PMP 450
Ordering Guide

**PMP 450
Access Point**

**PMP 450
Remote Module**

Cambium Networks™

INTRODUCTION

This Ordering Guide covers the Cambium PMP 450 Platform. It is intended to provide a structured guide to ordering a link with any accessories and ancillary items for a successful installation. The key steps involved in planning and ordering your system are:

Steps	Activities
1	**Regulatory Planning:** The first step is to contact the applicable radio regulator in your area to identify any restrictions or limitation imposed on radio equipment operating in your planned RF band and to determine whether you need to register your PMP network. As the user of the radio equipment, it is your responsibility to ensure that your system complies with any regulatory guidelines imposed by the local regulator.
2	**Site Planning:** We recommend that you complete a site survey to identify the many considerations critical for successful site selection, such as the availability of tower or rooftop space, the location of the grounding system, best positioning of the Access Points (AP) and Remote Modules (RM), aesthetics and other permission-based issues, and maximum cable lengths required for your deployment.
3	**Link and Sector Planning:** You need to determine link-planning factors such as path obstructions, risk of interference, path and link loss, maximum power levels permitted, and coverage requirements.
4	**Spectrum Analysis:** One of the most important elements in your planning process is the analysis of spectrum usage and signal strength needed to occupy the spectrum you are planning to use. In this process, you need to plan your sector coverage to determine how many APs will be needed and what sector size will be required to provide adequate coverage for the deployment.
5	**Preparing a PMP 450 Order:** Once you have identified all the regulatory requirements and planned the site, link, sector coverage and spectrum requirements, you are ready to prepare your order. This Ordering Guide provides the part numbers, product descriptions, instructions, and resources to help you complete a PMP 450 order.

When you are ready to prepare your order, the following equipment components can be selected for a PMP 450 greenfield network or a PMP 450 network migration order.

PMP 450 SYSTEM COMPONENTS	
PMP 450 Access Point (AP)	**PMP 450 Remote Module (RM)**
Access Point: • Number of APs required • 60-degree sector or 90-degree sector	**Remote Module:** • Number of RMs required • Throughput capacity for each RM (4, 10, 20 Mbps or uncapped [55] capacity)
30V Power Supply: • Standalone configuration: ACPSSW-20A or ACPSSW-21B • AP cluster: ACPS120WA (when using with CMM3 or CMM4)	**30V Power Supply:** • ACPSSW-09B • ACPSSW-13B

Antenna:
• 6-sector dual mode antenna (FSK and OFDM)
• 4-sector OFDM antenna
• Alternative configuration (verify regulations prior to purchase)
	Antenna or Reflector:
	• RMs include an integrated antenna
	• May also configure with:
	  – Passive LENS
	  – Reflector dish

Surge Suppressor:
• APs include built-in surge suppression – no external suppression is required at the AP
• Can add external units at:
  – Cable entrance point leading to the network
  – On the bottom of the tower/pole near the grounding bar
	Surge Suppressor:
	• RMs do not include built-in surge suppression
	• External Unit: 600 SS

Cabling and Accessories: • Cat 5e cables • Grounding cables • Connectors	**Cabling and Accessories:** • Cat 5e cables • Grounding cables • Connectors
AP Extended Warranty: • One additional year of coverage • Two additional years of coverage • Four additional years of coverage	**RM Extended Warranty:** • One additional year of coverage • Two additional years of coverage • Four additional years of coverage

ORDERING ACCESS POINTS

AP MODULES

Each AP contains both radio and networking electronics supplied in a connectorized configuration for use with an external antenna. Connectorized modules with external antennas are designed to cope with more difficult radio conditions. Each AP has an established throughput capacity of up to 90 Mbps and can support up to 200 RMs. The DES only model is available for countries that cannot import AES encrypted devices.

See the AP Specification Sheet for more information (click Download > spec sheets): http://www.cambiumnetworks.com/products/pmp-overview/pmp-450/

PMP 450 AP
Radio Unit

PMP 450 AP
Antenna

Frequency	Part Number	Description
5 GHz	C054045A001A	PMP 450 Connectorized Access Point
5 GHz	C054045A002A	PMP 450 Connectorized Access Point, US only
5 GHz	C054045A003A	PMP 450 Connectorized Access Point, DES only
2.4 GHz	C024045A001A	PMP 450 Connectorized Access Point, US only
2.4 GHz	C024045A003A	PMP 450 Connectorized Access Point, DES only

## AP SECTOR COVERAGE and ANTENNA OPTIONS

Each AP can provide a specific sector size or area of coverage. PMP 450 APs are connectorized radios and can support any coverage you need. However, we recommend using the AP with the high-performance antennas that have been developed specifically for the PMP 450 product – either a 6-sector or a 4-sector OFDM antenna. Your individual network and configuration may require a different sector width. If alternative configurations are needed, be sure that local regulations are followed prior to purchase.

