Cambium ePMP Quick Start Guide

System Release Beta

ePMP Series Model Numbers

This Quick Start Guide may be referenced for the following Cambium ePMP equipment:

Model	Description
N000900L001A	ePMP Pwr Supply for GPS Radio - no cord (spare)
N000900L002A	ePMP Pwr Supply for non-GPS Radio - no cord (spare)
C050900A011A	ePMP GPS, Conn - 5 GHz - no power cord
C058900A112A	ePMP GPS, Conn - 5 GHz - US power cord - FCC version
C050900A021A	ePMP Conn - 5 GHz - no power cord
C058900A122A	ePMP Conn - 5 GHz - US power cord - FCC version
C050900C031A	ePMP Integ(16dBi) - 5 GHz - no power cord
C058900C132A	ePMP Integ(16dBi) - 5 GHz - US power cord - FCC version
C050900D001A	ePMP Omni Antenna - 5 GHz
C050900D002A	ePMP Sector 120 Antenna - 5 GHz
C050900D003A	ePMP Sector 90 Antenna - 5 GHz
C050900D004A	ePMP High Gain Panel Antenna - 5 GHz

Cambium Networks

About this Guide

Thank you for choosing Cambium Networks for your Point-to-Multipoint networking solution.

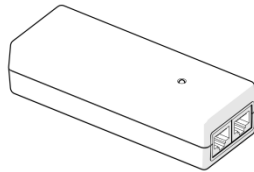This guide describes:

ePMP Hardware Components

Installation

**Accessing the Mangement GUI / Initial
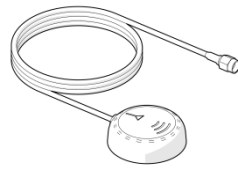Link Bring-up**

Specifications / General Information

Package Contents, AP
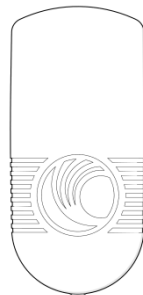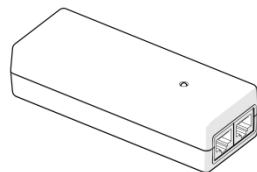
Radio   Power Supply   GPS Antenna

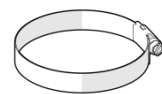# Package Contents, STA

Radio   Power Supply   Mounting Bracket   Strap

Overview of ePMP Hardware

This section describes the key components of the ePMP Access Point and Station modules.

Access Point Hardware

External antenna ports (50Ω, SMA)

LED Indicators

Removable Lower Shell (for Ethernet port access)
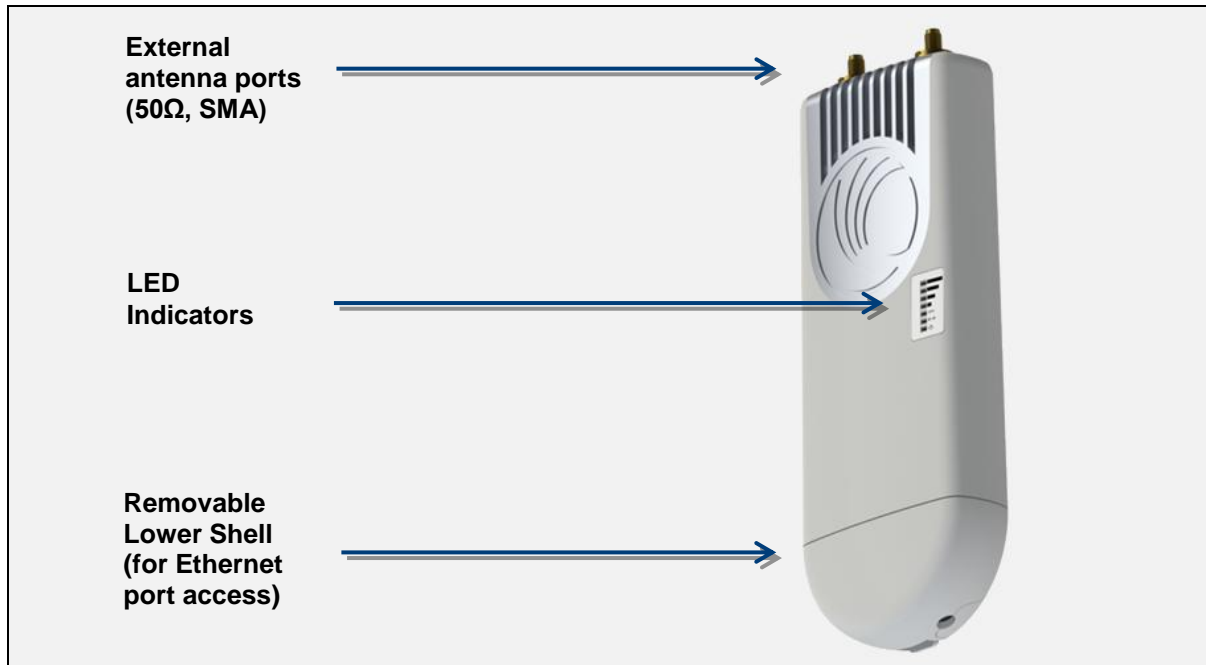
Access Point LED Indicators

Label	Function
POWER	Lit green when power is applied to the device.
GPS SYNC	Lit green when the AP has acquired a valid synchronization signal from a CMM or from its internal GPS.
ETH	Lit red when the Ethernet link is established at a 10 Mbps rate, blinks when traffic is sent over the Ethernet interface.
	Lit green when the Ethernet link is established at a 100 Mbps rate, blinks when traffic is sent over the Ethernet interface.
	Lit red and green when the Ethernet link is established at a 1000 Mbps rate, blinks when traffic is sent over the Ethernet interface.
RF Signal (3 LEDs)	TBD

