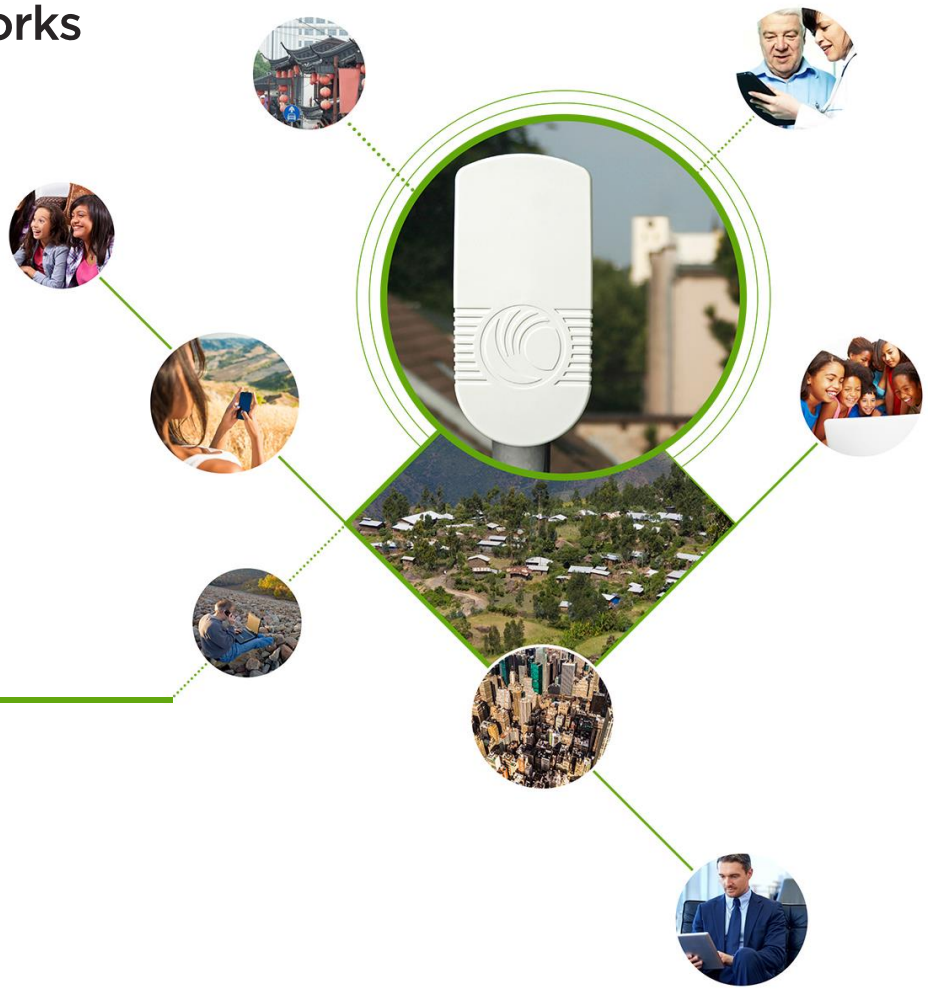
Cambium Networks



ePMP™
Installation Guide

System Release 1.0

- Safety and Installation Considerations
- Installing a Connectorized Radio
- Installing an Integrated Radio
- Antenna Installation
- Device LEDs
- Site Diagrams

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About this guide

This guide is supplied for ePMP radio equipment. It describes how to install the site equipment for ePMP Series networks. Users of this guide must follow good practices for outdoor radio installations.

RELATED DOCUMENTS

For full ePMP installation planning instructions and a list of components, refer to the *ePMP Series User Guide*.

VERSION INFORMATION

Document number and version: pmp-0423_001v000 (October 2013).

WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

For instructions on waste disposal of used products, refer to http://www.cambiumnetworks.com/support

SAFETY

Warning

To prevent loss of life or physical injury, observe the safety guidelines below. In no event shall Cambium Networks be liable for any injury or damage caused during the installation of the Cambium ePMP equipment. Ensure that only qualified personnel install ePMP equipment.

Power lines

Exercise extreme care when working near power lines.

Working at heights

Exercise extreme care when working at heights.

Grounding and protective earth

The connectorized ePMP module must be properly grounded to protect against lightning. It is the user's responsibility to install the equipment in accordance with national regulations. In the USA follow the requirements of the National Electrical code NFPA 70-2005 and 780-2004 *Installation of Lightning Protection Systems*. In Canada, follow Section 54 of the *Canadian Electrical Code*. These codes describe correct installation procedures for grounding the outdoor unit, mast, lead-in wire and discharge unit, size of grounding conductors and connection requirements for grounding electrodes. Other regulations may apply in different countries and therefore it is recommended that installation of the outdoor unit be contracted to a professional installer.

Powering down before servicing

Before servicing ePMP equipment, unplug the power supply from the power source.

Do not disconnect the RJ45 Ethernet cable connectors from the ePMP device while the power supply is on. Always remove the input power from the power supply.

External cables

Safety may be compromised if outdoor rated cables are not used for connections that will be exposed to the outdoor environment. For outdoor copper Cat5e Ethernet interfaces, always use Cat5e cable that is shielded with copper-plated steel. Alternative types of cable are not supported by Cambium Networks.

RF exposure near the antenna

Radio frequency (RF) fields will be present close to the antenna when the transmitter is on. Always turn off the power to the Access Point or Station before undertaking maintenance activities in front of the antenna.