Note that the N-type to N-type cable required to connect the AP to the antenna is not included and must be purchased separately. For an OFDM-only deployment, you will need two cables, one for each of the OFDM polarities. Each antenna includes a bracket for mounting to a pole that is 1.5 inches (40 mm) to 4.5 inches (110 mm) in diameter.

See Antenna specifications for pattern data and additional information (click Download > spec sheets):

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Frequency	Part Number	Description
5 GHz	85009324001	Sector Antenna for 90° Sector (H+V OFDM)
5 GHz	85009325001	Sector Antenna for 60° Sector (H+V OFDM)
2.4 GHz	C024045D601	Sector Antenna for 60° Sector (Dual Slant)
ALL	30009406002	N-type to N-type Cable (16 inch length)

If an alternative antenna is selected (i.e. not a Cambium-supplied part), and does not contain a method to mount the AP, a mounting kit is required to mount the AP to the tower independent of the chosen antenna. The WB2289A provides a heavy-duty mounting solution for the PMP 450 AP if needed. This is only necessary when using an alternative antenna solution. (Note: This is the same part used to mount PTP 500/600 equipment.)
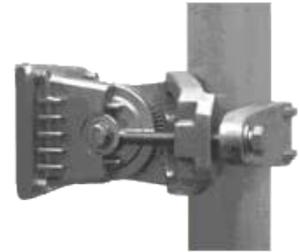
AP INTERFACES
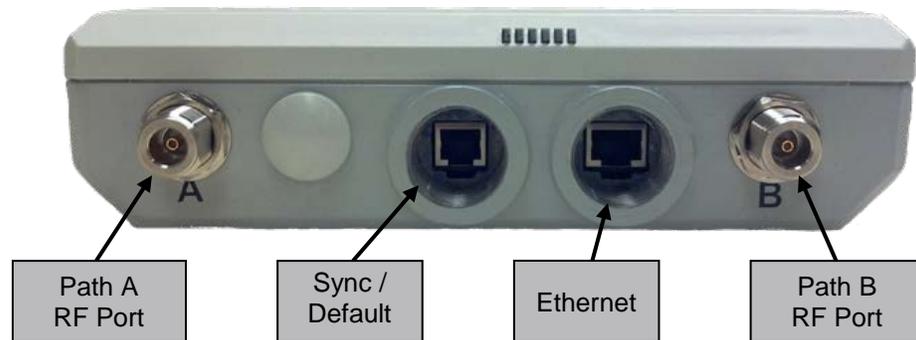
AP INTERFACES		
Interface	**Function**	**Cabling**
Path A RF Port (A)	Path A RF connection to antenna (V or -45)	50 ohm RF cable, N-type
Synchronization / Default Plug Port	GPS synchronization signaling, provides power to Universal GPS (uGPS) module	RJ11 Cable
Power-over-Ethernet, Ethernet Communications	Power-over-Ethernet, Ethernet communications (management and data)	RJ45 Cable
Path B RF Port (B)	Path B RF connection to antenna (H or +45)	50 ohm RF cable, N-type

5

Ground Lug (bottom of unit)	For grounding the unit	10 AWG copper wire

AP POWER SUPPLY

Each AP requires a power supply to generate the supply voltage (29.5 VDC) from the external DC source and inject the voltage into the AP. The power supply connects to the AP and network equipment via Cat 5e cable with RJ45 connectors.

ACPSSW-20A or ACPSSW-21B
Power Supply

ACPS120WA Power Supply
(connects to CMM3 or CMM4)

You can select the power supply that best meets your specific requirements. Power supplies ACPSSW-20A and ACPSSW-21B should be used with a PMP 450 AP in a standalone configuration. ACPSSW-20A plugs into the AC source using a detachable clip with the US, UK, and EU clips included. ACPSSW-21B adds a clip that allows a 2-wire IEC 60320 AC line cord (C7 or "figure of 8") to connect the power supply to an AC source for countries outside the US, UK, or EU regions.

