Cambium Networks™

USER GUIDE

ePMP(802.11ac/ax)

Release 4.7.1

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Contents

About This Guide

This guide describes the planning, installation, configuration, and operation of the Cambium ePMP Series of point-to-multipoint and point-to-point wireless Ethernet systems. It is intended for use by the system designer, system installer, and system administrator.

For system configuration, monitoring, and fault finding, see:

- Using the Device Management Interface

For operation and troubleshooting, see:

- Operation and Troubleshooting

Problems and warranty

Reporting problems

At Cambium Networks, we know what it takes to keep a growing network running optimally. We provide multiple layers of support including training, online documentation, technical support, information-sharing with an experienced community of users, software downloads, warranty services, and repair.

Through the Cambium Networks Support Center https://support.cambiumnetworks.com/ you can:

- Submit support requests
- Submit RMA request
- View support global contact numbers

Additional information including field service bulletins, license key information, warranty details, security advisories, Cambium Networks Care program descriptions, regional codes for PTP solutions, and compliance requirements can be viewed at https://www.cambiumnetworks.com/support/.

Repair and service

If unit failure is suspected, obtain details of the Return Material Authorization (RMA) process from the Cambium Networks support site.

Warranty

For products shipped after October 1st, 2018 Cambium Networks' standard hardware warranty is for three (3) years from the date of shipment from Cambium Networks or a Cambium Networks distributor. Cambium Networks 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 Networks 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 products will be subject to the original warranty period but not less than thirty (30) days.

To register ePMP products or activate warranties, visit the Cambium Networks support site.

For warranty assistance, contact the reseller or distributor.

Attention

Do not open the radio housing for repair or diagnostics; there are no serviceable parts within the housing.

Portions of Cambium equipment may be damaged from exposure to electrostatic discharge. Use precautions to prevent damage.

Security advice

Cambium Networks' systems and equipment provide security parameters that can be configured by the operator based on their particular operating environment. Cambium Networks recommends setting and using these parameters following industry-recognized security practices. Security aspects to be considered are protecting the confidentiality, integrity, and availability of information and assets. Assets include the ability to communicate, information about the nature of the communications, and information about the parties involved.

In certain instances Cambium Networks make specific recommendations regarding security practices, however, the implementation of these recommendations and final responsibility for the security of the system lies with the operator of the system.

ePMP equipment from Cambium Networks is shipped with the default web management interface login credentials. It is highly recommended that, these usernames and passwords are modified before system installation.

Precautionary statements

The following describes how precautionary statements are used in this document.

Warning

Precautionary statements with the Warning tag precede instructions that contain potentially hazardous situations. Warnings are used to alert the reader to possible hazards that could cause loss of life or physical injury. A warning has the following format:

Warning

Text and consequence for not following the instructions in the warning.

Federal Communication Commission Interference Statement

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 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.

Caution

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

This device complies with Part 15 of the FCC Rules. 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.

IMPORTANT NOTE

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 36 cm between the radiator and your body.

IC Interference Statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs / récepteurs exempts de licence qui sont conformes au (x) RSS (s) exemptés de licence d'Innovation, Sciences et Développement économique Canada. L'opération est soumise aux deux conditions suivantes:

(1) Cet appareil ne doit pas provoquer d'interférences.

(2) Cet appareil doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil.

IMPORTANT NOTE

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

IC MPE distance: 20 cm

Warning

Devices shall not be used for control of or communications with unmanned aircraft systems.

Les appareils ne doivent pas être utilisés pour contrôler ou communiquer avec des systèmes d'aéronefs sans pilote.

Warning

Operation on oil platforms, automobiles, trains, maritime vessels and aircraft shall be prohibited.

L'exploitation sur les plates-formes pétrolières, les automobiles, les trains, les navires maritimes et les aéronefs est interdite.

Warning

The antenna height shall be determined by the installer or operator of the standard-power access point or fixed client device, or by automatic means. This information shall be stored internally in the device. Provision of accurate device information is mandatory.

La hauteur de l'antenne doit être déterminée par l'installateur ou l'opérateur du point d'accès à puissance standard ou de l'appareil client fixe, ou par des moyens automatiques. Ces informations doivent être stockées en interne dans l'appareil. La fourniture d'informations précises sur l'appareil est obligatoire.

Attention

Precautionary statements with the Attention tag precede instructions that are used when there is a possibility of damage to systems, software, or individual items of equipment within a system. However, this damage presents no danger to personnel. An attention statement has the following format:

Attention

Text and consequence for not following the instructions.

Note

Precautionary statements with the Note tag indicate the possibility of an undesirable situation or provide additional information to help the reader understand a topic or concept. A note has the following format:

Note

Text.

Caring for the environment

The following information describes national or regional requirements for the disposal of Cambium Networks supplied equipment and for the approved disposal of surplus packaging.

In EU countries

The following information is provided to enable regulatory compliance with the European Union (EU) directives identified and any amendments made to these directives when using Cambium Networks equipment in the EU countries.

Disposal of Cambium Networks equipment

European Union (EU) Directive 2002/96/EC Waste Electrical and Electronic Equipment (WEEE).

Do not dispose of Cambium Networks equipment in landfill sites. For disposal instructions, see https://support.cambiumnetworks.com

Disposal of surplus packaging

Do not dispose of surplus packaging in landfill sites. In the EU, it is the individual recipient's responsibility to ensure that packaging materials are collected and recycled according to the requirements of EU environmental law.

In non-EU countries

In non-EU countries, dispose of Cambium Networks equipment and all surplus packaging in accordance with national and regional regulations.

Product Description

This section provides a high-level description of the ePMP products. It describes the function of the product, the main product variants, and the typical installation. It also describes the main hardware components.

The following topics are described in this chapter:

- The key features, typical uses, product variants, and components of the ePMP are explained in the Overview of ePMP.
- ePMP wireless link is operations, including modulation modes, power control, and security is described under Wireless operation.
- The ePMP management system, including the web interface, installation, configuration, alerts, and upgrades is described in System management.

Overview of ePMP

This section introduces the key features, typical uses, product variants, and components of the ePMP portfolio as a whole (ePMP third generation) products.

Purpose – ePMP portfolio

ePMP Series products from Cambium Networks are designed for Ethernet bridging over Point-to-Multipoint (PMP) and Point-to-Point (PTP) microwave links in the unlicensed 2.4 GHz, 2.5 GHz (Brazil only), 5 GHz, and 6 GHz bands. Users must ensure that the ePMP Series complies with local operating regulations.

ePMP devices support point-to-point microwave links in the unlicensed 5 GHz and 6 GHz bands.

The ePMP Series acts as a transparent bridge between two segments of the operator and customers' networks. In this sense, it can be treated as a virtual wired connection between the Access Point (AP) and the Subscriber Module (SM). The ePMP series forwards 802.3 Ethernet packets destined for the other part of the network and filters packets it does not need to forward and can deliver unicast data to unknown destinations as broadcast, similar to a switch functionality.

ePMP 3000

ePMP 3000 is a high-capacity outdoor point-to-multipoint or point-to-point link wireless device in the unlicensed 5 GHz frequency bands with a maximum UDP sector throughput of up to 1+ Gbps (when operating with 80 MHz channel bandwidth).

- It is capable of operating in Line-of-Sight (LoS) and near-LoS conditions and supports Quality of Service (QoS) for traffic prioritization.
- It is available as a connectorized unit for use with a separate 4x4 MU-MIMO Sector/Dual-Horn/Omni antenna and optional Smart Antenna (for uplink beam steering).
- ePMP 3000 supports maximum information rate (MIR) further allowing the operator to manage traffic profiles for end customers.

- ePMP 3000 provides Dynamic Frequency Selection (DFS) for North America (FCC) and supports additional DFS tuning balances detection of actual DFS signals vs false detection.
- ePMP 3000 supports backward and forward compatibility with ePMP 802.11n devices to provide an immediate sector upgrade to 802.11ac Wave 2 performance, and also to support future upgrades of networks operating ePMP 1000/2000 APs.
- ePMP 3000 is based on highly integrated wireless semiconductor components designed to meet the IEEE 802.11ac standard, however, the ePMP 3000 device has a proprietary air interface for the main point-to-multipoint or point-to-point link.
- ePMP 3000 is powered by standard power-over-Ethernet to a 1000BASE-T port.
- Management of the unit is conducted via the same interface as the bridged traffic (in-band Management).

ePMP 3000 is shown in Figure 1.

Figure 1: *ePMP 3000*

A summary of the main ePMP 3000 characteristics is listed under Table 1.

Table 1: Main characteristics of the ePMP 3000 Series

Characteristic	Value
Topology	PMP or PTP
Wireless link condition	LoS, near LoS
Scheduler	TDD
Connectivity	Ethernet

Characteristic	Value
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	10 MHz*, 20 MHz, 40 MHz, 80 MHz
Data rate	Up to 1+ Gbps Sector Throughput

* The 10 MHz Channel Bandwidth is supported only with the Force 300-19R SM.

ePMP 3000L

ePMP 3000L is the third-generation Access Point (AP) that carries on the interference tolerance mechanisms with an emphasis on high-performance in low-density point to multipoint sectors. The ePMP 3000L is a 2x 2 MIMO connectorized AP that can support a wide variety of deployments including 90/120-degree sectors, narrow-sector horns, or even 360-degree Omni coverage.

Also, the ePMP 3000L continues interference mitigation techniques with the support of TDD synchronization using GPS and the robust software from the ePMP product line. The ePMP 3000L system consists of the ePMP 3000L AP, an optional 2x2 sector antenna, and a wide variety of subscriber modules with varying form factors and link budgets.

ePMP 3000 supports backward and forward compatibility with ePMP 802.11n devices to provide an immediate sector upgrade to 802.11ac Wave 2 performance, and also to support future upgrades of networks operating ePMP 1000/2000 APs.

The ePMP 3000L system boasts a high packet per second performance, peak throughput of 600 Mbps, and supports subscriber modules with up to 600 Mbps of peak throughput.

ePMP 3000L is shown in Figure 2

Figure 2: *ePMP 3000L*

A summary of the main ePMP 3000L characteristics are listed under Table 2.

Table 2: Main characteristics of the ePMP 3000L Series

Characteristic	Value
Topology	PMP or PTP
Wireless link condition	LoS, near LoS
Scheduler	TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz
Data rate	Up to 1+ Gbps Sector Throughput

ePMP MP 3000 MicroPoP

ePMP MP 3000 MicroPoP is an integrated AP designed to serve short-range, low-density applications. It uses 802.11ac 2x2 architecture and can interoperate with a Force 300 subscriber module.

ePMP MP 3000 is shown in Figure 3.

Figure 3: *ePMP MP 3000 MicroPoP*

ePMP 4500C

ePMP 4500C is the third-generation Access Point (AP) that carries on the interference tolerance mechanisms with an emphasis on high-performance in low-density point to multipoint sectors. The ePMP 4500C is a 8 X 8 MU-MIMO connectorized AP that can support a wide variety of deployments including 90/120-degree sectors, narrow-sector horns, or even 360-degree Omni coverage.

The ePMP 4500C system consists of the ePMP 4500C AP, an optional 2x2 sector antenna, and a wide variety of subscriber modules with varying form factors and link budgets.

The ePMP 4500C system boasts a high packet per second performance, peak throughput of 3 Gbps, and supports subscriber modules with up to 3 Gbps of peak throughput.

ePMP 4500C is shown in Figure 4

Figure 4: *ePMP 4500C*

A summary of the main ePMP 4500C characteristics are listed under Table 3.

Table 3: Main characteristics of the ePMP 4500C Series

Characteristic	Value
Topology	PMP or PTP
Wireless link condition	LoS, near LoS
Scheduler	WLR, TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz
Data rate	3 Gbps

ePMP 4500

ePMP 4500 is the third-generation Access Point (AP) that carries on the interference tolerance mechanisms with an emphasis on high-performance in low-density point to multipoint sectors. The ePMP 4500 is a 2x 2 MIMO connectorized AP that can support a wide variety of deployments including 90/120-degree sectors, narrow-sector horns, or even 360-degree Omni coverage.

The ePMP 4500 system consists of the ePMP 4500 AP, an optional 2x2 sector antenna, and a wide variety of subscriber modules with varying form factors and link budgets.

The ePMP 4500 system boasts a high packet per second performance, peak throughput of 3 Gbps, and supports subscriber modules with up to 3 Gbps of peak throughput.

ePMP 4500 is shown in Figure 5

Figure 5: *ePMP 4500*

A summary of the main ePMP 4500 characteristics are listed under Table 4.

Table 4: Main characteristics of the ePMP 4500 Series

Characteristic	Value
Topology	PMP or PTP
Wireless link condition	LoS, near LoS
Scheduler	WLR, TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz
Data rate	3 Gbps

ePMP 4600

ePMP 4600 is the third-generation Access Point (AP) that carries on the interference tolerance mechanisms with an emphasis on high-performance in low-density point to multipoint sectors. The ePMP 4600 is a 4 x 4 MIMO connectorized AP that can support a wide variety of deployments including 90/120-degree sectors, narrow-sector horns, or even 360-degree omni coverage.

The ePMP 4600 system consists of the ePMP 4600 AP, an optional 4x4 sector antenna, and a wide variety of subscriber modules with varying form factors and link budgets.

The ePMP 4600 system boasts a high packet per second performance, peak throughput of 4.3 Gbps, and supports subscriber modules with up to 4.3 Gbps of peak throughput.

ePMP 4600 is shown in Figure 6

Figure 6: *ePMP 4600*

A summary of the main ePMP 4600 characteristics are listed under Table 5.

Table 5: Main characteristics of the ePMP 4600 Series

Characteristic	Value
Topology	PTP
Wireless link condition	LoS, near LoS
Scheduler	WLR, TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 6 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz, 160 MHz
Data rate	Up to 4.3 Gbps Sector Throughput

ePMP 4600L

ePMP 4600L is the third-generation Access Point (AP) that carries on the interference tolerance mechanisms with an emphasis on high-performance in low-density point to multipoint sectors. The ePMP 4600L is a 4 x 4 MIMO connectorized AP that can support a wide variety of deployments including 90/120-degree sectors, narrow-sector horns, or even 360-degree omni coverage.

The ePMP 4600L system consists of the ePMP 4600L AP, an optional 4x4 sector antenna, and a wide variety of subscriber modules with varying form factors and link budgets.

The ePMP 4600L system boasts a high packet per second performance, peak throughput of 4.3 Gbps, and supports subscriber modules with up to 4.3 Gbps of peak throughput.

ePMP 4600L is shown in Figure 7

Figure 7: *ePMP 4600L*

A summary of the main ePMP 4600L characteristics are listed under Table 6.

Table 6: Main characteristics of the ePMP 4600L Series

Characteristic	Value
Topology	PTP
Wireless link condition	LoS, near LoS
Scheduler	WLR, TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 6 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz, 160 MHz
Data rate	Up to 4.3 Gbps Sector Throughput

ePMP 4500L

ePMP 4500L is the third-generation Access Point (AP) that carries on the interference tolerance mechanisms with an emphasis on high-performance in low-density point to multipoint sectors. The ePMP 4500L is a 2 x 2 MIMO connectorized AP that can support a wide variety of deployments including 90/120-degree sectors, narrow-sector horns, or even 360-degree Omni coverage.

The ePMP 4500L system consists of the ePMP 4500L AP, an optional 2x2 sector antenna, and a wide variety of subscriber modules with varying form factors and link budgets.

The ePMP 4500L system boasts a high packet per second performance, peak throughput of 1 Gbps, and supports subscriber modules with up to 1 Gbps of peak throughput.

ePMP 4500L is shown in Figure 8

Figure 8: *ePMP 4500L*

A summary of the main ePMP 4500L characteristics are listed under Table 7.

Table 7: Main characteristics of the ePMP 4500L Series

Characteristic	Value
Topology	PMP or PTP
Wireless link condition	LoS, near LoS
Scheduler	WLR, TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz
Data rate	1 Gbps

ePMP 5/6GHz 4 x 4 sector antenna

ePMP 5/6GHz 4 x 4 sector antenna carries on the interference tolerance mechanisms with an emphasis on high-performance in low-density point to multipoint sectors. It is a 4 x 4 MIMO connectorized AP that can support a wide variety of deployments including 90/120-degree sectors, narrow-sector horns, or even 360-degree omni coverage.

Figure 9: *ePMP 5/6 GHz 4 x 4 sector antenna*

Force 300-25

Force 300-25 is a high-capacity outdoor Point-to-Multipoint or Point-to-Point link wireless device in the unlicensed 5 GHz frequency bands with a maximum UDP throughput of 500+ Mbps (when operating with 80 MHz channel bandwidth). It is capable of operating in line-of-sight (LoS) and near-LoS conditions. Force 300-25 is available as an integrated unit with a dual-polarized 25 dBi narrow Beamwidth dish antenna.

Force 300-25 is based on highly integrated wireless semiconductor components designed to meet the IEEE 802.11ac standard, however, the Force 300-25 device has a proprietary air interface for the main point-to-point link.

Force 300-25 is powered by standard power-over-Ethernet to a 1000BASE-T port.

Management of the unit is conducted via the same interface as the bridged traffic (in-band Management).

Force 300-25 is shown in Figure 10

Figure 10: *Force 300-25*

A summary of the main Force 300-25 characteristics are listed under Table 8.

Table 8: Main characteristics of the Force 300-25 Series

Characteristic	Value
Topology	PMP, PTP
Wireless link condition	LoS, near LoS
Scheduler	TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz
Data rate	Up to 500+ Mbps

Force 300-19

Force 300-19 is a high-capacity outdoor Point-to-Multipoint or Point-to-Point link wireless devices in the unlicensed 5 GHz frequency bands with a maximum UDP throughput of 500+ Mbps (when operating with 80 MHz channel bandwidth). The Force 300-19 is IP55 rated capable of operating in line-of-sight (LoS) and near-LoS conditions.

Management of the unit is conducted through the same interface as the bridged traffic (in-band Management).

Force 300-19 is shown in Figure 11.

Figure 11: *Force 300-19*

A summary of the main Force 300-19 characteristics are listed under Table 9.

Note

This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

Table 9: Main characteristics of the Force 300-19

Characteristic	Value
Topology	PMP, PTP
Wireless link condition	LoS, near LoS
Scheduler	TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz
Data rate	Up to 500+ Mbps

Force 300-19R

Force 300-19R is a high-capacity outdoor Point-to-Multipoint or Point-to-Point link wireless device in the unlicensed 5 GHz frequency bands with a maximum UDP throughput of 600+ Mbps (when operating with 80 MHz channel bandwidth). The Force 300-19R is IP67 rated capable of operating in line-of-sight (LoS) and near-LoS conditions. Force 300-19R is available as an integrated unit with a dual-polarized 19dBi integrated flat-panel antenna.

Force 300-19R is based on highly integrated wireless semiconductor components designed to meet the IEEE 802.11ac standard, however, the Force 300-19R device has a proprietary air interface for the main point-to-point link.

Force 300-19R is powered by standard power-over-Ethernet to a 1000BASE-T port.

Management of the unit is conducted through the same interface as the bridged traffic (in-band Management).

Force 300-19R is shown in Figure 12

Figure 12: *Force 300-19R*

A summary of the main Force 300-19R characteristics is listed under Table 10.

Note

This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

Table 10: Main characteristics of the Force 300-19R

Characteristic	Value
Topology	PMP, PTP
Wireless link condition	LoS, near LoS
Scheduler	TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	10/20/40/80 MHz
Data rate	Up to 500+ Mbps
Environmental	IP67 **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.
Temperature	-30°C to +60°C (-22°F to 140°F)

Force 300-16

Force 300-16 is a high-capacity outdoor Point-to-Multipoint or Point-to-Point link wireless device in the unlicensed 5 GHz frequency bands with a maximum UDP throughput of 500+ Mbps (when operating with 80 MHz channel bandwidth). It is capable of operating in line-of-sight (LoS) and near-LoS conditions. Force 300-16 is available as an integrated unit with a dual-polarized 16 dBi integrated antenna.

Force 300-16 is based on highly integrated wireless semiconductor components designed to meet the IEEE 802.11ac standard, however, the Force 300-16 device has a proprietary air interface for the main point-to-point link.

Force 300-16 is powered by standard power-over-Ethernet to a 1000BASE-T port.

Management of the unit is conducted through the same interface as the bridged traffic (in-band Management). Force 300-16 is shown in Figure 13.

Figure 13: *Force 300-16*

A summary of the main Force 300-16 characteristics is listed under Table 11.

Table 11: Main characteristics of the Force 300-16

Characteristic	Value
Topology	PMP, PTP
Wireless link condition	LoS, near LoS
Scheduler	TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz
Data rate	Up to 500+ Mbps

Force 300-13

Force 300-13 is a high-capacity outdoor Point-to-Multipoint or Point-to-Point link wireless device in the unlicensed 5 GHz frequency bands with a maximum UDP throughput of 500+ Mbps (when operating with 80 MHz channel bandwidth). It can operate in line-of-sight (LoS). Force 300-13 is available as an integrated unit with a dual-polarized 13 dBi flat-panel antenna.

Force 300-13 is based on highly integrated wireless semiconductor components designed to meet the IEEE 802.11ac standard, however, the Force 300-13 device has a proprietary air interface for the main point-to-point link.

Force 300-13 is powered by standard power-over-Ethernet to a 1000BASE-T port.

Management of the unit is conducted through the same interface as the bridged traffic (in-band Management). Force 300-13 is shown in Figure 14

Figure 14: *Force 300-13*

A summary of the main Force 300-13 characteristics are listed under Table 12.

