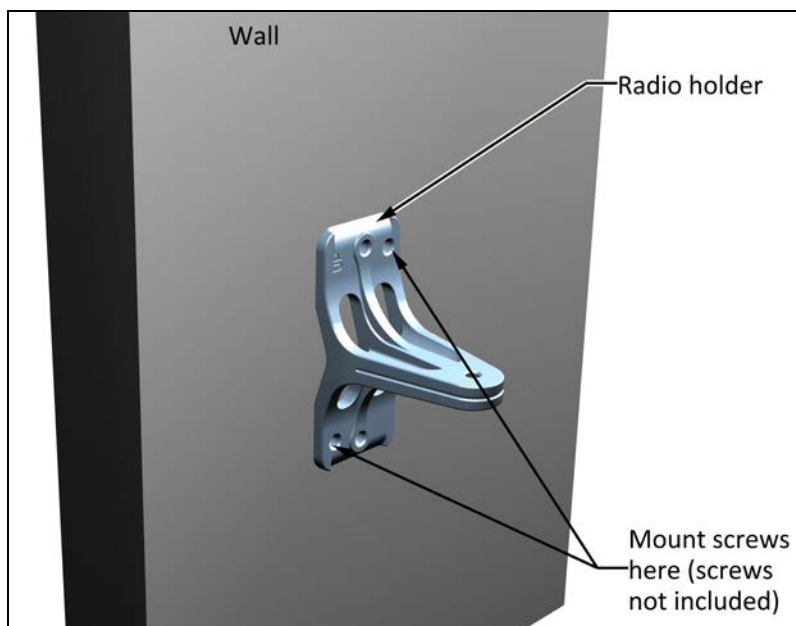
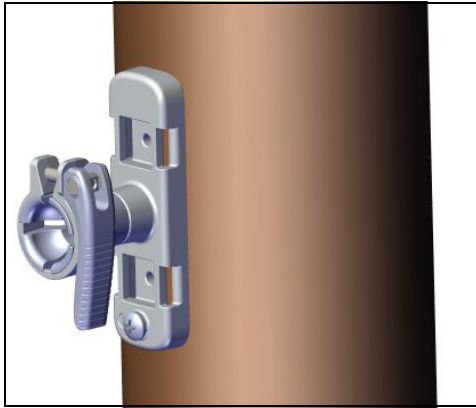


Figure 2-23: Mounting kit on a wall

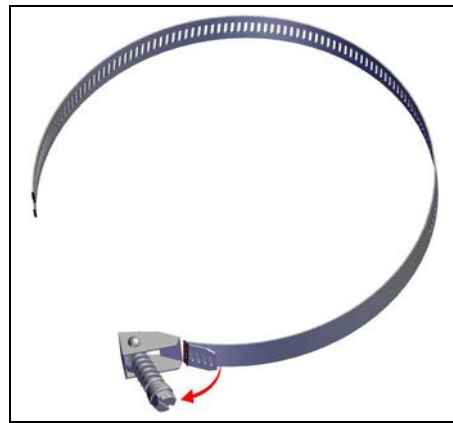
## 2.7 Install Mounting Kit for the SU *PRO/AIR* Radio Unit

The SU *PRO/AIR* 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:



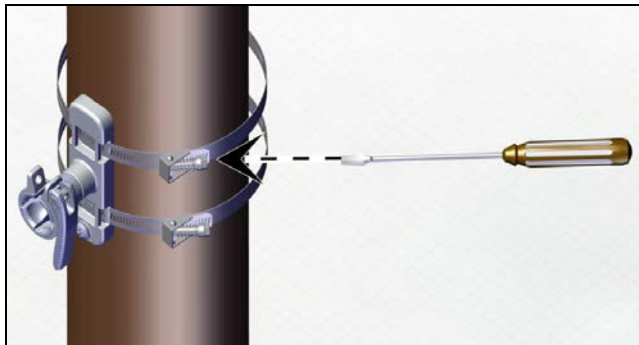
- c. Slide the metal band through the clamp:



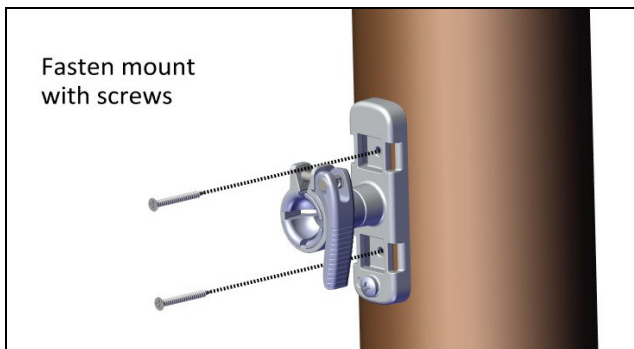
d. Adjust the radius of the band, and lock it with the clamp:



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) JET radio units, as well as external PoEs, and RADWIN GSUs, and external antennas to the mounting kit as shown in [Figure 2-24](#) to [Figure 2-26](#):

(if mounting a flat-panel antenna, see [page 2-21](#)).

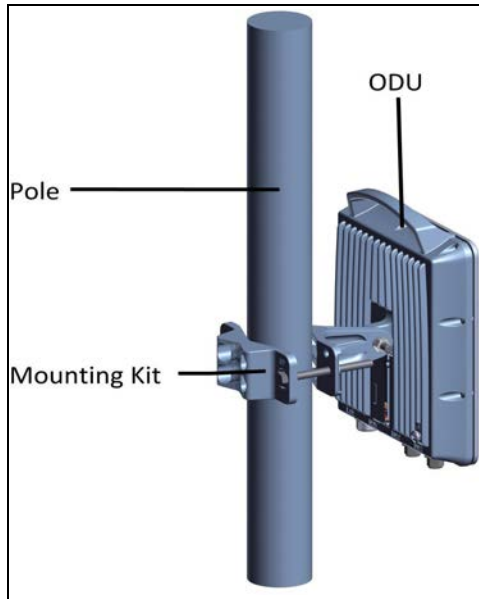


Figure 2-24: Mounted LFF radio unit

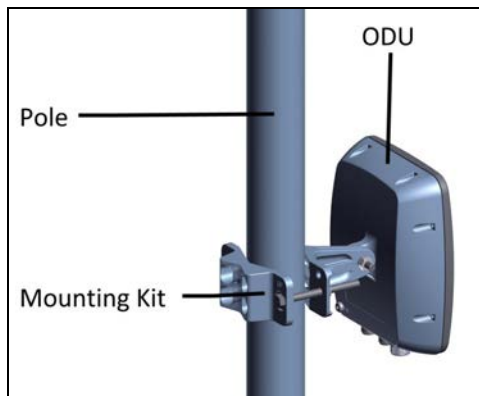


Figure 2-25: Mounted SFF radio unit or GSU



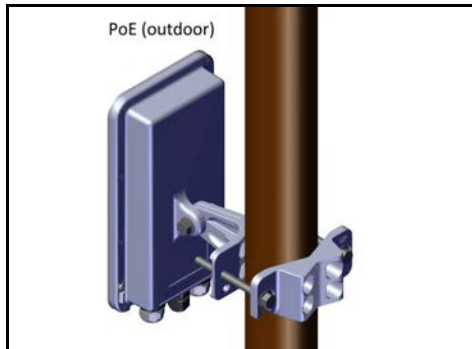


Figure 2-26: Mounted PoE

For JET radio units, mount as shown in [Figure 2-27](#) and [Figure 2-29](#):

- Use the radio vertical adaptor when mounting a JET or DUO unit on a vertical pole

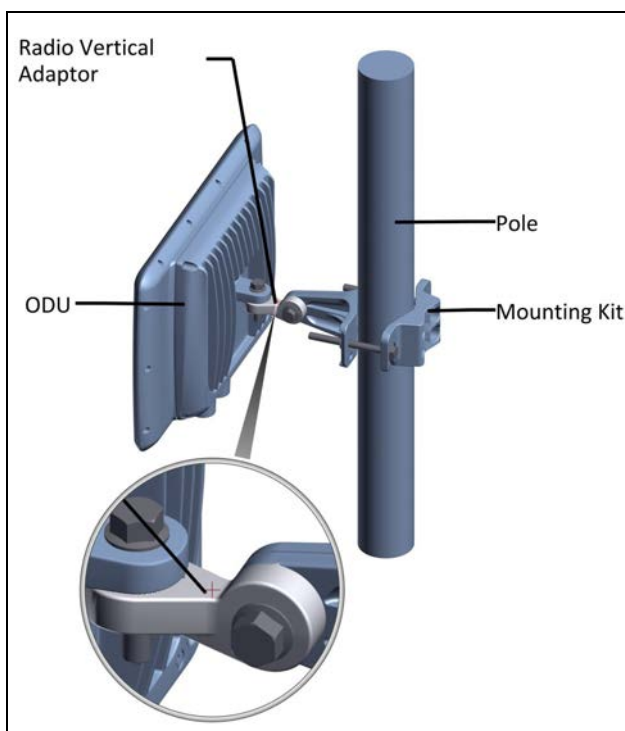


Figure 2-27: JET radio unit mounted on a vertical pole

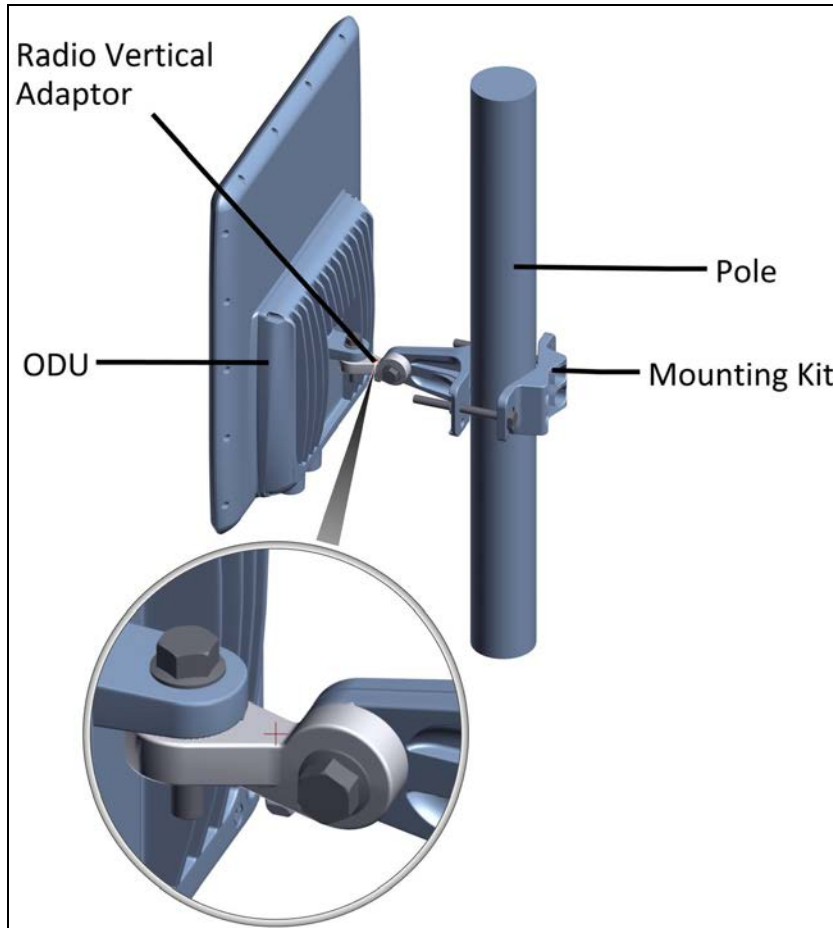


Figure 2-28: DUO radio unit mounted on a vertical pole

- When mounting a JET or DUO unit on a horizontal pole, the radio vertical adaptor is not needed:

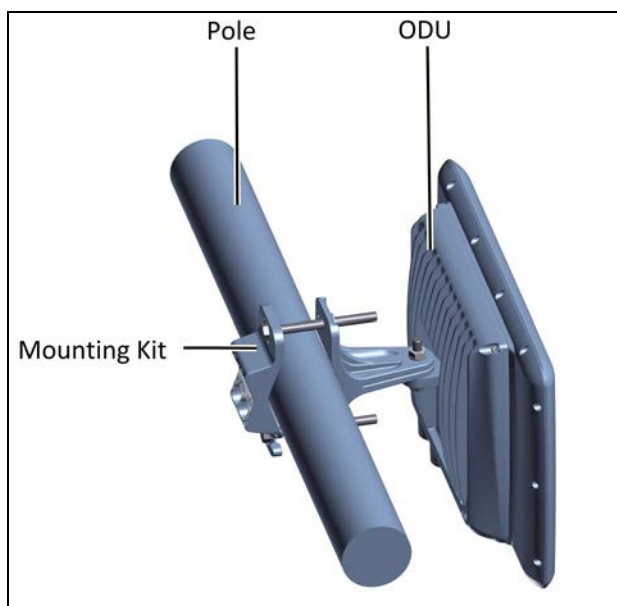


Figure 2-29: JET radio unit mounted on a horizontal pole

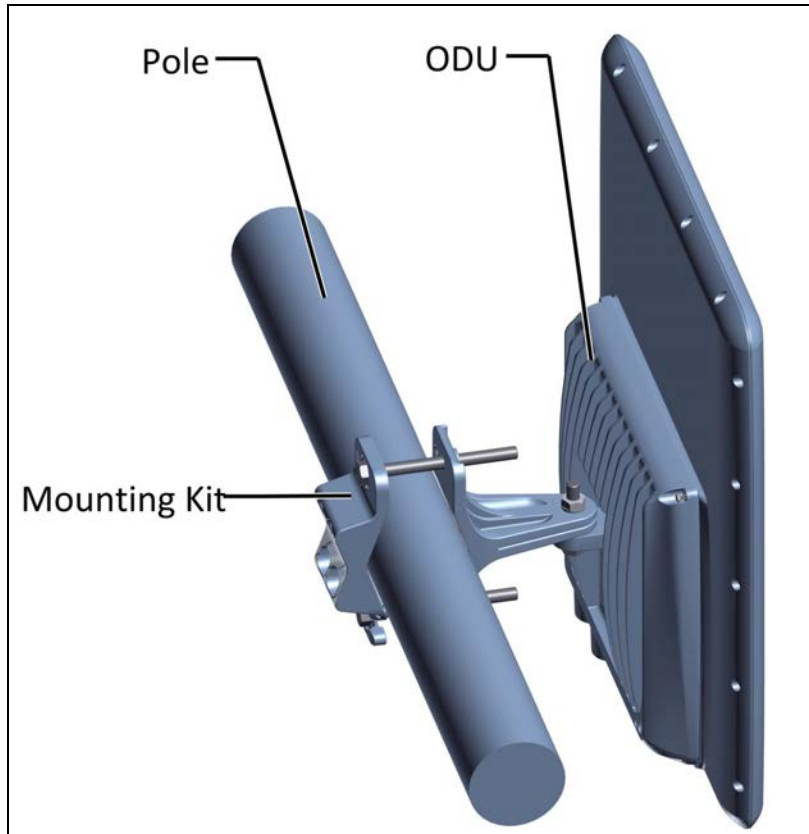


Figure 2-30: DUO radio unit mounted on a horizontal pole

### Flat panel antenna

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

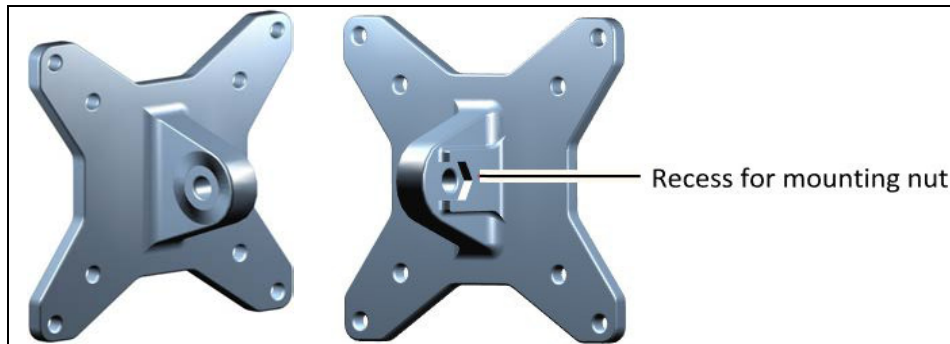


Figure 2-31: Flat panel antenna mounting kit adapter

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

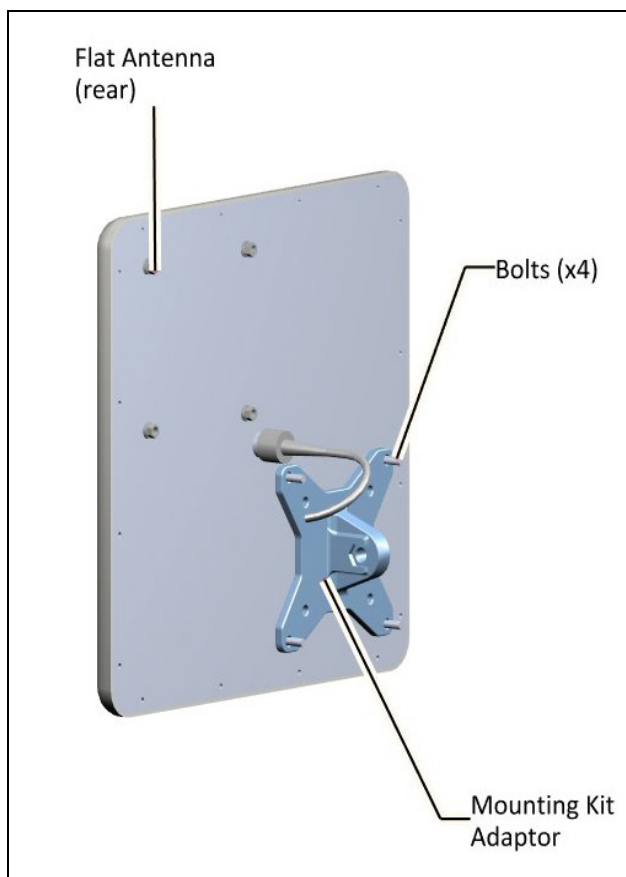


Figure 2-32: Flat Panel antenna - rear with mounting kit adapter

Mount the antenna with the adaptor to a vertical or horizontal pole (as shown in [Figure 2-24](#) to [Figure 2-25](#)).

