



Installation Guide

Outdoor CPE

CPE610

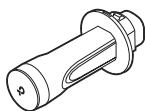
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Overview

TP-Link's Pharos series outdoor CPEs are dedicated to outdoor wireless network solutions. This guide is applicable to the product CPE610.

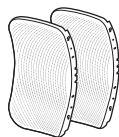
Package Contents



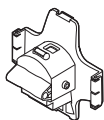
Pharos CPE



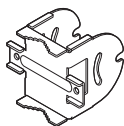
Center Reflector Panel



Side Reflector Panels
(Qty.2)



Rear Cover



Mounting Bracket
(For CPE)



Protective Cap



Bolts with Nut and Lock
Washer Assemblies
(M6x110, Qty.2)



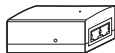
Bolts with Nut and Lock
Washer Assemblies
(M6x70)



Pole-mount Clamp



Power Cord



Passive PoE Adapter



Installation Guide



Mounting Bracket
(For PoE Adapter)



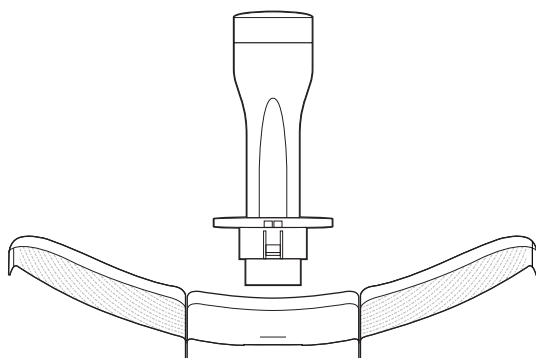
ST3x16 Self-tapping Screws
(Qty.2)



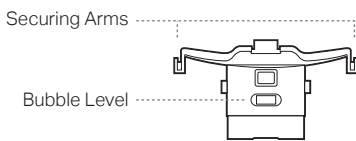
D3x28 Plastic Wall Anchors
(Qty.2)

Hardware Overview

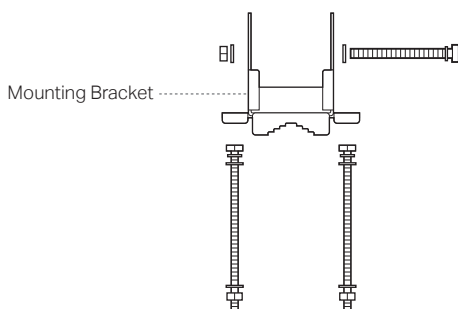
Bottom View



Reflector Assembly

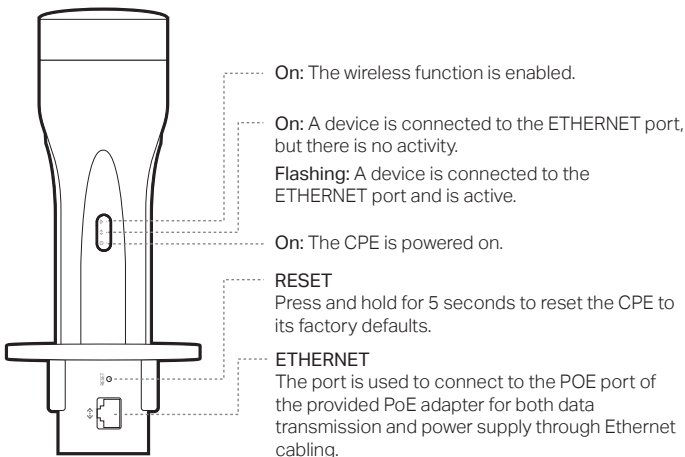


Rear Cover

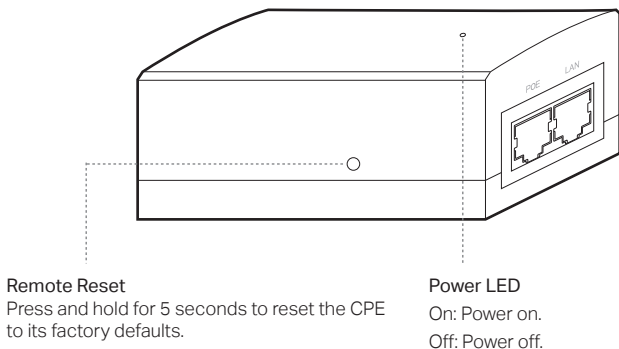


Pole-mount Clamp

Panel Layout



Passive PoE Adapter



Hardware Connection

Site Consideration

- Mounting Height

Ensure a clear line of sight between the wireless devices for optimum performance. An elevated location is recommended as obstacles like trees, buildings and large steel structures will weaken the wireless signal. See 'Q2' in 'FAQ' for details about how to calculate the minimum mounting height of the devices.