For APs in a cluster configuration, ACPS120WA (or ACPS120W-02A) should be used for connecting to a CMM3 or CMM4. A 3-wire IEC AC line cord (C13) will be needed to connect the power supply to the AC source.

Part Number	Description
ACPSSW-20A	Power Supply, 20W, 29.5V, 100-240VAC / 50-60 Hz
ACPSSW-21B	Power Supply, 20W, 29.5V, 100-240VAC / 50-60 Hz+C8 AC
ACPS120WA	Power Supply, 120W, 30VDC at 60C 100-240 VAC EL5

When selecting the location for the power supply, the following factors should be considered:
- Indoor location with no possibility of condensation
- Availability of mains electricity supply
- Accessibility for viewing the status indicator LED and connecting Ethernet cables
- Cable lengths – the maximum permitted length of the copper Ethernet interface cable is 330 feet (100 m) from the AP to the power supply or CMM.

SURGE SUPPRESSION

Because each AP includes a built-in surge suppressor, no external surge suppression unit is required on the AP module. However, you should include a surge suppressor at the building's cable entrance point leading to the indoor power supply. You may also want to include a surge suppressor at the bottom of the tower near the tower ground bar.

Part Number	Description
600SSH	Surge Suppressor

GPS SYNCHRONIZATION

GPS synchronization is essential in most networks to avoid self-interference and maintain efficient use of available spectrum. There are many options to provide the network with the timing pulse that maintains network synchronization.

For one cluster or throughout an entire wireless system, the Cluster Management Module (CMM) can provide a GPS timing pulse to each module, enabling the synchronization of the transmission cycles within a network. There are four variants of the CMM. A CMM is available in the Micro version (also known as CMM3) with an embedded Ethernet switch in an outdoor cabinet. The CMM3 contains an embedded Ethernet switch, which is limited to 10/100BaseT connection speeds. If expecting high density deployments, where aggregated traffic is expected to be higher than 100 Mbps in a given direction, a CMM4 is recommended.

There are three variants of the CMM4. If you have your own switches, you can choose either an outdoor cabinet or an indoor rack-mounted (1 RU high) version. If a rugged managed switch is required, there is an outdoor cabinet version with the switch included. This switch has 2 Gigabit uplink ports (1000BaseT, non-powered) that can handle data rates up to 1 Gbps. Each CMM includes a GPS antenna and receiver.

Note: Using the ACPS120WA (or ACPS120W-02A) power supply allows the CMM3 or CMM4 to supply power and sync for up to 6 (six) PMP 450 Access Points. If there are more than 6 AP's at a given site, a second power source (i.e. individual power supplies, or a second CMM) is recommended.

You also have the option of using a Universal GPS (uGPS) to provide synchronization to one or two APs. The uGPS is powered by the PMP 450 AP Sync (Timing) Port, eliminating the need for any external power supply for the uGPS device.

PMP 450 (starting with R12.1) now has a feature called Autosync, which will automatically choose a source of synchronization depending on what is detected, constantly monitors all possible sources, and will change to a different one should the primary source be interrupted. Please see the R12.1 release notes for further description of this feature.

http://support.cambiumnetworks.com/pmp/software/index.php?tag=pmp450

Part Number	Description
1070CKHH	CMM Micro (Outdoor Enclosure)
1090CKHH	CMM4 with Ruggedized Switch and GPS (Outdoor Enclosure)
1091HH	CMM4 No Switch (Outdoor Enclosure)

1092HH	CMM4 Rack Mount Assembly
1096H	Universal GPS Module

AP EXTENDED WARRANTIES

With the purchase of each AP, you have a 12-month (one-year) limited warranty on hardware components. Typical turn-around time for the RMA (Return Materials Authorization) process is less than 30 days. This Standard Warranty also includes minor software enhancements as available and 24x7 telephone technical support.

At the time of purchase or any time prior to the end of the 12-month Standard Warranty, we recommend that you purchase an Extended Warranty to extend your equipment coverage and protect your investment. You have the option of purchasing an Extended Warranty for one, two, or four additional years of coverage with a typical turn-around time of less than 30 days. Your Extended Warranty also includes minor software enhancements as they become available and 24x7 telephone technical support.

Part Number	Description
SG00TS4009A	PMP 450 AP Extended Warranty, 1 Additional Year
SG00TS4017A	PMP 450 AP Extended Warranty, 2 Additional Years
SG00TS4025A	PMP 450 AP Extended Warranty, 4 Additional Years

ORDERING REMOTE MODULES

RM MODULES

Each RM (also referred to as a Subscriber Module or SM) is a self-contained unit that houses the radio and networking electronics and is supplied in an integrated antenna configuration. Up to 200 RMs can be connected to one AP.