[Figure 2-33](#) shows a mounted antenna. Attach the mounting bolt to the side of the adaptor with the recess, as shown.

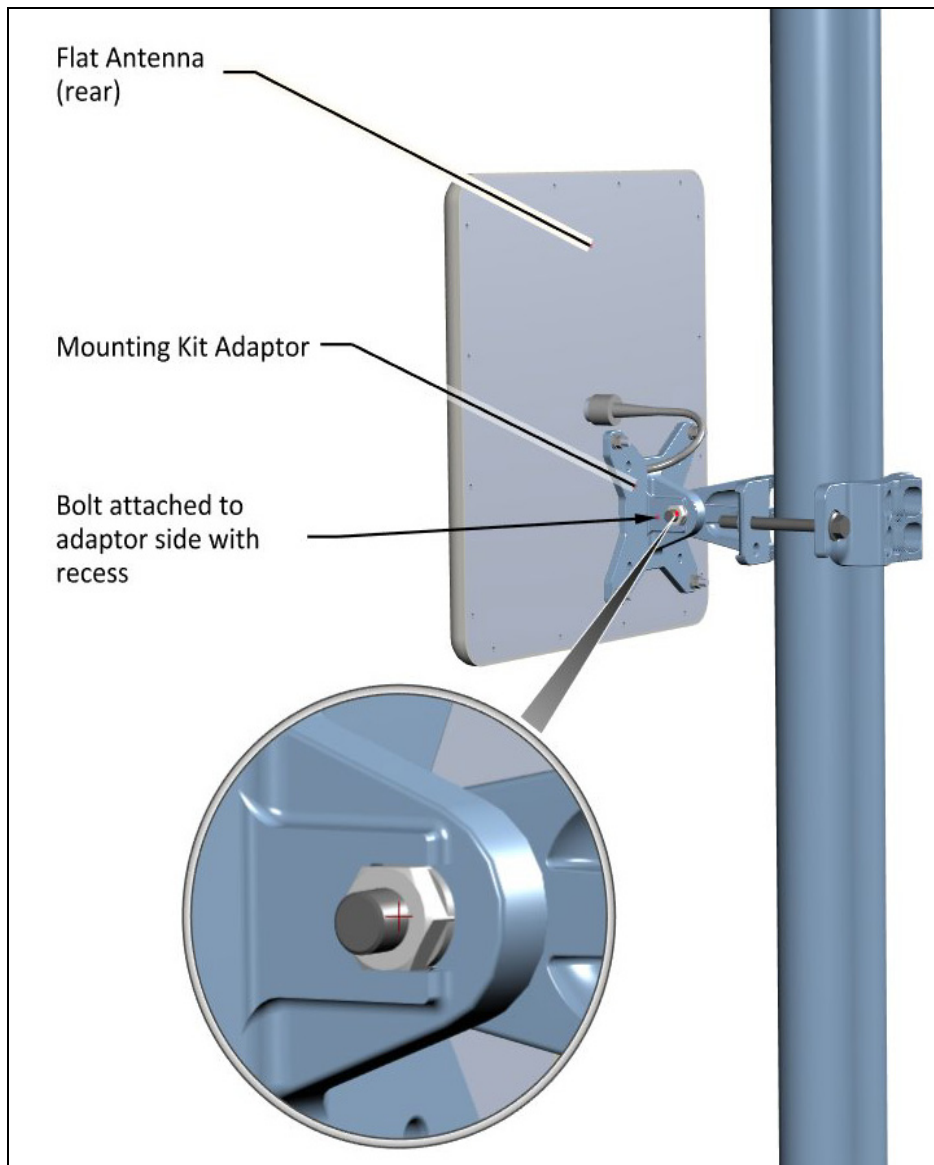


Figure 2-33: Flat Panel antenna - mounted on a pole

## 2.9 Ground Radio Unit

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



### 2.9.1 LFF Units

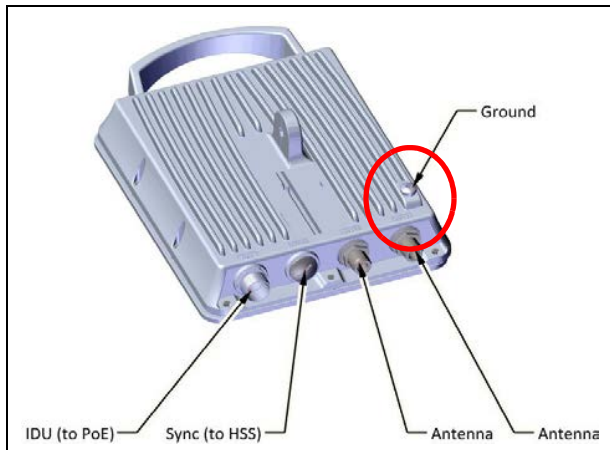


Figure 2-34: Ground: LFF radio unit

### 2.9.2 SFF Units

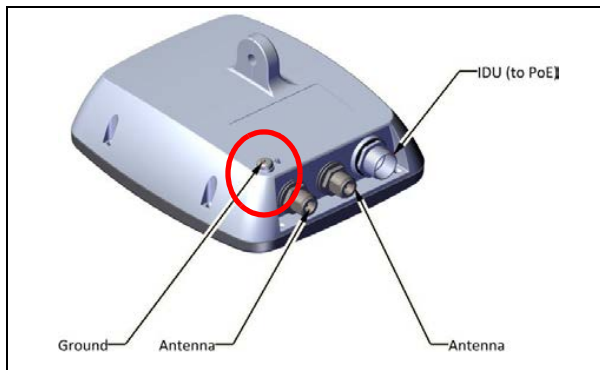


Figure 2-35: Ground: SFF radio unit

### 2.9.3 JET Units

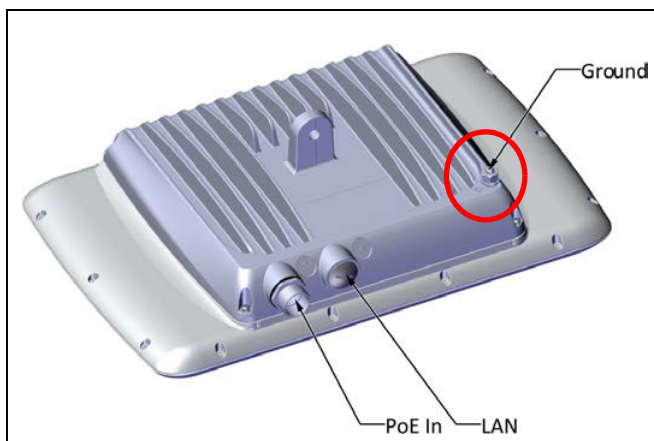


Figure 2-36: Ground: JET radio unit

## 2.9.4 DUO Units

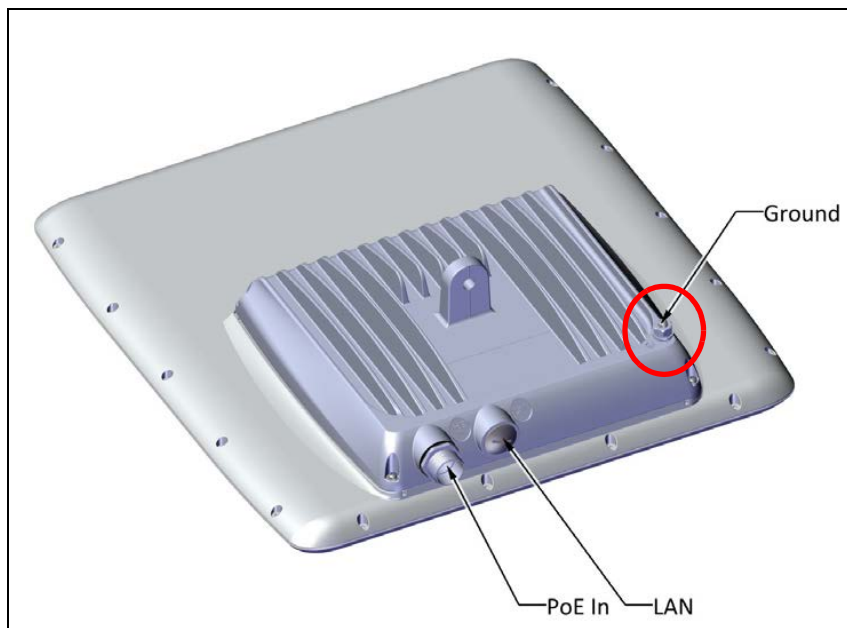


Figure 2-37: Ground: DUO radio unit

## 2.9.5 SU PRO/AIR Units

Since the SU PRO/AIR is grounded via its mounting kit, it must be grounded before being mounted.

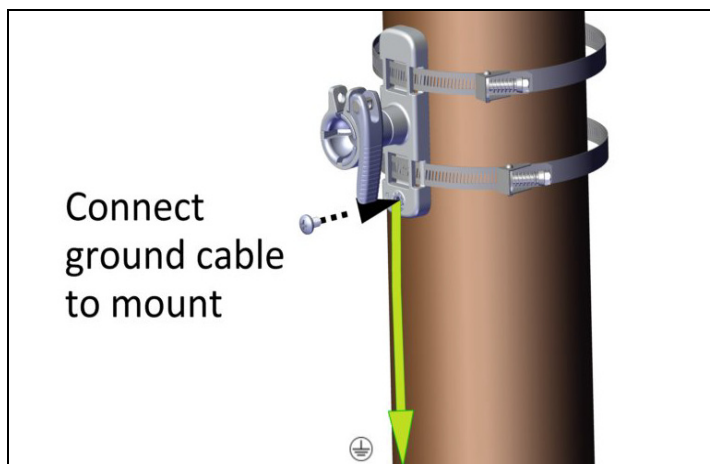
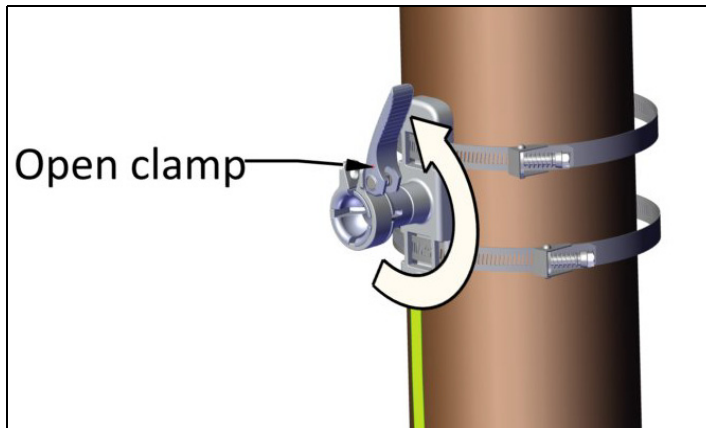


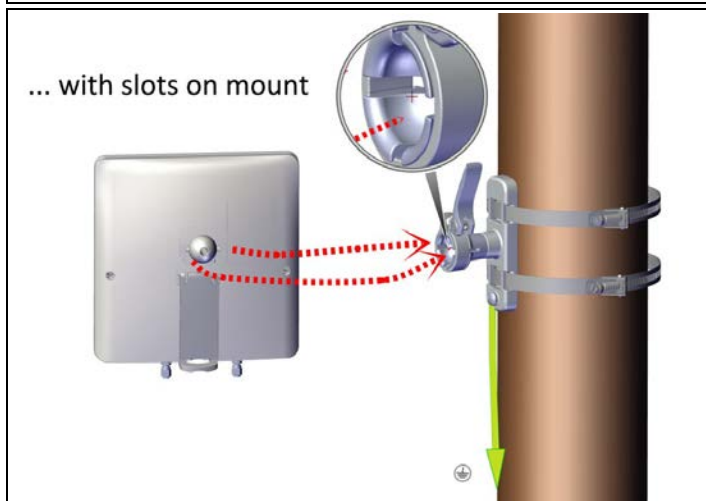
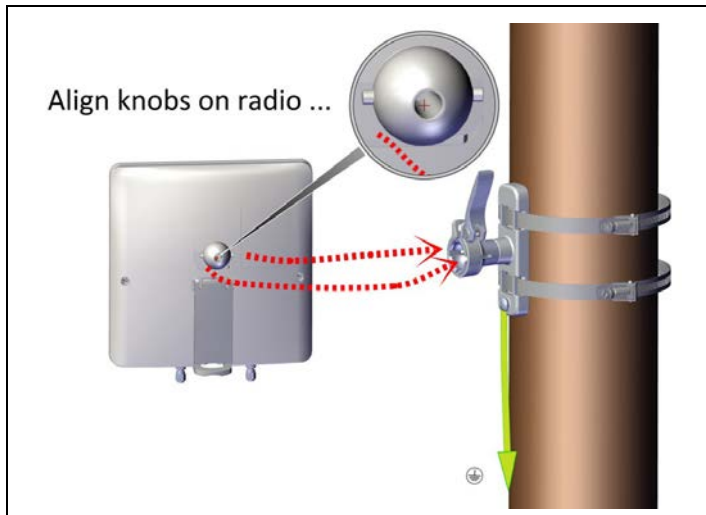
Figure 2-38: Ground: SU PRO/AIR radio unit