Station Hardware

LED Indicators

Mounting Bracket

Removable Lower Shell (for Ethernet port access)
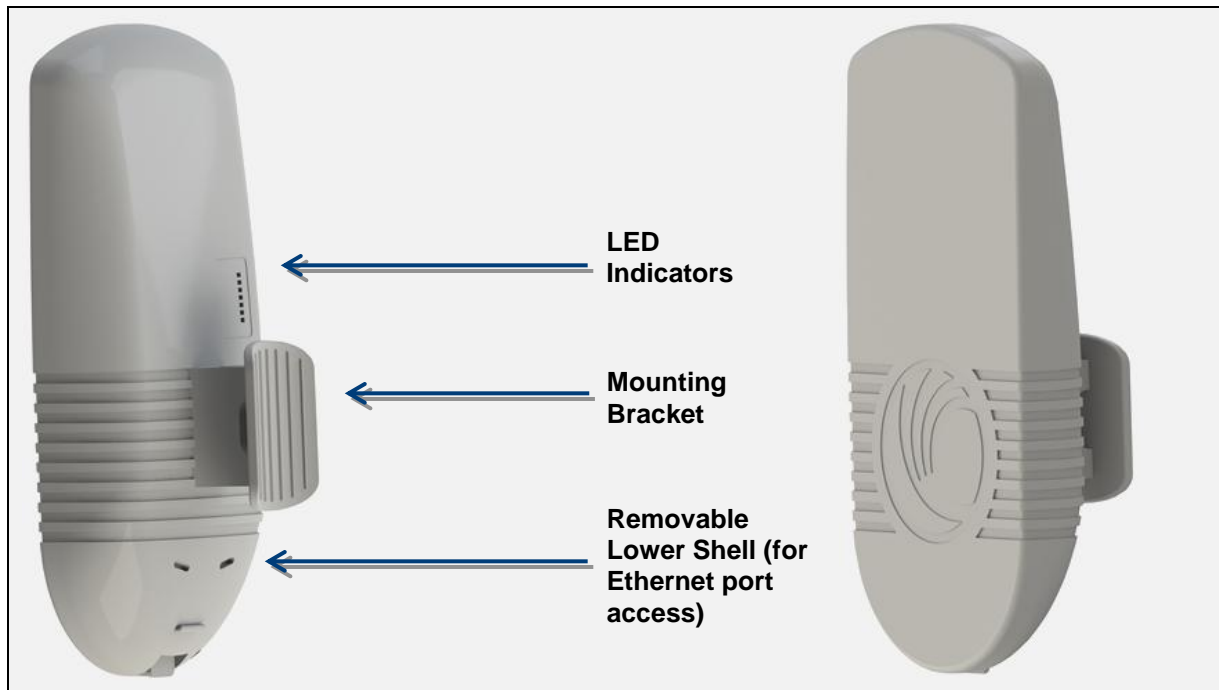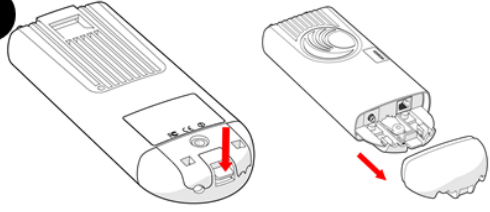
Station LED Indicators

Label	Function
POWER	Lit green when power is applied to the device.
ETH1	Lit green when Ethernet link is established at 10 Mbps or 100 Mbps, and blinks as traffic is sent over "Main" Ethernet interface.
ETH2	Lit green when Ethernet link is established at 10 Mbps or 100 Mbps, and blinks as traffic is sent over "Secondary" Ethernet interface.

RF Signal (3 LEDs)

Rx Signal Strength less than or equal to -80 dBm	Rx Signal Strength between -80 dBm and -70 dBm	Rx Signal Strength between -70 dBm and -60 dBm	Rx signal strength greater than -60 dBm
OFF	OFF	OFF	ON
OFF	OFF	ON	ON
OFF	ON	ON	ON

Installing the Access Point
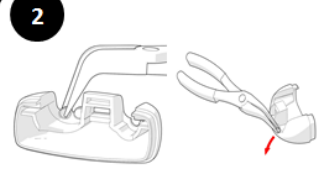
The ePMP Access Point is designed to attach to a Cambium antenna or to be pole-mounted (for use with a non-Cambium antenna).
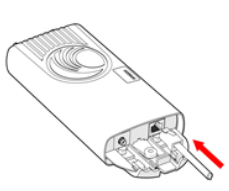
1 Depress the retaining clip, then remove the bottom cover of the AP
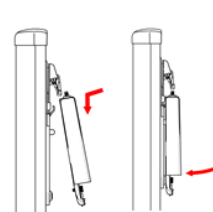
2 If utilizing the GPS sync functionality of ePMP, remove the knockouts from the bottom cover
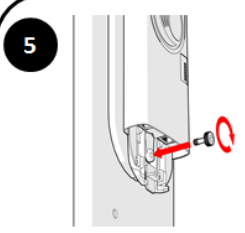
3 Plug one end of a CAT 5 Ethernet cable into the AP
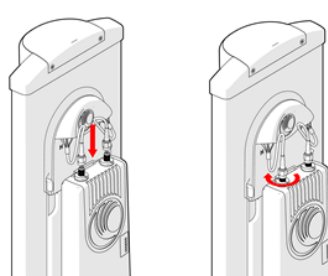
4 Attach the AP to the antenna
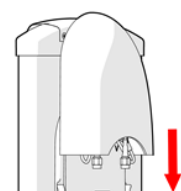
5 Install retaining thumbscrew

6 Connect RF antenna cables to both AP SMA connectors

7 Attach weather-proofing cover for AP
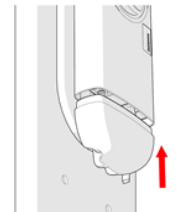
8 Connect the GPS antenna cable to the AP