Table 12: Main characteristics of the Force 300-13

Characteristic	Value
Topology	PMP, PTP
Wireless link condition	LoS
Scheduler	TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz
Data rate	Up to 500+ Mbps

Force 300-13L

Force 300-13L is an affordable Subscriber Module (SM) in the ePMP Force 300 series. The Force 300-13L uses 802.11ac technology and supports MU-MIMO and other features offered by the ePMP 3000 and ePMP 3000L APs. It is also backward compatible with the ePMP 2000 using backward compatibility features. The Force 300-13L is powered by standard power-over-Ethernet to a 1000BASE-T port. Force 300-13L is shown in Figure 15

Figure 15: *Force 300-13L*

Note

The ePMP Force 300-13L is available in EMEA, CALA, and APAC regions where type approved. It is NOT available in North America.

A summary of the main Force 300-13L characteristics is listed under Table 13.

Table 13: Main characteristics of the Force 300-13L

Characteristic	Value
Topology	PMP, PTP
Wireless link condition	LoS
Scheduler	TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz
Data rate	Up to 400+ Mbps

Force 300 CSM

Force 300 CSM is an IP67 high-capacity outdoor Point-to-Multipoint or Point-to-Point link wireless device in the unlicensed 5 GHz frequency bands with a maximum UDP throughput of 600+ Mbps (when operating with 80 MHz channel bandwidth). It can operate in line-of-sight (LoS). Force 300 CMS is a Connectorized device with support for RF Element Twistport™ adaptors.

The Force 300 CSM device is based on highly integrated wireless semiconductor components designed to meet the IEEE 802.11ac standard.

Management of the unit is conducted via the same interface as the bridged traffic (in-band Management). Force 300 CSM is shown in Figure 16.

Figure 16: *Force 300 CSM*

A summary of the main Force 300 CSM characteristics are listed under Table 14.

Note

This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be raintight.

Table 14: Main characteristics of the Force 300 CSM

Characteristic	Value
Topology	PMP, PTP
Wireless link condition	LoS
Scheduler	TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz
Data rate	Up to 600+ Mbps

Force 300 CSML

Force 300CSML is an affordable subscriber module in the ePMP Force 300 series. The Force 300 CSML uses 802.11ac technology and supports MU-MIMO and other features offered by the ePMP 3000 and ePMP 3000L APs. It is also backward compatible with the ePMP 2000 using backward compatibility features. The Force 300 CSML is powered by standard power-over-Ethernet to a 1000BASE-T port.

Force 300 CSML is shown in Figure 17.

Figure 17: *Force 300 CSML*

Note

The ePMP Force 300 CSML is available in EMEA, CALA, and APAC regions where type approved. It is not available in North America.

A summary of the main Force 300 CSML characteristics is listed under Table 15.

Table 15: Main characteristics of the Force 300 CSML

Characteristic	Value
Topology	PMP, PTP
Wireless link condition	LoS
Scheduler	TDD
Connectivity	Ethernet
Operating frequencies	Unlicensed bands, 5 GHz
Channel Bandwidth	20 MHz, 40 MHz, 80 MHz
Data rate	Up to 400+ Mbps

Force 425

Force 425 is a self-contained transceiver unit that houses both radio and networking electronics.

Force 425 is shown in Figure 18.

Figure 18: *Force 425 integrated*

Force 400C

Force 400C is a self-contained transceiver unit that houses both radio and networking electronics.

Force 400C is shown in Figure 19.

Figure 19: *Force 400C integrated*

Force 4600C

Force 4600C is a self-contained transceiver unit that houses both radio and networking electronics. The Force 4600C uses 802.11ax technology and supports MU-MIMO. It is powered by standard power-over-Ethernet to a 1000BASE-T port.

Force 4600C is shown in Figure 20.

Figure 20: *Force 4600C integrated*

Force 4525

Force 4525 is a self-contained transceiver unit that houses both radio and networking electronics. The Force 4525 uses 802.11ac technology and supports MU-MIMO. The Force 4525 is powered by standard power-over-Ethernet to a 1000BASE-T port.

Force 4525 is shown in Figure 21.

Figure 21: *Force 4525 integrated*

Force 4625

Force 4625 device is a self-contained transceiver unit that houses both radio and networking electronics. The Force 4625 uses 802.11ax technology and supports MU-MIMO. It is powered by standard power-over-Ethernet to a 1000BASE-T port.

Force 4625 is shown in Figure 22.

Figure 22: *Force 4625 integrated*

Typical installation equipment

The ePMP is a solution consisting of integrated outdoor units, indoor power supply units / LAN injectors, cabling, and surge suppression equipment.

The following are the main hardware components of an ePMP installation:

- **ePMP 3000 Access Point:** A connectorized outdoor transceiver unit containing all the radio, networking, and surge suppression electronics.
- **ePMP 3000L Access Point:** A connectorized *IP67 outdoor transceiver unit containing all the radio, networking, and surge suppression electronics.
- **ePMP 3000/3000L Access Point Power Supply:** An indoor power supply module providing Power-over-Ethernet (PoE) supply and 1000 / 100 Base-TX to the AP.
- **ePMP 3000/3000L Access Point Radio Cabling and Lightning Protection:** Shielded Cat5e cables, grounding cables, surge suppressors, and connectors.
- **ePMP Smart Antenna and cabling (optional):** For Smart Beamforming, dynamically creates a narrow, targeted beam to each subscriber
- **Force 300-25/Force 300-19/Force 300-19R/Force 300-16/Force 300-13/Force 300 CSM Radio:** Integrated outdoor transceiver units containing all the radio, networking, and surge suppression electronics.
- **Force 300-25/Force 300-19/Force 300-19R/Force 300-16/Force 300-13/Force 300 CSM Power Supply:** An indoor power supply module providing Power-over-Ethernet (PoE) supply and 100/1000 BASE-T to the Force 300-25 device.
- **Force 300-25/Force 300-19/Force 300-19R/Force 300-16/Force 300-13/Force 300 CSM Radio Cabling and Lightning Protection:** Shielded Cat5e cables, grounding cables, surge suppressors, and connectors.

- **ePMP 4x4 MU-MIMO Sector Antenna/ePMP 4x4 MU-MIMO Dual-Horn Antenna/ePMP 4x4 MU-MIMO Omni Antenna:** External Antennas for the ePMP 3000 AP.

For more information about these components, including interfaces, specifications, and Cambium part numbers, see Chapter 2: System Hardware.

Note

This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

Wireless operation

This section describes ePMP wireless link operating methods, modulation modes, power control, and security.

MU-MIMO

The ePMP 3000 MU-MIMO AP is equipped either with a sector antenna array or a pseudo-omni antenna. Antenna diversity allows simultaneous DL transmissions for two subscriber modules for MU-MIMO. As such, the ePMP 3000 AP's DL throughput capacity is significantly increased versus the ePMP 1000/2000 APs.

This is a contrast to a traditional wireless system, where two subscribers cannot communicate on the same channel to the same AP at the same time without causing significant self-interference and degrading the overall wireless network performance.

MIMO

The Multiple-Input Multiple-Output (MIMO) technique protects against the fading and increases the probability of a received decoded signal being usable.

Smart beamforming (ePMP 2000/3000 series)

ePMP series APs feature Smart Beamforming is powered by Hypure™ technology. This powerful addition to your network creates narrow, targeted beams to each subscriber, rather than relying on a traditional wide beam, blocking out multiple sources of interference to keep performance high.

The System learns the locations of each served Subscriber Module and forms a narrow beam towards the desired Subscriber Module while that radio is transmitting in the uplink. This reduces the gain on the uplink for on-channel interferers that are transmitting at an azimuth angle different than the Subscriber Module, delivering performance gains never seen before.

Figure 23: *Smart beamforming*

Smart antenna key advantages

The following are the key advantages of smart antenna:

- **Eliminate Uplink Interference**: Smart Beamforming delivers dramatic performance improvements when dealing with strong co-channel uplink interference, maximizing network performance.
- **Consistent Performance in High Interference**: By mitigating significant sources of interference, packet loss and retransmissions are kept to a minimum, keeping your network applications working at their best.
- **Improvement in Uplink and Downlink Performance**: By eliminating packet loss and retransmissions resulting from co-channel uplink interference, TCP retransmissions are greatly reduced. Other applications also show significant performance benefits.
- **Intelligent Filtering improves both receive and transmit performance**: It protects the network from off-channel interferences with a filter that dynamically moves around the channel. On the transmit side, it protects the RF environment by reducing off-channel transmission noise.

Time-division duplexing

TDD cycle

ePMP links operate using Time Division Duplexing (TDD). The links employ a TDD cycle in which the AP determines the Subscriber Modules to transmit and the time based on the configured downlink/uplink ratio (duty cycle). Three fixed Downlink/Uplink frame ratios are available – 75/25, 50/50, and 30/70.

OFDM and channel bandwidth

ePMP 3000 transmits using Orthogonal Frequency Division Multiplexing (OFDM). This wideband signal consists of many equally spaced sub-carriers. Although each subcarrier is modulated at a low rate using conventional modulation schemes, the resultant data rate from all the sub-carriers is high.

The channel bandwidth of the OFDM signal is 20 MHz, 40 MHz, or 80 MHz, based on operator configuration.

Each channel is offset in center frequency from its neighboring channel by 5 MHz.

Adaptive modulation

ePMP(802.11ac-ax) can transmit a data over the wireless link using several different modulation modes ranging from 256-QAM to QPSK. For a given channel bandwidth and TDD frame structure, each modulation mode transmits data at a fixed rate. Also, the receiver requires a given signal-to-noise ratio to successfully demodulate a given modulation mode. Although the more complex modulations such as 256-QAM transmits data at a more higher rate than the less complex modulation modes, the receiver requires a much higher signal-to-noise ratio.

ePMP(802.11ac-ax) provides an adaptive modulation scheme where the receiver constantly monitors the quality of the received signal and notifies the far end of the link of the optimum modulation mode with which to transmit. In this way, optimum capacity is achieved at all times.

Radar avoidance

In regions where the protection of radars is a part of the local regulations, ePMP must detect interference from radar-like systems and avoid co-channel operation with these systems.

To meet this requirement, ePMP implements the following features:

- The equipment can only transmits on available channels, of which there are none at initial power-up. The radar detection algorithm always scan a usable channel for 60 seconds for radar interference before making the channel an available channel.
- This compulsory channel scan means that there is at least 60 seconds service outage every time radar is detected, and that the installation time is extended by at least 60 seconds even if there is no radar on the channel.

There is a secondary requirement for bands requiring radar avoidance. Regulators have mandated that products provide a uniform loading of the spectrum across all devices. In general, this prevents operation with fixed frequency allocations as follows:

- ETSI regulations allow frequency planning of networks (as that has the same effect of spreading the load across the spectrum).
- The FCC allows the channels to be avoided if there is actual interference on them.

Note

When operating in a region that requires DFS, ensure that the AP is configured with alternate frequencies and the SM is configured to scan for these frequencies to avoid long outages.

Encryption

ePMP supports optional encryption for data transmitted over the wireless link. The encryption algorithm used is the Advanced Encryption Standard (AES) with a 128-bit key size. AES is a symmetric encryption algorithm approved by U.S. Government organizations (and others) to protect sensitive information.

Country codes

Some aspects of the wireless operation are controlled, enforced, or restricted according to a country code. ePMP country codes represent individual countries (for example Denmark) or regulatory regions (for example FCC or ETSI).

Country codes affect the following aspects of wireless operation:

- Maximum transmit power
- Radar avoidance (upcoming release)
- Frequency range

Attention

To avoid possible enforcement action by the country regulator, always operate links in accordance with the local regulations.

Further reading on wireless operation

For information on planning wireless operation, see:

- The regulatory restrictions that affect radio spectrum usages, such as frequency range and radar avoidance are described in Radio spectrum planning.
- The factors to be taken into account when planning links such as range, path loss, and data throughput are described in Link planning.
- The safety specifications against which the ePMP is tested are listed under Compliance with safety standards . It also describes how to keep RF exposure within safe limits.
- ePMP complies with the radio regulations that are enforced in various countries are explained in Compliance with radio regulations.

For more information on configuring and operating the wireless link, see:

- The configuration parameters of the ePMP devices are described in Using the menu options.
- Post-installation procedures and troubleshooting tips are explained in Operation and Troubleshooting.

System management

This section describes the ePMP management system, including the web interfaces, installation, alerts, upgrades, configuration, and management software.

Management agent

ePMP equipment is managed through an embedded management agent. Management workstations, network management systems, or PCs can be connected to this agent using the module's Ethernet port, SFP port, over the air (Subscriber Module connection through AP), or by using the device Wi-Fi management interface.

The management agent supports the following interfaces:

- Hypertext Transfer Protocol (HTTP)
- Hypertext Transfer Protocol Secure (HTTPs)
- Simple Network Management Protocol (SNMP)
- Network Time Protocol (NTP)
- System logging (Syslog)

- cnMaestro™ Cloud-based or On-premises Management System
- Dynamic Host Configuration Protocol (DHCP)

Webserver

The ePMP management agent contains a web server. The web server supports access through the HTTP and HTTPs interfaces.

Web-based management offers a convenient way to manage the ePMP equipment from a locally connected computer or from a network management workstation connected through a management network, without requiring any special management software. The web-based interfaces are the only interfaces supported for the installation of ePMP, and the majority of ePMP configuration management tasks.

Identity-based user accounts

When identity-based user accounts are configured, a security officer can define from one to four user accounts, each of which may have one of the four possible roles:

- ADMINISTRATOR (default username/password is **admin**), who has full read and write permission.
- INSTALLER (default username/password is **installer**), who has permission to read and write parameters applicable to unit installation and monitoring.
- HOME (default username/password is **home**), who has permission only to access pertinent information for support purposes.
- READONLY (default username/password is **readonly**), who has permission to only view the Monitor page.

SNMP

The management agent supports fault and performance management utilizing an SNMP interface. The management agent is compatible with SNMP v2c using one Management Information Base (MIB) file which is available for download from the Cambium Networks support site: https://support.cambiumnetworks.com/files/epmp.

Network Time Protocol (NTP)

The clock supplies accurate date and time information to the system. It can be set to run with or without a connection to a network time server (NTP). It can be configured to display local time by setting the time zone and daylight saving on the Time web page.

If an NTP server connection is available, the clock can be set to synchronize with the server time at regular intervals.

ePMP devices may receive NTP data from a CMM module or an NTP server configured in the system's management network.

The Time Zone option is configurable on the **Configure** > **System** page and may be used to offset the received NTP time to match the operator's local time zone.

Software upgrade

Software upgrades may be issued through the radio web interface (**Tools** > **Software Upgrade**) or cnMaestro (cloud.cambiumnetworks.com). For software upgrades, visit: https://support.cambiumnetworks.com/files/epmp.

Further reading on system management

For more information on system management, refer to Operation and Troubleshooting section.

System Hardware

This chapter describes the site planning and hardware components of an ePMP link.

The following topics are described in this chapter:

- Factors to be considered when planning the proposed network is described under Site planning.
- The ePMP 3000 Access Point hardware, part numbers, mounting equipment, and specifications are described in ePMP 3000 Access Point.
- The ePMP 3000L Access Point hardware, part numbers, mounting equipment, and specifications are described in ePMP 3000L Access Point.
- The ePMP MP3000 MicroPoP Access Point hardware, part numbers, mounting equipment, and specifications are described in ePMP MP3000 MicroPoP Access Point.
- The ePMP 4500C Access Point hardware, part numbers, mounting equipment, and specifications are described in ePMP 4500C Access Point.
- The ePMP 4500 Access Point hardware, part numbers, mounting equipment, and specifications are described in ePMP 4500 Access Point.
- The ePMP 4600 Access Point hardware, part numbers, mounting equipment, and specifications are described in ePMP 4600 Access Point.
- The ePMP 4600L Access Point hardware, part numbers, mounting equipment, and specifications are described in ePMP 4600L Access Point.
- The ePMP 4500L Access Point hardware, part numbers, mounting equipment, and specifications are described in ePMP 4500L Access Point.
- The Force 300-25 module hardware, part numbers, mounting equipment, and specifications are described in Force 300-25 .
- The Force 300-25L module hardware, part numbers, mounting equipment, and specifications are described in Force 300-25L.
- The Force 300-19 module hardware, part numbers, mounting equipment, and specifications are described in Force 300-19.
- The Force 300-19R module hardware, part numbers, mounting equipment, and specifications are described in Force 300-19R.
- The Force 300-16 module hardware, part numbers, mounting equipment, and specifications are described in Force 300-16.
- The Force 300-13 module hardware, part numbers, mounting equipment, and specifications are described in Force 300-13 .
- The Force 300-13L module hardware, part numbers, mounting equipment, and specifications are described in Force 300-13L .

- The Force 300 CSM module hardware, part numbers, mounting equipment, and specifications are described in Force 300 CSM .
- The Force 300 CSML module hardware, part numbers, mounting equipment, and specifications are described in Force 300 CSML.
- The Force 425 module hardware, integrated description, part numbers, mounting equipment, and specifications are described in Force 425.
- The Force 400C module hardware, integrated description, part numbers, mounting equipment, and specifications are described in Force 400C.
- The Force 4600C module hardware, integrated description, part numbers, mounting equipment, and specifications are described in Force 4600C.
- The Force 4525 module hardware, integrated description, part numbers, mounting equipment, and specifications are described in Force 4525.
- The Force 4625 module hardware, integrated description, part numbers, mounting equipment, and specifications are described in Force 4625.
- The power supply hardware, part numbers, and specifications are described in Power supply.
- Cable standards and lengths are described in Ethernet cabling.
- Surge suppression requirements and recommendations are described in Surge suppression unit.
- GPS synchronization generation information are described in cnPulse sync generator.

Site planning

Conduct a site survey to ensure that the proposed sites meet the requirements defined in this section.

Site installation

An ePMP site typically consists of a high supporting structure such as a mast, tower, or building for the devices.

Find a location for the device that meets the following requirements:

- The equipment is high enough to achieve the best radio path.
- People can be kept a safe distance away from the equipment when it is radiating. .
- The equipment is lower than the top of the supporting structure (tower, mast, or building) or its lightning air terminal.
- There is one Ethernet interface, a copper Cat5e connection from the device to the power supply, and network terminating equipment.

Grounding and lightning protection

Structures, equipment, and people must be protected against power surges (typically caused by lightning) by conducting the surge current to the ground through a separate preferential solid path. The

actual degree of protection required depends on local conditions and applicable local regulations. To adequately protect an ePMP installation, both ground bonding and transient voltage surge suppression are required.

Warning

Electro-magnetic discharge (lightning) damage is not covered under warranty. The recommendations in this guide, when followed correctly, give the user the best protection from the harmful effects of EMD. However, 100 percent protection is neither implied nor possible.

Details of lightning protection methods and requirements can be found in the international standards IEC 61024-1 and IEC 61312-1, the U.S. National Electric Code ANSI/NFPA No. 70-1984, or section 54 of the Canadian Electric Code.

Note

International and national standards take precedence over the requirements in this guide.

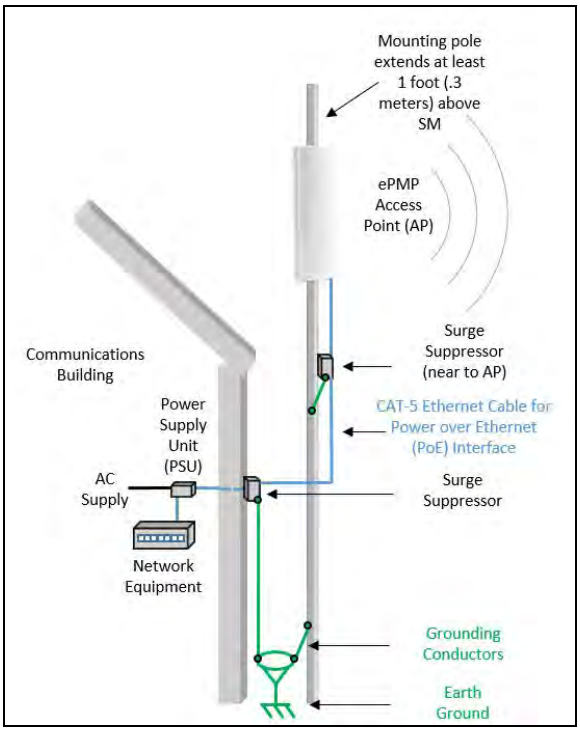


Figure 24: *Access Point installation diagram*

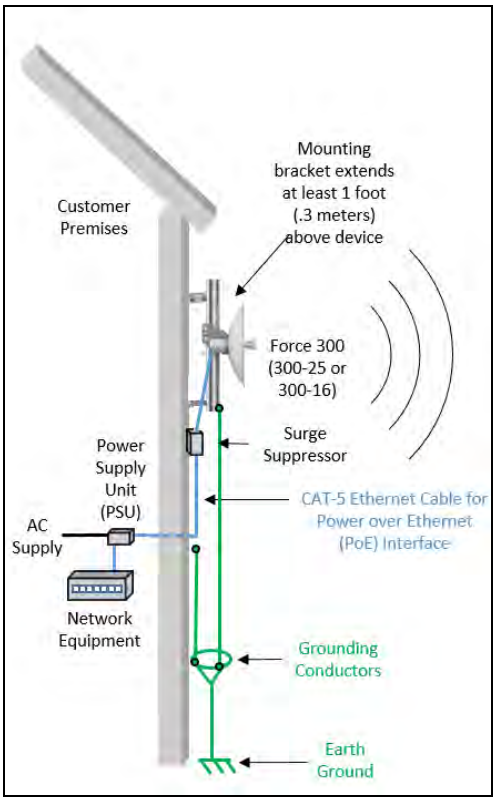


Figure 25: *Subscriber / Point-to-Point installation diagram*

Lightning protection zones

Use the rolling sphere method as shown in Figure 26 to determine where it is safe to mount the 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.