Side View

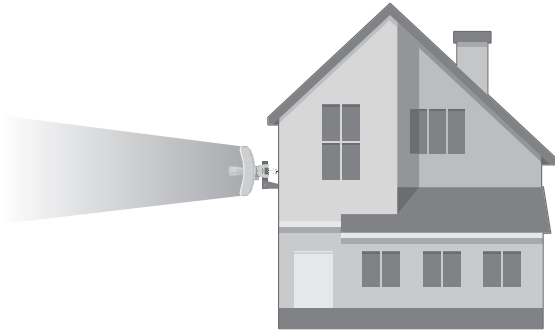
• Orientation

Install the CPE devices so that they point towards the devices that will receive the signal. You can orient the devices with the help of Google Maps, GPS and some landmarks. The horizontal bandwidth of CPE610 is 7°.



Application Example

The CPE device with the reflector installed provides outdoor network access over long distances for point-to-point applications.



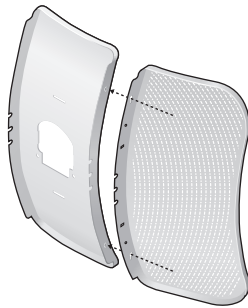
The CPE device without the reflector installed provides outdoor-to-indoor Wi-Fi coverage with the Feed only mode.



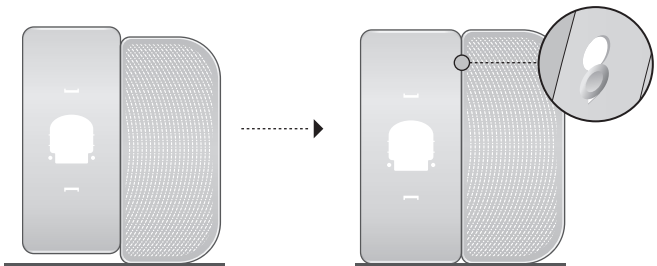
Hardware Installation

TERMS OF USE: TP-Link's Pharos series outdoor CPEs must be installed by a certified professional. Installers must abide by local rules and regulations in terms of legal frequency channels, output power, and Dynamic Frequency Selection (DFS) requirements.

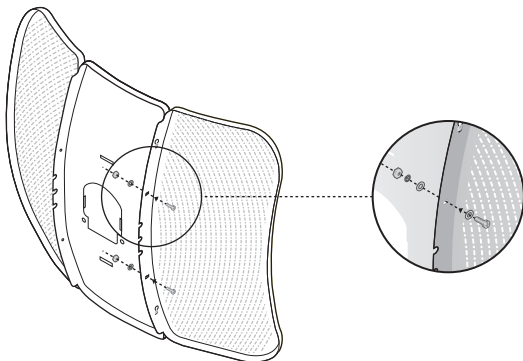
1. Attach the Side Reflector Panels to the Center Reflector Panel as follows:
 - a. Insert the two mounting studs on the Center Reflector Panel into the large opening of the slots on the Side Reflector Panel.



- b. Slide the Side Reflector Panel until the mounting studs are positioned over the narrow opening of the slots, and the top edges of the panels should be aligned when done.

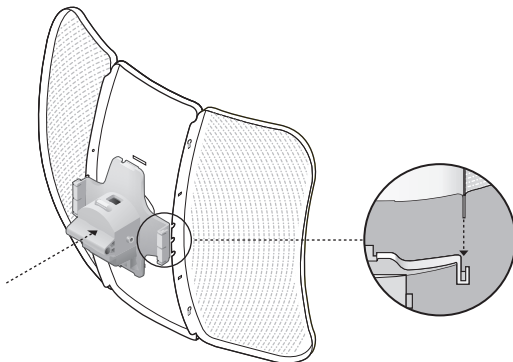


- c. Repeat step a and step b to attach the other Side Reflector Panel.
- d. (Optional) Attach the Side Reflector Panels to the Center Reflector Panel more securely using four M2.5x8 bolts and nuts (not provided). This is recommended if the CPE device is exposed to extreme weather, such as strong winds.