## 2.10 Mounting the SU PRO/AIR Radio Unit

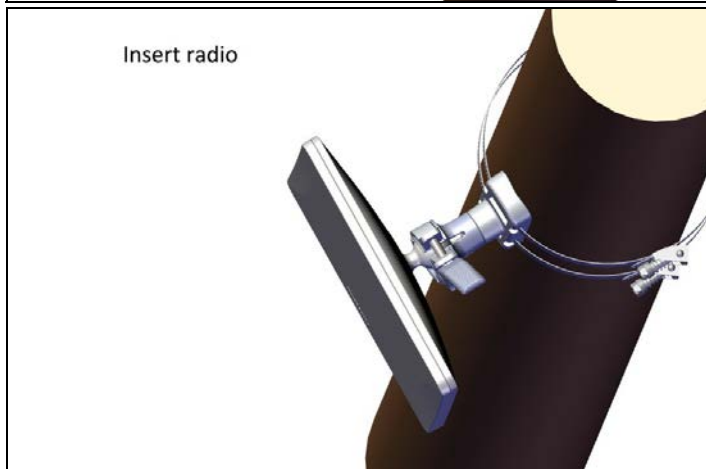
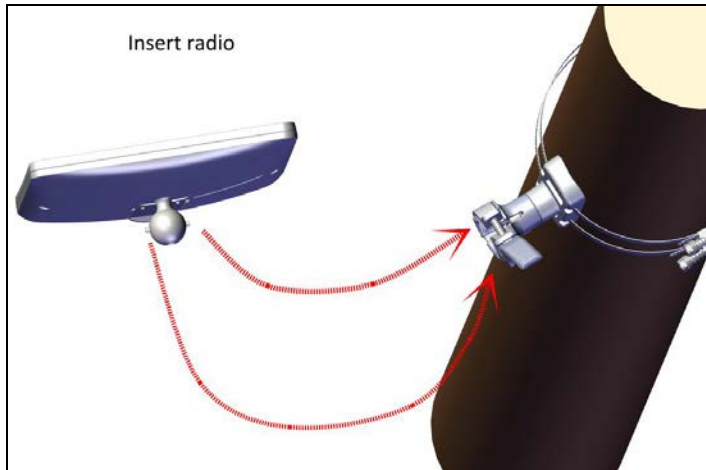
1. Open the clamp (for radio unit):



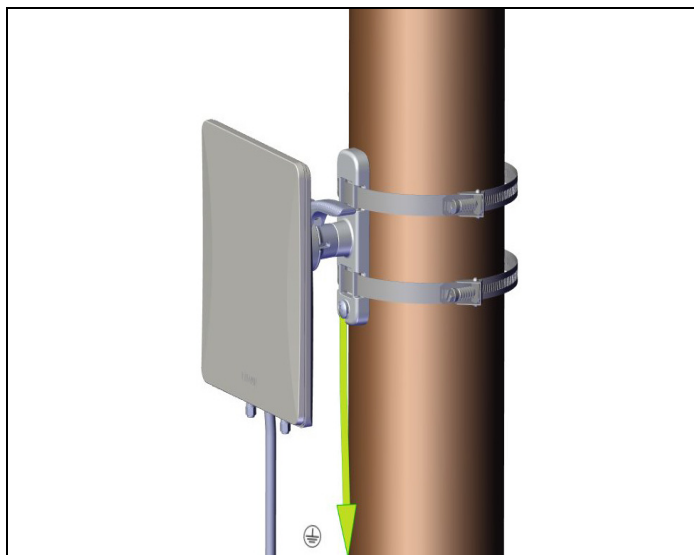
2. Position the radio unit so that the knobs on the mounting ball on the rear are opposite the slots on the mount:



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



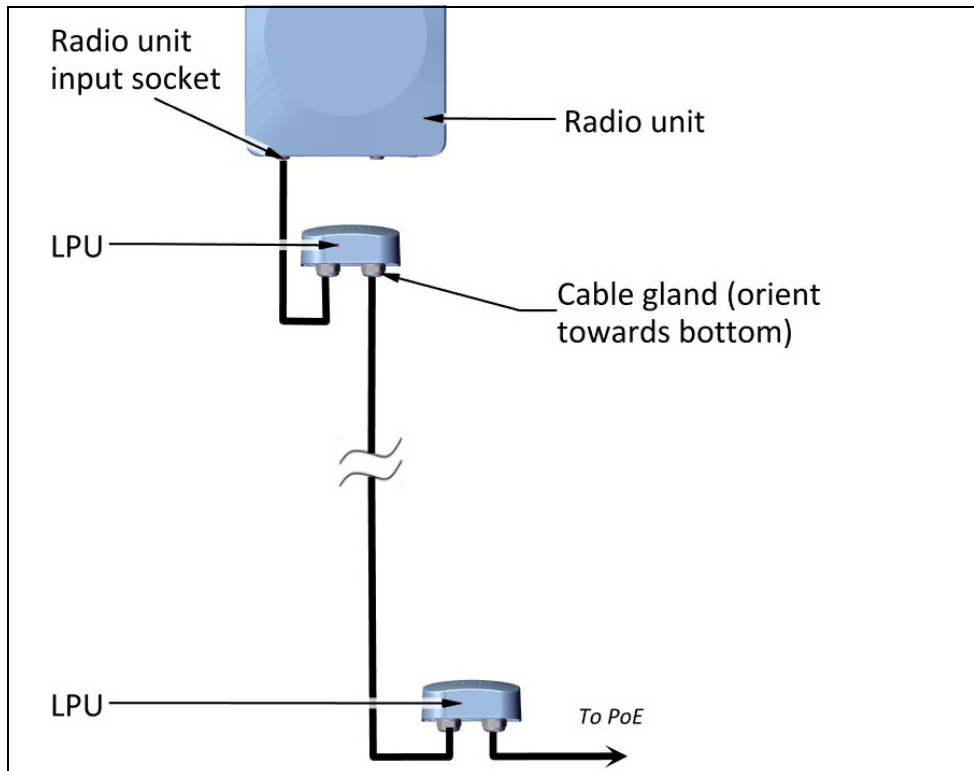
4. Close the clamp half-way:



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

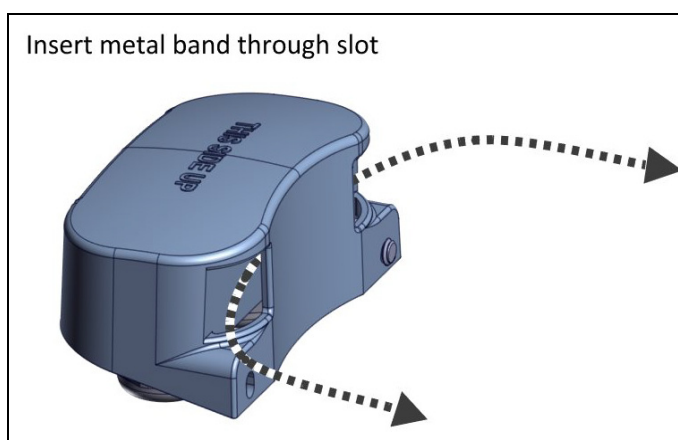
## 2.11 Mounting the Lightning Protection Units

- 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:



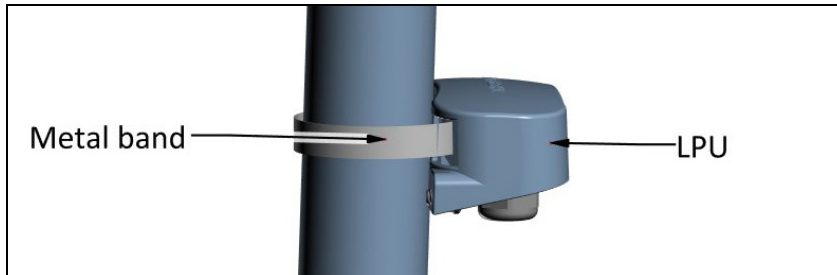
### 2.11.1 Mounting the LPU on a pole

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

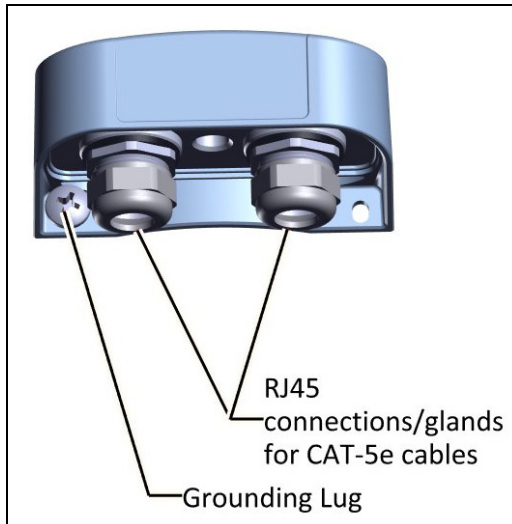




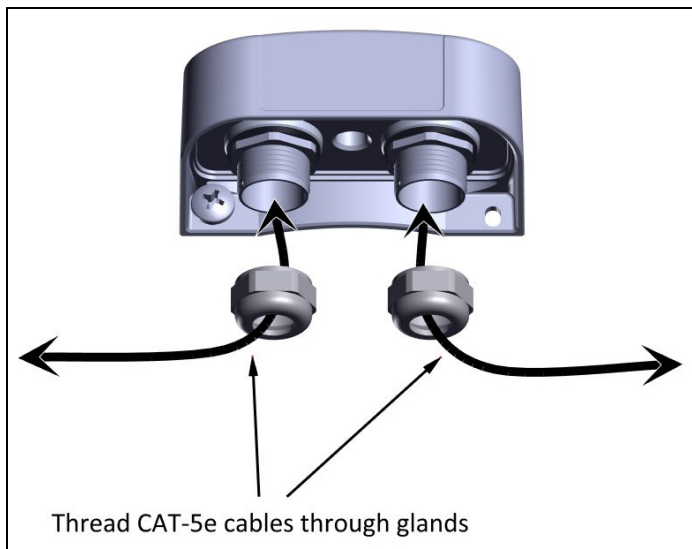
2. Tighten the metal band.



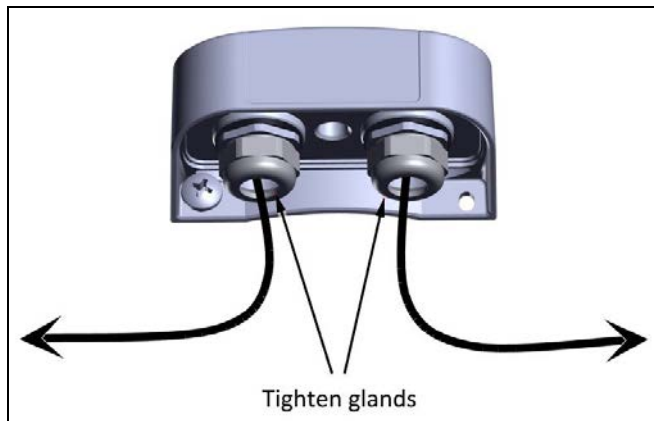
3. Connect the grounding lug to a ground source.



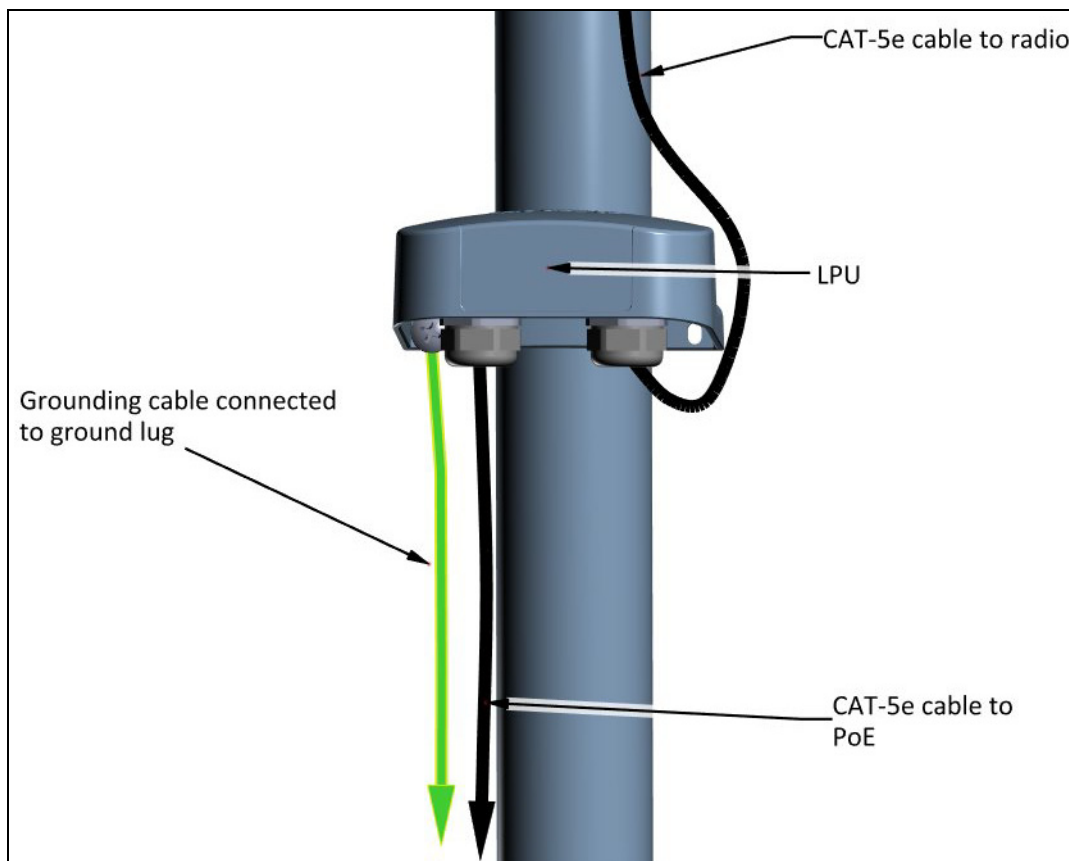
4. Remove the cable glands, and thread the CAT-5e cables through them:



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



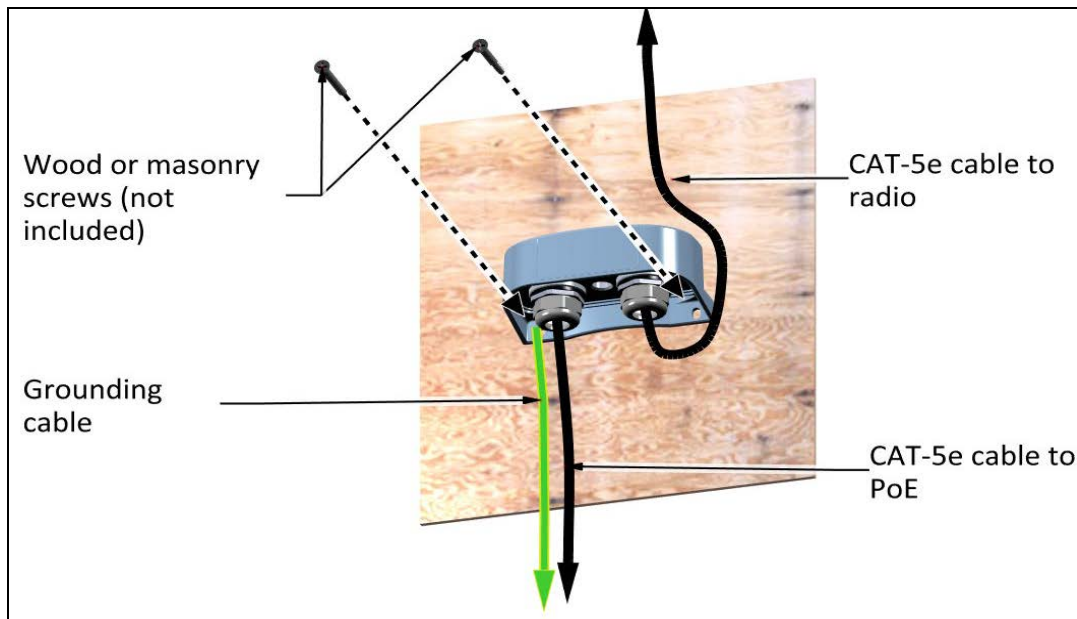
6. Route one CAT-5e cable up to the radio unit, and the other down to the PoE (via the lower LPU). An LPU installed on a pole is shown below:



## 2.11.2 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.



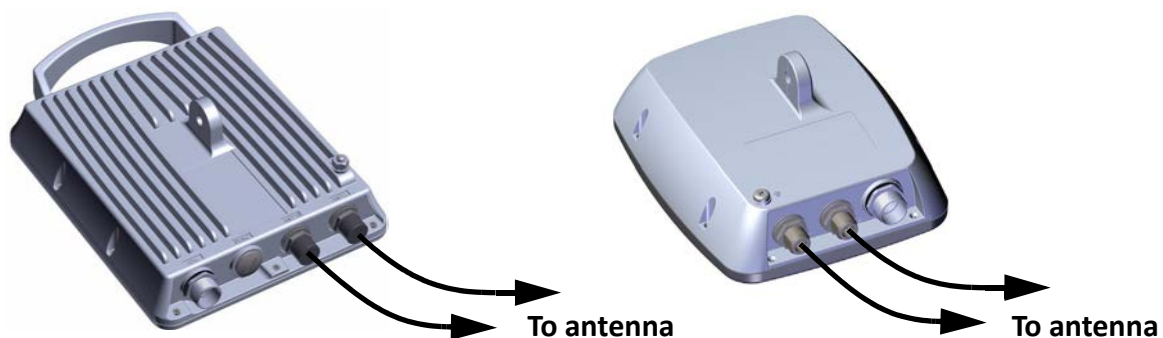
## 2.12 Connect External Antenna (if applicable)

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* radio units

### 2.12.1 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 2-17), 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).