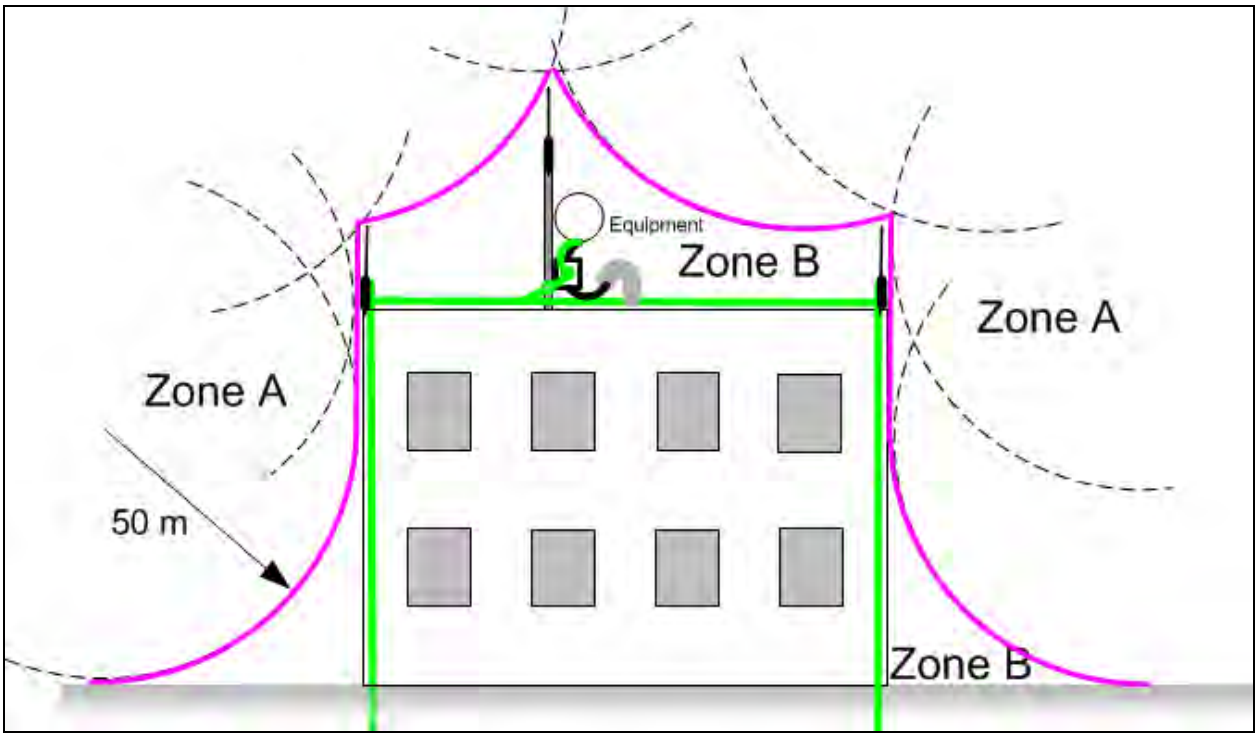


Figure 26: *Rolling sphere method to determine the lightning protection zones*

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 the equipment in this zone.
- **Zone B**: In this zone, direct EMD (lightning) effects are still possible, but mounting the equipment in this zone significantly reduces the possibility of a direct strike. Mount the equipment in this zone.

Warning

Do not mount the equipment in Zone A. Mounting the equipment in Zone A poses risk to the equipment, structures, and human lives.

Electromagnetic compatibility (EMC) compliance

The ePMP complies with European EMC Specification EN301 489-1 with testing carried out to the detailed requirements of EN301 489-4.

The EMC specification type approvals that is granted for ePMP are listed under Table 16.

Table 16: EMC emissions compliance

Region	Specification (Type Approvals)
USA	FCC CFR 47 Part 15 class B
Canada	RSS210, Issue 8 RSS247, Issue 1 (May 2015)
Europe	ETSI EN301 489-4

ePMP 3000 Access Point

For details of the ePMP 3000 Access Point hardware, see:

- ePMP 3000 Access Point description
- ePMP 3000 Access Point part numbers
- ePMP 3000 Access Point mounting bracket
- ePMP 3000 Access Point interfaces
- ePMP 3000 Access Point specifications
- ePMP 3000 Access Point heater
- ePMP 3000 Access Point wind loading
- ePMP 3000 Access Point software packages

ePMP 3000 Access Point description

ePMP 3000 AP is a self-contained transceiver unit that contains both radio and networking electronics.

It is available as a connectorized unit for use with a separate 4x4 MU-MIMO Sector/Dual-Horn/Omni antenna and an optional Smart Antenna (for uplink beam steering). ePMP 3000 is shown in Figure 27. The MPE distance is 105 cm.

Figure 27: *ePMP 3000 Access Point*

IMPORTANT NOTE

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 211 cm between the radiator and your body.

IMPORTANT NOTE

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

ePMP 3000 Access Point part numbers

Select the correct regional variant to adhere to the local licensing restrictions.

Each of the parts listed in Table 17 and Table 18 includes the following items:

- One connectorized unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 17: ePMP 3000 Access Point part numbers

Cambium description	Cambium part number
ePMP 3000 5 GHz Access Point Radio (FCC) (US cord)	C058910A102A
ePMP 3000 5 GHz Access Point Radio (IC) (Canada/US cord)	C050910A104A
ePMP 3000 5 GHz Access Point Radio (EU) (EU cord)	C050910A203A
ePMP 3000 5 GHz Access Point Radio (EU) (UK cord)	C050910A303A
ePMP 3000 5 GHz Access Point Radio (ROW) (no cord)	C050910A001A
ePMP 3000 5 GHz Access Point Radio (ROW) (US cord)	C050910A101A
ePMP 3000 5 GHz Access Point Radio (ROW) (EU cord)	C050910A201A
ePMP 3000 5 GHz Access Point Radio (ROW) (UK cord)	C050910A301A
ePMP 3000 5 GHz Access Point Radio (ROW) (India cord)	C050910A401A
ePMP 3000 5GHz Access Point Radio (India) (India Cord)	C050910A402A
ePMP 3000 5 GHz Access Point Radio (ROW) (China cord)	C050910A501A
ePMP 3000 5 GHz Access Point Radio (ROW) (Brazil cord)	C050910A601A
ePMP 3000 5 GHz Access Point Radio (ROW) (Argentina cord)	C050910A701A
ePMP 3000 5 GHz Access Point Radio (ROW) (ANZ cord)	C050910A801A
ePMP 3000 5 GHz Access Point Radio (ROW) (South Africa cord)	C050910A901A
ePMP 3000 5 GHz Access Point Radio (ROW) (No PSU)	C050910AZ01A
ePMP 4x4 MU-MIMO Sector Antenna (for ePMP3000AP)	C050910D301A
ePMP 4x4 MU-MIMO Dual-Horn Antenna (for ePMP3000AP)	C050900D025A
ePMP 4x4 MU-MIMO Omni Antenna (for ePMP3000AP) ▪ KP-5QSOMNI-13 (available directly from KP Performance)	

Table 18: ePMP 3000 accessories part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007
ePMP 3000 Pole and Wall mount Bracket	N000900L060A

ePMP 3000 Access Point mounting bracket

ePMP 3000 AP module is designed to be mounted with a sector antenna or pole-mounted using the mounting bracket provided in the accessory kit mentioned in Table 18.

ePMP 3000 AP mounting bracket is shown in Figure 28.

Figure 28: *ePMP 3000 Access Point module mounting bracket*

ePMP 3000 Access Point interfaces

The Ethernet port is located at the bottom of the unit. This interface is described in Table 19.

Table 19: ePMP 3000 Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE).  **Note** All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data.
SFP	SFP	Optical or Copper Gigabit Ethernet	Management and/or data.

ePMP 3000 Access Point specifications

ePMP 3000 connectorized module conforms to the specifications listed in Table 20 and Table 21.

The connectorized module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 20: ePMP 3000 Access Point physical specifications

Category	Specification
Dimensions (Length x Width x Height)	22.2 cm x 12.4 cm x 4.5 cm (8.75 in x 4.9 in x 1.75 in) without brackets
Weight	0.7 kg (1.5 lbs) without brackets

Table 21: ePMP 3000 Access Point environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +55°C (131°F)
Wind loading	124 mph (200 kph) maximum. See ePMP 3000 Access Point wind loading for a full description.
Humidity	95% condensing
Environmental	IP55  **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

ePMP 3000 Access Point heater

While starting, if the ePMP 3000 AP module temperature is at 32°F (0°C) or below than that, an internal heater is activated to ensure that the device can successfully begin the operation. The unit's heater is only activated when the unit is powered ON and does not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 22.

Table 22: ePMP 3000 AP startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

ePMP 3000 Access Point wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 200 kph (124 mph).

Wind blowing on the device subjects the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
V	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 23 and Table 24.

Table 23: ePMP 3000 Access Point wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		40	50	60
ePMP 3000 AP with Sector Antenna	0.13	21.74 Kg	33.96 Kg	48.91 Kg

Table 24: ePMP 3000 Access Point wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
ePMP 3000 AP with Sector Antenna	1.4	37.63 lb	58.80 lb	84.67 lb

ePMP 3000 Access Point software packages

ePMP 3000 AP devices can be upgraded by downloading new software packages from the Cambium Networks site or by using the cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AC-v4.5-GA.img (or higher version number)

ePMP 3000L Access Point

For details of the ePMP 3000L Access Point hardware, see:

- ePMP 3000L Access Point description
- ePMP 3000L Access Point part numbers
- ePMP 3000L Access Point mounting bracket
- ePMP 3000L Access Point interfaces
- ePMP 3000L Access Point specifications
- ePMP 3000L Access Point heater
- ePMP 3000L Access Point wind loading
- ePMP 3000L Access Point software packages

ePMP 3000L Access Point description

ePMP 3000L is a self-contained transceiver unit that contains both radio and networking electronics.

ePMP 3000L is shown in Figure 29.

Figure 29: *ePMP 3000L Access Point*

ePMP 3000L Access Point part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 25 and Table 26 includes the following items:

- One connectorized unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 25: ePMP 3000L Access Point part numbers

Cambium description	Cambium part number
ePMP 3000L 5 GHz Access Point Radio (FCC) (US cord)	C058910A122A
ePMP 3000L 5 GHz Access Point Radio (IC) (Canada/US cord)	C050910A124A
ePMP 3000L 5 GHz Access Point Radio (EU) (EU cord)	C050910A223A
ePMP 3000L 5 GHz Access Point Radio (EU) (UK cord)	C050910A323A
ePMP 3000L 5 GHz Access Point Radio (ROW) (no cord)	C050910A021A
ePMP 3000L 5 GHz Access Point Radio (ROW) (US cord)	C050910A121A
ePMP 3000L 5 GHz Access Point Radio (ROW) (EU cord)	C050910A221A
ePMP 3000L 5 GHz Access Point Radio (ROW) (UK cord)	C050910A321A
ePMP 3000L 5 GHz Access Point Radio (ROW) (India cord)	C050910A421A
ePMP 3000L 5GHz Access Point Radio (India) (India Cord)	C050910A422A
ePMP 3000L 5 GHz Access Point Radio (ROW) (China cord)	C050910A521A

Cambium description	Cambium part number
ePMP 3000L 5 GHz Access Point Radio (ROW) (Brazil cord)	C050910A621A
ePMP 3000L 5 GHz Access Point Radio (ROW) (Argentina cord)	C050910A721A
ePMP 3000L 5 GHz Access Point Radio (ROW) (ANZ cord)	C050910A821A
ePMP 3000L 5 GHz Access Point Radio (ROW) (South Africa cord)	C050910A921A
ePMP 3000L 5 GHz Access Point Radio (ROW) (No PSU)	C050910AZ21A

Table 26: ePMP 3000L accessories part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

ePMP 3000L Access Point mounting bracket

ePMP 3000L AP module is designed to be mounted with a sector antenna or pole-mounted using the mounting bracket provided in the box with the radio.

ePMP 3000L Access Point mounting bracket is shown in Figure 30

Figure 30: *ePMP 3000L Access Point module mounting bracket*

ePMP 3000L Access Point interfaces

The Ethernet port is located at the bottom of the unit. This interface is described in Table 27.

Table 27: ePMP 3000 Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE). **Note** All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data
SFP	SFP	Optical or Copper Gigabit Ethernet	Management and/or data

ePMP 3000L Access Point specifications

ePMP 3000L connectorized module conforms to the specifications listed in Table 28 and Table 29.

The connectorized module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 28: ePMP 3000L Access Point physical specifications

Category	Specification
Dimensions (Length x Width x Height)	22.2 cm x 12.4 cm x 4.5 cm (8.75 in x 4.9 in x 1.75 in) without brackets
Weight	0.7 kg (1.5 lbs) without brackets

Table 29: ePMP 3000L Access Point environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +55°C (131°F)
Wind loading	124 mph (200 kph) maximum. See ePMP 3000L Access Point wind loading (Kg) for a full description.
Humidity	95% condensing
Environmental	IP67.  **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

ePMP 3000L Access Point heater

While starting, if the ePMP 3000L AP module temperature is at 32°F (0°C) or below than that, an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and does not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 30.

Table 30: ePMP 3000L Access Point startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

ePMP 3000L Access Point wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 200 kph (124 mph).

Wind blowing on the device subjects the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = 0.0042_{AV^2}

Where:	Is:
A	the surface area in square feet
V	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 31 and Table 32.

Table 31: ePMP 3000L Access Point wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		40	50	60
ePMP 3000L Access Point with Sector Antenna	0.13	21.74 Kg	33.96 Kg	48.91 Kg

Table 32: ePMP 3000L Access Point wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
ePMP 3000L Access Point with Sector Antenna	1.4	37.63 lb	58.80 lb	84.67 lb

ePMP 3000L Access Point software packages

ePMP 3000L AP devices can be upgraded by downloading new software packages from the Cambium Networks site or by using the cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AC-v4.5-GA.img (or higher version number)

ePMP MP 3000 MicroPoP

For details of the ePMP MP 3000 MicroPoP hardware, see:

- ePMP MP 3000 MicroPoP integrated description
- ePMP MP 3000 MicroPoP part numbers
- ePMP MP 3000 MicroPoP interfaces
- ePMP MP 3000 MicroPoP specifications
- ePMP MP 3000 MicroPoP heater
- ePMP MP 3000 MicroPoP wind loading
- ePMP MP 3000 MicroPoP software packages

ePMP MP 3000 MicroPoP integrated description

The ePMP MP 3000 MicroPoP is an integrated AP designed to serve short-range, low-density applications. It uses 802.11ac 2x2 architecture and can interoperate with a Force 300 subscriber module.

ePMP MP 3000 MicroPoP is shown in Figure 31.

Figure 31: *ePMP MP 3000 MicroPoP integrated*

ePMP MP 3000 MicroPoP part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 33 and Table 34 includes the following items:

- One integrated unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 33: ePMP MP 3000 MicroPoP part numbers

Cambium description	Cambium part number
ePMP 5 GHz MP 3000 MicroPoP Radio (ROW) (no cord)	C050910A031A
ePMP 5 GHz MP 3000 MicroPoP Radio (ROW) (US cord)	C050910A131A
ePMP 5 GHz MP 3000 MicroPoP Radio (IC) (Canada/US cord)	C058910A134A
ePMP 5 GHz MP 3000 MicroPoP Radio (ROW) (EU cord)	C050910A231A
ePMP 5 GHz MP 3000 MicroPoP Radio (EU) (EU cord)	C050910A233A
ePMP 5 GHz MP 3000 MicroPoP Radio (ROW) (UK cord)	C050910A331A
ePMP 5 GHz MP 3000 MicroPoP Radio (EU) (UK cord)	C050910A333A
ePMP 5 GHz MP 3000 MicroPoP Radio (ROW) (India cord)	C050910A431A
ePMP 5 GHz MP 3000 MicroPoP Radio (India) (India Cord)	C050910A432A
ePMP 5 GHz MP 3000 MicroPoP Radio (ROW) (China cord)	C050910A531A
ePMP 5 GHz MP 3000 MicroPoP Radio (ROW) (Brazil cord)	C050910A631A
ePMP 5 GHz MP 3000 MicroPoP Radio (ROW) (Argentina cord)	C050910A731A
ePMP 5 GHz MP 3000 MicroPoP Radio (ROW) (ANZ cord)	C050910A831A
ePMP 5 GHz MP 3000 MicroPoP Radio (ROW) (South Africa cord)	C050910A931A
ePMP 5 GHz MP 3000 MicroPoP Radio (ROW) (No PSU)	C050910AZ31A
ePMP 5 GHz MP 3000 MicroPoP Radio (FCC) (US cord)	C058910A132A

Table 34: ePMP MP 3000 accessories part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

ePMP MP 3000 MicroPoP interfaces

The Ethernet port is located on the rear of the integrated unit.

Table 35: ePMP MP 3000 MicroPoP – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE).  **Note** All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data

ePMP MP 3000 MicroPoP specifications

The ePMP MP 3000 MicroPoP integrated module conforms to the specifications listed in Table 36 and Table 37. The integrated module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 36: ePMP MP 3000 MicroPoP physical specifications

Category	Specification
Dimensions (Diameter x Depth)	220mm x 80mm x 25mm (8.7in x 3.15in x 1.0in)
Weight	0.5 kg (1.1 lbs) – with mounting bracket
Antenna	Integrated dual-polarized, Omni-direction 8dBi

Table 37: ePMP MP 3000 MicroPoP environmental specifications

Category	Specification
Temperature	-40°C (-40°F) to +65C (149°F) ambient op temp
Wind loading	224 kph 320mm x 215mm x 65mm 1100g
Environmental	IP67  **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

ePMP MP 3000 MicroPoP heater

While starting, if the ePMP MP 3000 MicroPoP module temperature is at 32°F (0°C) or below than that, an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 38.

Table 38: ePMP MP 3000 MicroPoP startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

ePMP MP 3000 MicroPoP wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 180 kph (124 mph).

Wind blowing on the device subjects the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
v	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 39 and Table 40.

Table 39: ePMP MP 3000 wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		30	40	50
ePMP MP 3000 Integrated	0.03	2.82 Kg	5.02 Kg	7.84 Kg

Table 40: ePMP MP 3000 wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
ePMP MP 3000	0.28	7.53 lb	11.76 lb	16.93 lb

ePMP MP 3000 MicroPoP software packages

ePMP MP 3000 MicroPoP devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AC-v4.5-GA.img (or higher version number)

ePMP 4500C Access Point

For details of the ePMP 4500C Access Point hardware, see:

- ePMP 4500C Access Point description
- ePMP 4500C Access Point part numbers
- ePMP 4500C Access Point mounting bracket
- ePMP 4500C Access Point interfaces
- ePMP 4500C Access Point specifications
- ePMP 4500C Access Point heater
- ePMP 4500C Access Point wind loading
- ePMP 4500C Access Point mounting instructions
- ePMP 4500C Access Point software packages

ePMP 4500C Access Point description

The ePMP 4500C device is a self-contained transceiver unit that contains both radio and networking electronics. It is available with 8 X 8 MU-MIMO connectorized external antenna.

ePMP 4500C is shown in Figure 32.

Figure 32: *ePMP 4500C Access Point*

ePMP 4500C Access Point part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 41 and Table 42 includes the following items:

- One connectorized external unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 41: ePMP 4500C Access Point part numbers

Cambium description	Cambium part number
ePMP 4500C 5 GHz Access Point Radio (FCC) (US cord)	C058910A122A
ePMP 4500C 5 GHz Access Point Radio (IC) (Canada/US cord)	C050910A124A
ePMP 4500C 5 GHz Access Point Radio (EU) (EU cord)	C050910A223A
ePMP 4500C 5 GHz Access Point Radio (EU) (UK cord)	C050910A323A
ePMP 4500C 5 GHz Access Point Radio (ROW) (no cord)	C050910A021A
ePMP 4500C 5 GHz Access Point Radio (ROW) (US cord)	C050910A121A
ePMP 4500C 5 GHz Access Point Radio (ROW) (EU cord)	C050910A221A
ePMP 4500C 5 GHz Access Point Radio (ROW) (UK cord)	C050910A321A
ePMP 4500C 5 GHz Access Point Radio (ROW) (India cord)	C050910A421A
ePMP 4500C 5GHz Access Point Radio (India) (India Cord)	C050910A422A
ePMP 4500C 5 GHz Access Point Radio (ROW) (China cord)	C050910A521A
ePMP 4500C 5 GHz Access Point Radio (ROW) (Brazil cord)	C050910A621A
ePMP 4500C 5 GHz Access Point Radio (ROW) (Argentina cord)	C050910A721A
ePMP 4500C 5 GHz Access Point Radio (ROW) (ANZ cord)	C050910A821A

Cambium description	Cambium part number
ePMP 4500C 5 GHz Access Point Radio (ROW) (South Africa cord)	C050910A921A
ePMP 4500C 5 GHz Access Point Radio (ROW) (No PSU)	C050910AZ21A

Table 42: ePMP 4500C accessory part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

ePMP 4500C Access Point mounting bracket

The ePMP 4500C AP module is designed to be mounted with a external antenna or pole-mounted using the mounting bracket provided in the box with the radio.

ePMP 4500C AP mounting bracket is shown in Figure 33

Figure 33: *ePMP 4500C Access Point module mounting bracket*

ePMP 4500C Access Point interfaces

The Ethernet port is located at the bottom of the unit. This interface is described in Table 43.