Minimum separation distances

Ensure that personnel are not exposed to unsafe levels of RF energy. Never work in front of the antenna when the device is powered. Install the module so as to provide and maintain the minimum separation distances from all persons. For minimum separation distances, see the *ePMP Series User Guide*.

Grounding and lightning protection requirements

Ensure that the installation meets the requirements defined in the *ePMP Series User Guide*.

Grounding cable installation methods

To provide effective protection against lightning induced surges, observe these requirements:

- Grounding conductor runs must be as short, straight and smooth as possible, with bends and curves kept to a minimum.
- Grounding cables must not be installed with drip loops.
- All bends must have a minimum radius of 203 mm (8 in) and a minimum angle of 90°. A diagonal run is preferable to a bend, even though it does not follow the contour or run parallel to the supporting structure.
- All bends, curves and connections must be routed towards the grounding electrode system, ground rod, or ground bar.
- Grounding conductors must be securely fastened.
- Braided grounding conductors must not be used.
- Approved bonding techniques must be used for the connection of dissimilar metals.

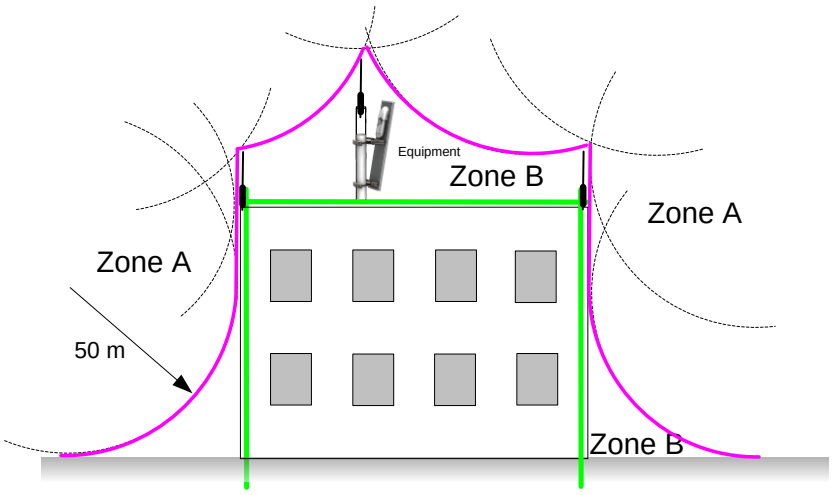
Siting Access Points, Stations, and antennas

Access Points, Stations, and external antennas are not designed to survive direct lightning strike. For this reason they must be installed in Zone B as defined in the *ePMP Series User Guide*. Mounting in Zone A may put equipment, structures and life at risk.

LIGHTNING PROTECTION ZONES

Use the rolling sphere method (Figure 1) to determine where it is safe to mount equipment. An imaginary sphere, typically 50 meters in radius, is rolled over the structure. Where the sphere rests against the ground and a strike termination device (such as a finial or ground bar), all the space under the sphere is considered to be in the zone of protection (Zone B). Similarly, where the sphere rests on two finials, the space under the sphere is considered to be in the zone of protection.

Figure 1 Rolling sphere method to determine the lightning protection zones



Assess locations on masts, towers and buildings to determine if the location is in Zone A or Zone B:

- **Zone A**: In this zone a direct lightning strike is possible. Do not mount equipment in this zone.
- **Zone B**: In this zone, direct EMD (lightning) effects are still possible, but mounting in this zone significantly reduces the possibility of a direct strike. Mount equipment in this zone.

Warning

Never mount equipment in Zone A. Mounting in Zone A may put equipment, structures and life at risk.

SITE GROUNDING SYSTEM

Confirm that the site has a correctly installed grounding system on a common ground ring with access points for grounding ePMP equipment.

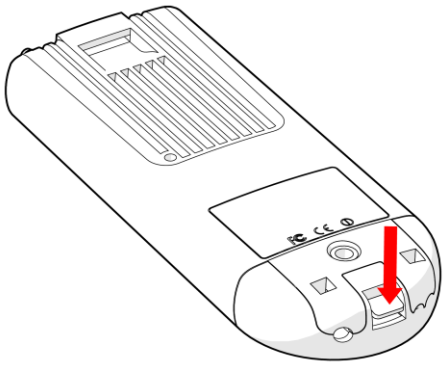
If the outdoor equipment is to be installed on the roof of a high building, confirm that the following additional requirements are met:

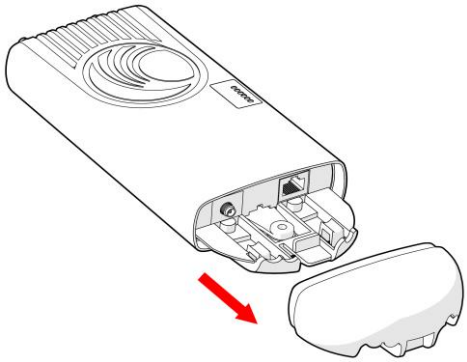
- A grounding conductor is installed around the roof perimeter to form the main roof perimeter lightning protection ring.
- Air terminals are installed along the length of the main roof perimeter lightning protection ring, typically every 6.1m (20ft).
- The main roof perimeter lightning protection ring contains at least two down conductors connected to the grounding electrode system. The down conductors should be physically separated from one another, as far as practical.