## 2.12.2 SU PRO/AIR Units

### **Turbo Gain antenna**

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

- a. Connect the cables to the radio
- b. Seal the cables (see [Waterproofing](#) on page 2-32)
- 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**



You may need to re-align the unit.

### **External, non-integrated antenna**

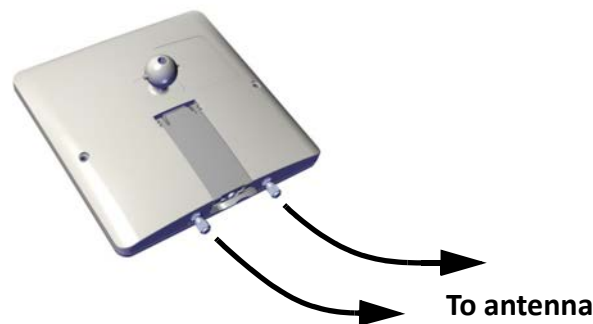
Follow these steps to connect an external, non-integrated to the SU *PRO*/*AIR* unit:

- 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 2-17).
- d. Connect the cables to the external, non-integrated antenna
- e. Seal the connectors on the external, non-integrated antenna (see [Waterproofing](#) on page 2-32)



Re-configure the unit as having an external antenna (see the RADWIN 5000 Configuration Guide).

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).

## 2.13 Waterproofing

Protect all outdoor connections<sup>1</sup> 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* unit



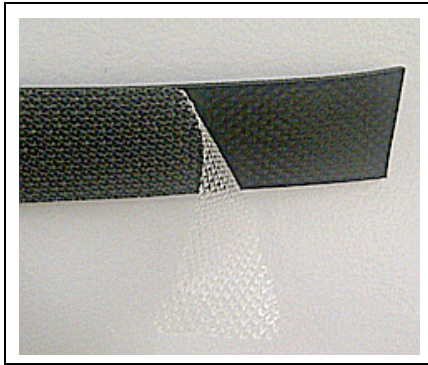


Figure 2-39: Sealant tape

Add tape as shown below.



Figure 2-40: Applying sealant tape to an external connection

## 2.14 Connect Radio (External Connections)

### 2.14.1 LFF, SFF and JET Units

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

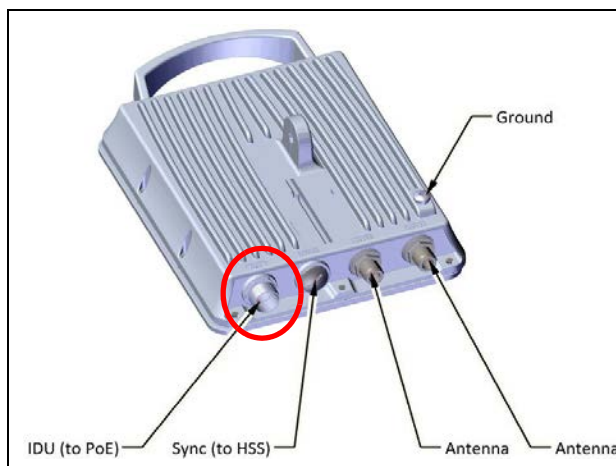


Figure 2-41: Input port: LFF unit (connection label: "IDU")

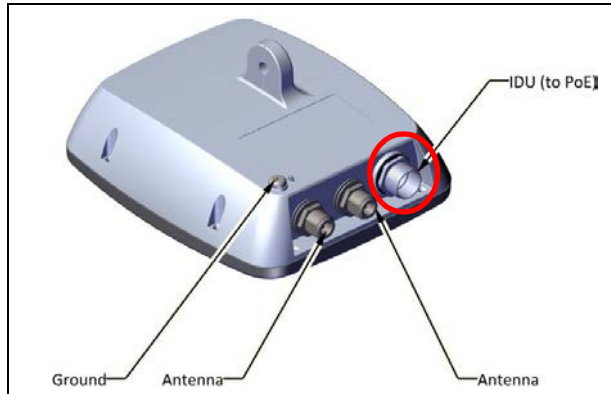


Figure 2-42: Input port: SFF unit (connection label: "IDU")

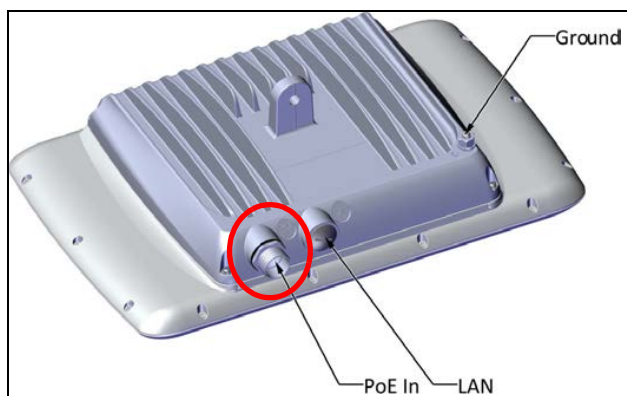


Figure 2-43: Input port: JET unit (connection label: "PoE In")

## 2.14.2 DUO 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 RADWIN Manager application :

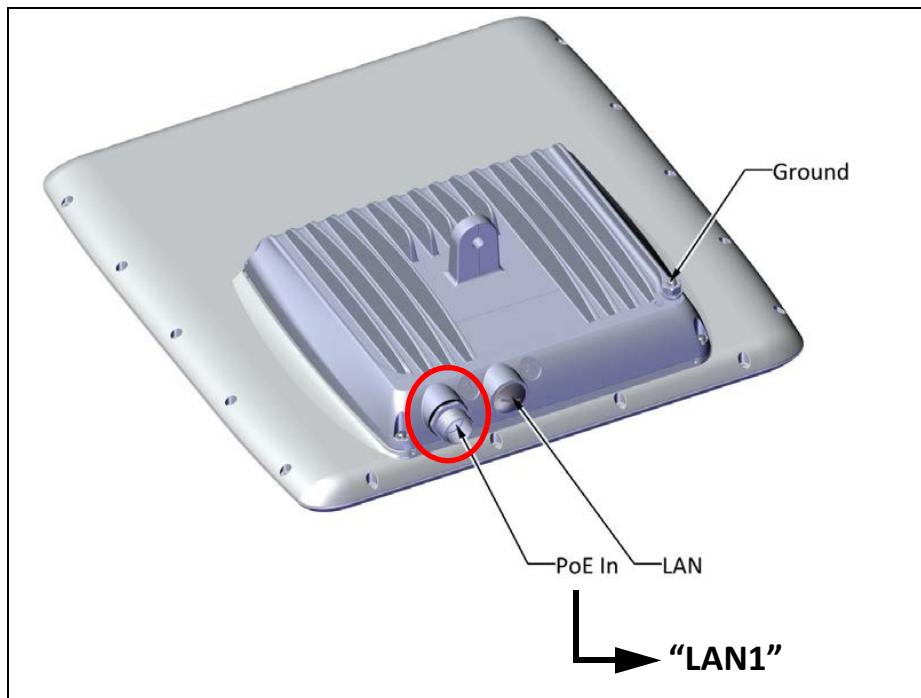


Figure 2-44: Input power and data port: DUO unit ("PoE IN" = LAN1)

2. Alternatively, you can use the SFP connection (labeled "LAN"), which provides management and data connection only (no power). This connection is referred to as "LAN2" in the RADWIN Manager application. Note that you must still connect a CAT-5e cable to "PoE In" to provide power:

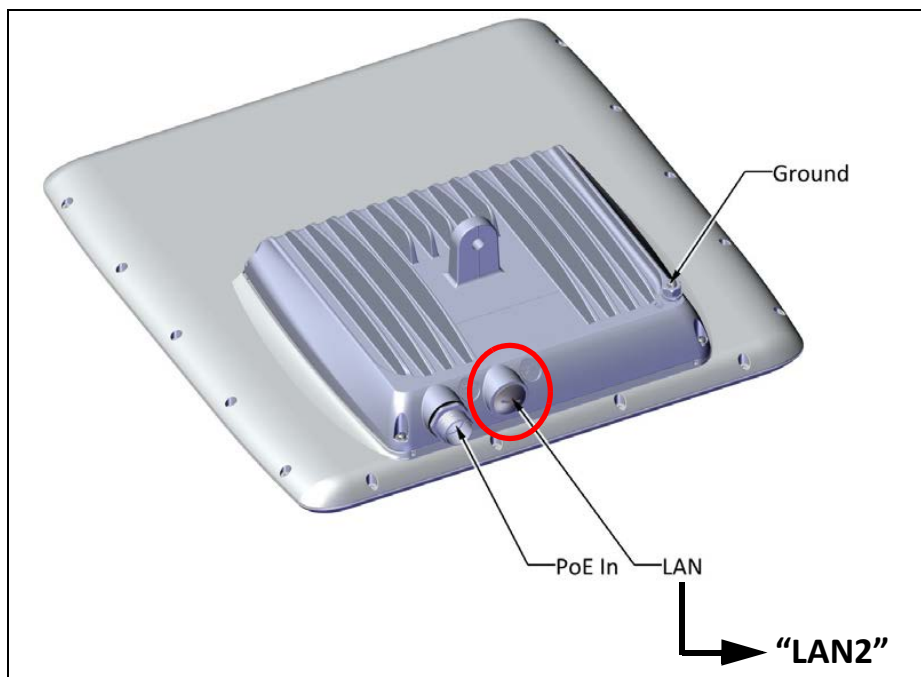


Figure 2-45: Input data port: DUO unit (LAN = "LAN2")

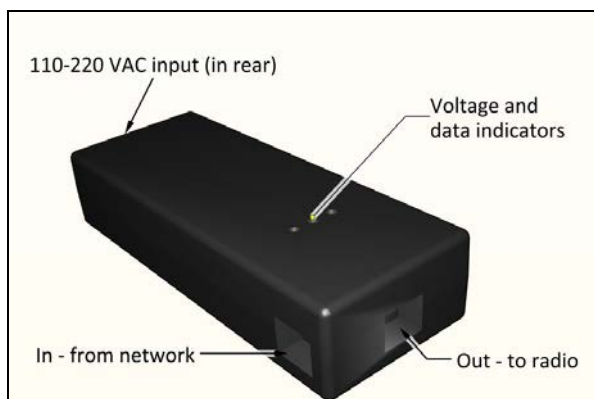
3. Add sealant tape to the connections (see ["Waterproofing"](#) on page 2-32.)



If you use the “LAN” port for management or data, it must be configured properly. See the RADWIN 5000 Configuration Guide for more details.

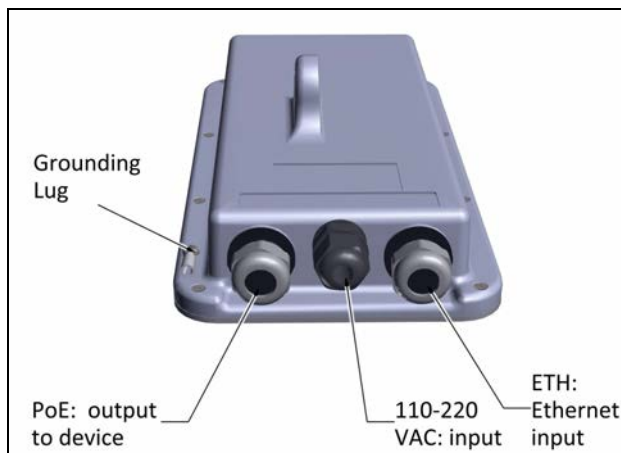
4. Route the CAT-5e and ground cables down from the radio to a PoE via 2 LPUs: one near the radio, one near the PoE. Fasten CAT-5e cable connections with a cable gland, add sealant tape.
5. Connect ground cable to ground.
6. Perform final connections via a PoE, depending on the type of PoE you are using, as follows:

### Indoor PoE



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

### Outdoor PoE



- a. Connect LAN cable to “ETH” port, fasten with cable gland, add tape.
- b. Connect ground cable.

- c. Connect power cable

## IDU-H

(The IDU-H does not support the beam-forming HBS (JET or DUO)).

The IDU-H is an aggregation switch with the functionality of six PoE devices. It is ideal for use at a base station having several collocated radios.

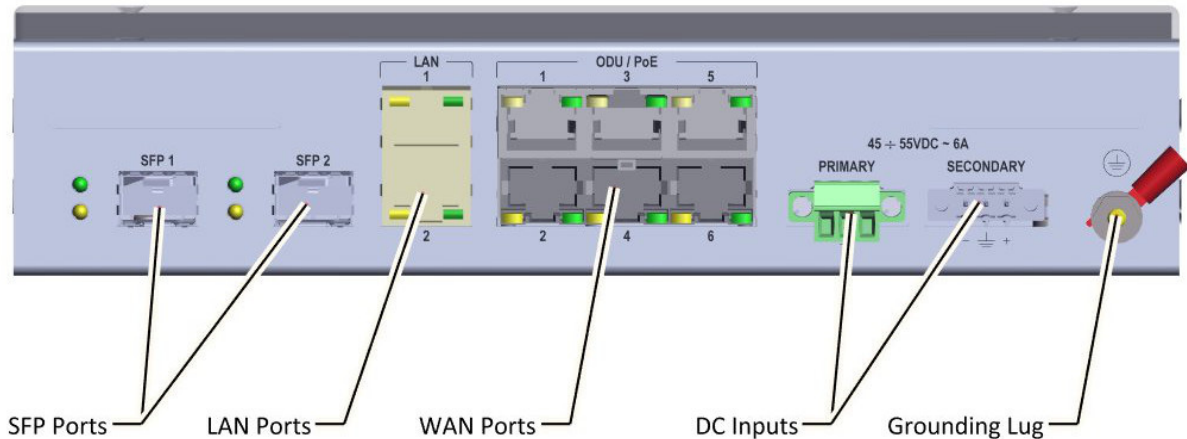


Figure 2-46: IDU-H

The IDU-H has the following connections:

- SFP ports
- LAN ports: Ethernet, supporting GbE.
- WAN 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 IDU-H:

- The IDU-H can sit on a table top, but is best installed in a rack.
- Connect the HBS IDU port to any of the six PoE ports of the IDU-H.
- The IDU-H has two LAN ports, either of which may be used for network connection.
- The IDU-H 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:

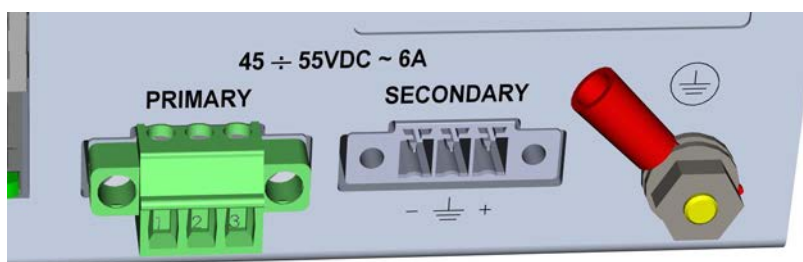
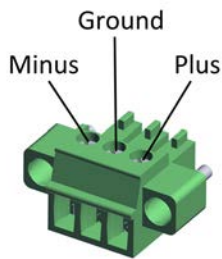


Figure 2-47: IDU-H power connectors and grounding lug.