9 Install the GPS antenna with a clear view of the sky
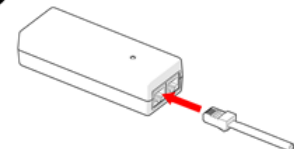
10 Reattach bottom cover of AP

Powering On the Access Point

1 Connect the AP 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"
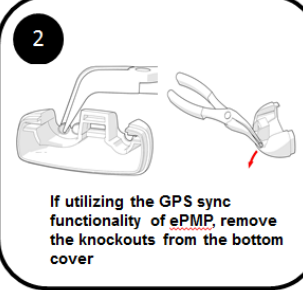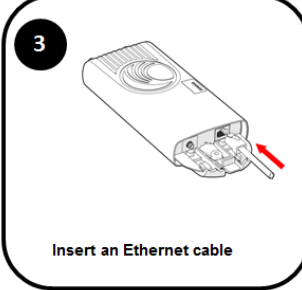
3 Connect the power supply cable to the power supply, then plug the cable into an electrical outlet
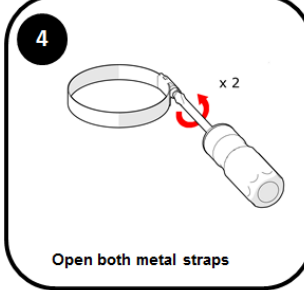
Pole-mounting the Access Point
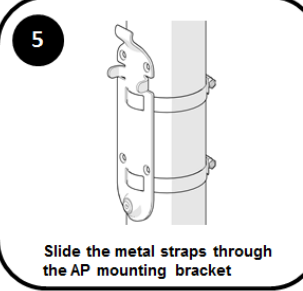
To install an ePMP Access Point with an aftermarket antenna, perform the following steps.
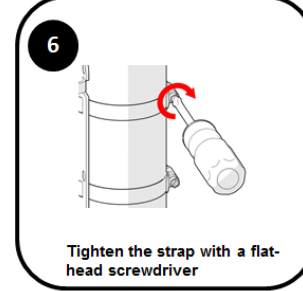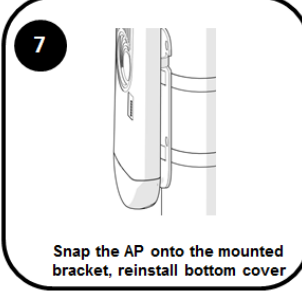
1 Remove the bottom cover by depressing the release lever and pulling the cover away from the unit
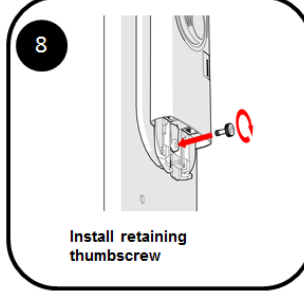
2 If utilizing the GPS sync functionality of ePMP, remove the knockouts from the bottom cover
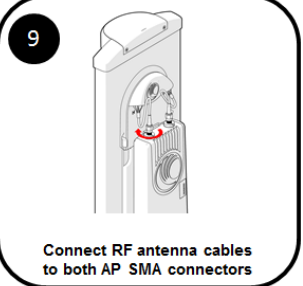
3 Insert an Ethernet cable
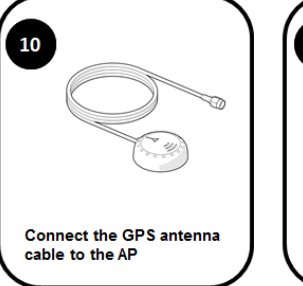
4 Open both metal straps
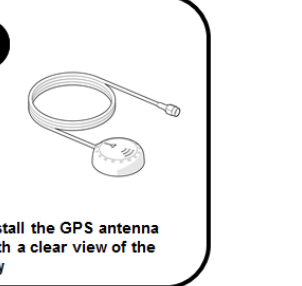
5 Slide the metal straps through the AP mounting bracket

6 Tighten the strap with a flat-head screwdriver

7 Snap the AP onto the mounted bracket, reinstall bottom cover
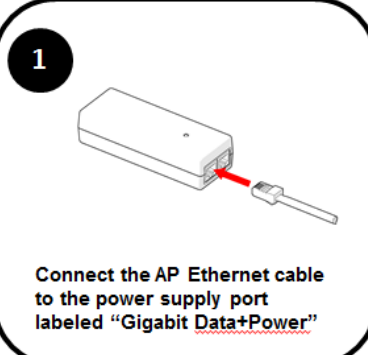
8 Install retaining thumbscrew
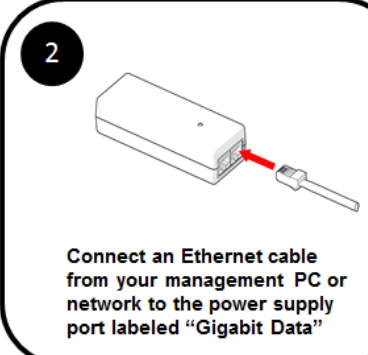
9 Connect RF antenna cables to both AP SMA connectors
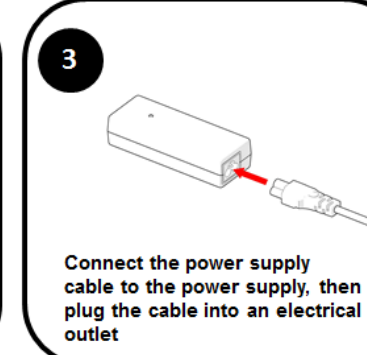
10 Connect the GPS antenna cable to the AP

11 Install the GPS antenna with a clear view of the sky

Powering On the Access Point

1 Connect the AP 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 supply cable to the power supply, then plug the cable into an electrical outlet

Installing the Station

The ePMP Station is designed to be pole-mounted. The Station antenna and networking components are self contained, so an external antenna does not need to be installed.