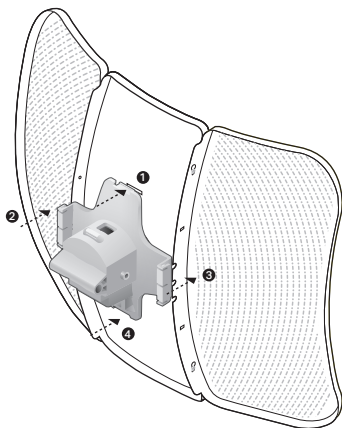


2. Attach the Rear Cover to the reflector assembly as follows:

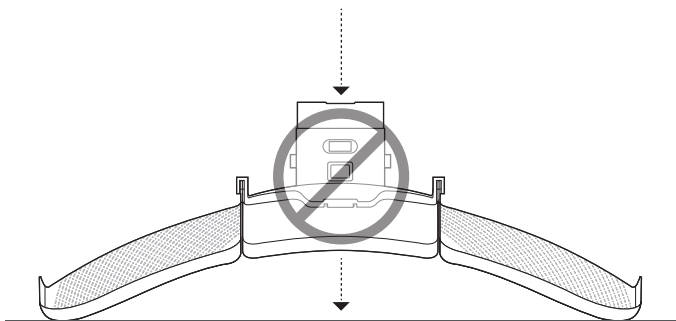
- a. While holding the reflector assembly, align the raised edges on the back with the Securing Arms of the Rear Cover, and align the Snap Hooks on the Rear Cover with the slots on the Center Reflector Panel.



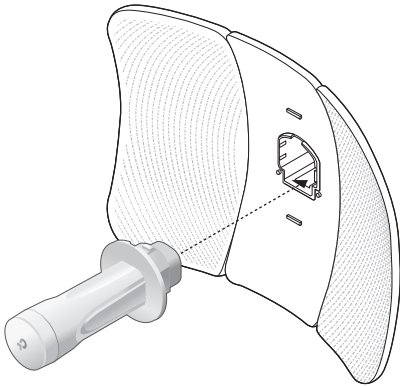
- b. Attach the Rear Cover to the reflector assembly. Press upon the Rear Cover at the four positions marked in the diagram below in sequence until it locks into place.



WARNING: To avoid damage, do not place the panels on a flat surface or push down on it.



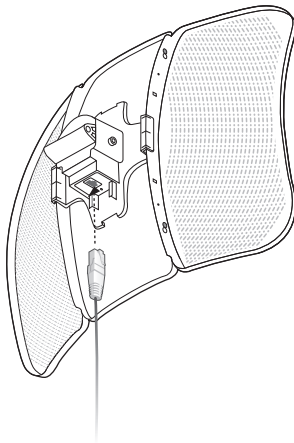
3. Insert the Pharos CPE into the Rear Cover until the CPE locks into place.



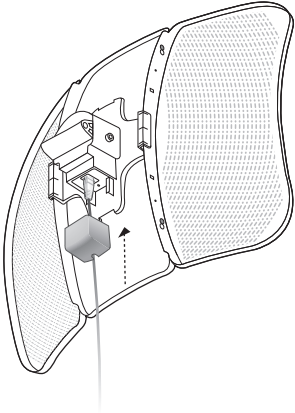
4. Connect the Ethernet cable to the Pharos CPE.

a. Connect the Ethernet cable to the Ethernet port.

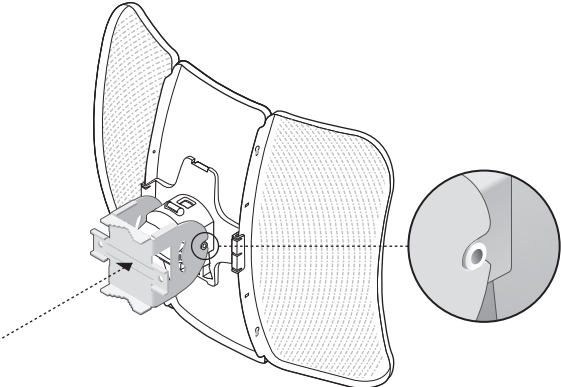
Note: The length of the Ethernet cable is up to 60m for steady power supply.