Table 43: ePMP 4500C Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE). **Note** All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data
SFP	SFP	Optical or Copper Gigabit Ethernet	Management and/or data

ePMP 4500C Access Point specifications

The ePMP 4500C connectorized module conforms to the specifications listed in Table 44 and Table 45.

The connectorized module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 44: ePMP 4500C Access Point physical specifications

Category	Specification
Dimensions (Length x Width x Height)	22.2 cm x 12.4 cm x 4.5 cm (8.75 in x 4.9 in x 1.75 in) without brackets
Weight	12.5 kg (27.56 lbs) without brackets 14.66 kg (32.32 lbs) with brackets

Table 45: ePMP 4500C Access Point environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +55°C (131°F).
Wind loading	124 mph (200 kph) maximum. See ePMP 4500C Access Point wind loading (Kg) for a full description.
Humidity	95% condensing.
Environmental	IP67.

Category	Specification
	 **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

ePMP 4500C Access Point heater

At startup, if the ePMP 4500C AP module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can begin the operation successfully. The unit's heater is only activated when the unit is powered ON and does not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), then the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 46.

Table 46: ePMP 4500C Access Point startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

ePMP 4500C Access Point wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 200 kph (124 mph).

Wind blowing on the device subjects the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
V	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 47 and Table 48.

Table 47: ePMP 4500C Access Point wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		40	50	56
ePMP 4500C Access Point with Sector Antenna	0.249	41.63 Kg	65.05 Kg	81.60 Kg

Table 48: ePMP 4500C Access Point wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	125
ePMP 4500C Access Point with Sector Antenna	2.68	72.03 lb	112.56 lb	175.88 lb

ePMP 4500C Access Point software packages

ePMP 4500C AP devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP connectorized radios are named:

- ePMP-AX-v5.x.x.img (or higher version number)

ePMP 4500 Access Point

For details of the ePMP 4500 Access Point hardware, see:

- ePMP 4500 Access Point description
- ePMP 4500 Access Point part numbers
- ePMP 4500 Access Point mounting bracket
- ePMP 4500 Access Point interfaces
- ePMP 4500 Access Point specifications
- ePMP 4500 Access Point heater
- ePMP 4500 Access Point wind loading
- ePMP 4500 Access Point software packages

ePMP 4500 Access Point description

The ePMP 4500 device is a self-contained transceiver unit that contains both radio and networking electronics. It is available with 8 X 8 MU-MIMO integrated antenna.

ePMP 4500 is shown in Figure 34.

Figure 34: *ePMP 4500 Access Point*

ePMP 4500 Access Point part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 49 and Table 50 includes the following items:

- One connectorized unit
- One power supply 1000/100 BASE-TX LAN injector

- One line cord

Table 49: ePMP 4500 Access Point part numbers

Cambium description	Cambium part number
ePMP 4500 5 GHz Access Point Radio (FCC) (US cord)	C058910A122A
ePMP 4500 5 GHz Access Point Radio (IC) (Canada/US cord)	C050910A124A
ePMP 4500 5 GHz Access Point Radio (EU) (EU cord)	C050910A223A
ePMP 4500 5 GHz Access Point Radio (EU) (UK cord)	C050910A323A
ePMP 4500 5 GHz Access Point Radio (ROW) (no cord)	C050910A021A
ePMP 4500 5 GHz Access Point Radio (ROW) (US cord)	C050910A121A
ePMP 4500 5 GHz Access Point Radio (ROW) (EU cord)	C050910A221A
ePMP 4500 5 GHz Access Point Radio (ROW) (UK cord)	C050910A321A
ePMP 4500 5 GHz Access Point Radio (ROW) (India cord)	C050910A421A
ePMP 4500 5GHz Access Point Radio (India) (India Cord)	C050910A422A
ePMP 4500 5 GHz Access Point Radio (ROW) (China cord)	C050910A521A
ePMP 4500 5 GHz Access Point Radio (ROW) (Brazil cord)	C050910A621A
ePMP 4500 5 GHz Access Point Radio (ROW) (Argentina cord)	C050910A721A
ePMP 4500 5 GHz Access Point Radio (ROW) (ANZ cord)	C050910A821A
ePMP 4500 5 GHz Access Point Radio (ROW) (South Africa cord)	C050910A921A
ePMP 4500 5 GHz Access Point Radio (ROW) (No PSU)	C050910AZ21A

Table 50: ePMP 4500 accessory part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

ePMP 4500 Access Point mounting bracket

The ePMP 4500 AP module is designed to be mounted with a sector antenna or pole-mounted using the mounting bracket provided in the box with the radio.

ePMP 4500 AP mounting bracket is shown in Figure 35

Figure 35: *ePMP 4500 Access Point module mounting bracket*

ePMP 4500 Access Point interfaces

The Ethernet port is located at the bottom of the unit. This interface is described in Table 51.

Table 51: ePMP 4500 Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE). **Note** All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data
SFP	SFP	Optical or Copper Gigabit Ethernet	Management and/or data

Connector pin numbering

Figure 36 shows the connector pin numbering of ePMP 4500.

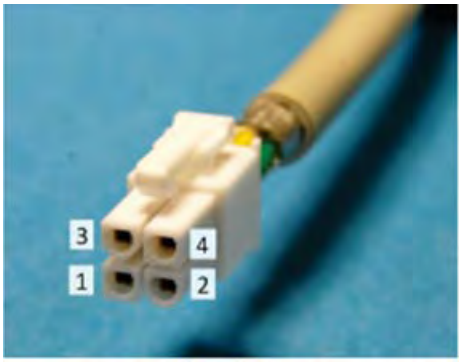


Figure 36: *Connector pin numbering*

Pin	Power supply connection
1, 2	Positive
3, 4	Negative

ePMP 4500 Access Point specifications

The ePMP 4500 connectorized module conforms to the specifications listed in Table 52 and Table 53.

The connectorized module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 52: ePMP 4500 Access Point physical specifications

Category	Specification
Dimensions (Length x Width x Height)	22.2 cm x 12.4 cm x 4.5 cm (8.75 in x 4.9 in x 1.75 in) without brackets
Weight	12.5 kg (27.56 lbs) without brackets 14.66 kg (32.32 lbs) with brackets

Table 53: ePMP 4500 Access Point environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +55°C (131°F).
Wind loading	124 mph (200 kph) maximum. See ePMP 4500 Access Point wind loading (Kg) for a full description.
Humidity	95% condensing.
Environmental	IP67.

Category	Specification
	 **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

ePMP 4500 Access Point heater

At startup, if the ePMP 4500 AP module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can begin the operation successfully. The unit's heater is only activated when the unit is powered ON and does not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), then the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 54.

Table 54: ePMP 4500 Access Point startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

ePMP 4500 Access Point wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 200 kph (124 mph).

Wind blowing on the device subjects the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
V	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 55 and Table 56.

Table 55: ePMP 4500 Access Point wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		40	50	56
ePMP 4500 Access Point with Sector Antenna	0.249	41.63 Kg	65.05 Kg	81.60 Kg

Table 56: ePMP 4500 Access Point wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	125
ePMP 4500 Access Point with Sector Antenna	2.68	72.03 lb	112.56 lb	175.88 lb

ePMP 4500 Access Point software packages

ePMP 4500 AP devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AX-v5.x.x.img (or higher version number)

ePMP 4600 Access Point

For details of the ePMP 4600 Access Point hardware, see:

- ePMP 4600 Access Point description
- ePMP 4600 Access Point part numbers
- ePMP 4600 Access Point mounting bracket
- ePMP 4600 Access Point interfaces
- ePMP 4600 Access Point specifications
- ePMP 4600 Access Point heater
- ePMP 4600 Access Point wind loading
- ePMP 4600 Access Point mounting instructions
- ePMP 4600 Access Point software packages

ePMP 4600 Access Point description

The ePMP 4600 device is a self-contained transceiver unit that houses both radio and networking electronics. It is available with 4 X 4 MU-MIMO connectorized antenna. The MPE distance for FCC is 105 cm and for IC is 20 cm.

ePMP 4600 is shown in Figure 37.

Figure 37: *ePMP 4600 Access Point*

Warning

The operation of this device is prohibited on oil platforms, cars, trains, boats, and aircraft.

Operation of the transmitters in 5.925 GHz - 7.125 GHz band is prohibited for control of communications with the unmanned aircraft systems.

Warning

This radio transmitter 109W-0068 is approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio (109W-0068) a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal d'antenne. Les types d'antennes non inclus dans cette liste qui ont un gain supérieur au gain maximal indiqué pour tout type listé sont strictement interdits pour une utilisation avec cet appareil.

Warning

Operation on oil platforms, automobiles, trains, maritime vessels and aircraft shall be prohibited.

L'exploitation sur les plates-formes pétrolières, les automobiles, les trains, les navires maritimes et les aéronefs est interdite.

Warning

Devices shall not be used for control of or communications with unmanned aircraft systems.

Les appareils ne doivent pas être utilisés pour contrôler ou communiquer avec des systèmes d'aéronefs sans pilote.

Warning

The antenna height shall be determined by the installer or operator of the standard-power access point or fixed client device, or by automatic means. This information are stored internally in the device. Provision of accurate device information is mandatory.

La hauteur de l'antenne doit être déterminée par l'installateur ou l'opérateur du point d'accès à puissance standard ou de l'appareil client fixe, ou par des moyens automatiques. Ces informations doivent être stockées en interne dans l'appareil. La fourniture d'informations précises sur l'appareil est obligatoire.

ePMP 4600 Access Point part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 57 includes the following items:

- One connectorized unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 57: ePMP 4600 Access Point part numbers

Cambium description	Cambium part number
ePMP 4600 6 GHz 4x4 Access Point Radio (ROW) (no cord)	C060940A021A
ePMP 4600 6 GHz 4x4 Access Point Radio (ROW) (US cord)	C060940A121A
ePMP 4600 6 GHz 4x4 Access Point Radio (IC) (Canada/US cord)	C068940A124A
ePMP 4600 6 GHz 4x4 Access Point Radio (ROW) (EU cord)	C060940A221A
ePMP 4600 6 GHz 4x4 Access Point Radio (EU) (EU cord)	C060940A223A
ePMP 4600 6 GHz 4x4 Access Point Radio (ROW) (UK cord)	C060940A321A
ePMP 4600 6 GHz 4x4 Access Point Radio (EU) (UK cord)	C060940A323A
ePMP 4600 6 GHz 4x4 Access Point Radio (ROW) (India cord)	C060940A421A
ePMP 4600 6 GHz 4x4 Access Point Radio (India) (India Cord)	C060940A425A
ePMP 4600 6 GHz 4x4 Access Point Radio (ROW) (China cord)	C060940A521A
ePMP 4600 6 GHz 4x4 Access Point Radio (ROW) (Brazil cord)	C060940A621A
ePMP 4600 6 GHz 4x4 Access Point Radio (ROW) (Argentina cord)	C060940A721A
ePMP 4600 6 GHz 4x4 Access Point Radio (ROW) (ANZ cord)	C060940A821A

Cambium description	Cambium part number
ePMP 4600 6 GHz 4x4 Access Point Radio (ROW) (South Africa cord)	C060940A921A
ePMP 4600 6 GHz 4x4 Access Point Radio (ROW) (No PSU)	C060940AZ21A
ePMP 4600 6 GHz 4x4 Access Point Radio (FCC) (US cord)	C068940A122B
ePMP 4600 6 GHz 4x4 Access Point Radio (Indonesia) (EU Cord)	C060940A226A
ePMP 4600 6 GHz 4x4 Access Point	C060940P021A
ePMP 6 GHz Force 4600C Subscriber Module	C060940P051A

Table 58: Antenna information

Antenna	Port	Brand	Model name	Antenna type	Connector	Gain (dBi)		
						UNII5	UNII6	UNII7
1	1	Cambium Networks	ePMP 4X4 6GHz MU-MIMO Sector Antenna	Sector Antenna	Reversed-SMA	18	18.62	18.73
	2	Cambium Networks	ePMP 4X4 6GHz MU-MIMO Sector Antenna	Sector Antenna	Reversed-SMA	18	18.62	18.73
	3	Cambium Networks	ePMP 4X4 6GHz MU-MIMO Sector Antenna	Sector Antenna	Reversed-SMA	18	18.62	18.73
	4	Cambium Networks	ePMP 4X4 6GHz MU-MIMO Sector Antenna	Sector Antenna	Reversed-SMA	18	18.62	18.73

ePMP 4600 Access Point mounting bracket

The ePMP 4600 AP module is designed to be mounted with a sector antenna or pole-mounted using the mounting bracket provided in the box with the radio.

ePMP 4600 AP mounting bracket is shown in Figure 38

Figure 38: *ePMP 4600 Access Point module mounting bracket*

ePMP 4600 Access Point interfaces

The Ethernet port is located at the bottom of the unit. This interface is described in Table 59.

Table 59: ePMP 4600 Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE). **Note** All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data
SFP	SFP	Optical or Copper Gigabit Ethernet	Management and/or data

ePMP 4600 Access Point specifications

The ePMP 4600 connectorized module conforms to the specifications listed in Table 60 and Table 61.

The connectorized module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 60: ePMP 4600 Access Point physical specifications

Category	Specification
Dimensions (Length x Width x Height)	22.2 cm x 12.4 cm x 4.5 cm (8.75 in x 4.9 in x 1.75 in) without brackets
Weight	12.5 kg (27.56 lbs) without brackets 14.66 kg (32.32 lbs) with brackets

Table 61: ePMP 4600 Access Point environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +55°C (131°F).
Wind loading	124 mph (200 kph) maximum. See ePMP 4600 Access Point wind loading (Kg) for a full description.
Humidity	95% condensing.
Environmental	IP67 **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

ePMP 4600 Access Point heater

At startup, if the ePMP 4600 AP module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 62.

Table 62: ePMP 4600 Access Point startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

ePMP 4600 Access Point wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 200 kph (124 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
V	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 63 and Table 64.

Table 63: ePMP 4600 Access Point wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		40	50	60
ePMP 4600 Access Point with Sector Antenna	0.13	21.74 Kg	33.96 Kg	48.91 Kg

Table 64: ePMP 4600 Access Point wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
ePMP 4600 Access Point with Sector Antenna	1.4	37.63 lb	58.80 lb	84.67 lb

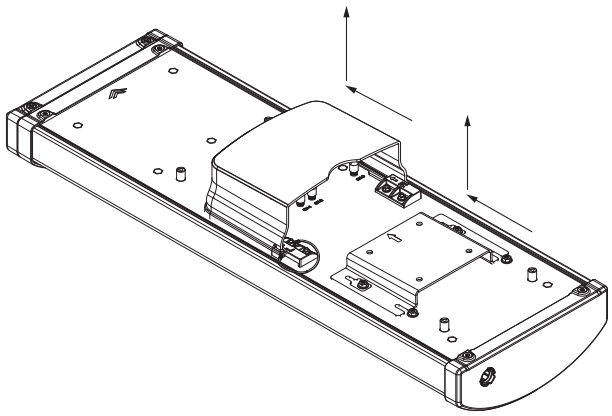
Installing the ePMP 4600 Access Point

Note

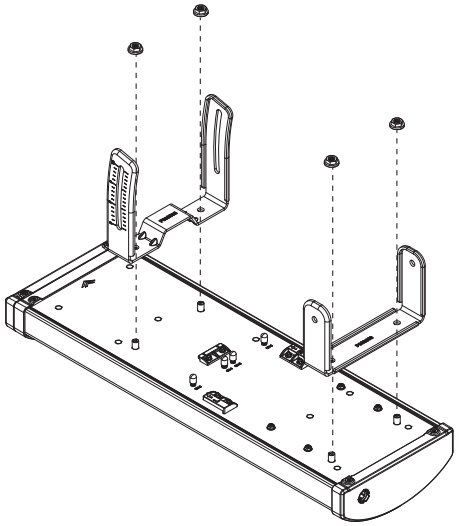
A professional installation is required.

To install ePMP 4600 Access Point, perform the following steps:

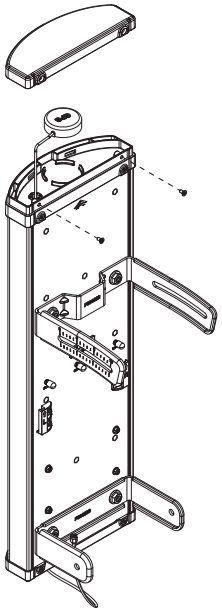
1. Loosen the M4 screw from the radio holder. Slide upside to remove the radio holder and push the shedder to upside to remove it.



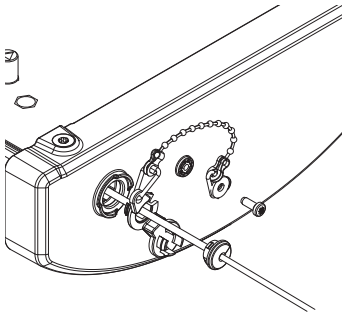
2. Place the top and bottom fixed clamps. Place the M8 nuts to antenna and tighten by applying 5.0Nm torque.



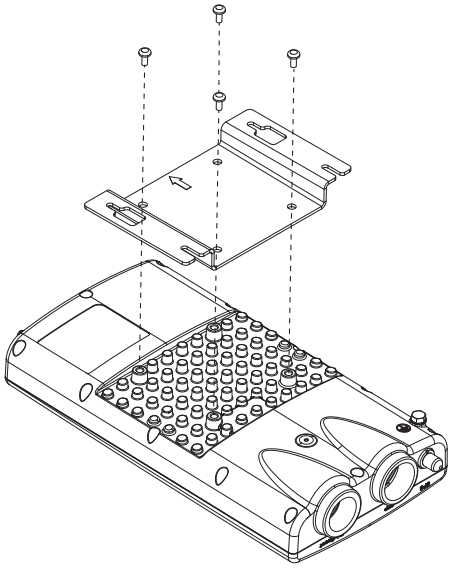
3. Remove the top cap using the T10 torxdriver. Place the GPS cable into the antenna. Once the cable is inserted inside the antenna, the cable comes out from the bottom of antenna.



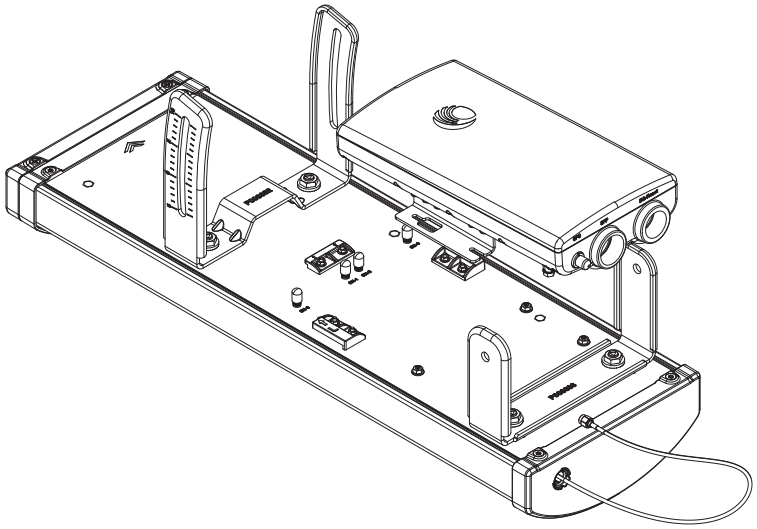
4. Take the GPS kit and insert the GPS cable into the GPS kit and assemble it at the bottom of antenna. Place the M3X8 mm screw at the bottom of antenna with GPS chain and secure it.



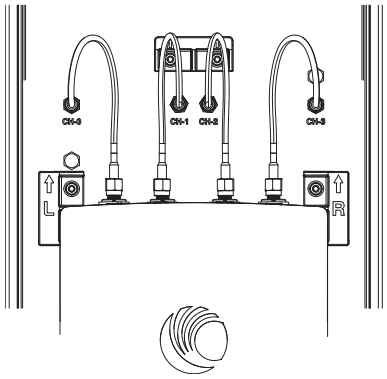
5. Place the radio holder to the radio. Place the M5X12 mm screw to the radio and tighten by applying 3.0 Nm torque.



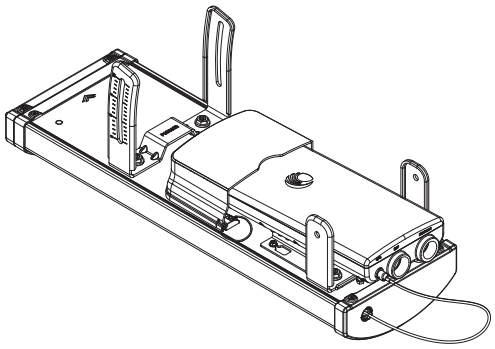
6. Place the radio to the antenna back body and slide down. Tighten the M4 nut to 3 Nm torque.



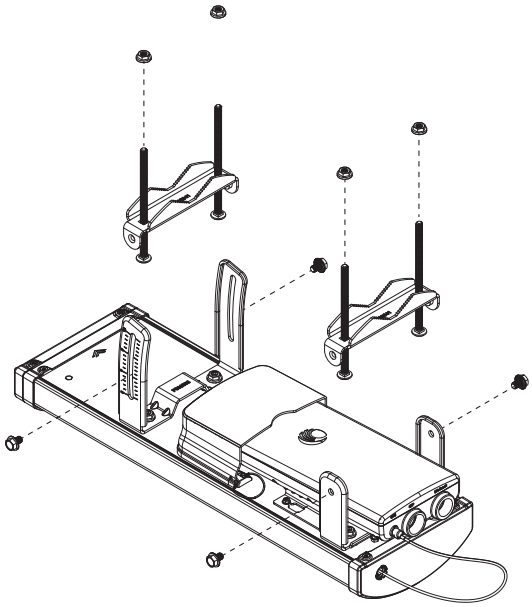
7. Connect the cable to radio and antenna. Follow the sequence for cable assembly CH 0 to CH 3. Cross cables are not allowed.