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

2 Plug one end of a CAT 5 Ethernet cable into the STA

3 Open the metal strap with a flat-head screwdriver

4 Slide the metal strap through the mounting point and around the pole, tighten with a flat-head screwdriver

5 Slide the STA onto the mounting bracket

7 Reattach the STA bottom cover
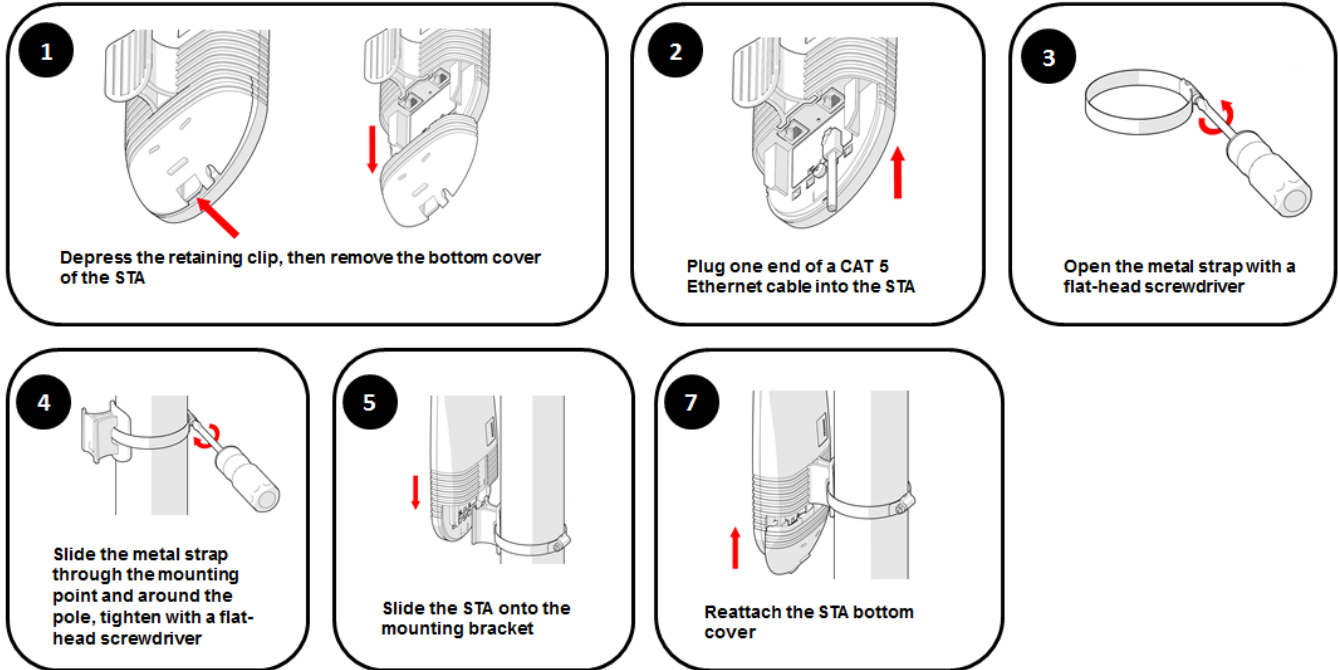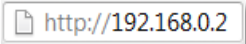
Powering On the Station

To power on the Station, perform the following steps:

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

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

3 Connect the power supply cable to the power supply, then plug the cable into an electrical outlet
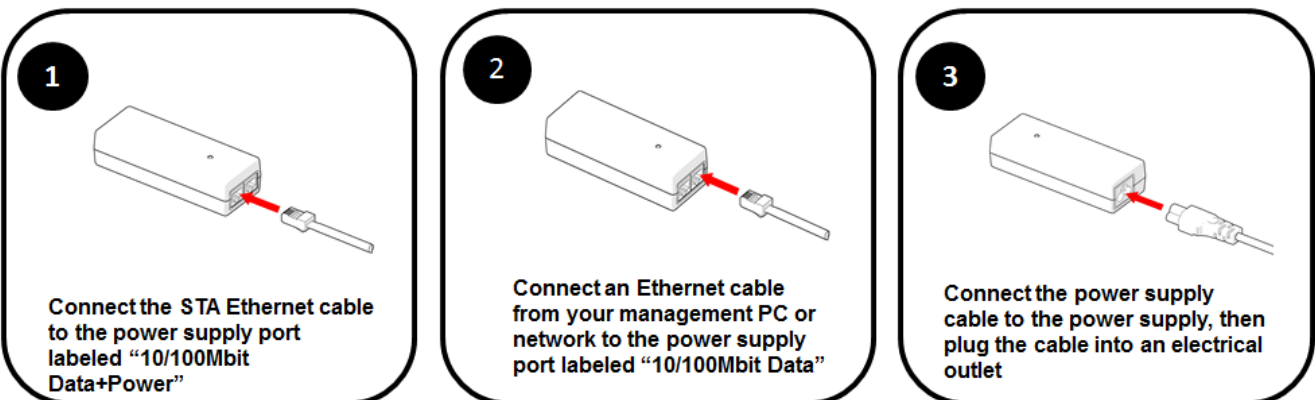
Connecting to the Unit and Logging into the Web Management Interface

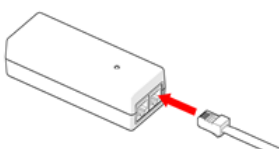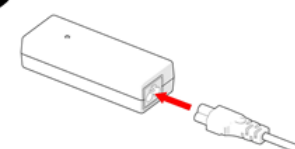To configure or monitor your ePMP networking equipment, log into the web management interface following the steps below:

1   Connect management PC Ethernet cable to power supply LAN port

2   Configure the management PC with an IP address in the 192.168.0.x subnet (for example, 192.168.0.100, subnet mask 255.255.255.0). This address must not be 192.168.0.1 or 192.168.0.2.