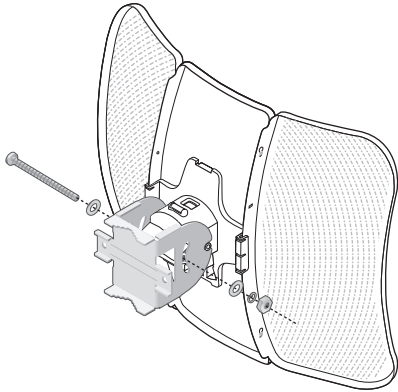
b. Attach the Protective Cap to the Rear Cover.



5. Attach the Mounting Bracket to the Rear Cover until the grooves on the Mounting Bracket are positioned over the pins on the Rear Cover.

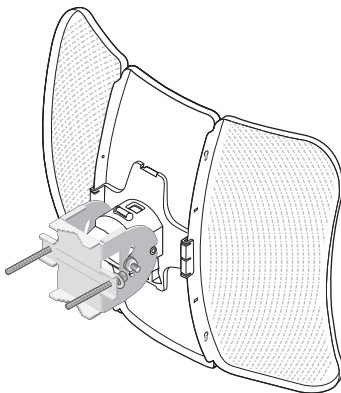


6. Secure the Mounting Bracket to the Rear Cover using M6x70 Bolts with Nut and Lock Washer Assemblies.

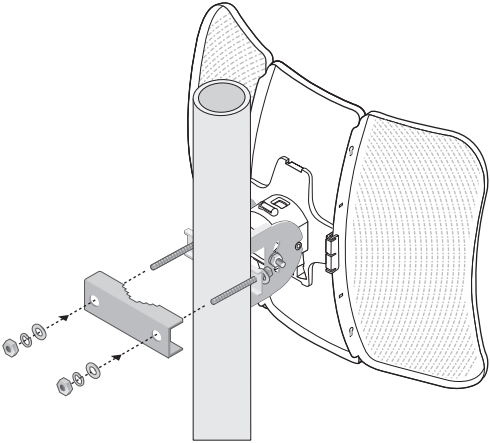


7. Attach the CPE assembly to the pole using two Pole-mount Clamps and two M6x110 Bolts with Nut and Lock Washer Assemblies.

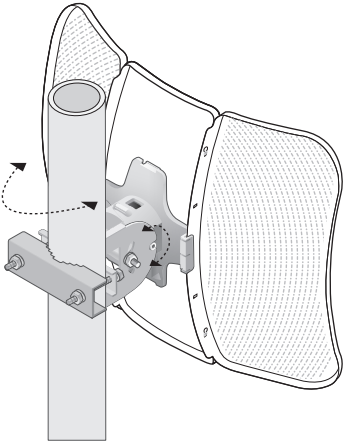
a. Insert the two Bolts into the Mounting Bracket.



b. Secure the Pole-mount Clamps with Nuts and Washers.
Note: Suitable pole diameters range from 15mm to 70mm.



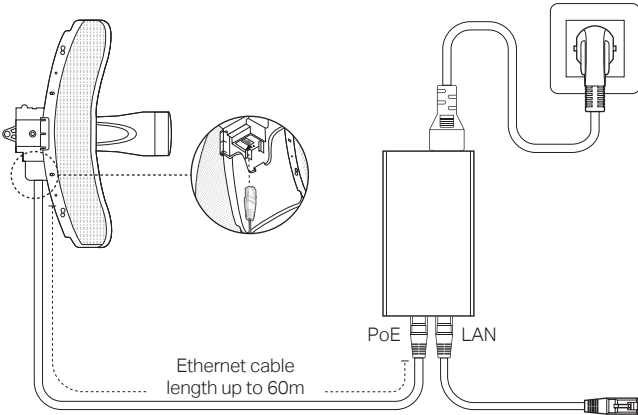
8. Adjust the azimuth and elevation angle of the CPE device to achieve maximum signal strength.



Power Supply

• Connecting the PoE Adapter

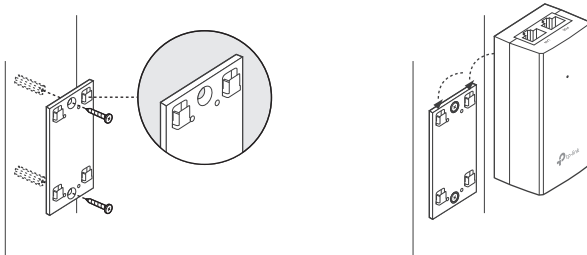
Connect the devices as shown in the figure below.