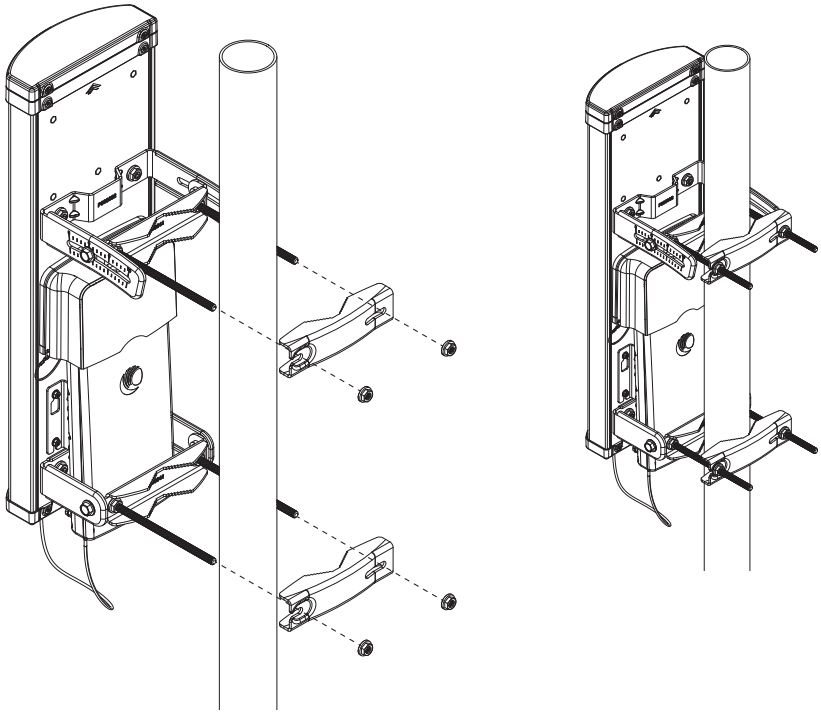
8. Place the radio cover back in the position.



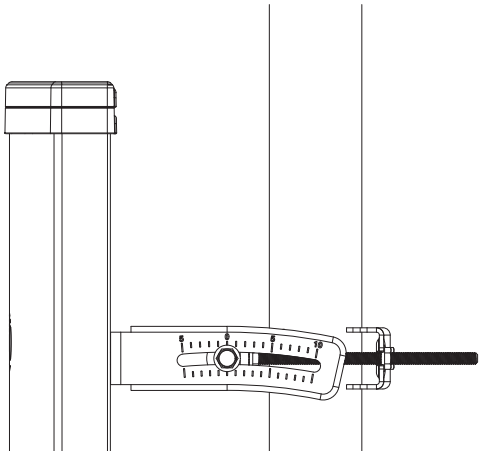
9. Assemble the front pole brackets to fixed clamps using four M8 X 12 mm bolt. Insert M8 X 160 mm bolt into front pole bracket and secure it with M8 nuts by applying 5.0 Nm torque.



10. Assemble antenna to pole with rear pole bracket and secure it with M8 nut by applying 10.0 Nm torque.



11. Antenna can be adjusted +5° to -10° as per the requirement.



Note

Electrical down tilt is 2°.

For installation guides and management of the radio, snap the QR code.

ePMP 4600 Access Point software packages

ePMP 4600 AP devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AX-v5.x.x.img (or higher version number)

ePMP 4600L Access Point

For details of the ePMP 4600L Access Point hardware, see:

- ePMP 4600L Access Point description
- ePMP 4600L Access Point part numbers
- ePMP 4600L Access Point mounting bracket
- ePMP 4600L Access Point interfaces
- ePMP 4600L Access Point specifications
- ePMP 4600L Access Point heater
- ePMP 4600L Access Point wind loading
- ePMP 4600L Access Point mounting instructions
- ePMP 4600L Access Point software packages

ePMP 4600L Access Point description

The ePMP 4600L device is a self-contained transceiver unit that contains both radio and networking electronics. It is available with 2 X 2 MU-MIMO connectorized antenna. The MPE distance for FCC is 371 cm (Dish), 132 cm (Sector), and for IC is 20 cm.

ePMP 4600L is shown in Figure 39.

Figure 39: *ePMP 4600L Access Point*

Warning

The operation of this device is prohibited on oil platforms, cars, trains, boats, and aircraft.

Operation of the transmitters in 5.925 GHz - 7.125 GHz band is prohibited for control of communications with the unmanned aircraft systems.

Warning

Devices shall not be used for control of or communications with unmanned aircraft systems.

Les appareils ne doivent pas être utilisés pour contrôler ou communiquer avec des systèmes d'aéronefs sans pilote.

Warning

Operation on oil platforms, automobiles, trains, maritime vessels, and aircraft shall be prohibited.

L'exploitation sur les plates-formes pétrolières, les automobiles, les trains, les navires maritimes et les aéronefs est interdite.

Warning

The antenna height shall be determined by the installer or operator of the standard-power access point or fixed client device, or by automatic means. This information are stored internally in the device. Provision of accurate device information is mandatory.

La hauteur de l'antenne doit être déterminée par l'installateur ou l'opérateur du point d'accès à puissance standard ou de l'appareil client fixe, ou par des moyens automatiques. Ces informations doivent être stockées en interne dans l'appareil. La fourniture d'informations précises sur l'appareil est obligatoire.

ePMP 4600L Access Point part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 65 includes the following items:

- One connectorized unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 65: ePMP 4600L Access Point part numbers

Cambium description	Cambium part number
ePMP 4600L 6 GHz 4x4 Access Point Radio (ROW) (no cord)	C060940A021A
ePMP 4600L 6 GHz 4x4 Access Point Radio (ROW) (US cord)	C060940A121A
ePMP 4600L 6 GHz 4x4 Access Point Radio (IC) (Canada/US cord)	C068940A124A
ePMP 4600L 6 GHz 4x4 Access Point Radio (ROW) (EU cord)	C060940A221A
ePMP 4600L 6 GHz 4x4 Access Point Radio (EU) (EU cord)	C060940A223A
ePMP 4600L 6 GHz 4x4 Access Point Radio (ROW) (UK cord)	C060940A321A
ePMP 4600L 6 GHz 4x4 Access Point Radio (EU) (UK cord)	C060940A323A
ePMP 4600L 6 GHz 4x4 Access Point Radio (ROW) (India cord)	C060940A421A
ePMP 4600L 6 GHz 4x4 Access Point Radio (India) (India Cord)	C060940A425A
ePMP 4600L 6 GHz 4x4 Access Point Radio (ROW) (China cord)	C060940A521A
ePMP 4600L 6 GHz 4x4 Access Point Radio (ROW) (Brazil cord)	C060940A621A
ePMP 4600L 6 GHz 4x4 Access Point Radio (ROW) (Argentina cord)	C060940A721A
ePMP 4600L 6 GHz 4x4 Access Point Radio (ROW) (ANZ cord)	C060940A821A
ePMP 4600L 6 GHz 4x4 Access Point Radio (ROW) (South Africa cord)	C060940A921A
ePMP 4600L 6 GHz 4x4 Access Point Radio (ROW) (No PSU)	C060940AZ21A
ePMP 4600L 6 GHz 4x4 Access Point Radio (FCC) (US cord)	C068940A122B
ePMP 4600L 6 GHz 4x4 Access Point Radio (Indonesia) (EU Cord)	C060940A226A
ePMP 4600L 6 GHz 2x2 Access Point	C068940P142A

ePMP 4600L Access Point mounting bracket

The ePMP 4600L AP module is designed to be mounted with a sector antenna or pole-mounted using the mounting bracket provided in the box with the radio.

ePMP 4600L AP mounting bracket is shown in Figure 40

Figure 40: *ePMP 4600L Access Point module mounting bracket*

ePMP 4600L Access Point interfaces

The Ethernet port is located at the bottom of the unit. This interface is described in Table 66.

Table 66: ePMP 4600L Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE). **Note** All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data
SFP	SFP	Optical or Copper Gigabit Ethernet	Management and/or data

ePMP 4600L Access Point specifications

The ePMP 4600L connectorized module conforms to the specifications listed in Table 67 and Table 68.

The connectorized module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 67: ePMP 4600L Access Point physical specifications

Category	Specification
Dimensions (Length x Width x Height)	22.2 cm x 12.4 cm x 4.5 cm (8.75 in x 4.9 in x 1.75 in) without brackets
Weight	12.5 kg (27.56 lbs) without brackets 14.66 kg (32.32 lbs) with brackets

Table 68: ePMP 4600L Access Point environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +55°C (131°F)
Wind loading	124 mph (200 kph) maximum. See ePMP 4600L Access Point wind loading (Kg) for a full description
Humidity	95% condensing
Environmental	IP67  **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

ePMP 4600L Access Point heater

At startup, if the ePMP 4600L AP module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 69.

Table 69: ePMP 4600L Access Point startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

ePMP 4600L Access Point wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 200 kph (124 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
V	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 70 and Table 71.

Table 70: ePMP 4600L Access Point wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		40	50	60
ePMP 4600L Access Point with Sector Antenna	0.13	21.74 Kg	33.96 Kg	48.91 Kg

Table 71: ePMP 4600L Access Point wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
ePMP 4600L Access Point with Sector Antenna	1.4	37.63 lb	58.80 lb	84.67 lb

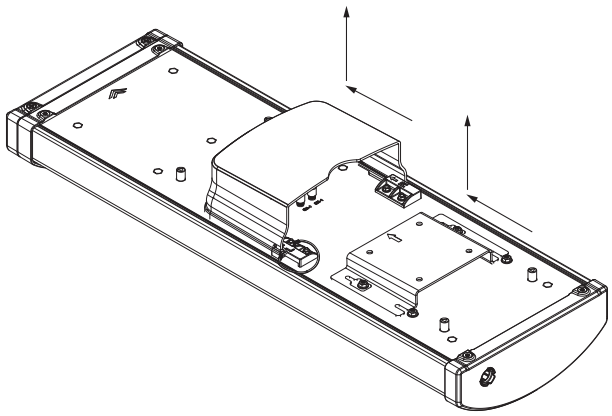
Installing the ePMP 4600L Access Point

Note

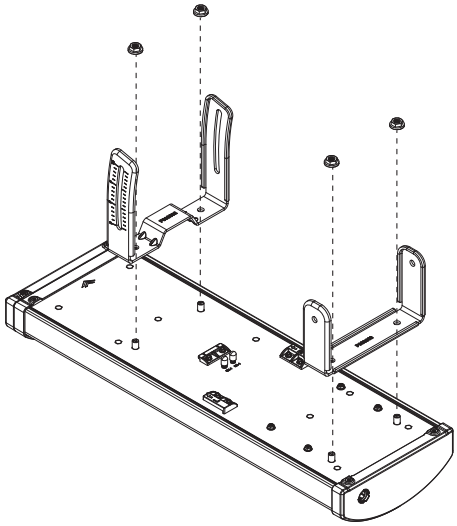
A professional installation is required.

To install ePMP 4600L Access Point, perform the following steps:

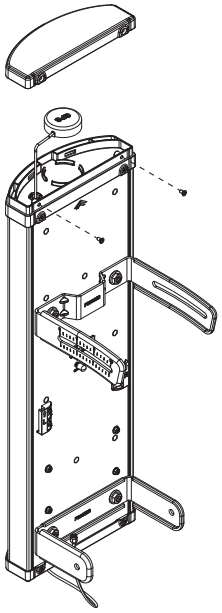
1. Loosen the M4 screw from the radio holder. Slide upside to remove the radio holder, push the shedder to upside to remove it.



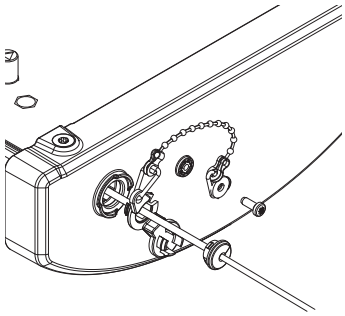
2. Place the top and bottom fixed clamps. Place the M8 nuts to antenna and tighten by applying 5.0 Nm torque.



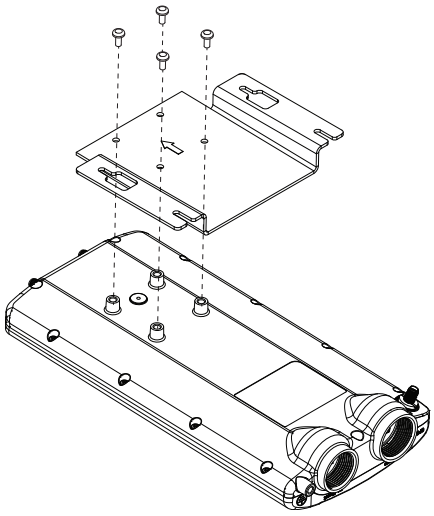
3. Remove the top cap using the T10 torxdriver. Place the GPS cable into the antenna. Once the cable is inserted inside the antenna, the cable comes out from the bottom of antenna.



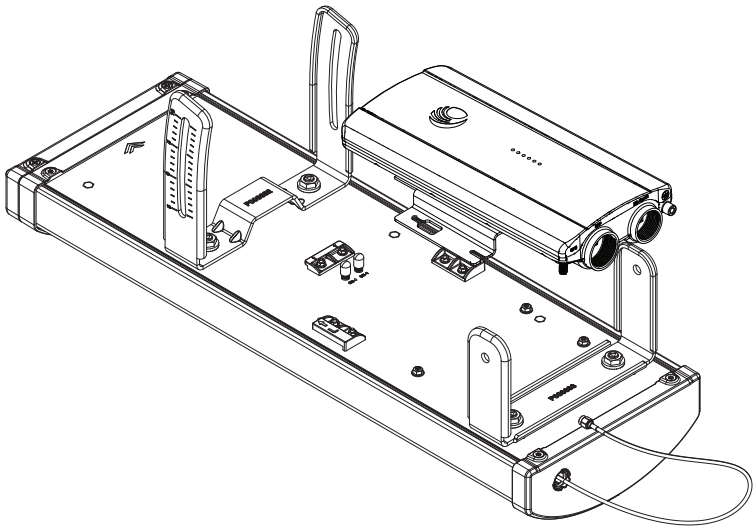
4. Take the GPS kit and insert the GPS cable into the GPS kit and assemble it at the botton of antenna. Place the M3X8 mm screw at the bottom of antenna with GPS chain and secure it.



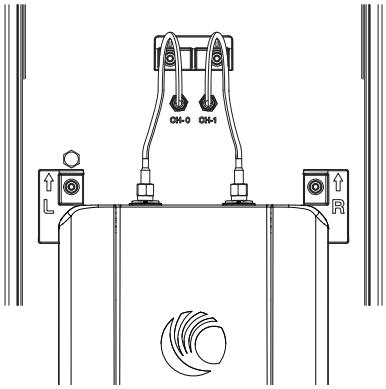
5. Place the radio holder to the radio. And place the M5X12 mm screw to the radio and tighten by applying 3.0 Nm torque.



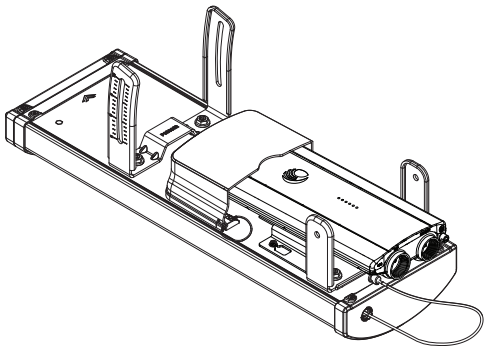
6. Place the radio to the antenna back body and slide down. Tighten the M4 nut to 3 Nm torque.



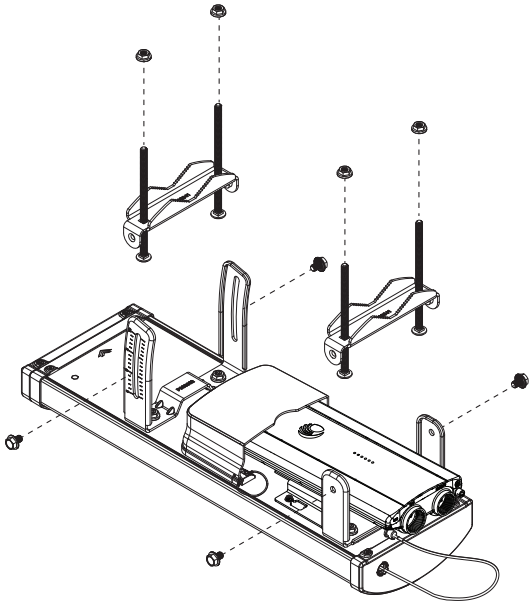
7. Connect the cable to Radio and antenna. Follow the sequence for cable assembly CH 0 to CH 1. Cross cables are not allowed.



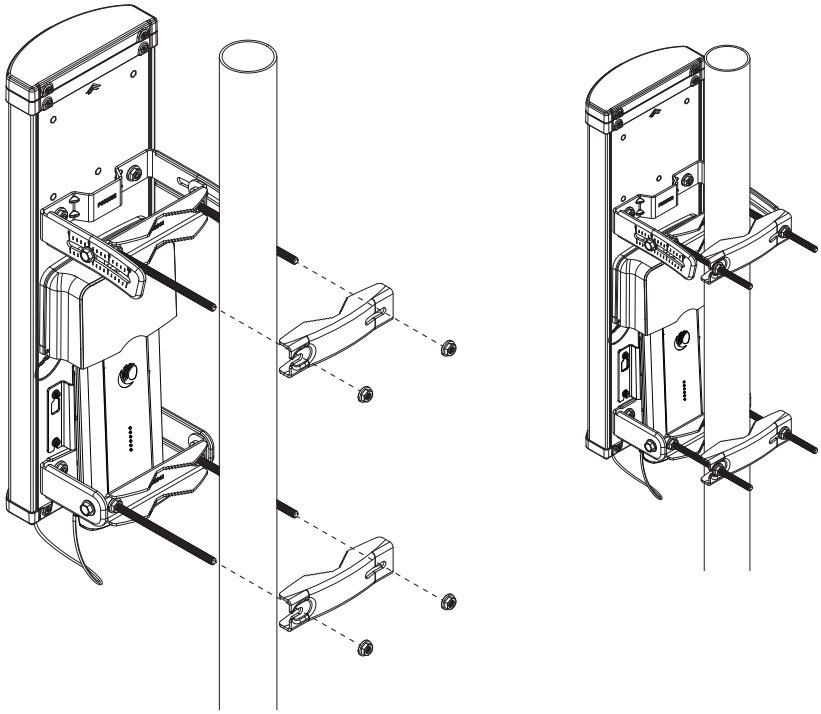
8. Place the Radio cover back in position.



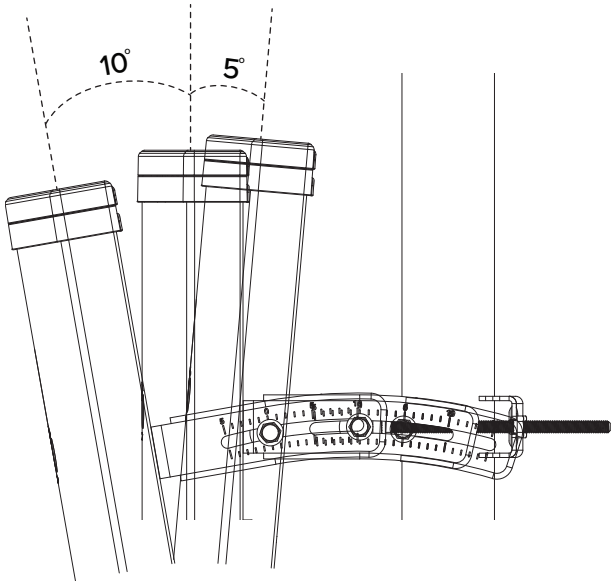
9. Assemble the front pole brackets to fixed clamps using four M8 X 12 mm bolt. Insert M8 X 160 mm bolt into front pole bracket and secure it with M8 nuts by applying 5.0 Nm torque.



10. Assemble antenna to pole with rear pole bracket and secure it with M8 nut by applying 10.0 Nm torque.



11. Antenna can be adjusted +5° to -10° as per requirement.



Note

Electrical down tilt is 2°.

ePMP 4600L Access Point software packages

ePMP 4600L AP devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AX-v5.x.x.img (or higher version number)

ePMP 4500L Access Point

For details of the ePMP 4500L Access Point hardware, see:

- ePMP 4500L Access Point description
- ePMP 4500L Access Point part numbers
- ePMP 4500L Access Point mounting bracket
- ePMP 4500L Access Point interfaces
- ePMP 4500L Access Point specifications
- ePMP 4500L Access Point heater
- ePMP 4500L Access Point wind loading
- ePMP 4500L Access Point software packages

ePMP 4500L Access Point description

The ePMP 4500L device is a self-contained transceiver unit that contains both radio and networking electronics. It is available with 2 X 2 MU-MIMO connectorized antenna.

ePMP 4500L is shown in Figure 41.