- 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 IDU-H, always use an AC/DC adapter and power plug supplied by RADWIN.



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

## 2.14.3 SU PRO/AIR Units

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

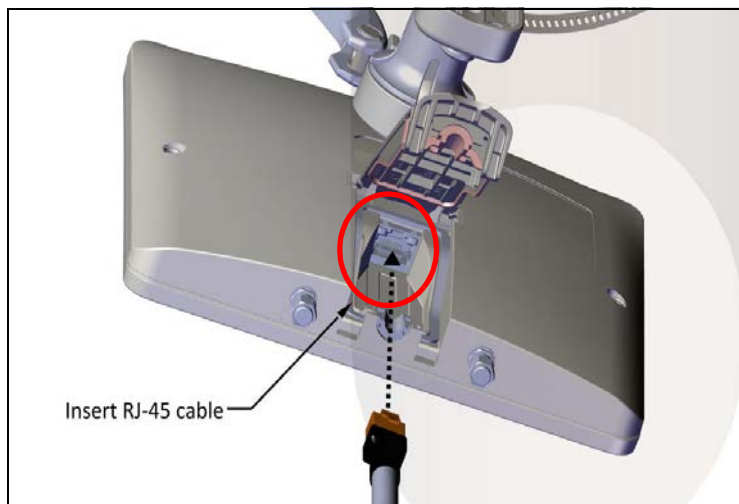
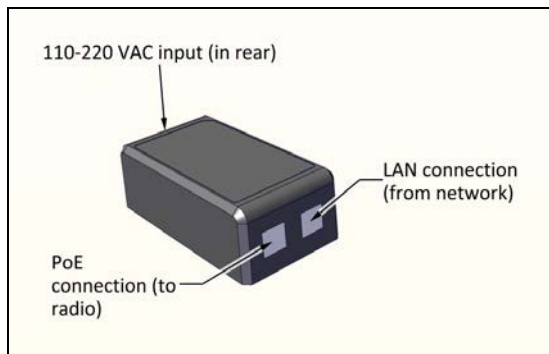


Figure 2-48: Input port: SU PRO/AIR unit  
Connection label: None

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. Fasten CAT-5e cable connections with gland, add sealant tape.
3. Connect ground cable to ground.
4. Perform final connections via the SU PRO/AIR PoE:



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

## 2.15 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 RADWIN JET DUO (labeled “LAN”) for communications and management purposes only.
2. From a command line, ping radio using radio’s IP address.

## 2.16 Activate Base Station

Applicable only if you are installing a base station.

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 RADWIN JET DUO (labeled “LAN”) for communications and management purposes only.
2. Log on to the RADWIN Manager application as “Installer”.
3. Enter IP address of Base Station (HBS).
4. From main window of the RADWIN Manager application, click **Activate**.
5. Follow wizard instructions to activate radio.

## 2.17 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:

### 2.17.1 LFF and SFF Units

#### 1. Align the unit horizontally (in azimuth):

- Swivel the unit  $90^{\circ}$  to the left slowly,  $180^{\circ}$  to the right, and then  $90^{\circ}$  back towards the base station.

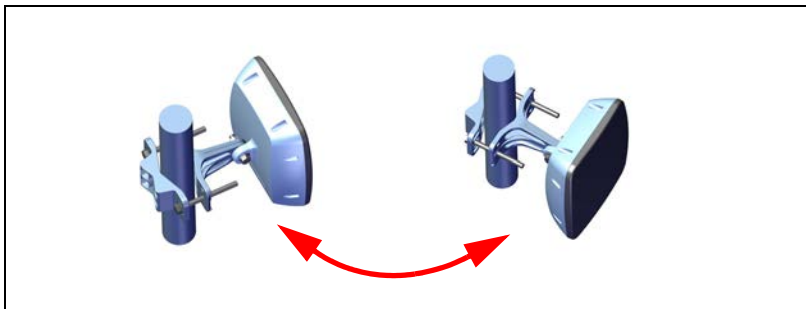


Figure 2-49: Swivel horizontally (SFF unit shown)

- 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.

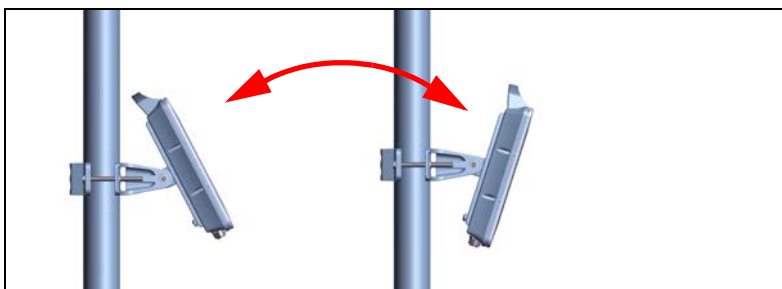
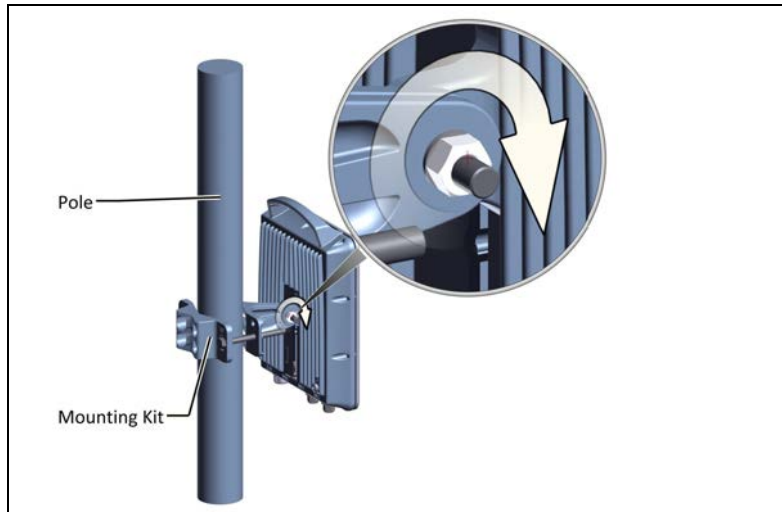


Figure 2-50: Swivel vertically (LFF unit shown)

- 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 RADWIN Manager application.

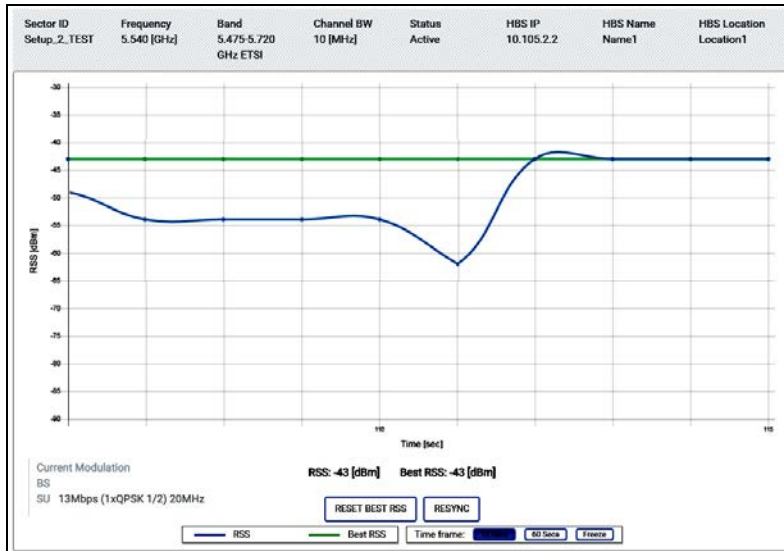
## 2.17.2 SU PRO/AIR Units

1. Connect to the unit via WiFi using a smartphone.
2. Using WINTouch:
  - Operate the WINTouch application, and follow its instructions.



3. Using the Web Interface:
  - a. Using a PC or laptop: access the web interface (enter the unit's IP address in a web browser)
  - b. Log in using username **admin** and password **netman**.
  - c. Activate the device by clicking **Tools -> Operations -> Functions -> Device Activation**.
  - d. You can continue with a PC or a smartphone: Click **Tools -> Antenna Alignment**.

- e. A graph will appear showing the real-time RSS value and the best RSS value for the test period. While referring to the real-time RSS value, do the following:
- f. 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.



- g. Repeat the above in elevation.

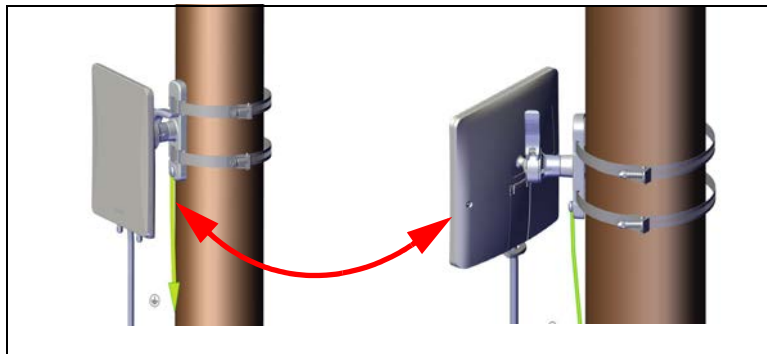


Figure 2-51: Swivel horizontally

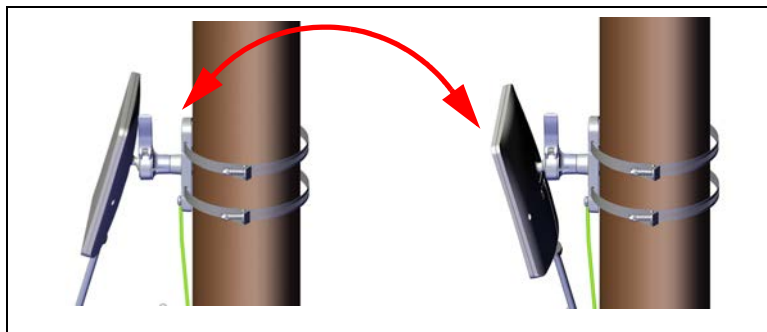


Figure 2-52: Swivel vertically



4. Once alignment is complete, tighten the arm on the mounting kit (see [Figure 2-53](#) for the SU PRO/AIR, see [Figure 2-33](#) for an external antenna).
5. If the unit requires more tightening, use the hex screw with a 5mm hex key as shown in [Figure 2-54](#).

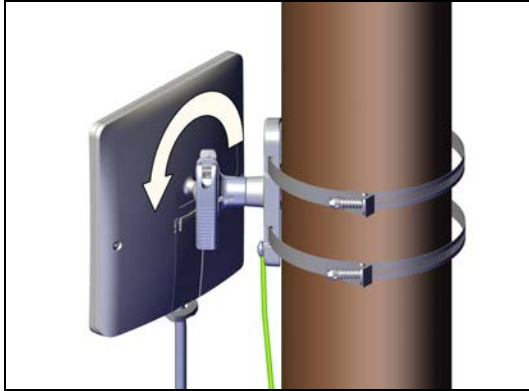


Figure 2-53: Tighten arm on mount: SU PRO/AIR radio unit

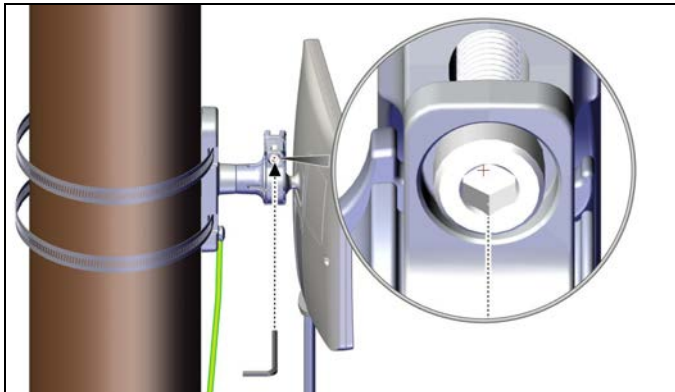


Figure 2-54: Use hex screw to further tighten arm on mount: SU PRO/AIR radio unit

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# Chapter 3: Safety Practices and Provisions

## 3.1 Scope of this Chapter

This chapter describes various safety practices.

### 3.1.1 Preventing Overexposure to RF Energy

To protect against overexposure to RF energy, install the radio units so as to provide and maintain minimal separation distances from all persons.

When the system is operational, avoid standing directly in front of the antenna. Strong RF fields are present when the transmitter is on. The radio unit must not be deployed in a location where it is possible for people to stand or walk inadvertently in front of the antenna.

### 3.1.2 Grounding

All RADWIN products should be grounded during operation. In addition:

- All ODUs should be grounded by a wire with diameter of at least **10 AWG**.
- The ground lug on an IDU-H should be connected to the protective earth at all times, by a wire with a diameter of **18 AWG** or wider.
- Rack-mounted equipment should be mounted only in grounded racks and cabinets.

Further, you should -

- Always make the ground connection first and disconnect it last
- Never connect telecommunication cables to ungrounded equipment
- Ensure that all other cables are disconnected before disconnecting the ground

### 3.1.3 Protection against Lightning

The use of lightning protection is dependent on regulatory and end user requirements. All RADWIN outdoor units are designed with surge limiting circuits to minimize the risk of

damage due to lightning strikes. RADWIN recommends the use of additional surge arrestor devices to protect the equipment from nearby lightning strikes.

### 3.1.4 General

- It is recommended that installation of outdoor units be contracted to a professional installer
- Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts
- Use extreme care when installing antennas near power lines
- Use extreme care when working at heights
- When using an AC power source for RADWIN devices, always use the AC power adapter supplied by RADWIN
- Use the right tools!
- Do not mount a radio unit upside down or horizontally. Doing this may void your product warranty.

### 3.1.5 Internal ESD Protection circuits

RADWIN equipment is designed to meet the ETSI/FCC/Aus/NZ/CSA EMC and Safety requirements. To fulfill these requirements, the system's Telecom lines at the radio unit/PoE are Transformer-isolated and include internal ESD (Electro-Static-Discharge) Protection circuits.



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When installing an AC powered HSU: To maintain Overvoltage (Installation) Category II, install a suitable surge suppressor device in the branch circuit to limit expected transients to Overvoltage Category II values.

The limits are based on IEC60664 and are also located in Table 2H of UL60950 (for mains  $\leq 150V$ , the transient rating is 1500V; for  $150V < \text{mains} \leq 300V$ , the transient rating is 2500V; and for  $300V < \text{mains} \leq 600V$ , the transient rating is 4000V).