• Mounting the PoE Adapter (Optional)

Note: To ensure the passive PoE adapter is attached most securely, it is recommended to install the adapter with the Ethernet port facing upward.

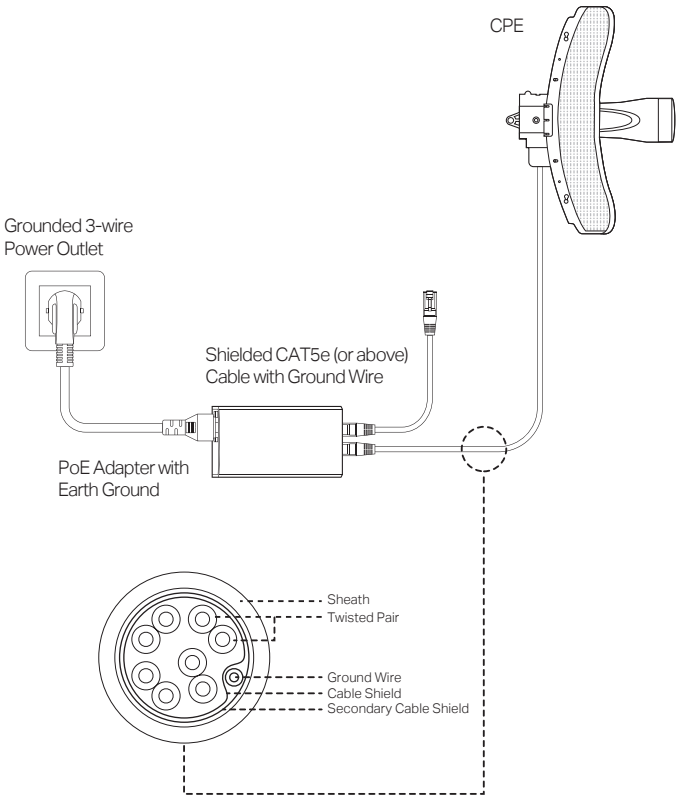
1. Drill two holes on the wall and insert the plastic wall anchors into the the holes. Secure the mounting bracket to the wall.
2. Attach the passive PoE adapter to the mounting bracket by sliding the adapter in the direction of the arrows until it locks into place.



Lightning & ESD Protection

Proper grounding is extremely important for outdoor devices.

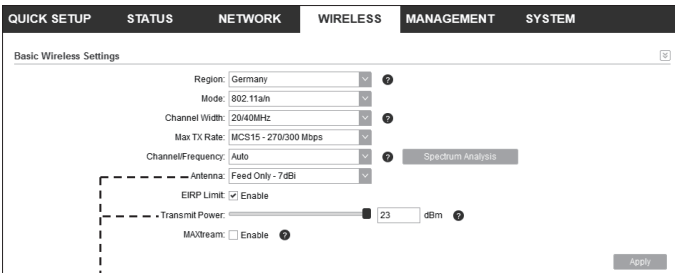
By using shielded CAT5e (or above) cable with ground wire and the provided PoE adapter, you can effectively eliminate ESD attacks.



Installer Compliance Responsibility

Devices must be professionally installed and it is the professional installer's responsibility to make sure the device is operated within local rules and regulations.

Since TP-Link's Pharos outdoor CPE610 can be paired with a variety of antennas, the **Antenna** and **Transmit Power** fields are provided to the professional installer to assist in meeting regulatory requirements.



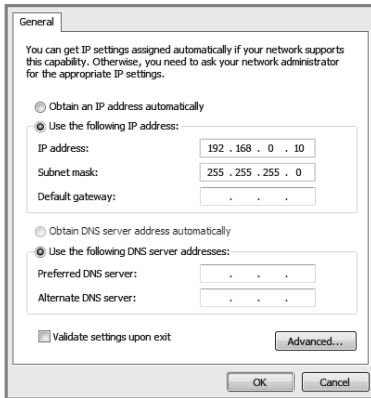
Refer to **Antenna** and **Transmit Power** fields to make sure the devices are operated within local rules and regulations.

Software Configuration

This chapter introduces the login to the PharOS Web Interface and the software configurations.

Logging in to the PharOS

1. Before accessing the PharOS Web Interface, you need to assign a static IP address 192.168.0.X (X ranges between 2 and 253, e.g. 192.168.0.10) to your computer.