Installing a Connectorized Radio

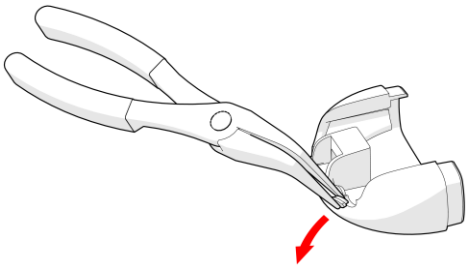
Cambium recommends to assemble the antenna and connectorized device prior to field deployment. To install the connectorized radio, GPS antenna, and cabling, proceed as follows:

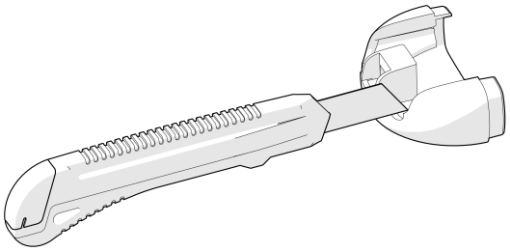
1 Depress the retaining clip, then remove the bottom cover of the connectorized device.



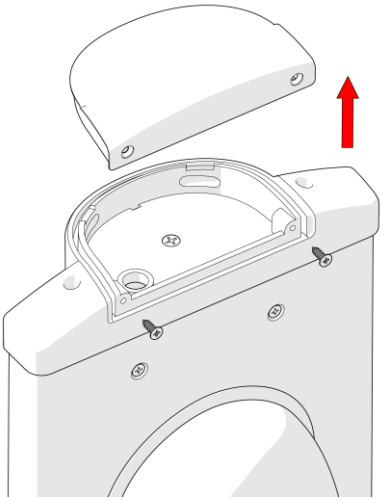


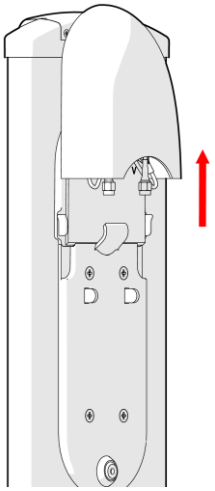
2 Remove the knockouts from the bottom shell cover for GPS, Ethernet, and grounding cable routing. Remove any remaining plastic burrs which may damage cabling.

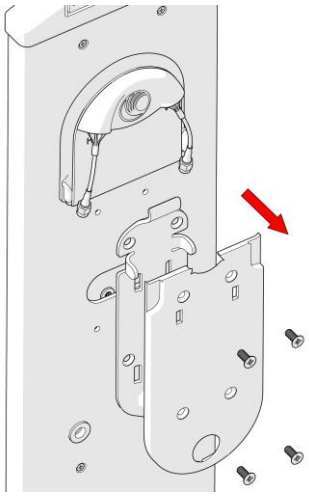




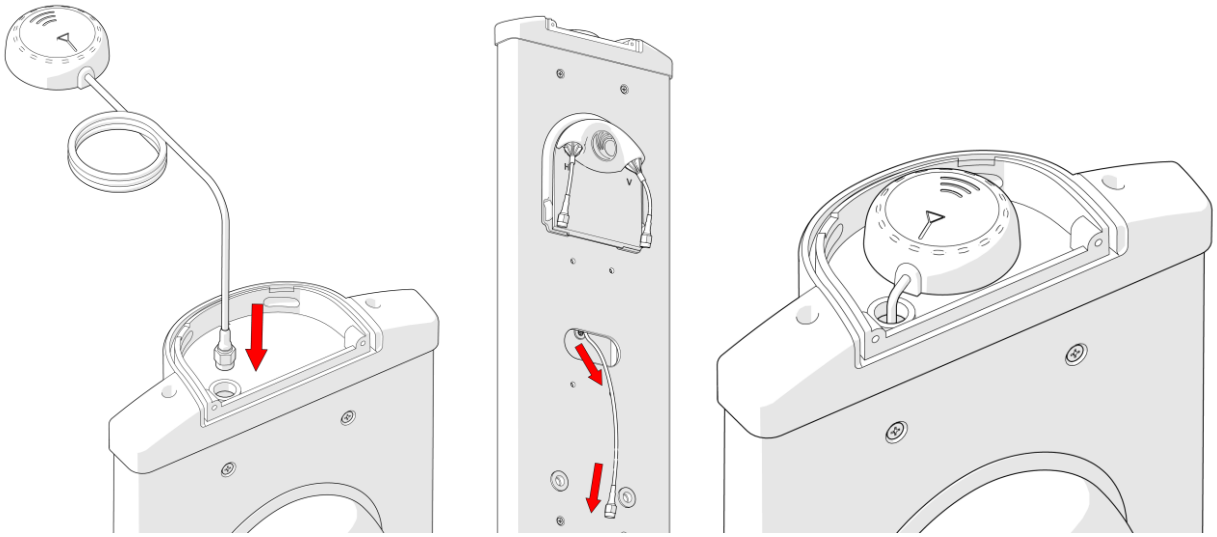
3 With a Philips screwdriver, remove the GPS cover (2 screws), radio protective cover and radio mounting bracket (4 screws) to prepare the antenna for GPS antenna mounting