PMP 450 Remote Module

PMP 450 Remote Module
With a Reflector Dish

Frequency	Part Number	Description
5 GHz	C054045C001A	PMP 450 Remote Module, 4 Mbps
5 GHz	C054045C002A	PMP 450 Remote Module, 10 Mbps
5 GHz	C054045C003A	PMP 450 Remote Module, 20 Mbps
5 GHz	C054045C004A	PMP 450 Remote Module, Uncapped
5 GHz	C054045C005A	PMP 450 Connectorized RM, 4 Mbps
5 GHz	C054045C006A	PMP 450 Connectorized RM, 10 Mbps
5 GHz	C054045C007A	PMP 450 Connectorized RM, 20 Mbps
5 GHz	C054045C008A	PMP 450 Connectorized RM, Uncapped
2.4 GHz	C024045C001A	PMP 450 Remote Module, 4 Mbps
2.4 GHz	C024045C002A	PMP 450 Remote Module, 10 Mbps
2.4 GHz	C024045C003A	PMP 450 Remote Module, 20 Mbps
2.4 GHz	C024045C004A	PMP 450 Remote Module, Uncapped
2.4 GHz	C024045C005A	PMP 450 Connectorized RM, 4 Mbps
2.4 GHz	C024045C006A	PMP 450 Connectorized RM, 10 Mbps
2.4 GHz	C024045C007A	PMP 450 Connectorized RM, 20 Mbps
2.4 GHz	C024045C008A	PMP 450 Connectorized RM, Uncapped

The capacity that you order establishes the maximum throughput capacity that can be achieved for the RM. "Uncapped" capacity indicates an RM module that will provide up to its maximum capacity – nearly 55 Mbps.

RM INTERFACES
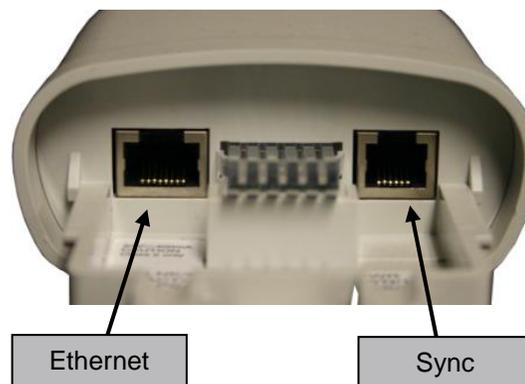
The network connection to a PMP 450 Series RM is made via a 10/100BaseT Ethernet connection. Power is provided over the Ethernet connection using a patented, non-standard power technique.

RM INTERFACES		
Interface	Function	Cabling

Power-over-Ethernet, Ethernet Communications	Power-over-Ethernet, Ethernet communications (management and data)	RJ45 Cable
Synchronization, Default Plug Port	GPS synchronization signaling, provides power to uGPS module	RJ11 cable
Ground Lug (bottom of connectorized unit)	For grounding the unit	10 AWG copper wire

If a connectorized unit is chosen, there will be two (2) RF cables with male N-type terminations as pictured. Use these to connect an appropriate subscriber antenna. Ensure the polarities are correct for your installation (one cable will be marked).

RM POWER SUPPLY

The RM power supply unit generates the supply voltage (29.5 VDC) from the external DC source and injects the voltage into the RM. The power supply is connected to the RM and network equipment using Cat5e cable with RJ45 connectors.

ACPSSW-09B or ACPSSW-13B (shown here) Power Supply

Part Number	Description	Region
ACPSSW-09B	Power Supply, 13.6W, 29.5V, 100-240VAC / 50-60 Hz	US, UK, and EU
ACPSSW-13B	Power Supply, 13.6W, 29.5V, 100-240VAC / 50-60+Fixed US	US Fixed Blade

ACPSSW-10B	Power Supply, 13.6W, 29.5V, 100-240VAC / 50-60 Hz+ARG	Argentina
ACPSSW-11B	Power Supply, 13.6W, 29.5V, 100-240VAC / 50-60 Hz+AUS	Australia
ACPSSW-12C	Power Supply, Assy, P/S, 13.6W, 29.5V, 90-240VAC / 50-60 Hz PS	China
ACPSSW-14A	Power Supply, 13.6W, 29.5V, 100-240VAC / 50-60 Hz+BRAZ	Brazil

When selecting the location for the power supply, the following factors should be considered:
- Indoor location with no possibility of condensation
- Availability of mains electricity supply
- Accessibility for viewing the status indicator LED and connecting Ethernet cables
- Cable lengths – the maximum permitted length of the copper Ethernet interface cable is 330 feet (100 m) from the RM to the associated power supply

RM ANTENNA ENHANCEMENT OPTIONS

For RMs that contain the integrated patch antenna, there are passive devices available to extend the range or enable higher throughputs at the same range.