2. Open a web browser, type `http://192.168.0.254` into the address field and press **Enter** (Windows) or **return** (Mac). It is recommended to use the latest version of Google Chrome, Firefox or Safari.



3. Enter **admin** for both **User Name** and **Password**, then select the **Language** from the drop-down list. Read and agree to the terms of use, then click **Login**.

4. Change the default User Name and Password for security purposes. You can then start to configure your CPE.

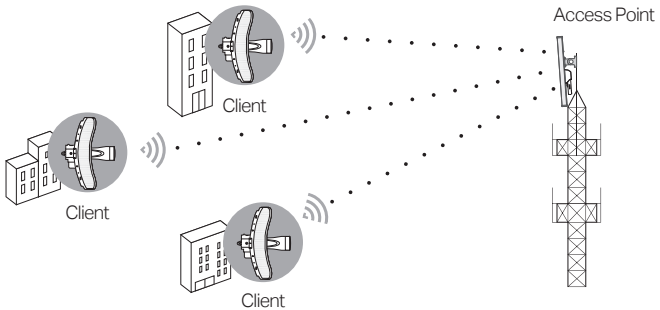
⚠ For subsequent logins, use the new username and password.

For more configurations, please visit <https://www.tp-link.com/support> to download the User Guide of PharOS products in the download center.

Configuration for a Typical Application

The typical topology is as follows: Multiple wireless bridges are built among the access point and the clients. Follow the instructions below to configure the Access Point and the Client.

For simplicity, we will take one wireless bridge as an example.



Configure the Access Point (AP)

1. Log in to PharOS and go to the Quick Setup page.
2. Operation Mode: Select **Access Point** and click **Next**.
3. LAN Settings: Click **Next**.
4. Wireless AP Settings:
 - a. Create a new SSID (Network name) for your wireless network.
 - b. Select **WPA-PSK/WPA2-PSK** for the Security method and create a PSK Password to protect your AP.

- c. Enter the distance between the Access Point and the Client into the **Distance Setting** field.
 - d. Select the **MAXtream** checkbox (Refer to Q3 in FAQ for details about MAXtream), and click **Next**.
5. Finish: Verify your settings and click **Finish** to complete the configuration.

Configure the Client

1. Log in to PharOS and go to the Quick Setup page.
2. Operation Mode: Select **Client** and click **Next**.
3. LAN Settings: Change the IP Address to 192.168.0.X (X ranges between 2 and 253), the same subnet as the access point, and click **Next**.
4. Wireless Client Settings:
 - a. Click **Survey** and select the SSID of the Access Point in the AP list, then click **Connect**.
 - b. Select **WPA-PSK/WPA2-PSK** from the Security option, enter the same PSK password and distance value of the Access Point, then click **Next**.
5. Finish: Verify your settings and click **Finish** to complete the configuration.

For more configurations, please visit <https://www.tp-link.com/support> to download the User Guide of PharOS products in the download center.

Antenna Alignment

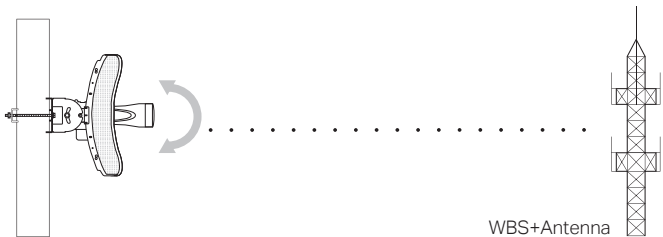
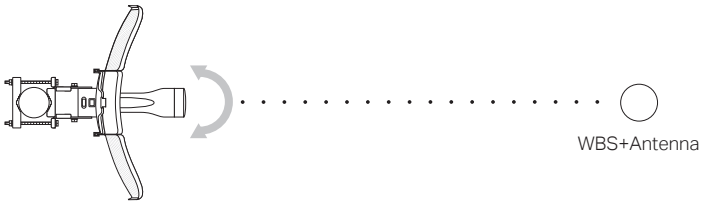
In order to get the best performance, you can precisely align the direction of the CPE with the assistance of Wireless Signal Quality on the STATUS page of the PharOS Web Interface.