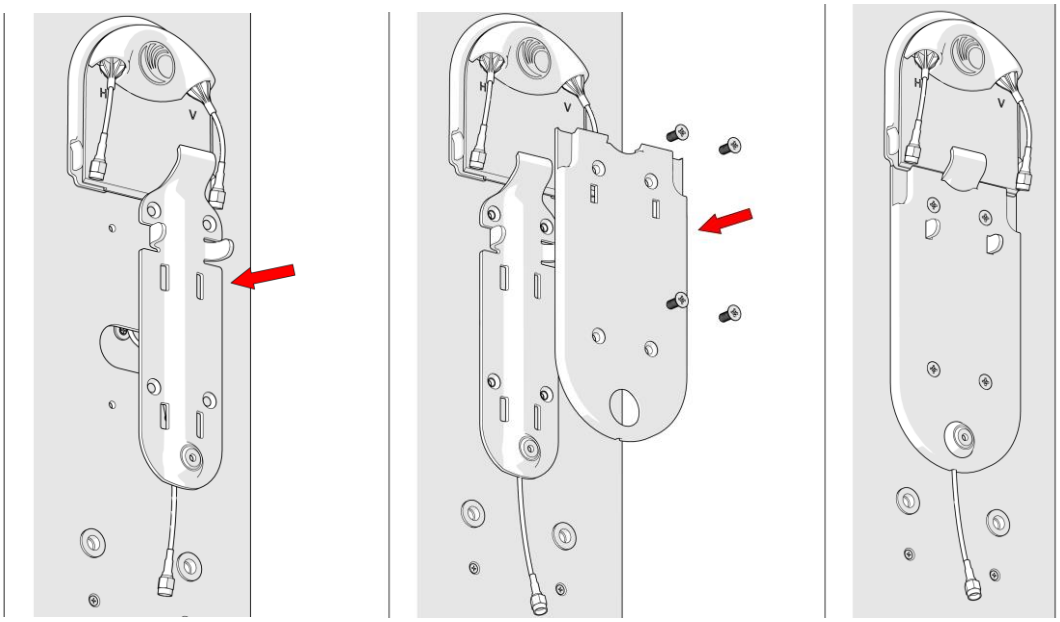




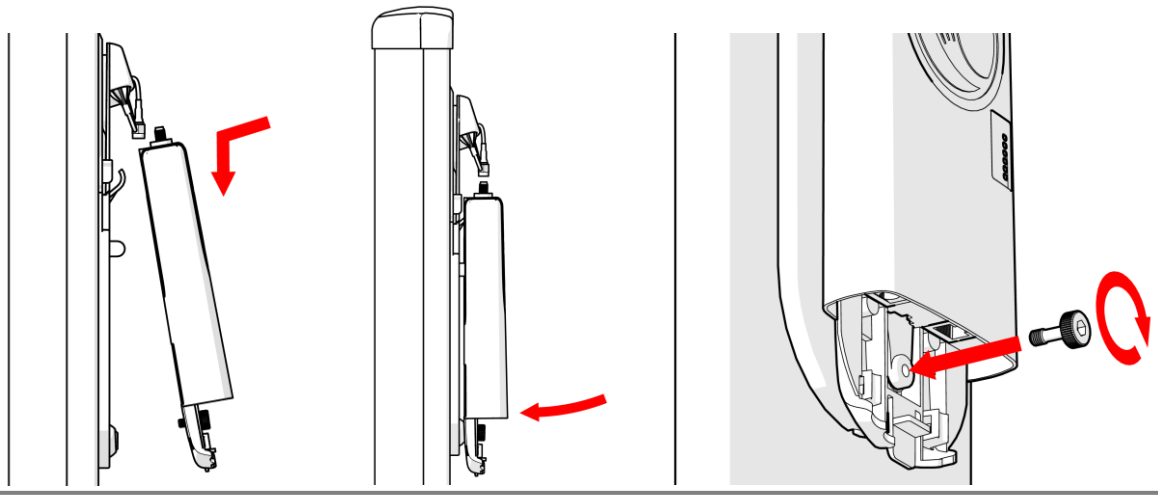
4 Route the GPS antenna cable down through the antenna housing, and secure the GPS antenna to the top of the sector antenna (magnetically)



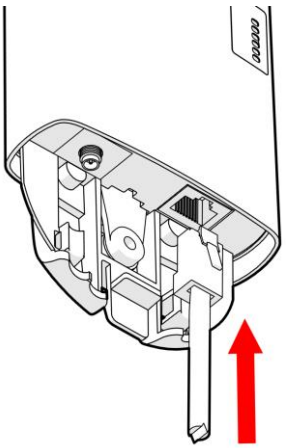
5 Reattach the radio mounting brackets to the sector antenna with a Philips screwdriver (4 screws), ensuring that the GPS antenna cable is routed through the opening at the bottom of the radio mounting brackets



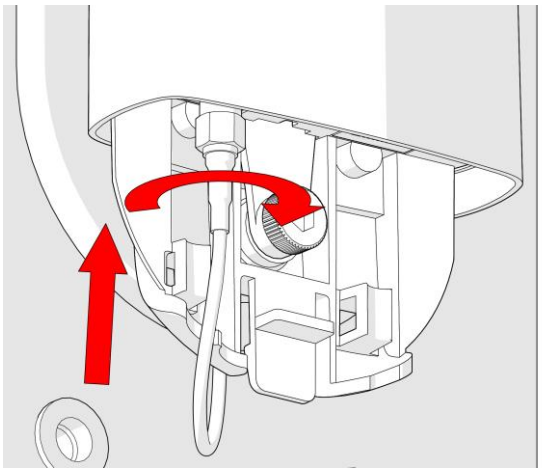
6 Attach the radio module to the sector antenna by hooking the top of the unit to the bracket then installing the retaining thumbscrew