For integrated 5 GHz RMs, there is a 9 dBi patch antenna. You may also add a passive CLIP (Cassegrain Lens for Improved Performance) to achieve an additional 8 dBi gain or a passive reflector dish to achieve an additional 14 dBi gain.

See CLIP specification for pattern data and more information (under "spec sheets"): http://www.cambiumnetworks.com/products/pmp-overview/pmp-450/

Part Number	Description
C050000D001A	5 GHz CLIP
HK2022A	53 cm Offset, Reflector Dish Kit, 4 pk

For integrated 2.4 GHz RMs, there is an 8 dBi patch antenna. You may also add a passive reflector dish to achieve an additional 12 dBi gain.

Part Number	Description
HK2022A	53 cm Offset, Reflector Dish Kit, 4 pk

SURGE SUPPRESSION

RMs do not include embedded surge suppression. So, we strongly recommend that you add external surge suppressors to your RMs for protection from the harmful effects of power surges induced into the electronics as a result of nearby lightning strikes. In addition to a surge suppressor near the RM, we recommend that you also include a surge suppressor at the building ingress.

Part Number	Description
600SSH	Surge Suppressor

CABLING AND ACCESSORIES

In addition to the components above, you will need to order your cables and other accessories (such as mounting hardware) as needed to complete your RM order.

Part Number	Description
SMMB1A	Universal Mounting Kit

UPGRADE LICENSE KEYS

When you purchase an RM, you specify the throughput capacity desired for the initial deployment. Later, you can upgrade the capacity of one or more RMs, as desired. Each RM capacity upgrade is available by purchasing an upgrade key. Then with a simple online process, you can reset the RM to the new throughput capacity without changing hardware. Once reset, the new capacity will be available immediately.

The next table shows the part numbers and descriptions for upgrade license keys.

Part Number	Description
C000045K002A	PMP 450 4 to 10 Mbps Upgrade Key
C000045K003A	PMP 450 4 to 20 Mbps Upgrade Key
C000045K004A	PMP 450 4 to Uncapped Upgrade Key
C000045K005A	PMP 450 10 to 20 Mbps Upgrade Key
C000045K006A	PMP 450 10 to Uncapped Mbps Upgrade Key
C000045K007A	PMP 450 20 to Uncapped Mbps Upgrade Key

RM EXTENDED WARRANTY

With the purchase of each RM, you have a 12-month (one-year) limited warranty on hardware components. Typical turn-around time for the RMA (Return Materials Authorization) process is less than 30 days. This Standard Warranty also includes minor software enhancements as available and 24x7 telephone technical support.

At the time of purchase or any time prior to the end of the 12-month Standard Warranty, we recommend that you purchase an Extended Warranty to extend your equipment coverage and protect your investment. You have the option of purchasing an Extended Warranty for one, two, or four additional years of coverage with a typical turn-around time of less than 30 days. Your Extended Warranty also includes minor software enhancements as they become available and 24x7 telephone technical support.

| Part Number	Description
SG00TS4010A	PMP 450 RM Extended Warranty, 1 Additional Year
SG00TS4018A	PMP 450 RM Extended Warranty, 2 Additional Years
SG00TS4026A	PMP 450 RM Extended Warranty, 4 Additional Years