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# Appendix A: Terminology

Table A-1: Terminology (Sheet 1 of 3)

Term	Description
Assured throughput	Actual number of timeslots allocated to a radio unit.
ACS	Automatic Channel Selection. Option that instructs the radio to choose which frequency to use. Enabling or disabling this option has various ramifications as shown in the documentation.
ATPC	Automatic Transmit Power Control
BE	Best Effort: A level of priority for traffic in which users receive dynamic resource allocation according to overall demand. They are not guaranteed resources. See also <a href="#">CIR</a> .
BS	Base Station: a radio that can transmit and receive to more than one point. See also HBS
CIR	Committed Information Rate: A level of priority for traffic in which users receive a guaranteed percentage of resources in addition to dynamic resources if available. See also <a href="#">BE</a> .
CPE	Customer Premises Equipment
DBA	Dynamic Bandwidth Allocation: a method that allocates bandwidth between the various users of that same bandwidth in the network.
DHCP	Dynamic Host Configuration Protocol: a protocol that automatically assigns IP addresses and other network configuration parameters.
Diversity	A technique by which the reliability of a radio link is increased using multiple transmitting and receiving antennas, transmitting the same signal on all antennas.
Downlink	Data traffic from an HBS to an HSU, or Data traffic from an RT-A to an RT-B
DUO	Dual Band base station

Table A-1: Terminology (Sheet 2 of 3)

Term	Description
EIRP	Equivalent (or Effective) Isotropically Radiated Power: The power that an antenna must emit to produce the peak power density in the direction of maximum antenna gain. In our cases, this is usually: System Tx Power + Antenna Gain - Cable Loss.
FAA	Federal Aviation Administration. A U.S. federal office that manages aviation regulations throughout the United States.
Fixed (HSU)	A “fixed” HSU remains in one location, as contrasted with a nomadic or mobile HSU, which does not remain in one location.
GHSS	GPS Hub Site Synchronization
HBS	High capacity Base Station. Same as a BS
HMU	High capacity Mobility (subscriber) Unit. Similar to an HSU, but can be mobile.
HSC	Hub Sync Client: When using Hub Site Synchronization, one unit is a master (generates the sync pulses), and the other units are clients.
HSM	Hub Sync Master: When using Hub Site Synchronization, one unit is a master (generates the sync pulses), and the other units are clients.
HSU	High capacity Subscriber Unit. Same as an SU
ISU	Integrated Synchronization Unit: a network device that provides a synchronization signal to underground HBSs.
ITHO	Intra-train handover mechanism
LFF	Large Form-Factor
MIMO	Multiple In, Multiple Out. A technique by which the capacity of a radio link is increased using multiple transmitting and receiving antennas, transmitting a different signal on all antennas.
MIR	Maximum Information Rate
Mobile (HSU)	A “mobile” HSU can move from location to location and provide service while it moves or when it is stationary.
Nomadic (HSU)	A “nomadic” HSU move from location to location but can only provide service when it is stationary.
ODU	Outdoor Unit: a generic term for any radio, and can usually be exchanged for HBS or HSU.
PtMP	Point to Multi-Point: link from an HBS to several HSUs
PtP	Point to Point
RADIUS	Remote Authentication Dial-In User Service



Table A-1: Terminology (Sheet 3 of 3)

Term	Description
QoS	Quality of Service
SBM	Smart Bandwidth Management
Sector	A group of radios that consists of one HBS and several HSUs that communicate with the HBS.
SFF	Small Form-Factor
SLA	Service Level Agreement
SSM	Synchronization Status Message: Provides traceability of synchronization signals, and is used in the Synchronous Ethernet standard of communication.
SU	Subscriber Unit: a radio that can transmit and receive to one point. See also HSU
Sync E or SyncE	Synchronous Ethernet: A standard of communication for ethernet that provides a synchronization signal to network elements that need such a signal.
TBS	Transportation Base Station. Similar to an HBS or BS, but used with high-speed transportation applications.
TDWR	Terminal Doppler Weather Radar: a type of radar station used in the U.S. and other countries for weather reporting. If a radio unit is installed close enough to one of these stations, the FCC requires that certain actions must be taken on the part of the customer. Regulations in other countries varies.
TMU	Transportation Mobile Unit. Similar to an SU
Track Side	Items or subject matter that relates to the environment <b>not</b> on or inside the train. It is not limited to precisely next to the track.
Train Side	Items or subject matter that relates to the environment on or inside the train itself.
Uplink	Data traffic from an HSU to an HBS, or Data traffic from an RT-B to an RT-A
VMU	Vehicular Mobile Unit
WI	Web Interface: web-based application that provides simple configuration capabilities for the radio units.
WISPA	Wireless Internet Service Provider Association. An organization that manages registration of wireless devices that operate close to TDWR facilities run by the FAA.

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# Appendix B: Wiring Specifications

## B.1 Scope of this Appendix

This appendix shows wiring specifications for the HBS and HSU.

### B.1 Radio unit-PoE Cable (HBS and HSU)

The radio unit-PoE cable is shielded/outdoor class CAT-5e, 4 twisted-pair 24 AWG terminated with RJ-45 connectors on both ends. A cable gland on the radio unit side provides hermetic sealing.

The following table shows the connector pinout:

*Table B-1: Radio unit-PoE RJ-45 Connector Pinout*

Function	Color	PoE	ODU
Rx N	White/Green	1	1
Rx T	Green	2	2
Tx T	White/Orange	3	3
Tx N	Orange	6	6
Power (+)	Blue	4	4
Power (+)	White/Blue	5	5
Power (-)	White/Brown	7	7
Power (-)	Brown	8	8

Table B-2: LAN-GbE PoE RJ-45 Connector Pinout

Function	Color	PoE	LAN
TxRx A	White/Green	1	1
TxRx A	Green	2	2
TxRx B	White/Orange	3	3
TxRx B	Orange	6	6
TxRx C & Power(+)	Blue	4	4
TxRx C & Power(+)	White/Blue	5	5
TxRx D & Power(-)	White/Brown	7	7
TxRx D & Power(-)	Brown	8	8

## B.2 User Port Connectors

### B.2.1 LAN Port

The LAN 10/100BaseT interface terminates in an 8-pin RJ-45 connector, wired in accordance to [Table B-3](#).

Table B-3: Fast Ethernet Connector Pinout

Function	Signal	Pin
Transmit Data (positive)	TD (+)	1
Transmit Data (negative)	TD (-)	2
Receive Data (positive)	RD (+)	3
Receive Data (negative)	RD (-)	6

## B.3 DC Power Terminals

### B.3.1 DC PoE

DC power terminals are as follows:

Table B-4: Terminal Block 2-pin -48VDC

Function	Pin
+	Right
-	Left

## B.4 SU2-AC Power Terminal

The SU2-AC power port is a four pin male socket with pin assignments as follows:

*Table B-5: SU2-AC power pin assignments*

	Pin	Wire Color	Function
	1	Red	Line
	2		Not used
	3	Black	Neutral
	4	Green or Green-Yellow	Ground

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# Appendix C: About Antennas

## C.1 Scope of this Appendix

This appendix provides some basic information and considerations regarding antennas and what you need to take into account when configuring antenna parameters.

## C.1 Antenna Issues

The choice of Tx Power, antenna gain and cable loss (between the radio and the antenna) determines the EIRP and is affected by such considerations as radio limitations and regulatory restrictions.

Before proceeding to antenna installation details, the following background information should be considered:

## C.2 About Single and Dual Antennas

Each RADWIN 5000 HPMP ODU is made of two radio transceivers (radios). The radios make use of algorithms that utilize both Spatial Multiplexing (also called MIMO) and Diversity resulting in enhanced capacity, range and link availability. The number of antennas (i.e. radios) used is determined by user configuration and by automatic system decisions, explained below.

### C.2.1 Dual Antennas at the HBS and an HSU

When using dual antennas at both sites (single bipolar antenna or two mono-unipolar antennas) you can choose between Spatial Multiplexing Mode and Diversity Mode.

#### ***Spatial Multiplexing Mode***

Under this mode, the system doubles the link capacity. At the same time, it keeps the same rate and modulation per radio as was used with single antenna, thus increasing capacity, range and availability.



For example with a dual antenna RADWIN 5000 HPMP can transmit at modulation of 64QAM and FEC of 5/6 and get an air rate of 130 Mbps, compared to 65 Mbps with single antenna.

To work in this mode, each antenna port must be connected to an antenna, the RSS level in both receivers should be balanced and a minimal separation between the antennas must be maintained. (For example, by using dual polarization antennas a cross polarization separation is attained).

Upon selecting Antenna Type as Dual, RADWIN 5000 HPMP automatically selects this mode and doubles the air rates.

RADWIN Manager indicates a case of unbalanced RSS between the two antennas in the HBS panels.

### **Diversity Mode**

Diversity Mode uses two antennas to improve the quality and reliability of the link. Often, there is not a clear line-of-sight (LOS) between transmitter and receiver. Instead the signal is reflected along multiple paths before finally being received.

Each such “bounce” can introduce phase shifts, time delays, attenuations, and even distortions that can destructively interfere with one another at the aperture of the receiving antenna. Antenna diversity is especially effective at mitigating these multi-path situations.

This is because multiple antennas afford a receiver several recordings of the same signal. Each antenna will be exposed to a different interference environment. Thus, if one antenna is undergoing a deep fade, it is likely that another has a sufficient signal. Collectively such a system can provide a robust link.

Antenna diversity requires antenna separation which is possible by using a dual-polarization antenna or by two spatially separated antennas.

Use Diversity instead of Spatial Multiplexing in the following situations:

- When the system cannot operate in Spatial Multiplexing Mode
- When one of the receivers has high interference compared to the second receiver (i.e. the system is “unbalanced”)
- When you achieve higher capacity in Diversity Mode than in Spatial Multiplexing Mode
- When high robustness is of importance and the capacity of Diversity Mode is sufficient (up to 25 Mbps full duplex)

## **C.2.2 Single Antennas at Both Sites**

By selecting a single antenna at the HBS and HSU, the ODUs operate with a single radio that is connected to the ANT 1 connector. The second radio is automatically shut down.

## **C.2.3 Single at One Site, Dual Antennas at the Other**

In this mode one of the sites uses the ODU with a single antenna while the other site uses the ODU with a dual antenna.

The advantages in this mode in comparison to using a single antenna in both sites are doubled total Tx Power and additional polarization and/or space diversity (depending on the polarization of installed antennas).

The air rates used in this mode are same as when using single antennas in both sites.

Table C-1 summarizes the situation: (SM =Spatial Multiplexing)

Table C-1: Spatial Multiplexing - Diversity settings

Number of Antennas		Mode		Max Full Duplex Capacity
Site A	Site B	Site A	Site B	
2	2	Spatial Multiplexing	Spatial Multiplexing	50 Mbps
		Diversity	Diversity	25 Mbps
2	1	Diversity	Single	25 Mbps
1	2	Single	Diversity	25 Mbps
1	1	Single	Single	25 Mbps

Site A and B may be HBS or HSU.

## C.3 Considerations for Changing Antenna Parameters

Let:

**max Available Tx Power** denote the maximum Tx Power practically available from an ODU. (It appears as **Tx Power per Radio**.)

**maxRegEIRP** denote the maximum EIRP available by regulation. It will be determined by three factors:

- per band/regulation
- per channel bandwidth
- antenna gain

**maxRegTxPower** denote the maximum regulatory Tx Power for the equipment, also having regard the above three points.

Then, the following relationship must be satisfied:

$$\text{maxAvailableTxPower} \leq \min(\text{maxRegEIRP} - \text{AntennaGain} + \text{CableLoss}, \text{maxRegTxPower}) \quad \dots (*)$$

The Tx Power (per radio) indicates the power of each radio inside the ODU and is used for Link Budget Calculations. The Tx Power (System) shows the total transmission power of the ODU and is used to calculate the EIRP according to regulations.



- The Max EIRP level will be automatically set according to the selected band and regulation.

The inequality (\*) above is always satisfied by the system in accordance with the relevant regulation.

The precise relationship between the items in inequality (\*) is as follows:

- Required Tx Power (per radio) will be adjusted down to the lesser of the value entered and **maxAvailableTxPower**
- Tx Power (system) is **maxAvailableTxPower + 3** (for 2 radios)
- Max EIRP is **maxRegEIRP**.
- EIRP is **maxAvailableTx Power + Antenna Gain - Cable Loss**

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# Appendix D: Regional Notice: French Canadian

## D.1 Procédures de sécurité

### D.1.1 Généralités

Avant de manipuler du matériel connecté à des lignes électriques ou de télécommunications, il est conseillé de se défaire de bijoux ou de tout autre objet métallique qui pourrait entrer en contact avec les éléments sous tension.

### D.1.2 Mise à la terre

Tous les produits RADWIN doivent être mis à la terre pendant l'usage courant. La mise à la terre est assurée en reliant la fiche d'alimentation à une prise de courant avec une protection de terre. En outre:

- La cosse de masse sur l'IDU-C doit être constamment connectée à la protection de terre, par un câble de diamètre de 18 AWG ou plus. Le matériel monté sur rack doit être installé seulement sur des racks ou armoires reliés à la terre
- Une ODU doit être mise à la terre par un câble de diamètre de 10 AWG ou plus
- Il ne doit pas y avoir de fusibles ou d'interrupteurs sur la connection à la terre

De plus:

- Il faut toujours connecter la terre en premier et la déconnecter en dernier
- Il ne faut jamais connecter les câbles de télécommunication à du matériel non à la terre
- Il faut s'assurer que tous les autres câbles sont déconnectés avant de déconnecter la terre

### D.1.3 Protection contre la foudre

L'utilisation de dispositifs de protection contre la foudre dépend des exigences réglementaires et de l'utilisateur final. Toutes les unités extérieures RADWIN sont conçues avec des circuits de limitation de surtension afin de minimiser les risques de dommages dus à

la foudre. RADWIN conseille l'utilisation d'un dispositif de parafoudre supplémentaire afin de protéger le matériel de coups de foudre proches.

### Matériel supplémentaire requis

L'équipement requis pour l'installation du matériel est le suivant:

- Pince à sertir RJ-45 (si un câble pré-assemblé ODU/IDU n'est pas utilisé)
- Perceuse (pour le montage sur mur seulement)
- Câbles de terre IDU et ODU
- Clef 13 mm (½")
- Câble ODU - IDU si non commandé (type extérieur, CAT-5e, 4 paires torsadées, 24 AWG)
- Colliers de serrage
- Ordinateur portable avec Windows 2000 ou Windows XP.

## D.1.4 Précautions de sécurité pendant le montage de ODU

Avant de connecter un câble à l'ODU, la borne protectrice de masse (visse) de l'ODU doit être connectée à un conducteur externe protecteur ou à un pylône relié à la terre. Il ne doit pas y avoir de fusibles ou d'interrupteurs sur la connection à la terre.

Seulement un personnel qualifié utilisant l'équipement de sécurité approprié doit pouvoir monter sur le pylône d'antenne. De même, l'installation ou le démontage de ODU ou de pylônes doit être effectuée seulement par des professionnels ayant suivi une formation.

### ➤ Pour monter l'ODU:

1. Vérifier que les supports de fixation de l'ODU sont correctement mis à la terre.
2. Monter l'unité ODU sur le pylône ou sur le mur; se référer à la [Installation sur pylône et mur](#) au dessous.
3. Connecter la câble de terre au point de châssis sur l'ODU.
4. Relier le câble ODU-IDU au connecteur ODU RJ-45.
5. Visser les presses-étoupe de câbles pour assurer le scellement hermétique des unités ODU.
6. Attacher le *câble au pylône ou aux supports en utilisant des colliers classés UV.*
7. Répéter la procédure sur le site distant.



Ne pas se placer en face d'une ODU sous tension.

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## D.1.5 Connecter la terre à IDU-C

Connecter un câble de terre de 18 AWG à la borne de masse de l'appareil. L'appareil doit être constamment connecté à la terre.





- Les appareils sont prévus pour être installés par un personnel de service.
- Les appareils doivent être connectés à une prise de courant avec une protection de terre.
- Le courant CC du IDU-C doit être fourni par l'intermédiaire d'un disjoncteur bipolaire et le diamètre du câble doit être de 14 mm avec un conduit de 16 mm.

## D.2 Installation sur pylône et mur

L' ODU ou l'O-PoE peuvent être montés sur un pylône ou un mur.