The screenshot shows the TP-Link PHAROS web interface. The top navigation bar includes 'QUICK SETUP', 'STATUS', 'NETWORK', 'WIRELESS', 'MANAGEMENT', and 'SYSTEM'. The 'STATUS' page is active, displaying 'Device Information' and 'Wireless Settings'. The 'Wireless Signal Quality' section shows four metrics: Signal Strength (-74dBm), Noise Strength (-97dBm), SNR (23dB), and Transmit CQI (85). A dashed line points from the SNR value to the instruction below.

Device Information	Wireless Settings
Device Name: CPE610	MAXstream: OFF
Device Model: CPE610 v1.0	Channel/Frequency: 153 / 5765MHz
Firmware Version: 2.1.0 Build 20170615 Rel. 48369 (0000)	Channel Width: 20MHz
System Time: 2015-01-01 00:03:47	IEEE802.11 Mode: A/N Mixed
Uptime: 0 days 00:03:48	Max TX Rate: 300.0Mbps
CPU: 3%	Transmit Power: 27dBm
Memory: 57%	Distance: 0.0km

Wireless Signal Quality	Radio Status
Signal Strength: -74dBm	AP: Disabled
Noise Strength: -97dBm	MAC Address: N/A
SNR: 23dB	SSID: N/A
Transmit CQI: 85	Security Mode: N/A
	Connected Stations: N/A

Adjust the direction of the CPE until the SNR reaches a maximum.



Specifications

HARDWARE FEATURES

Interface	10/100Mbps Ethernet port
Button	RESET: Restore the device to its factory defaults
Power Supply	24V passive PoE adapter included
ESD Protection	15KV ¹
Lightning Protection	Up to 6KV ¹
Operating Temperature	-40°C to 70°C (-40°F to 158°F)
Operating Humidity	10% to 90%
Certification	CE, FCC, RoHS, IP65

WIRELESS FEATURES

Antenna Gain	23dBi
Antenna Beamwidth	Azimuth: 7° Elevation: 9°
802.11 Standards	11a/n

Note:

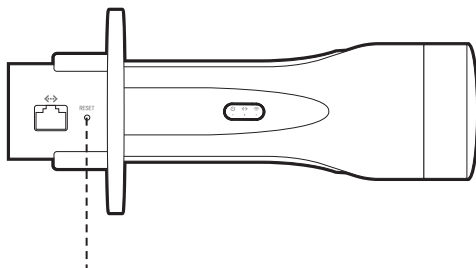
1. Estimation is based on shielded CAT5e(or above) cable with an integrated grounding wire.

FAQ

Q1. How to restore the CPE to its factory default settings?

Method 1:

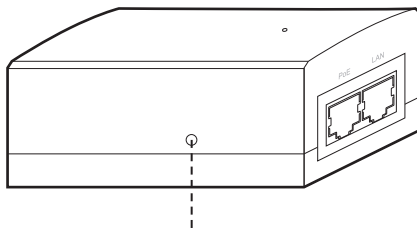
With the CPE powered on, press and hold the **RESET** button on the CPE for about 5 seconds.



RESET Button:
Press & hold for about 5 seconds

Method 2:

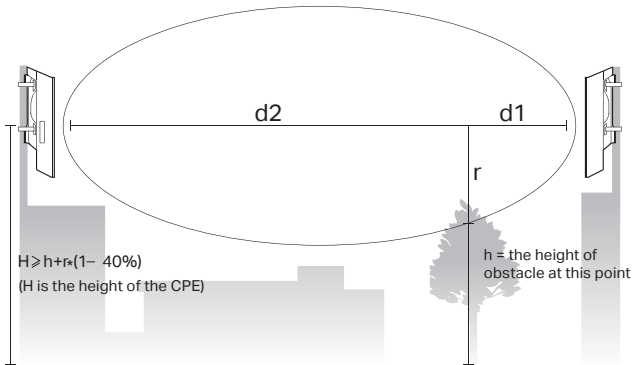
With the CPE powered on, press and hold the **Remote Reset** button on the passive PoE adapter for about 5 seconds.



Remote Reset Button:
Press & hold for about 5 seconds

Q2. How to calculate the minimum mounting height of the devices?