AP AND RM INSTALLATION EXAMPLES

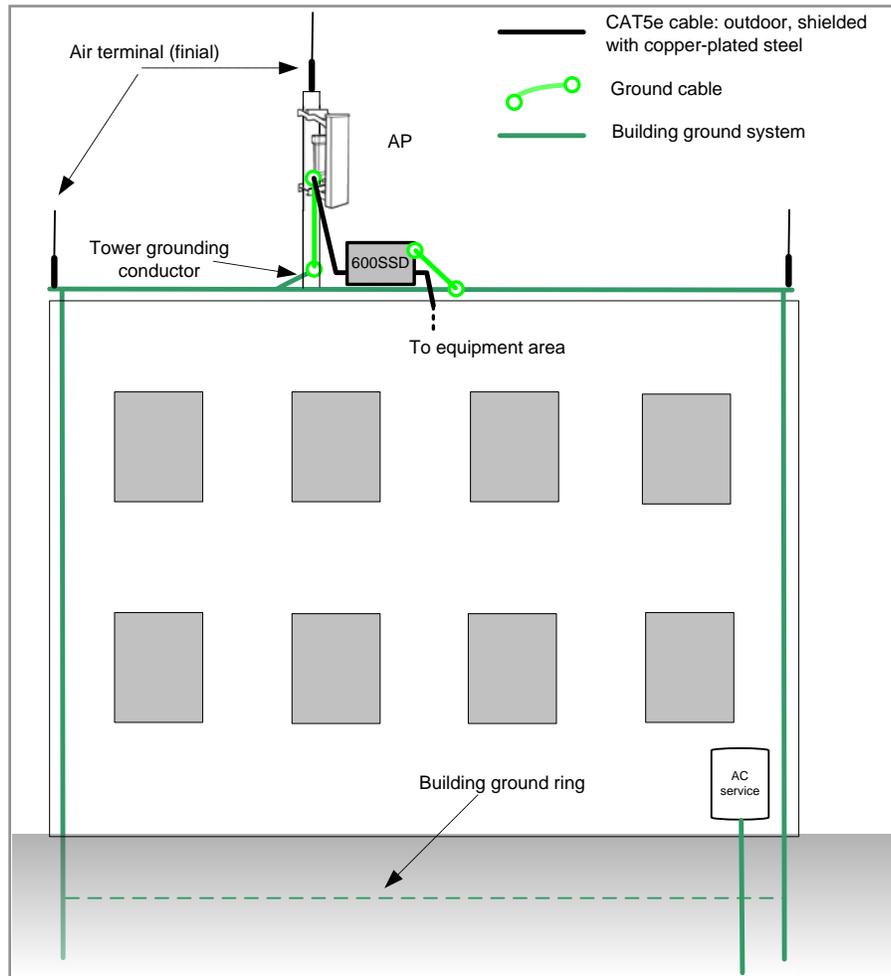This section illustrates the placement of PMP 450 systems with their ancillary components, cables, and accessories.