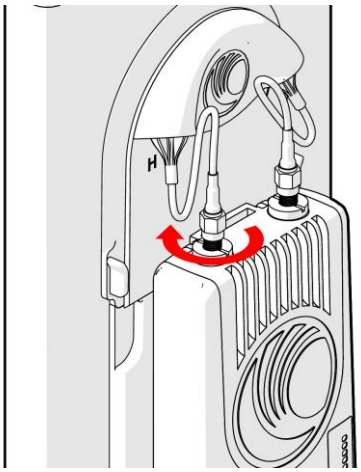


7 Pack the Ethernet port with dielctric grease, then insert one end of the Ethernet cable into the ETH port

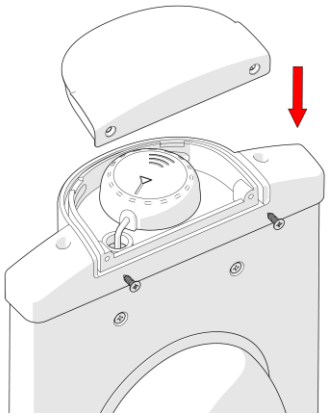


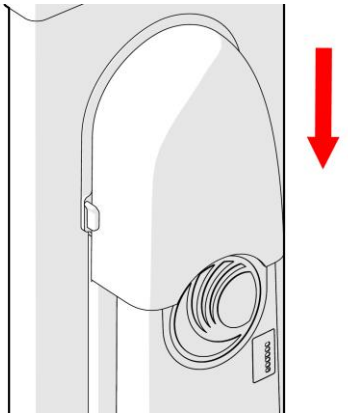
8 Tighten the GPS and sector antenna cables, then use overlapping wraps of vinyl tape to seal.

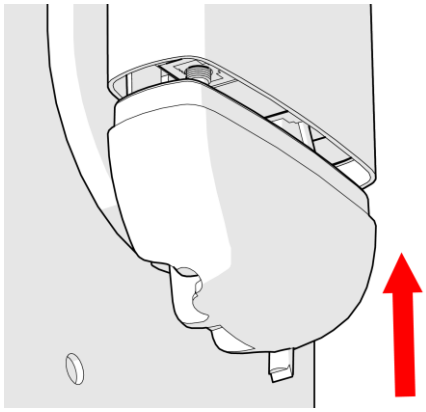




9 Reinstall the antenna's GPS cover and (2) screws with a Philips screwdriver then reinstall the connectorized device antenna cabling cover and bottom shell cover (ensure that the bottom shell is latched – you may need to hold the tab/latch open when reinstalling the bottom cover).

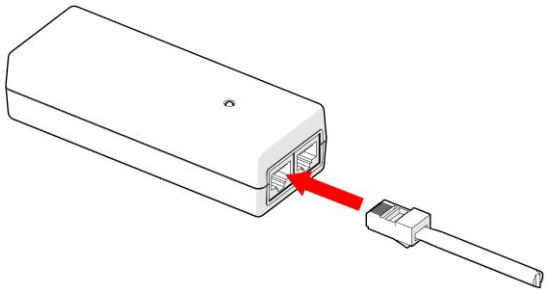




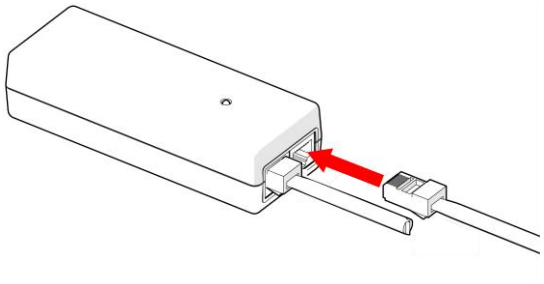


POWERING ON THE CONNECTORIZED DEVICE

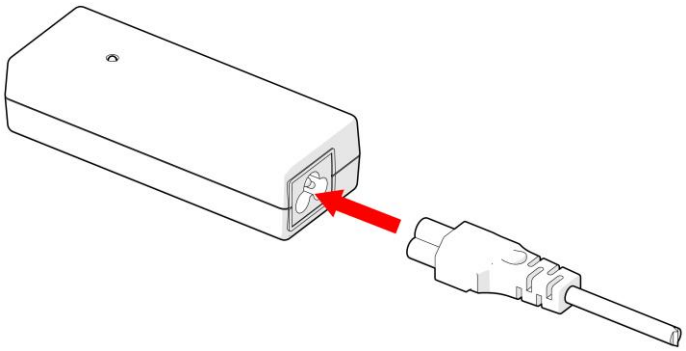
1 Connect the connectorized device Ethernet cable to the power supply port labeled “Gigabit Data+Power”



2 Connect an Ethernet cable from your management PC or network to the power supply port labeled “Gigabit Data”



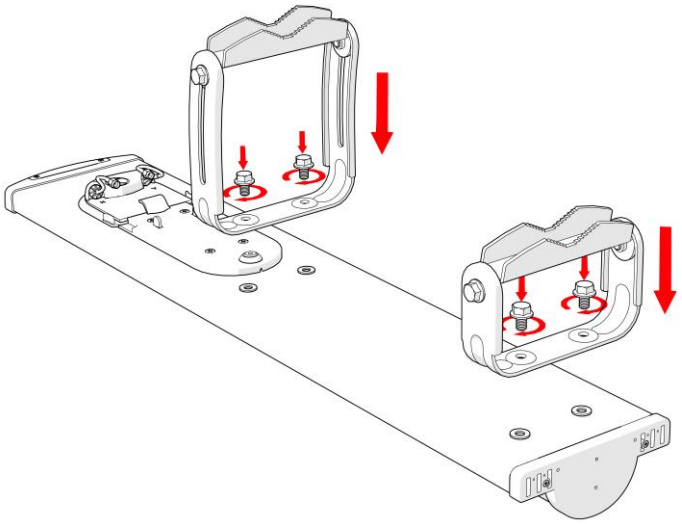
3 Connect the power cord to to power supply, then plug the cable into an electrical outlet Ensure that the power supply LED is lit green.