Figure 41: *ePMP 4500L Access Point*

ePMP 4500L Access Point part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 72 and Table 73 includes the following items:

- One connectorized unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 72: ePMP 4500L Access Point part numbers

Cambium description	Cambium part number
ePMP 4500L 6 GHz 2x2 Access Point Radio (ROW) (no cord)	C060940A051A
ePMP 4500L 6 GHz 2x2 Access Point Radio (ROW) (US cord)	C060940A151A
ePMP 4500L 6 GHz 2x2 Access Point Radio (IC) (Canada/US cord)	C068940A154A
ePMP 4500L 6 GHz 2x2 Access Point Radio (ROW) (EU cord)	C060940A251A
ePMP 4500L 6 GHz 2x2 Access Point Radio (EU) (EU cord)	C060940A253A
ePMP 4500L 6 GHz 2x2 Access Point Radio (ROW) (UK cord)	C060940A351A
ePMP 4500L 6 GHz 2x2 Access Point Radio (EU) (UK cord)	C060940A353A
ePMP 4500L 6 GHz 2x2 Access Point Radio (ROW) (India cord)	C060940A451A
ePMP 4500L 6 GHz 2x2 Access Point Radio (India) (India Cord)	C060940A455A
ePMP 4500L 6 GHz 2x2 Access Point Radio (ROW) (China cord)	C060940A551A
ePMP 4500L 6 GHz 2x2 Access Point Radio (ROW) (Brazil cord)	C060940A651A
ePMP 4500L 6 GHz 2x2 Access Point Radio (ROW) (Argentina cord)	C060940A751A
ePMP 4500L 6 GHz 2x2 Access Point Radio (ROW) (ANZ cord)	C060940A851A
ePMP 4500L 6 GHz 2x2 Access Point Radio (ROW) (South Africa cord)	C060940A951A
ePMP 4500L 6 GHz 2x2 Access Point Radio (ROW) (No PSU)	C060940AZ51A
ePMP 4500L 6 GHz 2x2 Access Point Radio (FCC) (US cord)	C068940A152A
ePMP 4500L 6 GHz 2x2 Access Point Radio (Indonesia) (EU Cord)	C060940A256A

Table 73: ePMP 4500L accessory part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

ePMP 4500L Access Point mounting bracket

The ePMP 4500L AP module is designed to be mounted with a sector antenna or pole-mounted using the mounting bracket provided in the box with the radio.

ePMP 4500L AP mounting bracket is shown in Figure 42

Figure 42: *ePMP 4500L Access Point module mounting bracket*

ePMP 4500L Access Point interfaces

The Ethernet port is located at the bottom of the unit. This interface is described in Table 74.

Table 74: ePMP 4500L Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE). **Note** All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data
SFP	SFP	Optical or Copper Gigabit Ethernet	Management and/or data

ePMP 4500L Access Point specifications

The ePMP 4500L connectorized module conforms to the specifications listed in Table 75 and Table 76.

The connectorized module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 75: ePMP 4500L Access Point physical specifications

Category	Specification
Dimensions (Length x Width x Height)	22.2 cm x 12.4 cm x 4.5 cm (8.75 in x 4.9 in x 1.75 in) without brackets
Weight	12.5 kg (27.56 lbs) without brackets 14.66 kg (32.32 lbs) with brackets

Table 76: ePMP 4500L Access Point environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +55°C (131°F)
Wind loading	124 mph (200 kph) maximum. See ePMP 4500L Access Point wind loading (Kg) for a full description.
Humidity	95% condensing
Environmental	IP67.  **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

ePMP 4500L Access Point heater

At startup, if the ePMP 4500L AP module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 77.

Table 77: ePMP 4500L Access Point startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

ePMP 4500L Access Point wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 200 kph (124 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = 0.0042_{AV^2}

Where:	Is:
A	the surface area in square feet
V	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 78 and Table 79.

Table 78: ePMP 4500L Access Point wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		40	50	56
ePMP 4500 Access Point with Sector Antenna	0.032	5.35 Kg	8.36 Kg	10.49 Kg

Table 79: ePMP 4500L Access Point wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	125
ePMP 4500 Access Point with Sector Antenna	0.344	9.25 lb	14.45 lb	22.58 lb

ePMP 4500L Access Point software packages

ePMP 4500L AP devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AX-v5.x.x.img (or higher version number)

ePMP 5/6GHz 4 x 4 sector antenna

For details of the 5/6GHz 4 x 4 sector antenna hardware, see:

- ePMP 5/6 GHz 4X4 sector antenna description
- ePMP 5/6 GHz 4X4 sector antenna part numbers
- ePMP 5/6 GHz 4X4 sector antenna mounting bracket
- ePMP 5/6 GHz 4X4 sector antenna interfaces
- ePMP 5/6 GHz 4X4 sector antenna specifications
- ePMP 5/6 GHz 4X4 sector antenna heater
- ePMP 5/6 GHz 4X4 sector antenna wind loading
- ePMP 5/6 GHz 4X4 sector antenna software packages

ePMP 5/6 GHz 4X4 sector antenna description

The ePMP 5/6 GHz 4X4 device is a self-contained transceiver unit that houses both radio and networking electronics. It is available with 4 X 4 MU-MIMO connectorized antenna. The MPE distance for FCC is 105 cm and for IC is 20 cm.

ePMP 5/6 GHz 4X4 is shown in Figure 43.

Figure 43: *ePMP 5/6 GHz 4X4 sector antenna*

Warning

The operation of this device is prohibited on oil platforms, cars, trains, boats, and aircraft.

Operation of the transmitters in 5.925 GHz - 7.125 GHz band is prohibited for control of communications with the unmanned aircraft systems.

Warning

This radio transmitter 109W-0068 is approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio (109W-0068) a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal d'antenne. Les types d'antennes non inclus dans cette liste qui ont un gain supérieur au gain maximal indiqué pour tout type listé sont strictement interdits pour une utilisation avec cet appareil.

Warning

Operation on oil platforms, automobiles, trains, maritime vessels and aircraft shall be prohibited.

L'exploitation sur les plates-formes pétrolières, les automobiles, les trains, les navires maritimes et les aéronefs est interdite.

Warning

Devices shall not be used for control of or communications with unmanned aircraft systems.

Les appareils ne doivent pas être utilisés pour contrôler ou communiquer avec des systèmes d'aéronefs sans pilote.

Warning

The antenna height shall be determined by the installer or operator of the standard-power sector antenna or fixed client device, or by automatic means. This information are stored internally in the device. Provision of accurate device information is mandatory.

La hauteur de l'antenne doit être déterminée par l'installateur ou l'opérateur du point d'accès à puissance standard ou de l'appareil client fixe, ou par des moyens automatiques. Ces informations doivent être stockées en interne dans l'appareil. La fourniture d'informations précises sur l'appareil est obligatoire.

5/6 GHz 4X4 sector antenna part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 80 includes the following items:

- One connectorized unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 80: 5/6 GHz 4X4 sector antenna part numbers

Cambium description	Cambium part number
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (ROW) (no cord)	C060940A021A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (ROW) (US cord)	C060940A121A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (IC) (Canada/US cord)	C068940A124A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (ROW) (EU cord)	C060940A221A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (EU) (EU cord)	C060940A223A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (ROW) (UK cord)	C060940A321A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (EU) (UK cord)	C060940A323A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (ROW) (India cord)	C060940A421A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (India) (India Cord)	C060940A425A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (ROW) (China cord)	C060940A521A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (ROW) (Brazil cord)	C060940A621A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (ROW) (Argentina cord)	C060940A721A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (ROW) (ANZ cord)	C060940A821A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (ROW) (South Africa cord)	C060940A921A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (ROW) (No PSU)	C060940AZ21A
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (FCC) (US cord)	C068940A122B
5/6 GHz 4X4 6 GHz 4x4 sector antenna Radio (Indonesia) (EU Cord)	C060940A226A
5/6 GHz 4X4 6 GHz 2x2 sector antenna	C068940P142A

ePMP 5/6 GHz 4X4 sector antenna mounting bracket

The ePMP 5/6 GHz 4X4 AP module is designed to be mounted with a sector antenna or pole-mounted using the mounting bracket provided in the box with the radio.

ePMP 5/6 GHz 4X4 AP mounting bracket is shown in Figure 44

Figure 44: *ePMP 5/6 GHz 4X4 sector antenna module mounting bracket*

ePMP 5/6 GHz 4X4 sector antenna interfaces

The Ethernet port is located at the bottom of the unit. This interface is described in Table 81.

Table 81: ePMP 5/6 GHz 4X4 Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE). **Note** All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data
SFP	SFP	Optical or Copper Gigabit Ethernet	Management and/or data

ePMP 5/6 GHz 4X4 sector antenna specifications

The ePMP 5/6 GHz 4X4 connectorized module conforms to the specifications listed in Table 82 and Table 83.

The connectorized module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 82: ePMP 5/6 GHz 4X4 sector antenna physical specifications

Category	Specification
Dimensions (Length x Width x Height)	22.2 cm x 12.4 cm x 4.5 cm (8.75 in x 4.9 in x 1.75 in) without brackets
Weight	12.5 kg (27.56 lbs) without brackets 14.66 kg (32.32 lbs) with brackets

Table 83: ePMP 5/6 GHz 4X4 sector antenna environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +55°C (131°F).
Wind loading	124 mph (200 kph) maximum. See ePMP 5/6 GHz 4X4 sector antenna wind loading (Kg) for a full description.
Humidity	95% condensing.
Environmental	IP67 **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

ePMP 5/6 GHz 4X4 sector antenna heater

At startup, if the ePMP 5/6 GHz 4X4 AP module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 84.

Table 84: ePMP 5/6 GHz 4X4 sector antenna startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

ePMP 5/6 GHz 4X4 sector antenna wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 200 kph (124 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
V	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 85 and Table 86.

Table 85: ePMP 5/6 GHz 4X4 sector antenna wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		40	50	60
ePMP 5/6 GHz 4X4 sector antenna with Sector Antenna	0.13	21.74 Kg	33.96 Kg	48.91 Kg

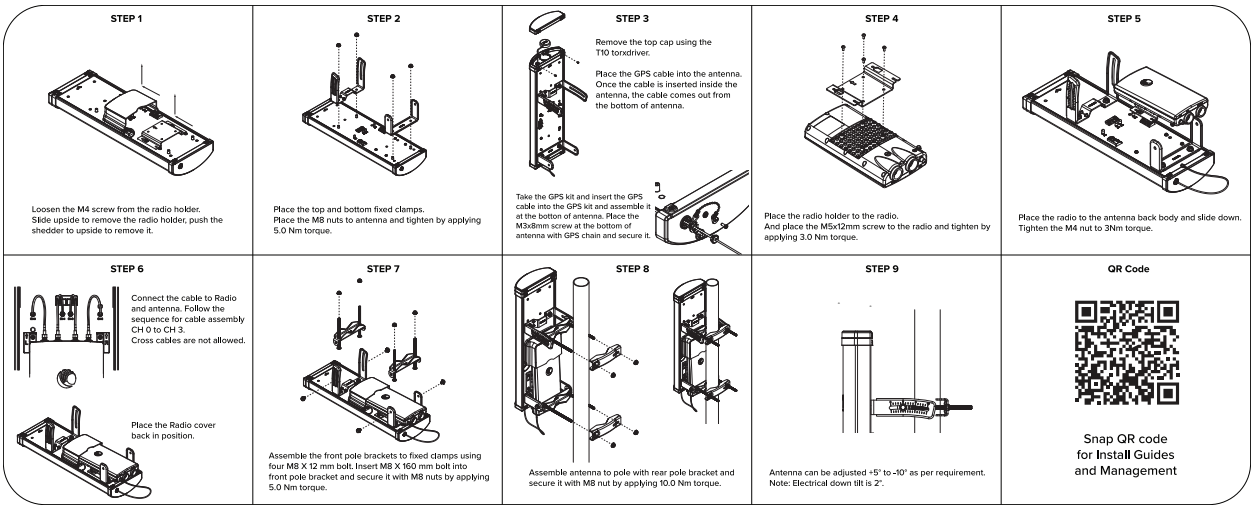
Table 86: ePMP 5/6 GHz 4X4 sector antenna wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
ePMP 5/6 GHz 4X4 sector antenna with Sector Antenna	1.4	37.63 lb	58.80 lb	84.67 lb

ePMP 5/6 GHz 4X4 sector antenna mounting instructions

Note

A professional installation is required.



ePMP 5/6 GHz 4X4 sector antenna software packages

ePMP 5/6 GHz 4X4 sector antenna devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AX-v5.x.x.img (or higher version number)

Force 300-25

For details of the Force 300-25 hardware, see:

- Force 300-25 integrated description
- Force 300-25 part numbers
- Force 300-25 mounting bracket
- Force 300-25 interfaces
- Force 300-25 heater
- Force 300-25 wind loading
- Force 300-25 software packages

Force 300-25 integrated description

The Force 300-25 device is a self-contained transceiver unit that contains both radio and networking electronics.

Force 300-25 integrated is shown in Figure 45.

Figure 45: *Force 300-25 integrated*

Force 300-25 part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 87 and Table 88 includes the following items:

- One integrated unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 87: Force 300-25 part numbers

Cambium description	Cambium part number
ePMP Force 300-25-25 5 GHz High Gain Radio (FCC) (US Cord)	C058910C102A
ePMP Force 300-25-25 5 GHz High Gain Radio (IC) (Canada/US Cord)	C050910C104A
ePMP Force 300-25-25 5 GHz High Gain Radio (EU) (EU Cord)	C050910C203A
ePMP Force 300-25-25 5 GHz High Gain Radio (EU) (UK Cord)	C050910C303A
ePMP Force 300-25-25 5 GHz High Gain Radio (RoW) (no Cord)	C050910C001A
ePMP Force 300-25-25 5 GHz High Gain Radio (RoW) (US Cord)	C050910C101A
ePMP Force 300-25-25 5 GHz High Gain Radio (RoW) (EU Cord)	C050910C201A
ePMP Force 300-25-25 5 GHz High Gain Radio (RoW) (UK Cord)	C050910C301A
ePMP Force 300-25-25 5 GHz High Gain Radio (RoW) (India Cord)	C050910C401A
ePMP Force 300-25-25 5 GHz High Gain Radio (RoW) (China Cord)	C050910C501A
ePMP Force 300-25-25 5 GHz High Gain Radio (RoW) (Brazil Cord)	C050910C601A
ePMP Force 300-25-25 5 GHz High Gain Radio (RoW) (Argentina Cord)	C050910C701A
ePMP Force 300-25-25 5 GHz High Gain Radio (RoW) (ANZ Cord)	C050910C801A

Cambium description	Cambium part number
ePMP Force 300-25-25 5 GHz High Gain Radio (RoW) (South Africa Cord)	C050910C901A
ePMP Force 300-25-25 5 GHz High Gain Radio (RoW) (No PSU)	C050910CZ01A

Table 88: Force 300-25 accessory part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

Force 300-25 mounting bracket

The Force 300-25 module is designed to be pole-mounted using the mounting bracket provided in the box with the radio.

Force 300-25 mounting bracket is shown in Figure 46.

Figure 46: *Force 300-25 module mounting bracket*

Force 300-25 interfaces

The Ethernet port is located on the rear of the integrated unit. This interface is described in Table 89.

Table 89: Force 300-25 Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE).  **Note** All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data

Force 300-25 specifications

The Force 300-25 integrated module conforms to the specifications listed in Table 90 and Table 91.

The integrated module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 90: Force 300-25 physical specifications

Category	Specification
Dimensions (Diameter x Depth)	47 cm x 31 cm (18.5 in x 12.2 in)
Weight	2.4 kg (5.2 lbs)

Table 91: Force 300-25 environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +55°C (131°F)
Wind loading	124 mph (200 kph) maximum. See Force 300-25 wind loading for a full description.
Humidity	95% condensing
Environmental	IP55  **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

Force 300-25 heater

At startup, if the Force 300-25 module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 92.

Table 92: Force 300-25 startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

Force 300-25 wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 200 kph (124 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
v	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 93 and Table 94.

Table 93: Force 300-25 wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		40	50	60
Force 300-25 Integrated	0.15	25.08 Kg	39.2 Kg	56.43 Kg

Table 94: Force 300-25 wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
Force 300-25 Integrated	1.61	43.28 lb	67.62 lb	97.37 lb

Force 300-25 software packages

Force 300-25 devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AC-v4.5-GA.img (or higher version number)

Force 300-25L

For details of the Force 300-25L hardware, see:

- Force 300 CSM Connectorized Subscriber Module description
- Force 300-25L key features
- Force 300-25L part numbers
- Force 300-25L interfaces
- Force 300-25L specifications
- Force 300-25L heater
- Force 300-25L wind loading
- Force 300-25L software packages

Force 300-25L integrated description

The Force 300-25L is an integrated 802.11ac Wave2 based Subscriber Module with an integrated 25 dBi dish.

The radio supports PTP and ePTP protocols and is compatible with PMP applications with ePMP 3000, ePMP 3000L, and ePMP 2000 APs.

Force 300-25L integrated is shown in Figure 47.

Figure 47: *Force 300-25L integrated*

Force 300-25L key features

- Supports up to 400 Mbps usable throughput
- Frequency Range from 4.9 GHz to 6.4 GHz
- Up to 26 dBm Tx Power
- Network management: HTTPS, SNMPv2c, SSH, cnMaestro
- Channel Size: 20 / 40 / 80 MHz

Force 300-25L part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 95 and Table 96 includes the following items:

- One unit
- One Dish
- One Fixed Mounting Bracket
- One unit
- Two Hose Clamps
- One PoE injector
- One Line Cord

Note

An optional Tilt Mount Bracket is available separately (N000900L063A).

Table 95: Force 300-25L part numbers

Cambium description	Cambium part number
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (no cord)	C050910M071A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (US cord)	C050910M171A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (EU cord)	C050910M271A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (EU) (EU cord)	C050910M273A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (UK cord)	C050910M371A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (EU) (UK cord)	C050910M373A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (India cord)	C050910M471A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (India) (India Cord)	C050910M472A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (China cord)	C050910M571A

Cambium description	Cambium part number
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (Brazil cord)	C050910M671A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (Argentina cord)	C050910M771A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (ANZ cord)	C050910M871A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (South Africa cord)	C050910CM71A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (No PSU)	C050910MZ71A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (no cord)	C050910C071A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (US cord)	C050910C171A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (EU cord)	C050910C271A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (EU) (EU cord)	C050910C273A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (UK cord)	C050910C371A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (EU) (UK cord)	C050910C373A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (India cord)	C050910C471A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (India) (India Cord)	C050910C472A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (China cord)	C050910C571A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (Brazil cord)	C050910C671A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (Argentina cord)	C050910C771A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (ANZ cord)	C050910C871A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (South Africa cord)	C050910C971A
ePMP 5 GHz Force 300-25L SM Bulk Packaging (ROW) (No PSU)	C050910CZ71A

Table 96: Force 300-25L accessory part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

Force 300-25L interfaces

The Ethernet port is located on the rear of the unit.

Table 97: Force 300-25L – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE).
		100/1000BASE-T Ethernet	Data

Force 300-25L specifications

The Force 300-25L integrated module conforms to the specifications listed in Table 98 and Table 99. The integrated module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 98: Force 300-25L physical specifications

Category	Specification
Dimensions (Diameter x Depth)	TBDmm x TBDmm x TBDmm (TBDin x TBDin x TBDin)
Weight	TBD
Antenna	Integrated dish, 25 dBi,
Pole Diameter Range	3.8 cm – 6.4 cm (1.5 in – 2.5 in)
Power Consumption	12 W Maximum, 9 W Typical
Input Voltage	30 V Passive PoE (14-30V DC input)

Table 99: Force 300-25L environmental specifications

Category	Specification
Temperature	-30°C to +55°C (-22°F to +122°F) ambient op temp
Wind Survival	200 km/hour (124 mi/hour)
Environmental	IP55 **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

Force 300-25L heater

At startup, if the Force 300-25L module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its start-up sequence.

The effect on device startup time at various temperatures is defined in Table 100.

Table 100: Force 300-25L startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

Force 300-25L wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 180 kph (124 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
v	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 101 and Table 102.

Table 101: Force 300-25L wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		30	40	50
Force 300-25L Integrated	0.03	2.82 Kg	5.02 Kg	7.84 Kg

Table 102: Force 300-25L wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
Force 300-25L	0.28	7.53 lb	11.76 lb	16.93 lb

Force 300-25L software packages

Force 300-25L devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AC-v4.5-GA.img (or higher version number)

Force 300-19

For details of the Force 300-19 hardware, see:

- Force 300-19 integrated description
- Force 300-19 part numbers
- Force 300-19 mounting bracket
- Force 300-19 interfaces
- Force 300-19 specifications
- Force 300-19 heater
- Force 300-19 wind loading
- Force 300-19 software packages

Force 300-19 integrated description

The Force 300-19 device is a self-contained transceiver unit that contains both radio and networking electronics. The device is labeled with FCCID:Z8H89FT0048 | IC:109W-0048.

Force 300-19 is shown in Figure 48.

Figure 48: *Force 300-19 Access Point*

Force 300-19 part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 103 and Table 104 include the following items:

- One integrated unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 103: Force 300-19 part numbers

Cambium description	Cambium part number
ePMP 5 GHz Force 300-19 SM (FCC) (US cord)	C058900C801A
ePMP 5 GHz Force 300-19 SM (IC) (Canada/US cord)	C050900C801A
ePMP 5 GHz Force 300-19 SM (EU) (EU cord)	C050900C802A
ePMP 5 GHz Force 300-19 SM (EU) (UK cord)	C050900C803A
ePMP 5 GHz Force 300-19 SM (ROW) (no cord)	C050900C804A
ePMP 5 GHz Force 300-19 SM (ROW) (US cord)	C050900C805A
ePMP 5 GHz Force 300-19 SM (ROW) (EU cord)	C050900C806A
ePMP 5 GHz Force 300-19 SM (ROW) (UK cord)	C050900C807A
ePMP 5 GHz Force 300-19 SM (ROW) (India cord)	C050900C808A
ePMP 5 GHz Force 300-19 SM (India) (India cord)	C050900C809A
ePMP 5 GHz Force 300-19 SM (ROW) (China cord)	C050900C810A
ePMP 5 GHz Force 300-19 SM (ROW) (Brazil cord)	C050900C811A
ePMP 5 GHz Force 300-19 SM (ROW) (Argentina cord)	C050900C812A
ePMP 5 GHz Force 300-19 SM (ROW) (ANZ cord)	C050900C813A
ePMP 5 GHz Force 300-19 SM (ROW) (South Africa cord)	C050900C814A
ePMP 5 GHz Force 300-19 SM (ROW) (No PSU)	C050900C815A

Table 104: Force 300-19 accessory part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012

Cambium description	Cambium part number
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

Force 300-19 mounting bracket

The Force 300-19 module is designed to be pole-mounted using the mounting bracket provided in the box with the radio.