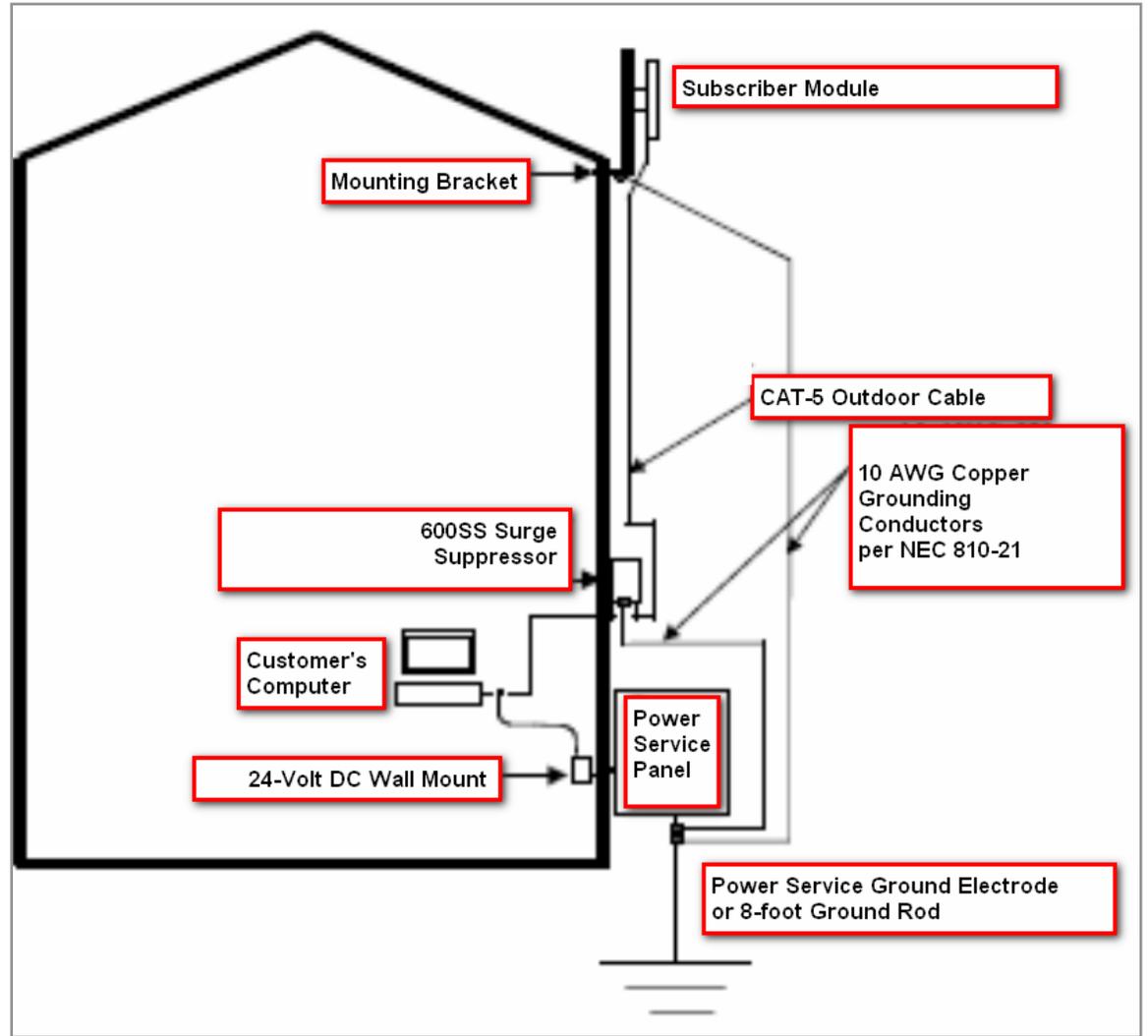
AP ON A TOWER
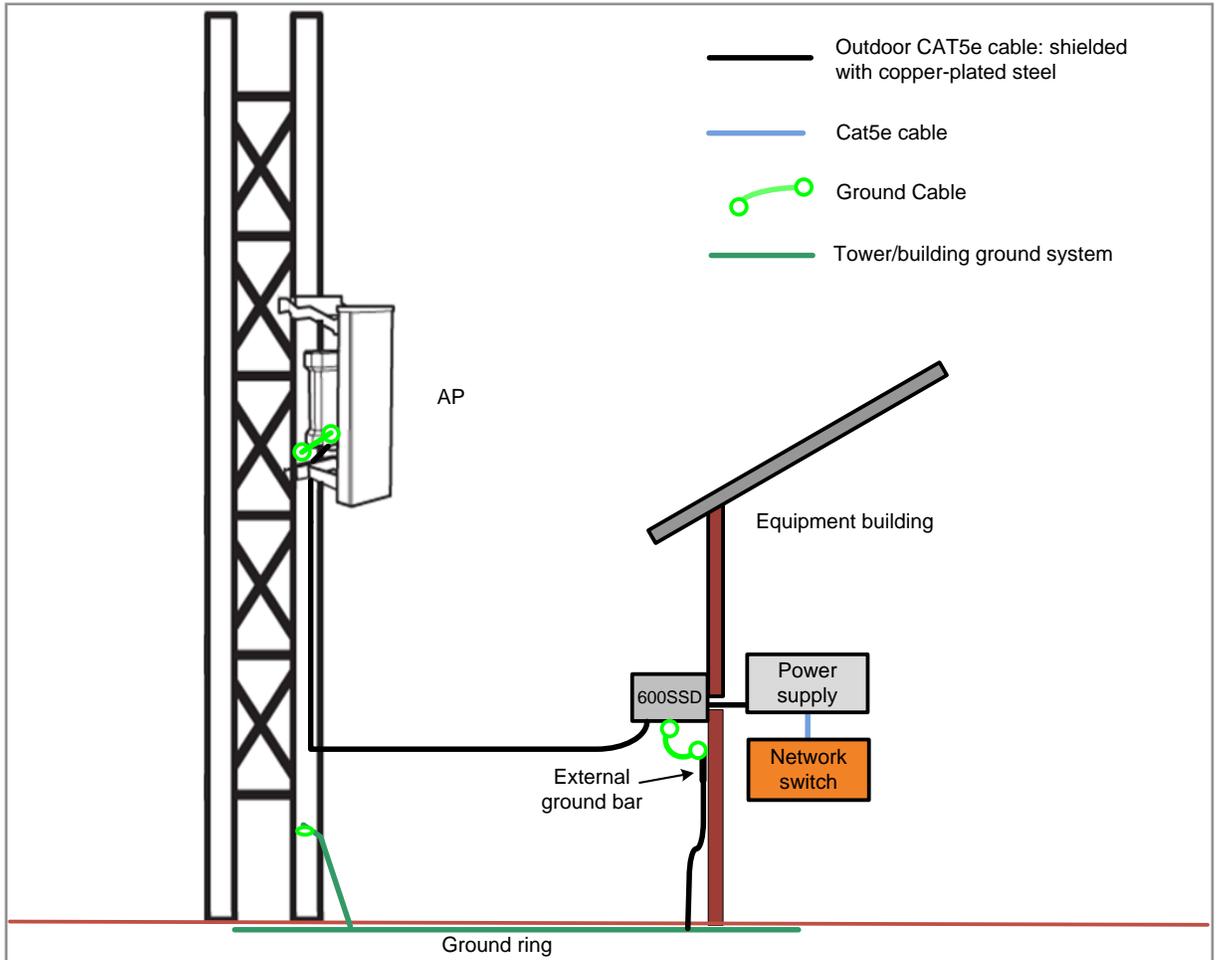
AP OR RM ON A RESIDENTIAL OR COMMERCIAL BUILDING