### D.2.1 Contenu du kit de montage ODU

Le kit de montage ODU comprend les pièces suivantes:

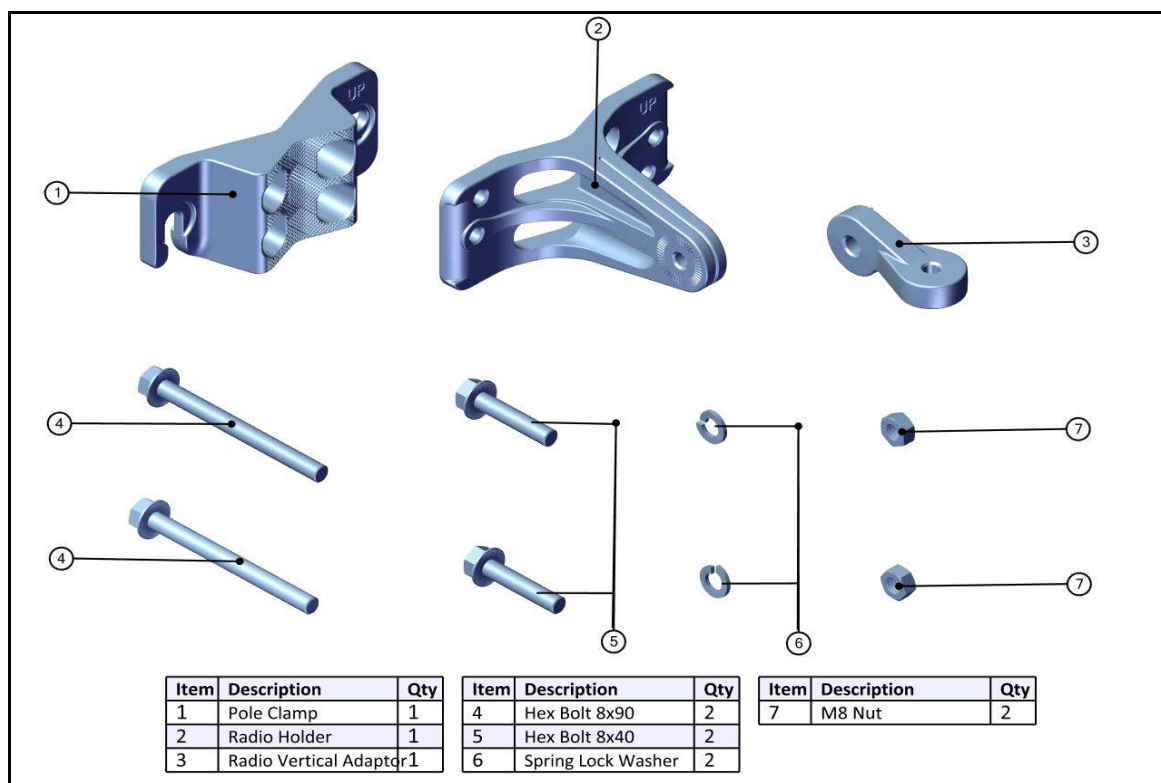


Figure D-1: Contenu du kit de montage ODU

## D.2.2 Montage sur un pylône

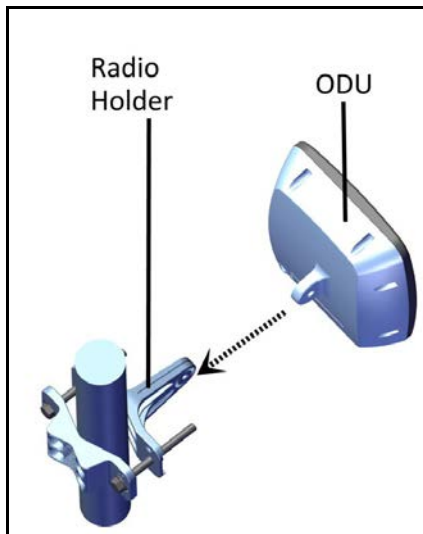


Figure D-2: Montage sur un pylône (1)

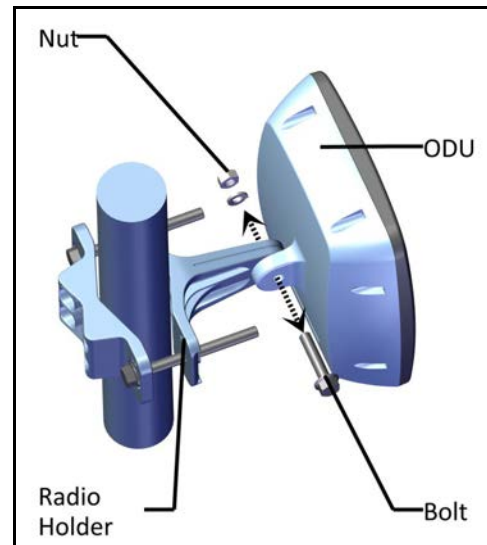


Figure D-3: Montage sur un pylône (2)

## D.2.3 Montage sur un mur

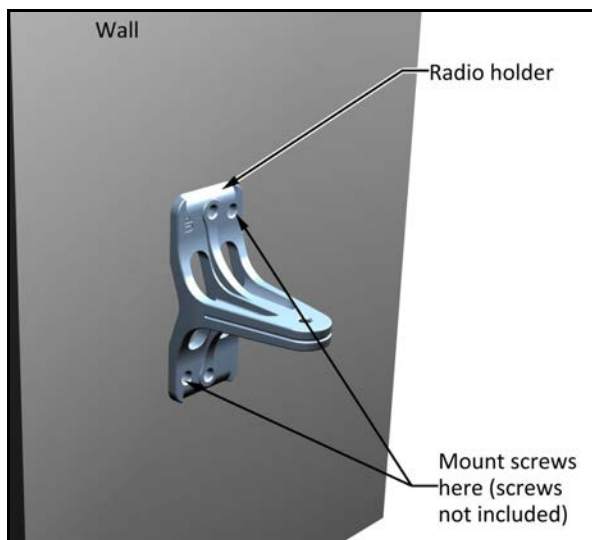


Figure D-4: Montage sur un mur (1)

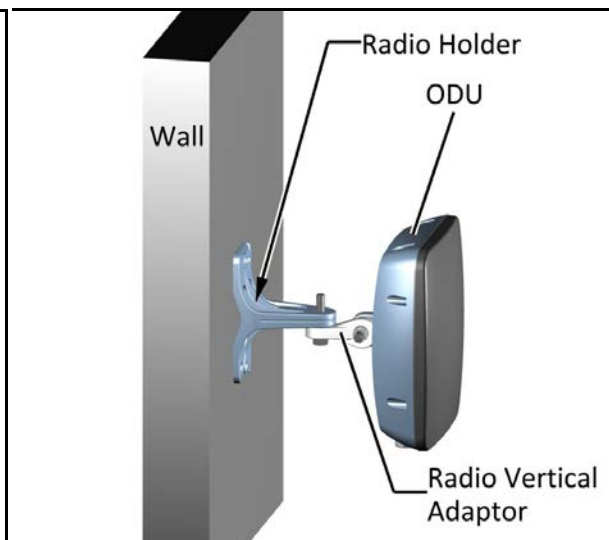


Figure D-5: Montage sur un mur (2)

## D.2.4 Montage d'une antenne externe

L'antenne externe optionnelle peut être montée sur un pylône.

## D.2.5 Contenu du kit de montage d'une antenne externe

Le kit de montage d'une antenne externe comprend les pièces suivantes

- Douze rondelles plates
- Huit rondelles élastiques
- Huit écrous hex

- Quatre boulons
- Un support en U
- Un support à pivotement
- Deux courroies de fixation en métal

➤ **Pour installer une antenne externe sur un pylône:**

1. Attacher le support en U à l'arrière de l'antenne en utilisant quatre rondelles plates, quatre rondelles élastiques et quatre écrous hex.
2. Attacher le support à pivotement au support en U en utilisant huit rondelles plates, quatre rondelles élastiques, quatre écrous hex et quatre boulons.
3. Passer les deux courroies de fixation par les fentes verticales dans le support à pivotement.
4. Attacher l'antenne au pylône en utilisant les deux courroies de fixation .

Ajuster l'inclinaison nécessaire en utilisant l'échelle angulaire et serrer tous les boulons et écrous à la position requise.

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# Appendix E: Certified Antennas

## E.1 For Deployment in US/Canada

Radio devices that bear the following FCC/IC IDs refer to [Table E-1](#) to [Table E-4](#) below:

**Contains FCC ID: Q3K- 5XACMOLD**

**Contains IC: 5100A- 5XACMOD**

Only the antennas shown in the tables below or antennas of the same type with lower gain are approved for use in this system. The antennas must be installed so as to provide a minimum separation distance from bystanders as specified in the tables below:

*Table E-1: Frequency Band 5725-5850 MHz*

Cat. No.	Type	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Integrated	Flat DP BS	11.0	120°	25	26
RW-9061-5004	Flat DP BS	11.0	120°	25	26
Integrated	Flat DP BS	12.0	95°	25	29
Integrated	Flat DP BS	13.0	90°	25	32
RW-9061-5001	Flat DP BS	14.0	90°	25	36
RW-9061-5002	Flat DP BS	15.5	60°	25	43
Integrated	Flat DP	16.0	35°	25	45
Integrated	Flat DP	16.5	35°	25	48
RW-9613-4960	Flat DP	23.0	8°	25	100
Integrated	Flat DP	23.5	8°	25	107
RW-9622-5001	Flat DP	29.0	5°	25	200
RW-9401-5002	Shark Fin SP	12.5	50°	25	30
RW-9721-5158	Dish DP	28.0	5.5°	25	178
RW-9732-4958	Dish DP	32.0	4°	25	314

Table E-2: Frequency Bands 5250-5350 MHz and 5470-5725 MHz

Cat. No.	Type	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Integrated	Flat DP BS	11.0	120°	16	20
RW-9061-5004	Flat DP BS	11.0	120°	16	20
Integrated	Flat DP BS	12.0	95°	15	20
Integrated	Flat DP BS	13.0	90°	14	20
RW-9061-5001	Flat DP BS	14.0	90°	13	20
RW-9061-5002	Flat DP BS	15.5	60°	11.5	20
Integrated	Flat DP	16.0	35°	11	20
Integrated	Flat DP	16.5	35°	10.5	20
RW-9613-4960	Flat DP	23.0	8°	4	20
Integrated	Flat DP	23.5	8°	3.5	20
RW-9622-5001	Flat DP	29.0	5°	-2	20
RW-9401-5002	Shark Fin SP	12.5	50°	14.5	20
RW-9721-5158	Dish DP	28.0	5.5°	-1	20
RW-9732-4958	Dish DP	32.0	4°	-5	20



Table E-3: Frequency Bands 5150-5250 MHz

Cat. No.	Type	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Integrated	Flat DP BS	11.0	120°	22	20
RW-9061-5004	Flat DP BS	11.0	120°	22	20
Integrated	Flat DP BS	12.0	95°	21	20
Integrated	Flat DP BS	13.0	90°	18	20
RW-9061-5001	Flat DP BS	14.0	90°	18	20
RW-9061-5002	Flat DP BS	15.5	60°	18	20
Integrated	Flat DP	16.0	35°	24	40
Integrated	Flat DP	16.0	35°	24	40
RW-9613-4960	Flat DP	23.0	8°	25	100
Integrated	Flat DP	23.5	8°	25	107
RW-9622-5001	Flat DP	29.0	5°	22	142
RW-9401-5002	Shark Fin SP	12.5	50°	21	20
RW-9721-5158	Dish DP	28.0	5.5°	19	90
RW-9732-4958	Dish DP	32.0	4°	19	142

Table E-4: Frequency Bands 4940-4990 MHz

Cat. No.	Type	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Integrated	Flat DP BS	11.0	120°	25	26
RW-9061-5004	Flat DP BS	11.0	120°	25	26
Integrated	Flat DP BS	12.0	95°	25	29
Integrated	Flat DP BS	13.0	90°	25	32
RW-9061-5001	Flat DP BS	14.0	90°	25	36
RW-9061-5002	Flat DP BS	15.0	60°	25	40
Integrated	Flat DP	14.0	35°	25	36
Integrated	Flat DP	16.0	35°	25	45
RW-9613-4960	Flat DP	23.0	8°	25	100
Integrated	Flat DP	21.0	8°	25	80
RW-9622-5001	Flat DP	29.0	5°	25	200
RW-9401-5002	Shark Fin SP	12.5	50°	25	30
RW-9721-5158	Dish DP	28.0	5.5°	25	178
RW-9732-4958	Dish DP	30.0	4°	25	225

The RADWIN SU *PRO/AIR* bears the following FCC/IC IDs on the label. Refer to [Table E-5](#) to [Table E-9](#) below:

**FCC ID: Q3K-5XACULC-X**

**IC: 5100A-5XACULC-X**

The RADWIN SU *PRO/AIR* must be installed so as to provide a minimum separation distance from bystanders as specified in the tables below:

*Table E-5: Frequency Band 5725-5850 MHz*

Cat. No.	Type	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Embedded	Flat DB	16.0	17.5° Hor 29.1° Ver	27	110
RW-9614-5359	Flat DB	23.0	10.0°	27	110

*Table E-6: Frequency Bands 5250-5350 MHz and 5470-5725 MHz*

Cat. No.	Type	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Embedded	Flat DB	16.0	17.5° Hor 29.1° Ver	10	20
RW-9614-5359	Flat DB	23.0	10.0°	4	20

*Table E-7: Frequency Band 5150-5250 MHz*

Cat. No.	Type	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Embedded	Flat DB	16.0	17.5° Hor 29.1° Ver	11	107
RW-9614-5359	Flat DB	23.0	10.0°	4	107

Table E-8: Frequency Band 4940-4990 MHz

Cat. No.	Type	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Embedded	Flat DB	14.0	17.5° Hor 29.1° Ver	17	43
RW-9614-5359	Flat DB	23.0	10.0°	17	43

Table E-9: Frequency Band 2400-2483.5 MHz WiFi

Cat. No.	Type	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
On Board	Printed	3.0	360°	26	110

The RADWIN 5000 JET bears the following FCC/IC IDs on the label, and refer to [Table E-10](#) to [Table E-13](#) below:

**FCC ID: Q3K-BFJET5X**

**IC: 5100A-BFJET5X**

The RADWIN 5000 JET must be installed so as to provide a minimum separation distance from bystanders as specified in the tables below:

Table E-10: Frequency Band 5725-5850 MHz

Operating Form	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Uniform	20.0	9.4°	13	96
Floodlight	11.0	60°	22	96

Table E-11: Frequency Bands 5250-5350 MHz and 5470-5725 MHz

Operating Form	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Uniform	20.0	9.4°	7	20
Floodlight	11.0	60°	16	20

Table E-12: Frequency Bands 5150-5250 MHz

Operating Form	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Uniform	20.0	9.4°	13	20
Floodlight	11.0	60°	13	20

Table E-13: Frequency Bands 4940-4990 MHz

Operating Form	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Uniform	17.0	9.4°	21	55
Floodlight	8.0	60°	21	55

The RADWIN JET DUO bears the following FCC/IC IDs on the label, and refer to [Table E-14](#) to [Table E-16](#) below:

**FCC ID: Q3K-JETDB5X3X**

**IC: 5100A-JETDB5X3X**

The RADWIN JET DUO must be installed so as to provide a minimum separation distance from bystanders as specified in the tables below:

Table E-14: Frequency Band 5725-5850 MHz

Operating Form	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Uniform	20.0	12°	13	32
Sharp	19.0	16°	14	32
Floodlight	11.0	85°	22	32

Table E-15: Frequency Band 5150-5250 MHz

Operating Form	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Uniform	20.0	12°	13	30
Sharp	19.0	16°	14	30
Floodlight	11.0	85°	22	30

Table E-16: Frequency Band 3650-3700 MHz

Operating Form	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Uniform	17.0	17°	27	55
Floodlight	11.0	70°	27	55

## E.2 For Deployment in ETSI Countries

Table E-17: Safety Distances for RADWIN 5000 ETSI Products

Frequency Band [GHz]	Antenna gain [dBi]	Min. Safety Distance [cm]
5.8/5.3/5.4/2.4	All gains	20

The RADWIN 5000 JET must be installed so as to provide a minimum separation distance from bystanders as specified in the tables below:

Table E-18: Frequency Band 5725-5875 MHz

Operating Form	Gain (dBi)	Dir BW	Tx Power per chain (dBm)	Min. Safe Distance (cm)
Uniform	20.0	9.4	7	20
Floodlight	11.0	60	16	20



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# Appendix F: Revision History

Table F-1: Revision History: RADWIN 5000 HPMP Installation Guide: DQ0193780/0.6

Cat.No.	Date	Description
DQ0193780/0.1 System Release 4.9	Feb, 2017	<ul style="list-style-type: none"><li>Initial release</li></ul>
DQ0193770/0.2 System Release 4.9.15	Jun, 2017	<ul style="list-style-type: none"><li>Turbo Gain antenna description added (see <a href="#">SU PRO/AIR Units</a> on page 2-31)</li><li>Regulatory comment added (see <a href="#">Regulatory Compliance: General Note</a>)</li></ul>
DQ0193770/0.3 System Release 4.9.17	Sep, 2017	<ul style="list-style-type: none"><li>External antenna added for SU/PRO Air (see <a href="#">SU PRO/AIR Units</a> on page 2-31 and see <a href="#">External, non-integrated antenna</a> on page 2-32)</li><li>Description for attaching cables for the Turbo Gain antenna modified (see <a href="#">SU PRO/AIR Units</a> on page 2-31)</li></ul>
DQ0193770/0.4 System Release 4.9.20	Nov, 2017	<ul style="list-style-type: none"><li>Description added for sealing tape when installing Turbo Gain antenna on SU/PRO Air units (see <a href="#">SU PRO/AIR Units</a> on page 2-31)</li></ul>
DQ0193770/0.6 System Release 4.9.30	Dec, 2017	New product: RADWIN JET DUO: <ul style="list-style-type: none"><li>Has two frequency bands (3.x and 5.x)</li><li>Uses a larger, integrated antenna than that of the JET platform (see <a href="#">JET and DUO Units</a> on page 2-4)</li><li>Uses the second input port on the JET platform as an SFP port (see <a href="#">DUO Units</a> on page 2-34)</li></ul>

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# Regulatory Compliance

## General Note

This system has achieved Type Approval in various countries around the world. This means that the system has been tested against various local technical regulations and found to comply. The frequency bands in which the system operates may be “unlicensed” and in these bands, the system can be used provided it does not cause interference.