3   In your web browser, navigate to http://192.168.0.1 (AP) or http://192.168.0.2 (STA)

http://192.168.0.2

4   At the top of the landing page, enter username admin and password admin then click the Login button.

5   At the home screen, click Configure, Monitor, Tools, or Quick Start to begin.

Configuring Quick Start Parameters (AP)

The Quick Start tab contains a simple listing of parameters required to configure a simple radio link and to configure requisite networking parameters. After configuring these parameters on the AP and STA and resetting both devices, the STA will be ready to associate (register) to the AP.

1

Navigate to menu Quick Start

2 Configure parameter *Device Mode:*

This parameter controls the function of the device – all ePMP devices may be configured to operate as an Access Point (AP), Station (STA), or as a Spectrum Analyzer. For initial link bring-up, choose "AP"

3 Configure parameter *Country Code:*

Country Code settings affect the radios in the following ways:
- Maximum transmit power limiting (based on radio transmitter power plus configured antenna gain)
- DFS operation is enabled based on the configured region code, if applicable

Select the country in which your network will be operating.

4 Configure parameter *DL/UL Ratio:*

Specify the percentage of the aggregate throughput for the downlink (frames transmitted from the AP to the STA). For example, if the aggregate (uplink and downlink total) throughput on the AP is 90 Mb, then 75/25 specified for this parameter allocates 67.5 Mb for the downlink and 22.5 Mb for the uplink. The default for this parameter is 75/25.

You must set this parameter exactly the same for all APs in a cluster.

5 Configure parameter *AP Name (SSID):*

The AP Name (SSID) is used to identify the AP, and is used to configure the STA with the appropriate AP with which to register.

6 Configure parameter *Synchronization Source:*

This parameter defines the timing source for the device which can be GPS-based or internally generated. Select "GPS" if the AP will receive synchronization pulses from a connected GPS antenna. Select "CMM" if the device will receive GPS synchronization pulses from a co-located Cambium Cluster Management Module. Select "Internal" if no GPS synchronization source is available (in this mode, transmission between co-located devices will create radio interference).

7 Configure parameter *IP Address Mode (LAN):*

If DHCP is selected, the DHCP server automatically assigns the IP configuration (Ethernet (LAN) IP Address, Ethernet (LAN) IP Subnet Mask, Gateway IP Address (LAN)) and the values of those individual parameters (below) are not used. To configure a simple test network, this parameter may be left at default (Static).

8 Configure parameter *Ethernet (LAN) IP Address:*

Internet Protocol (IP) address. This address is used by the family of Internet protocols to uniquely identify this unit on a network. To configure a simple test network, this field may be left at default (192.168.0.1).

9 Configure parameter *Ethernet (LAN) Subnet Mask:*

The Subnet Mask defines the address range of the connected IP network. To configure a simple test network, this field may be left at default (255.255.255.0).

10 Configure parameter *Gateway IP Address (LAN):*

The IP address of a computer on the current network that acts as a gateway. A gateway acts as an entrance and exit to packets from and to other networks. To configure a simple test network, this parameter may be left at default (blank).

11 Click the *Save* icon,
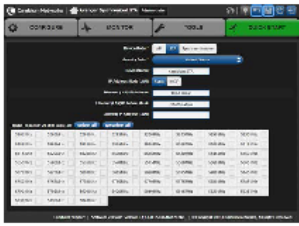
Then click the *Reset* icon:

Configuring Quick Start Parameters (STA)

The Quick Start tab contains a simple listing of parameters required to configure a simple radio link and to configure requisite networking parameters.

1 — Navigate to menu Quick Start

2 — Configure parameter *Device Mode:*

This parameter controls the function of the device – all ePMP devices may be configured to operate as an Access Point (AP), Station (STA), or as a Spectrum Analyzer. For initial link bring-up, choose "STA"

3 — Configure parameter *Country Code:*

Country Code settings affect the radios in the following ways:
- Maximum transmit power limiting (based on radio transmitter power plus configured antenna gain)
- DFS operation is enabled based on the configured region code, if applicable

Select the country in which your network will be operating.

4 — Configure parameter *Device Name:*

The STA Device Name is used to identify the device on the network. This parameter may be modified or left at the default value of "Cambium-STA".

5 — Configure parameter *IP Address Mode (LAN):*

If DHCP is selected, the DHCP server automatically assigns the IP configuration (Ethernet (LAN) IP Address, Ethernet (LAN) IP Subnet Mask, Gateway IP Address (LAN)) and the values of those individual parameters (below) are not used. To configure a simple test network, this parameter may be left at default (Static).

6 — Configure parameter *Ethernet (LAN) IP Address:*

Internet Protocol (IP) address. This address is used by the family of Internet protocols to uniquely identify this unit on a network. To configure a simple test network, this field may be left at default (192.168.0.1).

7 — Configure parameter *Ethernet (LAN) Subnet Mask:*

The Subnet Mask defines the address range of the connected IP network. To configure a simple test network, this field may be left at default (255.255.255.0).

8 — Configure parameter *Gateway IP Address (LAN):*

The IP address of a computer on the current network that acts as a gateway. A gateway acts as an entrance and exit to packets from and to other networks. To configure a simple test network, this parameter may be left at default (blank).
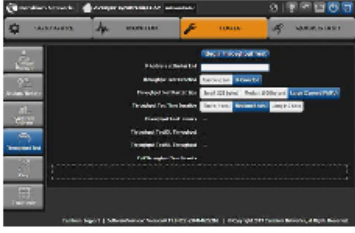
9 — Configure parameter *Radio Frequency 20 MHz Scan List:*

The Radio Scan List determines the frequencies for which the STA will scan for AP signaling. Select the appropriate frequencies for your test network, ensuring that one of the selections matches the AP's frequency configuration.