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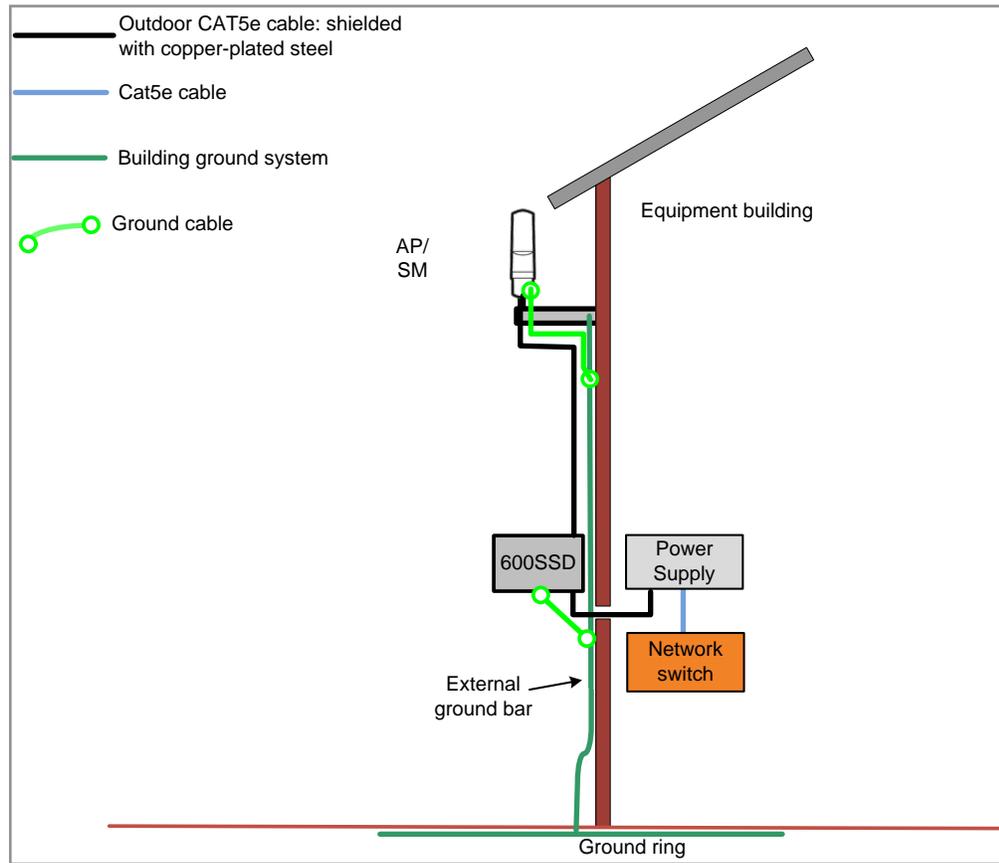
AP ON A ROOFTOP

RM GROUNDING AND PROTECTION

For more information about configuring, ordering, and installing PMP 450 systems, refer to the PMP 450 Planning and Installation Guides.

http://support.cambiumnetworks.com/pmp/software/index.php?tag=pmp450

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