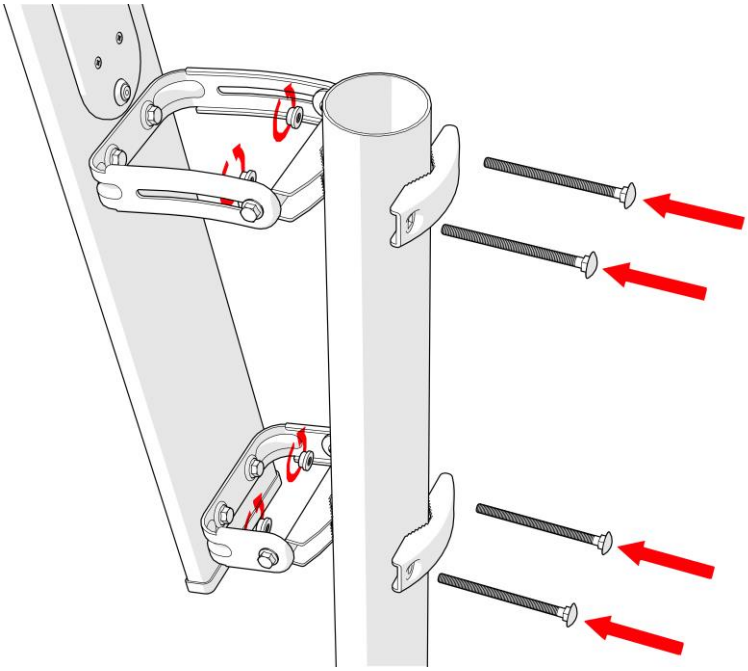
Mounting the Sector Antenna for a Connectorized Radio

Cambium recommends to assemble the antenna and connectorized device prior to field deployment. To install the connectorized module sector antenna, proceed as follows:

1 Install the sector antenna mounting brackets using the (4) provided bolts. Thread the bolts in by hand then tighten with a 13mm wrench.



2 Attach the brackets to the mounting pole by threading the (4) carriage bolts through the rear mounting straps and antenna bracket. Next, tighten the (4) included flange nuts with a 13mm wrench. The antenna's tilt may be adjusted from -3° to +12°. The antenna should not be mounted at the highest point of the tower. If installing the antenna with a GPS antenna, ensure that the GPS antenna has a clear view of the southern horizon.



To determine down tilt or up tilt setting in degrees:

1 Determine the height of the AP = H_{AP}

2 Determine the average elevation of the STA installations = H_{STA}

3 Determine the average distance from the AP to the STA installations = D

4 Calculate the antenna tilt with the following formula (English standard):

$$angle\ (degrees) = \tan^{-1}\left(\frac{(H_{AP} - H_{STA})}{D\ x\ 5280}\right)$$

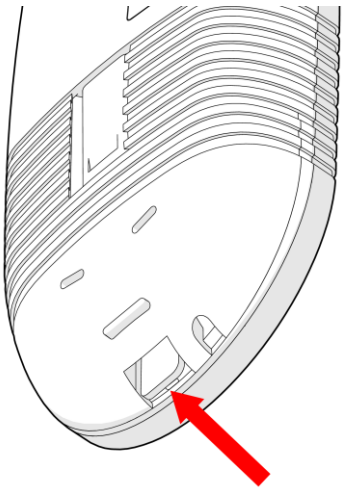
5 Calculate the antenna tilt with the following formula (metric):

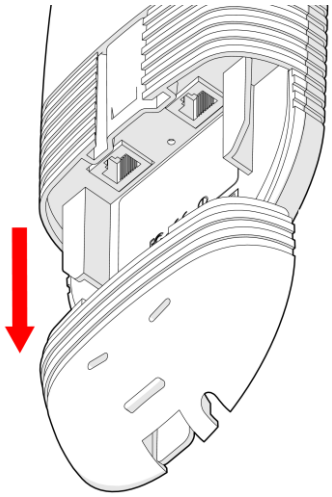
$$angle\ (degrees) = \tan^{-1}\left(\frac{(H_{AP} - H_{STA})}{D\ x\ 1000}\right)$$

Installing an Integrated Radio

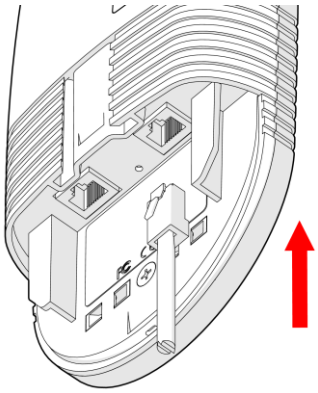
To install the integrated radio module and cabling, proceed as follows:

1 Depress the retaining clip, then remove the bottom cover of the device

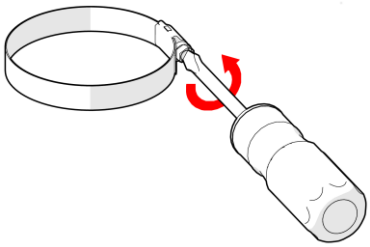




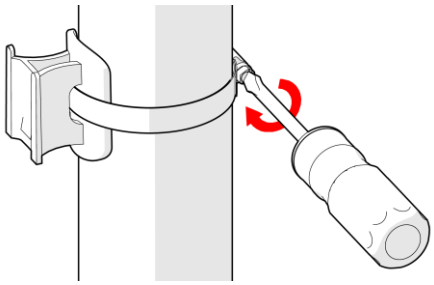
2 Pack the Ethernet port with dielectric grease, then plug one end of an Ethernet cable into the device Main ETH port