10 — Click the *Save* icon,

Then click the *Reset* icon:

Verifying Radio Connectivity

1	Log into the AP and navigate to menu Tools, Throughput Test
2	Configure parameter *IP Address at the Far End:* This parameter indicates the IP address for which test traffic will be sent/received. This parameter should be configured with the IP address of the STA (default 192.168.0.2).
3	Click button *Begin Throughput Test:* After clicking **Begin Throughput Test**, the test is run for 5 seconds, and the results are displayed once the test is complete.

Enabling GPS Synchronization

There are two ways in which the AP may receive GPS synchronization signaling:

- Internal GPS (models C024900A011A, C050900A011A, C058900A112A): The ePMP access point contains an internal GPS chip and antenna for receiving synchronization pulse and data (location, date, and time) from GPS satellites. For supported models, this mode may be enabled by navigating to **Configure**, **System** and setting **Synchronization Source** to **GPS.**

- Cluster Management Module (CMM): The ePMP access point may be configured to receive GPS synchronization pulses via a co-located CMM. The access point receives synchronization over the Ethernet cable connected to the CMM. This mode may be enabled by navigating to **Configure**, **System** and setting **Synchronization Source** to **CMM**.

The AP web management interface contains an icon in the status bar which indicates receipt of a valid GPS signal:

The AP is not receiving a valid synchronization pulse.

Check GPS antenna installation, cabling, or CMM configuration.

The AP is receiving a valid synchronization pulse.

All GPS-synchronized APs within radio range are transmitting and receiving at the same time.

Cabling and ligntning protection

The following practices are essential to the reliability and longevity of cabled connections:

- Use only shielded cables and connectors to resist interference and corrosion.
- For vertical runs, provide cable support and strain relief.
- Include a 2-ft (0.6-m) service loop on each end of the cable to allow for thermal expansion and contraction and to facilitate terminating the cable again when needed.
- Include a drip loop to shed water so that most of the water does not reach the connector at the device.
- Properly crimp all connectors.
- Use dielectric grease on all connectors to resist corrosion.

The AP or STA must be positioned
- with hardware that the wind and ambient vibrations cannot flex or move.
- where a grounding system is available.
- with lightning arrestors to transport lightning strikes away from equipment.
- at a proper height:
  o higher than the tallest points of objects immediately around them (such as trees, buildings, and tower legs).
  o at least 2 feet (0.6 meters) below the tallest point on the tower, pole, or roof (for lightning protection).
- away from high-RF energy sites (such as AM or FM stations, high-powered antennas, and live AM radio towers).

that will not be obstructed by trees as they grow or structures that are later built.

Regulatory Compliance

The Cambium ePMP product is certified as an unlicensed device in frequency bands where it is not allowed to cause interference to licensed services (called primary users of the bands).

Radar avoidance

In countries where radar systems are the primary band users, the regulators have mandated special requirements to protect these systems from interference caused by unlicensed devices. Unlicensed devices must detect and avoid co-channel operation with radar systems.

The Cambium ePMP product provides detect-and-avoid functionality for countries and frequency bands requiring protection for radar systems.

Installers and users must meet all local regulatory requirements for radar detection. To meet these requirements, users must set the correct country code during commissioning of the the ePMP product. If this is not done, installers and users may be liable to civil and criminal penalties.

Contact the Cambium helpdesk if more guidance is required.

USA and Canada specific information

The USA Federal Communications Commission (FCC) has asked manufacturers to implement special features to prevent interference to weather radar systems that operate in the band 5600 MHz to 5650 MHz. These features must be implemented in all products able to operate outdoors in the band 5470 MHz to 5725 MHz.

Manufacturers must ensure that such radio products cannot be configured to operate outside of FCC rules; specifically it must not be possible to disable or modify the radar protection functions that have been demonstrated to the FCC.

In order to comply with these FCC requirements, Cambium supplies variants of the ePMP product for operation in the USA or Canada. These variants are only allowed to operate in accordance with FCC/IC rules. In particular, operation of radio channels overlapping the band 5600-5650 MHz is not allowed and these channels are permanently barred.

In addition, other channels may also need to be barred when operating close to weather radar installations. To ensure compliance with FCC rules (KDB 443999: Interim Plans to Approve UNII Devices Operating in the 5470 - 5725 MHz Band with Radar Detection and DFS Capabilities), follow the instructions in Avoidance of weather radars on page 5.

Other variants of the ePMP product are available for use in the rest of the world, but these variants are not supplied to the USA or Canada except under strict controls, when they are needed for export and deployment outside the USA or Canada.

ePMP regulatory compliance

The ePMP complies with the regulations that are enforced in the USA and Canada. The relevant notifications are specified in this section.

ePMP FCC and IC notification

U.S. Federal Communication Commission (FCC) and Industry Canada (IC) Notification.

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 band in which the system operates is 'license exempt' and the system is allowed to be used provided it does not cause interference. The licensing authority does not guarantee protection against interference from other products and installations.

This device complies with part 15 of the US FCC Rules and Regulations and with RSS-210 of Industry Canada. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation. In Canada, users should be cautioned to take note that high power radars are allocated as primary users (meaning they have priority) of the 5650 – 5850 MHz spectrum and these radars could cause interference and/or damage to license-exempt local area networks (LELAN).

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (PIRE) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the US FCC Rules and with RSS-210 of Industry Canada. 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 these instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to correct the interference by one or more of the following measures:

- Increase the separation between the affected equipment and the unit;
- Connect the affected equipment to a power outlet on a different circuit from that which the receiver is connected to;
- Consult the dealer and/or experienced radio/TV technician for help.

Where necessary, the end user 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. Contact the appropriate national administrations for details on the conditions of use for the bands in question and any exceptions that might apply.