Force 300-19 mounting bracket is shown in Figure 49

Figure 49: *Force 300-19 module mounting bracket*

Force 300-19 interfaces

The Ethernet port is located on the rear of the integrated unit. This interface is described in Table 105.

Table 105: Force 300-19 Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE). **Note** All RJ45 Ethernet LAN cables used for providing power or connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data

Force 300-19 specifications

The Force 300-19 integrated module conforms to the specifications listed in Table 106 and Table 107.

The integrated module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 106: Force 300-19 physical specifications

Category	Specification
Dimensions	27.8 cm x 27.8 cm x 4.5cm (10.9 in x 10.9 in x 1.8 in)
Weight	1.45 kg (3.2 lbs) (Including mounting bracket)
Antenna Gain	19 dBi

Table 107: Force 300-19 environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +60°C (140°F)
Wind loading	113 mph (180 kph) maximum. See Force 300-19 wind loading for a full description.
Humidity	95% condensing
Environmental	IP55 **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

Force 300-19 heater

At startup, if the Force 300-19 module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 108.

Table 108: Force 300-19 startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

Force 300-19 wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 180 kph (113 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
v	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 109 and Table 110.

Table 109: Force 300-19 wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		40	50	60
Force 300-19 Integrated	0.08	13.4 Kg	20.9 Kg	30. 1Kg

Table 110: Force 300-19 wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
Force 300-19 Integrated	0.8281	22.3 lb	34.8 lb	50.1 lb

Force 300-19 software packages

Force 300-19 devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AC-v4.5-GA.img (or higher version number)

Force 300-19R

For details of the Force 300-19R hardware, see:

- Force 300-19R integrated description
- Force 300-19R part numbers
- Force 300-19R mounting bracket

- Force 300-19R interfaces
- Force 300-19R specifications
- Force 300-19R heater
- Force 300-19R wind loading
- Force 300-19R software packages

Force 300-19R integrated description

The Force 300-19R device is a self-contained transceiver unit that contains both radio and networking electronics. The device is labeled with FCCID:Z8H89FT0048 | IC:109W-0048.

Force 300-19R part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 111 and Table 112 include the following items:

Figure 50: *Force 300-19R*

- One integrated unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 111: Force 300-19R part numbers

Cambium description	Cambium part number
ePMP 5 GHz Force 300-19R SM (FCC) (US cord)	C058900C901A
ePMP 5 GHz Force 300-19R SM (IC) (Canada/US cord)	C050900C901A
ePMP 5 GHz Force 300-19R SM (EU) (EU cord)	C050900C902A
ePMP 5 GHz Force 300-19R SM (EU) (UK cord)	C050900C903A
ePMP 5 GHz Force 300-19R SM (ROW) (no cord)	C050900C904A

Cambium description	Cambium part number
ePMP 5 GHz Force 300-19R SM (ROW) (US cord)	C050900C905A
ePMP 5 GHz Force 300-19R SM (ROW) (EU cord)	C050900C906A
ePMP 5 GHz Force 300-19R SM (ROW) (UK cord)	C050900C907A
ePMP 5 GHz Force 300-19R SM (ROW) (India cord)	C050900C908A
ePMP 5 GHz Force 300-19R SM (India) (India cord)	C050900C909A
ePMP 5 GHz Force 300-19R SM (ROW) (China cord)	C050900C910A
ePMP 5 GHz Force 300-19R SM (ROW) (Brazil cord)	C050900C911A
ePMP 5 GHz Force 300-19R SM (ROW) (Argentina cord)	C050900C912A
ePMP 5 GHz Force 300-19R SM (ROW) (ANZ cord)	C050900C913A
ePMP 5 GHz Force 300-19R SM (ROW) (South Africa cord)	C050900C914A
ePMP 5 GHz Force 300-19R SM (ROW) (No PSU)	C050900C915A

Table 112: Force 300-19R accessory part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

Force 300-19R mounting bracket

The Force 300-19R module is designed to be pole-mounted using the mounting bracket provided in the box with the radio.

Force 300-19R mounting bracket is shown in Figure 51

Figure 51: *Force 300-19R module mounting bracket*

Force 300-19R interfaces

The Ethernet port is located on the rear of the integrated unit. This interface is described in Table 113.

Table 113: Force 300-19R Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE).
		100/1000BASE-T Ethernet	Data

Force 300-19R specifications

The Force 300-19R integrated module conforms to the specifications listed in Table 114 and Table 115.

The integrated module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 114: Force 300-19R physical specifications

Category	Specification
Dimensions	27.8 cm x 27.8 cm x 4.5cm (10.9 in x 10.9 in x 1.8 in)
Weight	1.45 kg (3.2 lbs) (Including mounting bracket)
Antenna Gain	19 dBi

Table 115: Force 300-19R environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +60°C (140°F)
Wind loading	113 mph (180 kph) maximum. See Force 300-19R wind loading for a full description.

Category	Specification
Humidity	95% condensing
Environmental	IP67  **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

Force 300-19R heater

At startup, if the Force 300-19R module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 116.

Table 116: Force 300-19R startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

Force 300-19R wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 180 kph (113 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
v	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 117 and Table 118.

Table 117: Force 300-19R wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		40	50	60
Force 300-19 Integrated	0.08	13.4Kg	20.9Kg	30.1Kg

Table 118: Force 300-19R wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
Force 300-19 Integrated	0.8281	22.3 lb	34.8 lb	50.1 lb

Force 300-19R software packages

Force 300-19R devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AC-v4.5-GA.img (or higher version number)

Force 300-16

For details of the Force 300-16 hardware, see:

- Force 300-16 integrated description
- Force 300-16 part numbers
- Force 300-16 interfaces
- Force 300-16 specifications
- Force 300-16 heater
- Force 300-16 wind loading
- Force 300-16 software packages

Force 300-16 integrated description

The Force 300-16 device is a self-contained transceiver unit that contains both radio and networking electronics.

Force 300-16 integrated is shown in Figure 52.

Figure 52: *Force 300-16 integrated*

IMPORTANT NOTE

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 211 cm between the radiator and your body.

IMPORTANT NOTE

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

Force 300-16 part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 119 and Table 120 include the following items:

- One integrated unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 119: Force 300-16 part numbers

Cambium description	Cambium part number
ePMP 5 GHz Force 300-16 Radio (FCC) (US cord)	C058910C112A
ePMP 5 GHz Force 300-16 Radio (IC) (Canada/US cord)	C050910C114A
ePMP 5 GHz Force 300-16 Radio (EU) (EU cord)	C050910C213A

Cambium description	Cambium part number
ePMP 5 GHz Force 300-16 Radio (EU) (UK cord)	C050910C313A
ePMP 5 GHz Force 300-16 Radio (ROW) (no cord)	C050910C011A
ePMP 5 GHz Force 300-16 Radio (ROW) (US cord)	C050910C111A
ePMP 5 GHz Force 300-16 Radio (ROW) (EU cord)	C050910C211A
ePMP 5 GHz Force 300-16 Radio (ROW) (UK cord)	C050910C311A
ePMP 5 GHz Force 300-16 Radio (ROW) (India cord)	C050910C411A
ePMP 5 GHz Force 300-16 Radio (India) (India cord)	C050910C412A
ePMP 5 GHz Force 300-16 Radio (ROW) (China cord)	C050910C511A
ePMP 5 GHz Force 300-16 Radio (ROW) (Brazil cord)	C050910C611A
ePMP 5 GHz Force 300-16 Radio (ROW) (Argentina cord)	C050910C711A
ePMP 5 GHz Force 300-16 Radio (ROW) (ANZ cord)	C050910C811A
ePMP 5 GHz Force 300-16 Radio (ROW) (South Africa cord)	C050910C911A
ePMP 5 GHz Force 300-16 Radio (ROW) (No PSU)	C050910CZ11A

Table 120: Force 300-16 accessory part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

Force 300-16 interfaces

The Ethernet port is located on the rear of the integrated unit.

Table 121: Force 300-16 Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE).

Port name	Connector	Interface	Description
			Note All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data

Force 300-16 specifications

The Force 300-16 integrated module conforms to the specifications listed in Table 122 and Table 123.

The integrated module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 122: Force 300-16 physical specifications

Category	Specification
Dimensions (Diameter x Depth)	12.4 cm x 25.1 cm x 11.9 cm (4.9 in x 9.9 in x 4.7 in) – with mounting bracket
Weight	0.5 kg (1.1 lbs) – with mounting bracket

Table 123: Force 300-16 environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +60°C (140°F)
Wind loading	112 mph (180 kph) maximum. See Force 300-16 wind loading for a full description.
Environmental	IP55 **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

Force 300-16 heater

At startup, if the Force 300-16 module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 124.

Table 124: Force 300-16 startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

Force 300-16 wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 180 kph (124 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
v	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 125 and Table 126.

Table 125: Force 300-16 wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		30	40	50
Force 300-16 Integrated	0.03	2.8 Kg	5 Kg	7.8 Kg

Table 126: Force 300-16 wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
Force 300-16 Integrated	0.34	9.1 lb	14.3 lb	20.6 lb

Force 300-16 software packages

Force 300-16 devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AC-v4.5-GA.img (or higher version number)

Force 300-13

For details of the Force 300-13 hardware, see:

- Force 300-13 integrated description
- Force 300-13 part numbers
- Force 300-13 interfaces
- Force 300-13 specifications
- Force 300-13 heater
- Force 300-13 wind loading
- Force 300-13 software packages

Force 300-13 integrated description

The Force 300-13 device is a self-contained transceiver unit that contains both radio and networking electronics.

(FCCID:Z8H89FT0048 | IC:109W-0048).

Force 300-13 integrated is shown in Figure 53.

Figure 53: *Force 300-13 integrated radio*

Force 300-13 part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 127 and Table 128 include the following items:

- One integrated unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 127: Force 300-13 part numbers

Cambium description	Cambium part number
ePMP 5GHz Force 300-13 SM (FCC) (US cord)	C058900C701A
ePMP 5GHz Force 300-13 SM (IC) (Canada/US cord)	C050900C701A
ePMP 5GHz Force 300-13 SM (EU) (EU cord)	C050900C702A
ePMP 5GHz Force 300-13 SM (EU) (UK cord)	C050900C703A
ePMP 5GHz Force 300-13 SM (ROW) (no cord)	C050900C704A
ePMP 5GHz Force 300-13 SM (ROW) (US cord)	C050900C705A
ePMP 5GHz Force 300-13 SM (ROW) (EU cord)	C050900C706A
ePMP 5GHz Force 300-13 SM (ROW) (UK cord)	C050900C707A
ePMP 5GHz Force 300-13 SM (ROW) (India cord)	C050900C708A
ePMP 5GHz Force 300-13 SM (India) (India cord)	C050900C709A
ePMP 5GHz Force 300-13 SM (ROW) (China cord)	C050900C710A
ePMP 5GHz Force 300-13 SM (ROW) (Brazil cord)	C050900C711A
ePMP 5GHz Force 300-13 SM (ROW) (Argentina cord)	C050900C712A
ePMP 5GHz Force 300-13 SM (ROW) (ANZ cord)	C050900C713A
ePMP 5GHz Force 300-13 SM (ROW) (South Africa cord)	C050900C714A
ePMP 5GHz Force 300-13 SM (ROW) (No PSU)	C050900C715A

Table 128: Force 300-13 accessory part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

Force 300-13 interfaces

The Ethernet port is located on the rear of the integrated unit.

Table 129: Force 300-13 Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE). **Note** All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data

Force 300-13 specifications

The Force 300-13 integrated module conforms to the specifications listed in Table 130 and Table 131.

The integrated module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 130: Force 300-13 physical specifications

Category	Specification
Dimensions (Diameter x Depth)	12.4 cm x 25.1 cm x 11.9 cm (4.9 in x 9.9 in x 4.7 in) – with mounting bracket
Weight	0.5 kg (1.1 lbs) – with mounting bracket
Antenna Gain	13 dBi

Table 131: Force 300-13 environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +60°C (140°F)
Wind loading	112 mph (180 kph) maximum. See Force 300-13 wind loading for a full description.
Environmental	IP55 **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

Force 300-13 heater

At startup, if the Force 300-13 module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 132.

Table 132: Force 300-13 startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

Force 300-13 wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 180 kph (124 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
v	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 133 and Table 134.

Table 133: Force 300-13 wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		30	40	50
Force 300-13 Integrated	0.03	2.82 Kg	5.02 Kg	7.84 Kg

Table 134: Force 300-13 wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
Force 300-13 Integrated	0.28	7.53 lb	11.76 lb	16.93 lb

Force 300-13 software packages

Force 300-16 devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AC-v4.5-GA.img (or higher version number)

Force 300-13L

For details of the Force 300-13L hardware, see:

- Force 300-13L integrated description
- Force 300-13L part numbers
- Force 300-13L interfaces
- Force 300-13L specifications
- Force 300-13L wind loading
- Force 300-13L LEDs
- Force 300-13L software packages

Force 300-13L integrated description

The Force 300-13L device is a self-contained transceiver unit that contains both radio and networking electronics. The Force 300-13L uses 802.11ac technology and supports MU-MIMO and other features offered by the ePMP 3000 and ePMP 3000L APs. It is also backward compatible with the ePMP 2000 using backward compatibility features.

Force 300-13L integrated is shown in Figure 54.

Figure 54: *Force 300-13L integrated*

Force 300-13L part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 135 and Table 136 include the following items:

- One integrated unit
- One power supply 1000/100 BASE-TX LAN injector
- One-line cord

Table 135: Force 300-13L part numbers

Cambium description	Cambium part number
ePMP 5 GHz Force 300-13L SM (ROW) (no cord)	C050910C031A
ePMP 5 GHz Force 300-13L SM (ROW) (US cord)	C050910C131A
ePMP 5 GHz Force 300-13L SM (ROW) (EU cord)	C050910C231A
ePMP 5 GHz Force 300-13L SM (EU) (EU cord)	C050910C233A
ePMP 5 GHz Force 300-13L SM (ROW) (UK cord)	C050910C331A
ePMP 5 GHz Force 300-13L SM (EU) (UK cord)	C050910C333A
ePMP 5 GHz Force 300-13L SM (ROW) (India cord)	C050910C431A
ePMP 5 GHz Force 300-13L SM (India) (India Cord)	C050910C432A
ePMP 5 GHz Force 300-13L SM (ROW) (China cord)	C050910C531A

Cambium description	Cambium part number
ePMP 5 GHz Force 300-13L SM (ROW) (Brazil cord)	C050910C631A
ePMP 5 GHz Force 300-13L SM (ROW) (Argentina cord)	C050910C731A
ePMP 5 GHz Force 300-13L SM (ROW) (ANZ cord)	C050910C831A
ePMP 5 GHz Force 300-13L SM (ROW) (South Africa cord)	C050910C931A
ePMP 5 GHz Force 300-13L SM (ROW) (No PSU)	C050910CZ31A

Table 136: Force 300-13L accessory part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

Force 300-13L interfaces

The Ethernet port is located on the rear of the integrated unit.

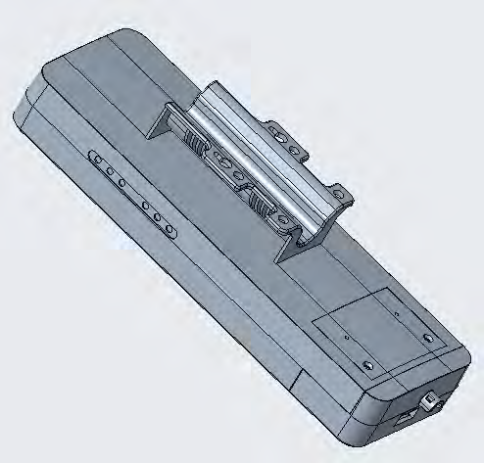


Figure 55: *Rear Interfaces*

Table 137: Force 300-13L Series – rear interfaces

Port name	Connector	Interface	Description
Ethernet	RJ45	24V PoE input	10/100 BASE-T
		100 BASE-TX Ethernet	Management and data
Reset Button	Physical button	N/A	For resetting the radio and for setting the radio back to its factory default configuration.

Force 300-13L specifications

The Force 300-13L integrated module conforms to the specifications listed in Table 138 and Table 139.

The integrated module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 138: Force 300-13L physical specifications

Category	Specification
Dimensions (Diameter x Depth)	235 x 77 x 58 mm
Weight	0.35 kg (0.88 lbs)
Antenna Gain	13 dBi

Table 139: Force 300-13L environmental specifications

Category	Specification
Temperature	-30°C to +55°C (-22°F to +122°F)
Wind loading	125 km/hour (78 mi/hour)
Environmental	IP55 **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be raintight.

Force 300-13L wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 125 kph (78 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and surface area.

Force 300-13L LEDs

The LEDs and the corresponding description are described in Table 140.

Table 140: Force 300-13L LED Functions

LED	Function
POWER	Green: Power is applied to the device Unlit: No power is applied to the device or improper power source
WiFi	XXX
LAN	XXX
 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

Force 300-13L software packages

Force 300-13L devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP- NonGPS_Synced-[version].tar.gz (or higher version number)

Force 300 CSM

For details of the Force 300 CSM hardware, see:

- Force 300 CSM description
- Force 300 CSM part numbers
- Force 300 CSM interfaces
- Force 300 CSM specifications
- Force 300 CSM heater

- Force 300 CSM wind loading
- Force 300 CSM software packages

Force 300 CSM description

The Force 300 CSM device is a connectorized subscriber module transceiver unit that contains both radio and networking electronics.

Force 300 CSM is shown in Figure 56.

Figure 56: *Force 300 CSM*

Force 300 CSM part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 141 and Table 142 includes the following items:

- One integrated unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 141: Force 300 CSM part numbers

Cambium description	Cambium part number
ePMP 5 GHz Force 300 CSM SM (FCC) (US cord)	C058910C122A
ePMP 5 GHz Force 300 CSM SM (IC) (Canada/US cord)	C050910C124A
ePMP 5 GHz Force 300 CSM SM (EU) (EU cord)	C050910C223A
ePMP 5 GHz Force 300 CSM SM (EU) (UK cord)	C050910C323A
ePMP 5 GHz Force 300 CSM SM (ROW) (no cord)	C050910C021A
ePMP 5 GHz Force 300 CSM SM (ROW) (US cord)	C050910C121A

Cambium description	Cambium part number
ePMP 5 GHz Force 300 CSM SM (ROW) (EU cord)	C050910C221A
ePMP 5 GHz Force 300 CSM SM (ROW) (UK cord)	C050910C321A
ePMP 5 GHz Force 300 CSM SM (ROW) (India cord)	C050910C421A
ePMP 5 GHz Force 300 CSM SM (India) (India cord)	C050910C422A
ePMP 5 GHz Force 300 CSM SM (ROW) (China cord)	C050910C521A
ePMP 5 GHz Force 300 CSM SM (ROW) (Brazil cord)	C050910C621A
ePMP 5 GHz Force 300 CSM SM (ROW) (Argentina cord)	C050910C721A
ePMP 5 GHz Force 300 CSM SM (ROW) (ANZ cord)	C050910C821A
ePMP 5 GHz Force 300 CSM SM (ROW) (South Africa cord)	C050910C921A
ePMP 5 GHz Force 300 CSM SM (ROW) (No PSU)	C050910CZ21A

Table 142: Force 300 CSM accessory part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008
CABLE, UL POWER SUPPLY CORD SET, INDIA	N000900L012
CABLE, UL POWER SUPPLY CORD SET, UK	N000900L009
CABLE, UL POWER SUPPLY CORD SET, US	N000900L007

Force 300 CSM interfaces

The Ethernet port is located on the rear of the unit.

Table 143: Force 300 CSM Series – rear interfaces

Port name	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE).  **Note**

Port name	Connector	Interface	Description
			All RJ45 Ethernet LAN cables used for providing power or are connected to power ports (PoE) must be UL certified with VW-1 markings.
		100/1000BASE-T Ethernet	Data

Force 300 CSM specifications

The Force 300 CSM connectorized module conforms to the specifications listed in Table 144 and Table 145.

The module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 144: Force 300 CSM physical specifications

Category	Specification
Dimensions (Diameter x Depth)	220mm x 80mm x 25mm (8.7in x 3.15in x 1.0in)
Weight	0.5 kg (1.1 lbs) – with mounting bracket

Table 145: Force 300 CSM environmental specifications

Category	Specification
Temperature	-30°C (-22°F) to +60C (140°F)
Wind loading	112 mph (180 kph) maximum. See Force 300 CSM wind loading for a full description.
Environmental	IP67 **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

Force 300 CSM heater

At startup, if the Force 300 CSM module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 146.

Table 146: Force 300 CSM startup times based on ambient temperature

Initial Temperature	Startup time (from power on to operational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

Force 300 CSM wind loading

Ensure that the device and the structure on which it is mounted can withstand the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 180 kph (124 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
v	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 147 and Table 148.