3 Open the included metal strap with a flathead screwdriver



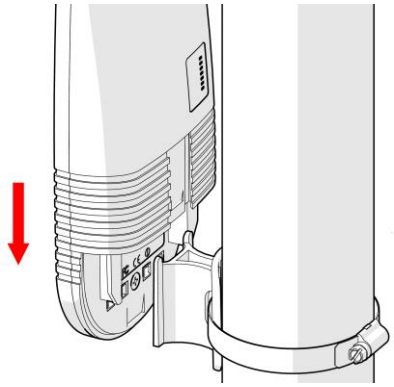
4 Slide the metal strap through the mounting bracket and around the pole; tighten with a flathead screwdriver



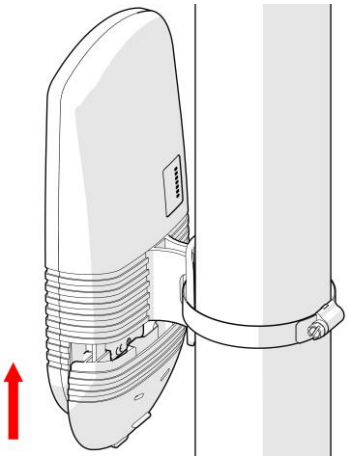
5 Slide the radio onto the mounting bracket

Note

Once the radio has been installed onto its mounting bracket, the radio housing cannot be separated from the mounting bracket.

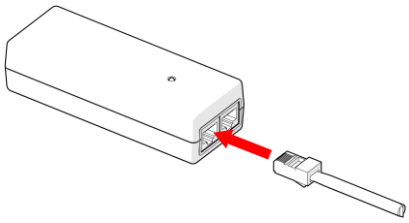


6 Reinstall the device bottom shell cover

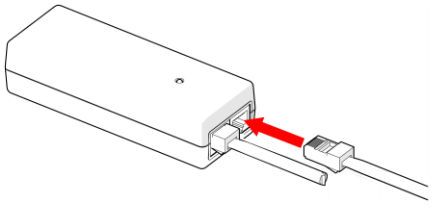


POWERING ON THE INTEGRATED RADIO

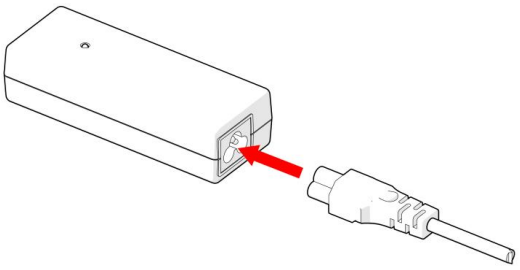
1 Connect the integrated radio Ethernet cable to the power supply port labeled "10/100 Mbit Data+Power"



2 Connect an Ethernet cable from your management PC or network to the power supply port labeled "10/100 Mbit Data"

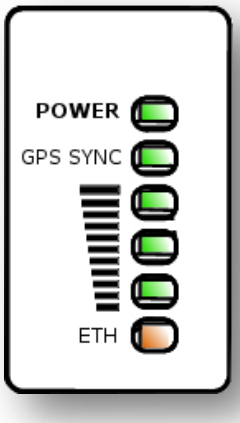


3 Connect the power cord to to power supply, then plug the cable into an electrical outlet. Ensure that the power supply LED is lit green.



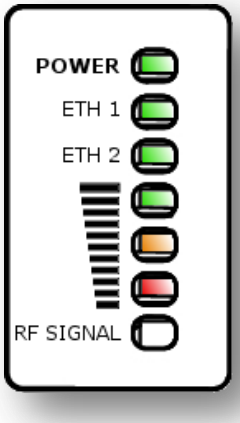
Device LEDs

CONNECTORIZED MODULE LEDS

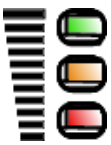


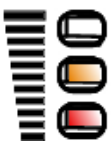
LED	Function
POWER	Green: Power is applied to the device Unlit: No power is applied to the device or improper power source
GPS SYNC	Green: AP has acquired a 1PPS GPS synchronization pulse either from the internal GPS module and antenna or from a connected CMM Unlit: 1PPS GPS not acquired, or **Synchronization Source** set to **Internal** (AP generating sync, not GPS-based)
	Reserved for future release
ETH	Once lit, blinking indicates Ethernet activity Red: 10BaseTX link Green: 100BaseTX link Orange: 1000BaseTX link Unlit: No Ethernet link established

INTEGRATED MODULE LEDS

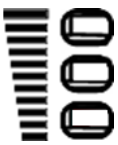


LED	Function
POWER	Green: Power is applied to the device Unlit: No power is applied to the device or improper power source
ETH 1	Main/Primary Ethernet port indicator Once lit, blinking indicates Ethernet activity Green: 10/100BaseTX link
ETH 2	Auxiliary/Secondary Ethernet port indicator Once lit, blinking indicates Ethernet activity Green: 10/100BaseTX link
 RF SIGNAL	Radio scanning: LEDs light in an ascending sequence to indicate that the radio is scanning Radio registered: LEDs light to indicate the RSSI level at the device.