This radio transmitter (identify the device by certification number, or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (identifier le dispositif par son numéro de certification ou son numéro de modèle s'il fait partie du matériel de catégorie I) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Approved Antenna Model	Description	Input Impedance
C050900D003A	5 GHz Antenna for 90 Degree Sector, 17 dBi	50 Ω
C050900D003A	5 GHz Antenna for 60 Degree Sector, 16 dBi	50 Ω

FCC ID	Industry Canada Cert Number	Frequencies	Module Families	Antenna	Maximum Combined Tx Output Power[1]
Z8H89FT0006	109W-0006	20 MHz channels, centered on 5735-5840 in 5 MHz increments (within the 5725-5850 MHz ISM band)	ePMP AP 5 GHz	17 dBi Connectorized	19 dBm
				16 dBi Connectorized	20 dBm
		20 MHz channels, centered on 5480 – 5590; 5660 – 5715 in 5 MHz increments (within the 5470 – 5600; 5650 – 5725 MHz UNII band)		17 dBi Connectorized	13 dBm
				16 dBi Connectorized	14 dBm
Z8H89FT0005	109W-0005	20 MHz channels, centered on 5735-5840 in 5 MHz increments (within the 5725-5850 MHz ISM band)	ePMP STA 5 GHz	16 dBi Integrated	20 dBm
		20 MHz channels, centered on 5480 – 5590; 5660 – 5715 in 5 MHz increments (within the 5470 – 5600; 5650 – 5725 MHz UNII band)			

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[1] At band edges, transmit power must be reduced by 3 dB

Specific expertise and training required for professional installers

To ensure that the ePMP equipment is installed and configured in compliance with the requirements of Industry Canada and the FCC, installers must have the radio engineering skills and training described in this section. This is particularly important when installing and configuring a ePMP system for operation in the 5.4 GHz UNII band.

Avoidance of weather radars

The installer must be familiar with the requirements in FCC KDB 443999. Essentially, the installer must be able to:

- Access the FCC data base of weather radar location and channel frequencies.
- Use this information to correctly configure the product (using the GUI) to avoid operation on channels that should be barred according to the guidelines that are contained in the KDB and explained in detail in this user guide.

External antennas

When using a connectorized version of the product (as compared to the version with an integrated antenna), the conducted transmit power must be reduced to ensure the regulatory limit on transmitter EIRP is not exceeded. The installer must have an understanding of how to compute the effective antenna gain from the actual antenna gain and the feeder cable losses.

The range of permissible values for maximum antenna gain and feeder cable losses are included in the user guide together with a sample calculation. The product GUI automatically applies the correct conducted power limit to ensure that it is not possible for the installation to exceed the EIRP limit, when the appropriate values for antenna gain and feeder cable losses are entered into the GUI.

Ethernet networking skills

The installer must have the ability to configure IP addressing on a PC and to set up and control products using a web browser interface.

Lightning protection

To protect outdoor radio installations from the impact of lightning strikes, the installer must be familiar with the normal procedures for site selection, bonding and grounding,

Specifications

Access Point (AP)

Category	Specification
Product	
Model Number	C050900P011A, C058900P112A
Spectrum	
Channel Spacing	Configurable on 5 MHz increments
Frequency Range — 5.0 GHz	5.250 GHz – 5.350 GHz, 5.470 GHz – 5.875 GHz (dependent upon Region Code setting)
Channel Width	20 MHz
Interface	
MAC (Media Access Control) Layer	Cambium Networks Proprietary
Physical Layer	2x2 MIMO OFDM
Ethernet Interface	10/100/1000BaseT, half/full duplex, rate auto negotiated (802.3 compliant)
Protocols Used	IPv4, UDP, TCP, IP, ICMP, SNMP, HTTP, FTP
Network Management	HTTP, SNMP v2c, Syslog
Performance	

Category	Specification		
Nominal Receive Sensitivity (w/ FEC) @ 20 MHz Channel, Per Port	MCS	Rx Sensitivity at 1% PER (dBm)	Rx Sensitivity at 10% PER (dBm)
	MCS15	-68	-69
	MCS14	-69	-70
	MCS13	-71	-72
	MCS12	-76	-77
	MCS11	-79	-80
	MCS10	-82	-83
	MCS 9	-85	-86
	MCS7	-70	-71
	MCS6	-72	-73
	MCS5	-73	-75
	MCS4	-78	-79
	MCS3	-81	-82
	MCS2	-85	-86
	MCS1	-88	-89
Maximum Deployment Range	Up to 40 km (25 mi)		
Subscribers Per Sector	120		
ARQ	Yes		
Cyclic Prefix	1/16		
Modulation Levels (Adaptive)	MCS1 through MCS15		
Latency (Round-trip)	15 ms		
Packets Per Second	30,000		
GPS Synchronization	Yes, via CMM3, CMM4, or internal GPS (models C050900A011A, C058900A112A, C024900A011A)		
Quality of Service	Diffserv QoS		
Link Budget			

Category	Specification
Antenna Beam Width	90º or 120º sectors, or Omni
Transmit Power, per Chain	0 to +27 dBm (to EIRP limit by region) in 1 dB-configurable intervals
Antenna Gain	17 dBi Horizontal and Vertical
Physical	
Wind Loading	190 km/hour (118 mi/hour)
Antenna Connection	50 ohm, SMA
Environmental	IP54
Temperature	-30ºC to +55ºC (-22ºF to +131ºF)
Weight	.521 kg (1.15 lbs) without antenna 1.92 kg (4.23 lbs) with antenna
Dimensions (H x W x D)	Radio: 227 x 88 x 33 mm (8.9" x 3.5" x 1.3") Antenna: 529 x 124 x 53 mm (20.8" x 4.9" x 2.1")
Maximum Power Consumption	15 W over 100 meter CAT-5 Ethernet cable
Input Voltage	29 V
Security	
Encryption	AES
Certifications	
FCC ID	Z8H89FT0006
Industry Canada Cert	109W-0006

Station (STA)