For information on the restrictions on putting the device into service please contact your national telecommunication authorities.

## FCC/ISED - Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### RF Exposure

For the safety of the general public it is recommended to keep a minimum safe distance from radiating antennas according to the table below:

Pour la sécurité du grand public, il est recommandé de respecter une distance de sécurité minimale par rapport aux antennes rayonnantes, conformément au tableau ci-dessous:

FCC Identifier	IC Identifier	Band (GHz)	Safe Distance (cm)	
			U.S.	Canada
Contains FCC ID: Q3K-5XACMOLD	Contains IC: 5100A-5XACMOD	4.9-5.8	310	314
FCC ID: Q3K-BFJET5X	IC: 5100A- BFJET5X	4.9-5.8	94.38	96
FCC ID: Q3K-JETDB5X3X	IC: 5100A-JETDB5X3X	3.6; 5.1; 5.8	55	66
FCC ID: Q3K-5XACULC-X	IC: 5100A-5XACULC-X	2.4; 4.9-5.8	110	115



**Warning**

It is the responsibility of the installer to ensure that when using the outdoor antenna kits in the United States (or where FCC rules apply), only those antennas certified with the product are used. The use of any antenna other than those certified with the product is expressly forbidden by FCC rules 47 CFR part 15.204.



**Warning**

It is the responsibility of the installer to ensure that when configuring the radio in the United States (or where FCC rules apply), the Tx power is set according to the values for which the product is certified. The use of Tx power values other than those, for which the product is certified, is expressly forbidden by FCC rules 47 CFR part 15.204.

Indoor Units comply with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) These devices may not cause harmful interference.
- (2) These devices must accept any interference received, including interference that may cause undesired operation.



Outdoor units and antennas should be installed **ONLY** by experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities. Failure to do so may void the product warranty and may expose the end user or the service provider to legal and financial liabilities. Resellers or distributors of this equipment are not liable for injury, damage or violation of regulations associated with the installation of outdoor units or antennas. The installer should configure the output power level of antennas according to country regulations and antenna type.



Les unités extérieures et les antennes doivent être installées **UNIQUEMENT** par des les professionnels de l'installation qui connaissent le bâtiment et la sécurité locaux codes et, le cas échéant, sont autorisés par les autorités compétentes autorités de réglementation gouvernementales. Ne pas le faire peut annuler le produit garantie et peut exposer l'utilisateur final ou le fournisseur de services à des passifs financiers. Les revendeurs ou distributeurs de cet équipement ne sont pas responsable des blessures, des dommages ou de la violation de la réglementation installation d'unités extérieures ou d'antennes. L'installateur doit configurer le niveau de puissance de sortie des antennes selon les réglementations du pays et type d'antenne.



- Where Outdoor units are configurable by software to Tx power values other than those for which the product is certified, it is the responsibility of the Professional Installer to restrict the Tx power to the certified limits.
- This product was tested with special accessories - indoor unit (IDU or PoE), FTP CAT-5e shielded cable with sealing gasket, 10 AWG grounding cable - which must be used with the unit to insure compliance.



The system must be professionally installed to ensure compliance with the Part 15 certification. It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States. The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden. The radio must be installed and used in strict accordance with the manufacturer's instructions as described in this guide. Any other installation or use of the product violates FCC Part 15 regulations.



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Le système doit être professionnellement installé pour assurer la conformité avec Certification de la partie 15 Il est de la responsabilité de l'opérateur et de l'installateur professionnel que seuls les systèmes certifiés sont déployés aux États-Unis. L'utilisation du système dans toute autre combinaison (p. antennes transmettant la même information) est expressément interdite. La radio doit être installée et utilisée en stricte conformité avec les instructions du fabricant décrites dans ce guide. Toute autre installation ou utilisation du produit enfreint les règlements de l'ISDE règlements.

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It is the responsibility of the installer to ensure that when using the outdoor antenna kits in the United States (or where FCC rules apply), only those antennas certified with the product are used. The use of any antenna other than those certified with the product is expressly forbidden by FCC rules 47 CFR part 15.204. A list of approved external antennas can be found in [Appendix E: Certified Antennas](#).

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Le système doit être professionnellement installé pour assurer la conformité avec Certification de la partie 15 Il est de la responsabilité de l'opérateur et de l'installateur professionnel que seuls les systèmes certifiés sont déployés aux États-Unis. L'utilisation du système dans toute autre combinaison (p. antennes transmettant la même information) est expressément interdite. Il est de la responsabilité de l'installateur de s'assurer que lors de l'utilisation du kits d'antenne extérieure aux États-Unis (ou lorsque les règles de la FCC s'appliquent), seulement les antennes certifiées avec le produit sont utilisées. L'utilisation de tout l'antenne autre que celles certifiées avec le produit est expressément interdite par les règlements ISED. Une liste d'antennes externes approuvées peut se trouve à l'annexe Antennes Certifiées ([Appendix E: Certified Antennas](#))

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It is the responsibility of the operator and professional installer to ensure that when configuring the radio in the United States (or where FCC rules apply), the Tx power is set according to the values for which the product is certified. The use of Tx power values other than those, for which the product is certified, is expressly forbidden by FCC rules 47 CFR part 15.204

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Il est de la responsabilité de l'opérateur et de l'installateur professionnel que lors de la configuration de la radio au Canada (ou lorsque les règles canadiennes appliquer), la puissance Tx est définie en fonction des valeurs pour lesquelles le produit est agréé. L'utilisation de valeurs de puissance Tx autres que celles pour lesquelles le produit est certifié, est expressément interdit par les règlements de l'ISDE

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Warning

It is the responsibility of the installer to ensure that Sector and Base Station radios operating in the band 5150-5250 MHz are installed so that the antennas do not exceed 21 dBm EIRP at any elevation angle above 30 degrees as measured from the horizon, as required by FCC rule 47 CFR Part 15.407 (a)(1)(i).



Warning

In Canada Radio Local Area Network Devices Operating in the 5150-5250 MHz Frequency Band may only be allowed following licensing process.

Au Canada, les appareils du réseau local radio fonctionnant dans la bande de fréquences 5150-5250 MHz ne peuvent être autorisés qu'après un processus d'attribution de licence.



Warning

Under regulatory environments supporting other than FCC/ISED rules: Where Outdoor units are configurable by software to Tx power values other than those for which the product is certified, it is the responsibility of the Professional Installer to restrict the Tx power to the certified limits.

This product was tested with special accessories ? indoor unit (IDU or PoE), FTP CAT?5e shielded cable with sealing gasket, 10 AWG grounding cable - which must be used with the unit to insure compliance.



Warning

Dans des environnements réglementaires prenant en charge d'autres règles que celles de la FCC / ISED: Où les unités extérieures sont configurables par logiciel aux valeurs de puissance Tx autres que ceux pour lesquels le produit est certifié, c'est le la responsabilité de l'installateur professionnel de restreindre la puissance Tx à les limites certifiées.

Ce produit a été testé avec des accessoires spéciaux - unité intérieure (UDI ou PoE), câble blindé FTP CAT-5e avec joint d'étanchéité, mise à la terre 10 AWG câble - qui doit être utilisé avec l'unité pour assurer la conformité.



Warning

Radio devices using external antennas operating in the 5250-5350 MHz and 5470-5725 MHz bands must comply with the EIRP limits as specified in [Appendix E](#):

Appareils radio utilisant des antennes externes fonctionnant dans les bandes 5250-5350 MHz et 5470-5725 MHz seront conformes ala EIRP limites iniquees a l'[Appendix E](#):





Radio devices using external antennas operating in the 5725-5850 MHz band must comply with the EIRP limits as specified in [Appendix E](#): for point-to-point and point-to-multipoint operation.

Appareils radio utilisant des antennes externes fonctionnant dans la bande 5725-5850 MHz seront conformes ala EIRP limites iniquees a l'[Appendix E](#): pour un fonctionnement point a point et non point a point.



Radio devices shall be so installed to have worst-case tilt angle to remain compliant with the EIRP elevation mask requirement set forth in RSS-247 Section 6.2.2(3).

Appareils de radio doivent etre installes de maniere a avoir l'angle d'inclinaison du pire poir rester conforme a la EIRP exigence de masque d'elevation selon la RSS-247 Sec tion 6.2.2(3)



Installers are advised to consider high-power radars allocation as priority users of the bands 5250-5350 MHz and 5470-5725 MHz and that these radars could cause interference and/or damage to the radio devices.

Les installateurs sont invites a envisager de radars a haute puissance allocation que les utilisateurs prioritaires des bandes 5250-5350 MHz - 5470-5725 MHz et que ces radars pourraient causer interferences et /ou endommager les appareils de radio.



The radio devices in this manual have been approved by Industry Canada to operate with the antenna types listed in [Appendix E](#): 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 indicate for that type, are strictly prohibited for use with this device.

Les appareils de radio dans ce manuel ont ete approuves par Industrie Canada pour fonctionner avec les types d'antenne enumeries a [Appendix E](#): avec le gain maximal admissible et l'impedance d'antenne requise pour chaque type d'antenne indique.

Types d'antennes non inclus dans cette liste, ayant un gain superieur au gain maximum indique pour ce type, sont strictement interdics pur une utilisation avec cet appareil.



Radio devices subject to RSS-247 issue 2 shall not be capable of transmitting in the band 5600-5650 MHz.

Dispositifs radio soumis a la delivrance RS-247 2 ne sont pas capables de transmettre dans la bande 5600-5650 MHz.



Radio devices subject to RSS-247 issue 2 shall not be capable of transmitting in the band 5600-5650 MHz.

Dispositifs radio soumis à la délivrance RSS-247 2 ne sont pas capables de transmettre dans la bande 5600-5650 MHz.

Radio devices operating in the 3650-3700 MHz band must comply with the output power limits as specified in [Appendix E](#)

Base stations operating in the 3650-3700 MHz band may not be located within 150 km of any grandfathered satellite earth station operating in the 3650-3700 MHz band. The coordinates of these stations are available at <http://www.fcc.gov/ib/sd/3650/>.

Base stations operating in the 3650-3700 MHz band may not be located within 80 km of the following Federal Government radio location facilities:

- St. Inigoes, MD - 38° 10' N., 76°, 23' W
- Pensacola, FL - 30° 21' 28" N., 87°, 16' 26" W
- Pascagoula, MS - 30° 22' N, 88° 29'

Licensees installing equipment in the 3650-3700 MHz band should determine if there are any nearby U.S. Federal Government radar systems that could affect their operations. Information regarding the location and operational characteristics of the radar systems operating adjacent to this band are provided in NTIA TR-99-361.

Requests for base station locations closer than 80 km to the U.S. Federal Government radio location facilities listed above will only be approved upon successful coordination by the Commission with NTIA through the Frequency Assignment Subcommittee of the Interdepartmental Radio Advisory Committee.

Fixed devices operating in the 3650-3700 MHz band generally must be located at least 8 kilometers from the U.S./Canada or U.S./Mexico border if the antenna of that device looks within the 160° sector away from the border. Fixed devices must be located at least 56 kilometers from each border if the antenna looks within the 200° sector towards the border.

Fixed devices may be located nearer to the U.S./Canada or U.S./Mexico border than specified above only if the Commission is able to coordinate such use with Canada or Mexico, as appropriate.

Licensees in the 3650-3700 MHz band must comply with the requirements of current and future agreements with Canada and Mexico regarding operation in U.S./Canada and U.S./Mexico border areas.



## Canadian Emission Requirements for Indoor Units

This Class B digital apparatus complies with Canadian ISED-003.

*Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.*

## EU – Compliance




Radio transmitters operating in the EU need to comply the RE-DIRECTIVE 2014/53/EU, EMC Directive 2014/30/EU, Low Voltage Directive 2014/35/EU.

The 5.8 GHz products are suitable for use in, and comply with the Broadband Wireless Access System (WAS). It is a Class 2 device and uses operating frequencies that are not harmonized throughout the EU member states. The operator is responsible for obtaining any national licenses required to operate this product and these must be obtained before using the product in any particular country.

The RADWIN 5000 JET 5.8 GHz product complies with the requirements of the harmonized standard ETSI EN 302 502 and the ECC RECOMMENDATION (06)04

### Restrictions on the use of 5.8 GHz Band in EU member states



BE	EL	LT	PT	BG	ES
LU	RO	CZ	FR	HU	SI
DK	HR	SK	DE	IT	UL
NL	CY	AT	SE	IE	LV
PL					

## China MII

Operation of the equipment is only allowed under China MII 5.8GHz band regulation configuration with EIRP limited to 33 dBm (2 Watt).

## India WPC

Operation of the equipment is only allowed under India WPC GSR-38 for 5.8GHz band regulation configuration.

## Brazil

The equipment will operate only in the frequency bands 5470 - 5725 MHz and 5725 - 5850 MHz. The software version to be sold in Brazil with blocking is from version 4.6.

The power supplies presented in this user manual are not sold with this product.

O equipamento irá operar apenas nas faixas de frequências 5470 - 5725 MHz e 5725 - 5850 MHz. A versão do software a ser comercializado no Brasil com bloqueio é a partir da versão 4.6.

As fontes de alimentação apresentadas neste manual não serão comercializadas junto com este produto.

## For Norway and Sweden only

Equipment connected to the protective earthing of the building installation through the mains connection or through other equipment with a connection to protective earthing - and to a cable distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a cable distribution system has therefore to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11).

### Norway

Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplede utstyr - og er tilkoplede et kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel-TV nettet

### Sweden

Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet.

## Unregulated


In countries where the radio is not regulated the equipment can be operated in any regulation configuration, best results will be obtained using Universal regulation configuration.

## Safety Practices

Applicable requirements of National Electrical Code (NEC), NFPA 70; and the National Electrical Safety Code, ANSI/IEEE C2, must be considered during installation.

### NOTES:

1. A Primary Protector is not required to protect the exposed wiring as long as the exposed wiring length is limited to less than or equal to 140 feet, and instructions are provided to avoid exposure of wiring to accidental contact with lightning and power conductors in accordance with NEC Sections 725-54 (c) and 800-30.



In all other cases, an appropriate Listed Primary Protector must be provided. Refer to Articles 800 and 810 of the NEC for details.

2. For protection of ODU against direct lightning strikes, appropriate requirements of NFPA 780 should be considered in addition to NEC.

3. For Canada, appropriate requirements of the CEC 22.1 including Section 60 and additional requirements of CAN/CSA-B72 must be considered as applicable.

4. Only UL Listed parts and components will be used for installation. Use UL Listed devices having an environmental rating equal to or better than the enclosure rating to close all unfilled openings.

5. Use min. 10AWG external protective earthing conductor.



# RADWIN 5000 HPMP

## User Handbook

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