RSSI > -60 dBm


-70 dBm < RSSI ≤ -60 dBm

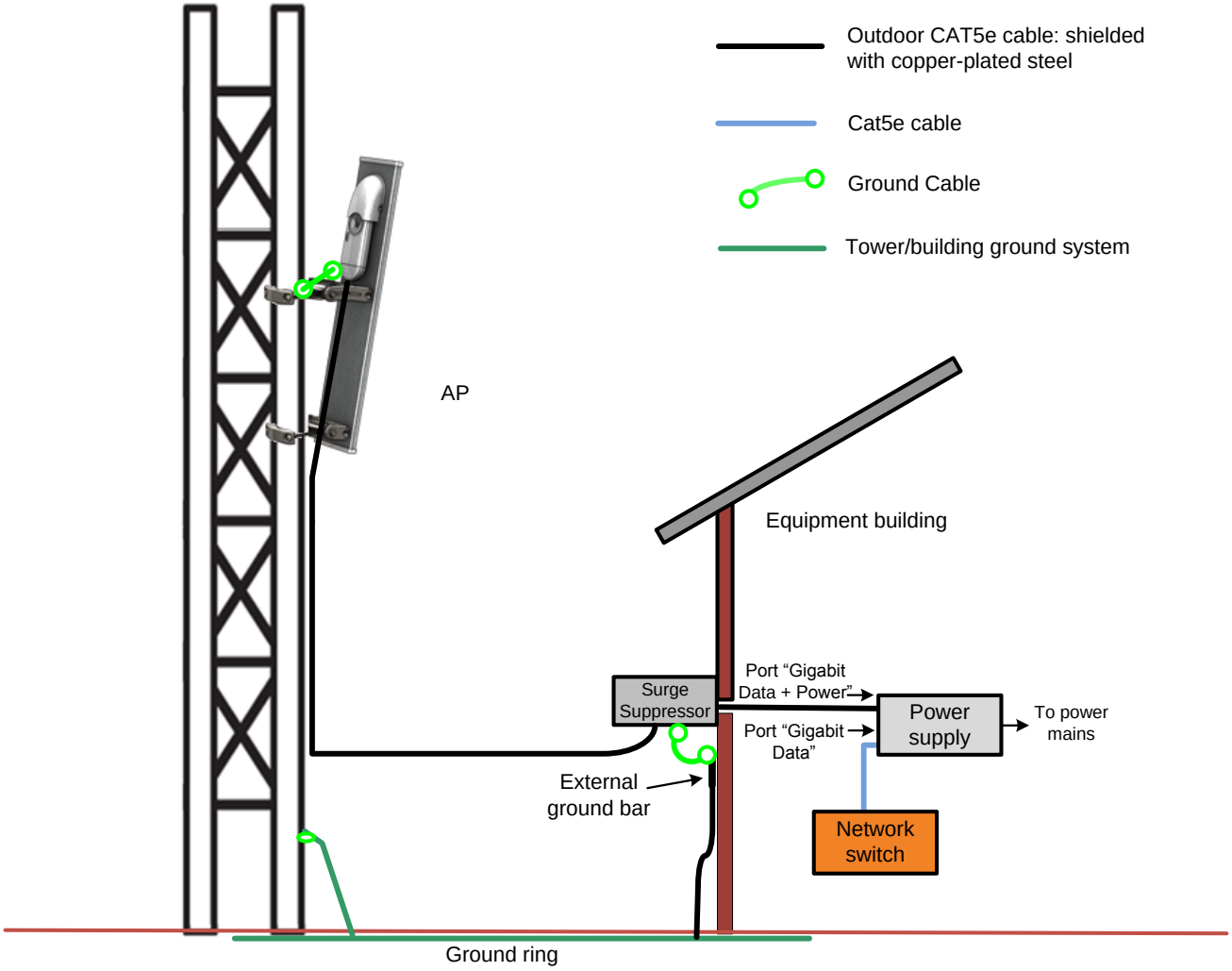

-80 dBm < RSSI ≤ -70 dBm


RSSI ≤ -80 dBm

Typical connectorized radio deployment

An ePMP connectorized radio site typically consists of a high supporting structure such as a mast, tower or building for the radio, and an equipment building or moisture-proof enclosure for the indoor equipment (power supply, Cluster Management Module), as shown here in a typical mast or tower installation. If the radio/antenna is to be mounted on a metal tower or mast, then in addition to the general protection requirements (see section Safety), the following requirements must be observed:

- The equipment must be lower than the top of the tower or its lightning air terminal.
- The metal tower or mast must be correctly grounded.



Note

The Cambium 600SSH surge suppressor may be used for 10/100 Mbit Ethernet deployments. For 1000 Mbit (Gigabit) Ethernet deployments, the following surge suppressors must be used:

Manufacturer	Part Number	Description
L-COM	AL-CAT6JW	Outdoor 10/100/1000 Base-T CAT6 PoE Compatible Lightning Protector – RJ45 jacks
L-COM	AL-CAT6HPJW	Outdoor 10/100/1000 Base-T CAT6 Hi-Power Lightning Protector – RJ45 jacks

Typical integrated radio deployment

An ePMP integrated radio site typically consists of a supporting structure such as a pole, mast, or building for the radio, and an equipment building or moisture-proof enclosure for the indoor equipment (power supply, networking equipment), as shown here in a typical building installation. If the radio is to be mounted on a metal tower or mast, then in addition to the general protection requirements (see section Safety), the following requirements must be observed:

- The equipment must be lower than the top of the structure or its lightning air terminal.
- The metal tower or mast must be correctly grounded.