Category	Specification
Product	
Model Number	C050900P031A, C058900P132A
Spectrum	
Channel Spacing	Configurable on 5 MHz increments
Frequency Range — 5.0 GHz	5.250 GHz – 5.350 GHz, 5.470 GHz – 5.875 GHz (dependent upon Region Code setting)
Channel Width	20 MHz
Interface	
MAC (Media Access Control) Layer	Cambium Networks Proprietary
Physical Layer	2x2 MIMO OFDM
Ethernet Interface	10/100BaseT, half/full duplex, rate auto negotiated (802.3 compliant)
Protocols Used	IPv4, UDP, TCP, IP, SNMP, HTTP, FTP
Network Management	HTTP, SNMP v2c
Performance	

Category	Specification		
Nominal Receive Sensitivity (w/ FEC) @ 20 MHz Channel, Per Port	**MCS**	**Rx Sensitivity at 1% PER (dBm)**	**Rx Sensitivity at 10% PER (dBm)**
	MCS15	-68	-69
	MCS14	-69	-70
	MCS13	-71	-72
	MCS12	-76	-77
	MCS11	-79	-80
	MCS10	-82	-83
	MCS 9	-85	-86
	MCS7	-70	-71
	MCS6	-72	-73
	MCS5	-73	-75
	MCS4	-78	-79
	MCS3	-81	-82
	MCS2	-85	-86
	MCS1	-88	-89
Maximum Deployment Range	Up to 40 km (25 mi)		
Subscribers Per Sector	120		
ARQ	Yes		
Cyclic Prefix	1/16		
Modulation Levels (Adaptive)	MCS1 through MCS15		
Latency (Round-trip)	15 ms		
Packets Per Second	30,000		
Quality of Service	Classification Rules based on Traffic Type		
Link Budget			
Antenna Beam Width	90º or 120º sectors, or Omni		

Category	Specification
Transmit Power, per Chain	0 to +27 dBm (to EIRP limit by region) in 1 dB-configurable intervals
Antenna Gain	16 dBi Horizontal and Vertical
Physical	
Wind Loading	190 km/hour (118 mi/hour)
Antenna Connection	50 ohm, SMA
Environmental	IP54
Temperature	-30ºC to +55ºC (-22ºF to +131ºF)
Weight	4.94 kg (10.9 lbs)
Dimensions (H x W x D)	Radio: 252 x 117 x 78 mm (9.9" x 4.6" x 3.1")
Maximum Power Consumption	15 W over 100 meter CAT-5 Ethernet cable
Input Voltage	29 V
Security	
Encryption	AES
Certifications	
FCC ID	Z8H89FT0005
Industry Canada Cert	109W-0005

Safety Notices

This section describes important safety and regulatory guidelines that must be observed by personnel installing or operating ePMP equipment.

Important safety information

To prevent loss of life or physical injury, observe the safety guidelines in this section.

Power lines

Exercise extreme care when working near power lines.

Working at heights

Exercise extreme care when working at heights.

Grounding and protective earth

ePMP units 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 Section 810 of the *National Electric Code, ANSI/NFPA No.70-1984* (USA). 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

Always power down and unplug the equipment before servicing.

Primary disconnect device

The AP or STA unit's power supply is the primary disconnect device.

External cables

Safety may be compromised if outdoor rated cables are not used for connections that will be exposed to the outdoor environment.

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 ePMP unit before undertaking maintenance activities in front of the antenna.

Minimum separation distances

Install the AP/STA so as to provide and maintain the minimum separation distances from all persons.

The minimum separation distances for each frequency variant are specified in the ePMP User Guide.

Freq. Band	Antenna	Variable			d	Recommended Separation Distance	Power Compliance Margin
		P	G	S			
5 GHz OFDM	Integrated STA, 16 dBi patch	0.199 W (23 dBm)	39.8 (16 dB)	10 W/m^2 or 1 mW/cm^2	25.1 cm	26cm	
	Connectorized AP, with 17 dBi Sector Antenna and 1dB cable Loss	0.100 W (20 dBm)	39.8 (16 dB)	10 W/m^2 or 1 mW/cm^2	17.8 cm	20cm	

Warranty

Cambium's standard hardware warranty is for one (1) year from date of shipment from Cambium or a Cambium Point-To-Point Distributor. Cambium warrants that hardware will conform to the relevant published specifications and will be free from material defects in material and workmanship under normal use and service. Cambium shall within this time, at its own option, either repair or replace the defective product within thirty (30) days of receipt of the defective product. Repaired or replaced product will be subject to the original warranty period but not less than thirty (30) days.

Cambium Networks

Cambium Networks provides professional grade fixed wireless broadband and microwave solutions for customers around the world. Our solutions are deployed in thousands of networks in over 153 countries, with our innovative technologies providing reliable, secure, cost-effective connectivity that's easy to deploy and proven to deliver outstanding metrics.

Our flexible Point-to-Multipoint (PMP) solutions operate in the licensed, unlicensed and federal frequency bands, providing reliable, secure, cost effective access networks. With more than three million modules deployed in networks around the world, our PMP access network solutions prove themselves day-in and day-out in residential access, leased line replacement, video surveillance and smart grid infrastructure applications.

Our award-winning Point to Point (PTP) radio solutions operate in licensed, unlicensed and defined use frequency bands including specific FIPS 140-2 solutions for the U.S. Federal market. Ruggedized for 99.999% availability, our PTP solutions have an impeccable track record for delivering reliable high-speed backhaul connectivity even in the most challenging non-line-of-sight RF environments.

Cambium Networks solutions are proven, respected leaders in the wireless broadband industry. We design, deploy and deliver innovative data, voice and video connectivity solutions that enable and ensure the communications of life, empowering personal, commercial and community growth virtually everywhere in the world.

Contacting Cambium Networks

PMP support website: http://www.cambiumnetworks.com/support

Cambium main website: http://www.cambiumnetworks.com/

Sales enquiries: solutions@cambiumnetworks.com

Email support: support@cambiumnetworks.com

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http://www.cambiumnetworks.com/support/technical.php

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