Table 147: Force 300 CSM wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		30	40	50
Force 300 CSM Connectorized	0.03	2.82 Kg	5.02 Kg	7.84 Kg

Table 148: Force 300 CSM wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
Force 300 CSM Connectorized	0.28	7.53 lb	11.76 lb	16.93 lb

Force 300 CSM software packages

The Force 300 CSM devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AC-v4.5-GA.img (or higher version number)

Force 300 CSML

For details of the Force 300 CSML hardware, see:

- Force 300 CSML description
- Force 300 CSML part numbers
- Force 300 CSML interfaces
- Force 300 CSML mounting bracket
- Force 300 CSML specifications
- Force 300 CSML wind loading
- Force 300 CSML LEDs
- Force 300 CSML software packages

Force 300 CSML description

The Force 300 CSML device is a self-contained transceiver unit that contains both radio and networking electronics. The Force 300 CSML uses 802.11ac technology and supports MU-MIMO and other features offered by the ePMP 3000 and ePMP 3000L APs. It is also backward compatible with the ePMP 2000 using backward compatibility features.

Force 300 CSML is shown in Figure 57.

Figure 57: *Force 300 CSML*

Force 300 CSML part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 149 and Table 150 include the following items:

- One connectorized unit
- One power supply 1000/100 BASE-TX LAN injector
- One-line cord

Table 149: Force 300 CSML part numbers

Cambium description	Cambium part number
ePMP 5 GHz Force 300 CSML SM (ROW) (no cord)	C050910C061A
ePMP 5 GHz Force 300 CSML SM (ROW) (US cord)	C050910C161A
ePMP 5 GHz Force 300 CSML SM (ROW) (EU cord)	C050910C261A
ePMP 5 GHz Force 300 CSML SM (EU) (EU cord)	C050910C263A
ePMP 5 GHz Force 300 CSML SM (ROW) (UK cord)	C050910C361A
ePMP 5 GHz Force 300 CSML SM (EU) (UK cord)	C050910C363A
ePMP 5 GHz Force 300 CSML SM (ROW) (India cord)	C050910C461A
ePMP 5 GHz Force 300 CSML SM (India) (India Cord)	C050910C462A
ePMP 5 GHz Force 300 CSML SM (ROW) (China cord)	C050910C561A
ePMP 5 GHz Force 300 CSML SM (ROW) (Brazil cord)	C050910C661A
ePMP 5 GHz Force 300 CSML SM (ROW) (Argentina cord)	C050910C761A
ePMP 5 GHz Force 300 CSML SM Bulk Packaging (ROW) (ANZ cord)	C050910C861A
ePMP 5 GHz Force 300 CSML SM (ROW) (South Africa cord)	C050910C961A
ePMP 5 GHz Force 300 CSML SM (ROW) (No PSU)	C050910CZ61A

Table 150: Force 300 CSML accessories part numbers

Cambium description	Cambium part number
PoE Gigabit DC Injector, 15W Output at 30V, Energy Level 6 Supply	N000900L001
CABLE, UL POWER SUPPLY CORD SET, ARGENTINA	N000900L013
CABLE, UL POWER SUPPLY CORD SET, AUS/NZ	N000900L011
CABLE, UL POWER SUPPLY CORD SET, Brazil	N000900L010
CABLE, UL POWER SUPPLY CORD SET, CHINA	N000900L015
CABLE, UL POWER SUPPLY CORD SET, EU	N000900L008

Force 300 CSML interfaces

The Ethernet port is located on the rear of the connectorized unit.

Figure 58: *Rear interfaces*

Table 151: Force 300 CSML Series – Rear interfaces

Port name	Connector	Interface	Description
Ethernet	RJ45	24V PoE input	10/100BASE-T
		100 BASE-TX Ethernet	Management and data
Reset Button	Physical button	N/A	For resetting the radio and for setting the radio back to its factory default configuration.

Force 300 CSML mounting bracket

The Force 300 CSML module is designed to be pole-mounted using the mounting bracket provided in the box with the radio.

Force 300 CSML mounting bracket is shown in Figure 59.

Figure 59: *Force 300 CSML module mounting bracket*

Force 300 CSML specifications

The Force 300 CSML module conforms to the specifications listed in Table 152 and Table 153. The connectorized module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning

suppression.

Table 152: Force 300 CSML physical specifications

Category	Specification
Dimensions (Diameter x Depth)	227 x 88 x 33 mm
Weight	0.521 kg (1.15 lbs) without antenna

Table 153: Force 300 CSML environmental specifications

Category	Specification
Temperature	-30°C to +55°C (-22°F to +122°F)
Wind loading	125 km/hour (78 mi/hour)
Environmental	IP55  **Note** This product meets the UL/cUL 62368 / IEC 62368 edition 2 specification, and the radio housings are designed to be rain-tight.

Force 300 CSML wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting brackets are capable of withstanding wind speeds of up to 125 kph (78 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and surface area.

Force 300 CSML LEDs

The LEDs and corresponding functions are provided in Table 154.

Table 154: Force 300 CSML LED functions

LED	Function
POWER	**Green**: Power is applied to the device **Unlit**: No power is applied to the device or improper power source
WiFi	XXX
LAN	XXX
 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

Force 300 CSML software packages

Force 300 CSML devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AC-F300-[Radio Model]-[version].tar.gz (or higher version number)

Force 425

For details of the Force 425 hardware, see:

- Force 425 integrated description
- Force 425 part numbers
- Force 425 mounting bracket with Range Extender
- Force 425 interfaces
- Force 425 specifications
- Force 425 heater
- Force 425 software packages

Force 425 integrated description

The Force 425 device is a self-contained transceiver unit that contains both radio and networking electronics.

Force 425 is shown in Figure 60.

Figure 60: *Force 425 integrated*

Force 425 part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed in Table 155 and Table 156 includes the following items:

- One integrated unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 155: ePMP Force 425 part numbers

Cambium description	Cambium part number
ePMP 5 GHz Force 425 SM 2-pack packaging (ROW) (no cord) - Priced per radio	C050940M001A
ePMP 5 GHz Force 425 SM 2-pack packaging (ROW) (US cord) - Priced per radio	C050940M101A
ePMP 5 GHz Force 425 SM 2-pack packaging (IC) (Canada/US cord) - Priced per radio	C058940M104A
ePMP 5 GHz Force 425 SM 2-pack packaging (ROW) (EU cord) - Priced per radio	C050940M201A
ePMP 5 GHz Force 425 SM 2-pack packaging (EU) (EU cord) - Priced per radio	C050940M203A
ePMP 5 GHz Force 425 SM 2-pack packaging (ROW) (UK cord) - Priced per radio	C050940M301A
ePMP 5 GHz Force 425 SM 2-pack packaging (EU) (UK cord) - Priced per radio	C050940M303A
ePMP 5 GHz Force 425 SM 2-pack packaging (ROW) (India cord) - Priced per radio	C050940M401A

Cambium description	Cambium part number
ePMP 5 GHz Force 425 SM 2-pack packaging (India) (India Cord) - Priced per radio	C050940M402A
ePMP 5 GHz Force 425 SM 2-pack packaging (ROW) (China cord) - Priced per radio	C050940M501A
ePMP 5 GHz Force 425 SM 2-pack packaging (ROW) (Brazil cord) - Priced per radio	C050940M601A
ePMP 5 GHz Force 425 SM 2-pack packaging (ROW) (Argentina cord) - Priced per radio	C050940M701A
ePMP 5 GHz Force 425 SM 2-pack packaging (ROW) (ANZ cord) - Priced per radio	C050940M801A
ePMP 5 GHz Force 425 SM 2-pack packaging (ROW) (South Africa cord) - Priced per radio	C050940M901A
ePMP 5 GHz Force 425 SM 2-pack packaging (ROW) (No PSU) - Priced per radio	C050940MZ01A
ePMP 5 GHz Force 425 SM 2-pack packaging (FCC) (US Cord) - Priced per radio	C058940M102A

Table 156: Force 425 accessory part numbers

Cambium description	Cambium part number
ePMP Force 425 Range Extender Dish Accessory 4-Pack Packaging, priced per unit	N000900L062A

Force 425 mounting bracket with Range Extender

The Force 425 module is designed to be pole-mounted using the mounting bracket provided in the box with the radio.

Force 425 mounting bracket is shown in Figure 61

Figure 61: *Force 425 module mounting bracket with Range Extender*

Force 425 interfaces

The Ethernet port is located on the rear of the integrated unit. This interface is described in Table 157.

Table 157: Force 425 Series – rear interfaces

Portname	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE).
		100/1000BASE-T Ethernet	Data
	SFP	10 Gigabit cage	Optional 10 Gigabit SFP cage for SFP module

Force 425 specifications

The Force 425 integrated module conforms to the specifications listed in Table 158 and Table 159.

The integrated module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 158: Force 425 physical specifications

Category	Specification
Dimensions (Diameter x Depth)	470 mm diameter x 285 mm depth (18.5 in diameter x 11.2 in depth)
Weight	4.8 kg (10.6 lbs.)

Table 159: Force 425 environmental specifications

Category	Specification
Temperature	-30°C to 65°C (-22°F to 149°F)
Wind loading	200 km/hour (124 mph)
Humidity	95% condensing
Environmental	IPx0

Force 425 heater

At startup, if the Force 425 module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated, and the unit continues its startup sequence.

The effect on device startup time at various temperatures is defined in Table 160.

Table 160: Force 425 startup times based on ambient temperature

InitialTemperature	Startuptime(frompowerontooperational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

Force 425 wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the dominant wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 200 kph (124 mph).

Wind blowing on the device subjects the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:

A	the surface area in square feet
v	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 161 and Table 162.

Table 161: Force 425 wind loading (Kg)

Type of ePMP device	Largest surface area (square meters)	Wind speed (meters per second)		
		40	50	60
Force 425 Integrated	0.15	25.08 Kg	39.2 Kg	56.43 Kg

Table 162: Force 425 wind loading (lb)

Type of ePMP device	Largest surface area (square feet)	Wind speed (miles per hour)		
		80	100	120
Force 425 Integrated	1.61	43.28 lb	67.62 lb	97.37 lb

Force 425 software packages

Force 425 devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AX-v5.0.img (or higher version number)

Force 400C

For details of the Force 400C hardware, see:

- Force 400C integrated description
- Force 400C part numbers
- Force 400C interfaces
- Force 400C specifications
- Force 400C heater
- Force 400C wind loading
- Force 400C software packages

Force 400C integrated description

The Force 400C device is a self-contained transceiver unit that contains both radio and networking electronics.

Force 400C is shown in Figure 62.

Figure 62: *Force 400C integrated*

Force 400C part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed includes the following items:

- One integrated unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 163: Force 400C part numbers

Cambium description	Cambium partnumber
ePMP 5 GHz Force 400C (ROW) (no cord)	C050940C021A
ePMP 5 GHz Force 400C (ROW) (US cord)	C050940C121A
ePMP 5 GHz Force 400C (IC) (Canada/US cord)	C058940C124A
ePMP 5 GHz Force 400C (ROW) (EU cord)	C050940C221A
ePMP 5 GHz Force 400C (EU) (EU cord)	C050940C223A
ePMP 5 GHz Force 400C (ROW) (UK cord)	C050940C321A
ePMP 5 GHz Force 400C (EU) (UK cord)	C050940C323A
ePMP 5 GHz Force 400C (ROW) (India cord)	C050940C421A
ePMP 5 GHz Force 400C (India) (India Cord)	C050940C422A
ePMP 5 GHz Force 400C (ROW) (China cord)	C050940C521A

Cambium description	Cambium partnumber
ePMP 5 GHz Force 400C (ROW) (Brazil cord)	C050940C621A
ePMP 5 GHz Force 400C (ROW) (Argentina cord)	C050940C721A
ePMP 5 GHz Force 400C (ROW) (ANZ cord)	C050940C821A
ePMP 5 GHz Force 400C (ROW) (South Africa cord)	C050940C921A
ePMP 5 GHz Force 400C (ROW) (No PSU)	C050940CZ21A
ePMP 5 GHz Force 400C (FCC) (US Cord)	C058940C122A

Table 164: Force 400C accessory part numbers

Cambiumdescription	Cambiumpartnumber
ePMP Force 400 spares kit	N000900L061A

Force 400C interfaces

The Ethernet port is located on the rear of the integrated unit.

Table 165: Force 400C series – rear interfaces

Portname	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE)
		100/1000BASE-T Ethernet	Data
	SFP	10 Gigabit cage	Optional 10 Gigabit SFP cage for SFP module

Force 400C specifications

The Force 400C integrated module conforms to the specifications listed in Table 166 and Table 167.

The integrated module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 166: Force 400C physical specifications

Category	Specification
Dimensions (Diameter x Depth)	256 mm x 125 mm x 46 mm (10.1 in x 4.9 in. x 1.8 in.)
Weight	1.3 kg (2.9 lbs.)

Table 167: Force 400C environmental specifications

Category	Specification
Temperature	-30°C to 65°C (-22°F to 149°F)

Category	Specification
Wind loading	200 km/hour (124 mph)
Environmental	IPx0

Force 400C heater

At startup, if the Force 400C module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated and the unit continues its start-up sequence.

The effect on device startup time at various temperatures is defined in Table 168.

Table 168: Force 400C startup times based on ambient temperature

InitialTemperature	Startuptime(frompowerontooperational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes
14°F (-10°C)	2 minutes, 30 seconds

Force 400C wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 180 kph (124 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
v	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 169 and Table 170.

Table 169: Force 400C wind loading (Kg)

TypeofePMPdevice	Largest surfacearea(squaremeters)	Wind speed (meters per second)		
		30	40	50
Force 400C Integrated	0.03	2.82 Kg	5.02 Kg	7.84 Kg

Table 170: Force 400C wind loading (lb)

TypeofePMPdevice	Largest surfacearea(squarefeet)	Wind speed (miles per hour)		
		80	100	120
Force 400C Integrated	0.28	7.53 lb	11.76 lb	16.93 lb

Force 400C software packages

Force 400C devices can be upgraded by downloading new software packages from the Cambium Networks site or by using cnMaestro. The software packages applicable to ePMP integrated radios are named:

- ePMP-AX-v5.x.x.img (or higher version number)

Force 4600C

For details of the Force 4600C hardware, see:

- Force 4600C integrated description
- Force 4600C part numbers
- Force 4600C interfaces
- Force 4600C specifications
- Force 4600C heater
- Force 4600C wind loading
- Force 4600C Access Point mounting instructions
- Force 4600C software packages

Force 4600C integrated description

The Force 4600C device is a self-contained transceiver unit that contains both radio and networking electronics. The MPE distance for FCC is 371 cm (Dish), 132 cm (Sector), and for IC is 20 cm.

Force 4600C is shown in Figure 63.

Figure 63: *Force 4600C integrated*

Warning

The operation of this device is prohibited on oil platforms, cars, trains, boats, and aircraft.

Operation of the transmitters in 5.925 GHz - 7.125 GHz band is prohibited for control of communications with the unmanned aircraft systems.

Warning

Devices shall not be used for control of or communications with unmanned aircraft systems.

Les appareils ne doivent pas être utilisés pour contrôler ou communiquer avec des systèmes d'aéronefs sans pilote.

Warning

Operation on oil platforms, automobiles, trains, maritime vessels, and aircraft shall be prohibited.

L'exploitation sur les plates-formes pétrolières, les automobiles, les trains, les navires maritimes et les aéronefs est interdite.

Warning

The antenna height shall be determined by the installer or operator of the standard-power access point or fixed client device, or by automatic means. This information are stored internally in the device. Provision of accurate device information is mandatory.

La hauteur de l'antenne doit être déterminée par l'installateur ou l'opérateur du point d'accès à puissance standard ou de l'appareil client fixe, ou par des moyens automatiques. Ces informations doivent être stockées en interne dans l'appareil. La fourniture d'informations précises sur l'appareil est obligatoire.

Force 4600C part numbers

Select the correct regional variant to adhere to local licensing restrictions.

Each of the parts listed includes the following items:

- One integrated unit
- One power supply 1000/100 BASE-TX LAN injector
- One line cord

Table 171: Force 4600C part numbers

Cambiumdescription	Cambium partnumber
ePMP 6 GHz Force 4600C SM Radio (ROW) (no cord)	C060940C021A
ePMP 6 GHz Force 4600C SM Radio (ROW) (US cord)	C060940C121A
ePMP 6 GHz Force 4600C SM Radio (IC) (Canada/US cord)	C068940C124A
ePMP 6 GHz Force 4600C SM Radio (ROW) (EU cord)	C060940C221A
ePMP 6 GHz Force 4600C SM Radio (EU) (EU cord)	C060940C223A
ePMP 6 GHz Force 4600C SM Radio (ROW) (UK cord)	C060940C321A
ePMP 6 GHz Force 4600C SM Radio (EU) (UK cord)	C060940C323A
ePMP 6 GHz Force 4600C SM Radio (ROW) (India cord)	C060940C421A
ePMP 6 GHz Force 4600C SM Radio (India) (India Cord)	C060940C425A
ePMP 6 GHz Force 4600C SM Radio (ROW) (China cord)	C060940C521A
ePMP 6 GHz Force 4600C SM Radio (ROW) (Brazil cord)	C060940C621A
ePMP 6 GHz Force 4600C SM Radio (ROW) (Argentina cord)	C060940C721A
ePMP 6 GHz Force 4600C SM Radio (ROW) (ANZ cord)	C060940C821A
ePMP 6 GHz Force 4600C SM Radio (ROW) (South Africa cord)	C060940C921A
ePMP 6 GHz Force 4600C SM Radio (ROW) (No PSU)	C060940CZ21A
ePMP 6 GHz Force 4600C SM Radio (FCC) (US Cord)	C068940C122B
ePMP 6 GHz Force 4600C SM Radio (Indonesia) (EU Cord)	C060940C226A

Table 172: Force 4600C accessory part numbers

Cambiumdescription	Cambiumpartnumber
ePMP 6 GHz Force 4625 Spare Feedhorn Only (ROW)	C060940F041A
ePMP 6 GHz Force 4625 Spare Feedhorn Only (IC)	C068940F144A
ePMP 6 GHz Force 4625 Spare Feedhorn Only (EU)	C060940F243A
ePMP 6 GHz Force 4625 Spare Feedhorn Only (India)	C060940F445A
ePMP 6 GHz Force 4625 Spare Feedhorn Only (FCC)	C068940F142A
ePMP 6 GHz Force 4625 Spare Feedhorn Only (Indonesia)	C060940F446A
ePMP 5 and 6 GHz Force 4525 and 4625 Spare Dish 2-Pack	C050940M140A

Force 4600C interfaces

The Ethernet port is located on the rear of the integrated unit.

Table 173: Force 4600C series – rear interfaces

Portname	Connector	Interface	Description
Eth	RJ45	PoE input	Power over Ethernet (PoE)
		100/1000BASE-T Ethernet	Data
	SFP	10 Gigabit cage	Optional 10 Gigabit SFP cage for SFP module

Force 4600C specifications

The Force 4600C integrated module conforms to the specifications listed inTable 174 and Table 175.

The integrated module meets the low-level static discharge specifications identified in Electromagnetic compatibility (EMC) compliance and provides internal surge suppression, but does not provide lightning suppression.

Table 174: Force 4600C physical specifications

Category	Specification
Dimensions (Diameter x Depth)	256 mm x 125 mm x 46 mm (10.1 in x 4.9 in. x 1.8 in.)
Weight	1.3 kg (2.9 lbs.)

Table 175: Force 4600C environmental specifications

Category	Specification
Temperature	-30°C to 55°C (-22°F to 131°F)
Wind loading	200 km/hour (124 mph)
Environmental	IPx0

Force 4600C heater

At startup, if the Force 4600C module temperature is at or below 32°F (0°C), an internal heater is activated to ensure that the device can successfully begin operation. The unit's heater is only activated when the unit is powered on and will not apply heat to the device once the startup is complete. When the unit temperature is greater than 32°F (0°C), the heater is deactivated and the unit continues its start-up sequence.

The effect on device startup time at various temperatures is defined in Table 176.

Table 176: Force 4600C startup times based on ambient temperature

InitialTemperature	Startuptime(frompowerontooperational)
-22°F (-30°C) H	20 minutes
-4°F (-20°C)	6 minutes

InitialTemperature	Startuptime(frompowerontooperational)
14°F (-10°C)	2 minutes, 30 seconds

Force 4600C wind loading

Ensure that the device and the structure on which it is mounted are capable of withstanding the prevalent wind speeds at a proposed ePMP site. Wind speed statistics are available from national meteorological offices.

The device and its mounting bracket are capable of withstanding wind speeds of up to 180 kph (124 mph).

Wind blowing on the device will subject the mounting structure to significant lateral force. The magnitude of the force depends on both wind strength and the surface area of the device. Wind loading is estimated using the following formulae:

Force (in kilograms) = $0.1045aV^2$

Where:	Is:
a	the surface area in square meters
V	wind speed in meters per second

Force (in pounds) = $0.0042Av^2$

Where:	Is:
A	the surface area in square feet
v	wind speed in miles per hour

Applying these formulae to the ePMP device at different wind speeds, the resulting wind loadings are shown in Table 177 and Table 178.

Table 177: Force 4600C wind loading (Kg)

TypeofePMPdevice	Largest surfacearea(squaremeters)	Wind speed (meters per second)		
		30	40	50
Force 4600C Integrated	0.03	2.82 Kg	5.02 Kg	7.84 Kg

Table 178: Force 4600C wind loading (lb)

TypeofePMPdevice	Largest surfacearea(squarefeet)	Wind speed (miles per hour)		
		80	100	120
Force 4600C Integrated	0.28	7.53 lb	11.76 lb	16.93 lb