In order to maximize the received signal strength of the devices, you need to minimize the effect of the out-of-phase signals, which is caused by obstacles in the path between the transmitter and the receiver. Fresnel Zone is a usual method to calculate this path, as shown in the formula and the figure below.



where,

r = Fresnel zone radius in meters

$c = 3 \times 10^8$ m/s, speed of light

f = operating frequency of the devices in Hz

d_1 & d_2 = the distances between the point and the devices in meters

For example, assume d_1 is 2km, d_2 is 8km, and f is 2.4GHz, then r would be 14.142m. Considering a toleration of 40%, allowable radius would be 8.485m. Assume h is 10m, then the result of the minimum mounting height based on this point would be 18.485m. Similarly, calculate the results based on all the points where there are obstacles, and the maximum value would be the final result.

For more information, please refer to:

http://en.wikipedia.org/wiki/Fresnel_zone

Q3. What is Pharos MAXstream?

Pharos MAXstream is a proprietary protocol developed on the basis of Time Division Multiple Access (TDMA) by TP-Link.

The MAXstream technology has the following advantages:

- Eliminates hidden node collisions & improves channel efficiency.
- Lower latency, higher throughput, larger network capacity & more stability.
- Improves the QoS for video, voice and sound data stream.

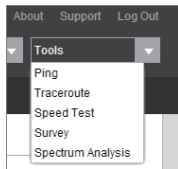
By dividing the timing of transmission into different time slots, MAXstream allows the Pharos devices to transmit in rapid succession, one after another, each stream using its own time slot to transmit and receive frames, which greatly reduces the chance of collision.

Pharos MAXstream is a non-standard Wi-Fi protocol that is only compatible with TP-Link's Pharos series products.

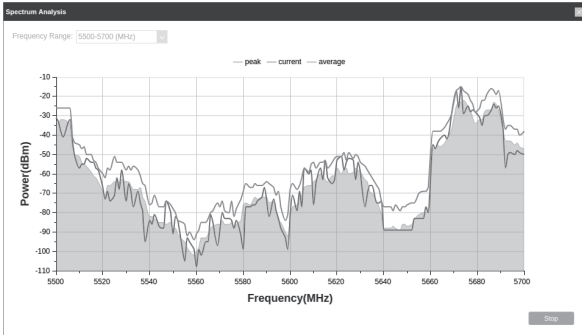
Please note that you will not be able to connect other Wi-Fi devices to an AP with MAXstream enabled.

Q4. How can I use Spectrum Analysis to find the appropriate channel for the devices?

1. Log in to PharOS, click **Spectrum Analysis** in the tools drop-down list, a window will pop up to remind you that all wireless connections will be lost during spectrum analysis. Click **Yes** to continue to the Spectrum Analysis page.



2. Click **Start**, PharOS will begin to analyze the power of frequency. Observe the curves for a period of time, and then click **Stop**. Note that the relatively low and continuous part of the average curve indicates less radio noise. Here, we use the figure below as an example.



3. When choosing channel/frequency, you should avoid the spectrum with large radio noise. In this example, the recommended channel/ frequency is 112/5560MHz.

FCC STATEMENT

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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.
- 2) This device must accept any interference received, including interference that may cause undesired operation.

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

Note: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

FCC RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

"To comply with FCC RF exposure compliance requirements, this grant is applicable to only Mobile Configurations. The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter."

We, TP-Link USA Corporation, has determined that the equipment shown as above has been shown to comply with the applicable technical standards, FCC part 15. There is no unauthorized change is made in the equipment and the equipment is properly maintained and operated.

Issue Date: 2018/06/14

CE Mark Warning

RF Exposure Information

This device meets the EU requirements (2014/53/EU Article 3.1a) on the limitation of exposure of the general public to electromagnetic fields by way of health protection.



This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

EU declaration of conformity

TP-Link hereby declares that the device is in compliance with the essential requirements and other relevant provisions of directives 2014/53/EU, 2009/125/EC and 2011/65/EU.

The original EU declaration of conformity may be found at <http://www.tp-link.com/en/ce>

OPERATING FREQUENCY(the maximum transmitted power)

5470 MHz -5725 MHz (30dBm)

RF Exposure Information

This device meets the EU requirements (2014/53/EU Article 3.1a) on the limitation of exposure of the general public to electromagnetic fields by way of health protection.

The device complies with RF specifications when the device used at 20 cm from your body.

Canadian Compliance Statement

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

- 1) This device may not cause interference, and
- 2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- 1) l'appareil ne doit pas produire de brouillage;
- 2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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 22 cm between the radiator & 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 22 cm de distance entre la source de rayonnement et votre corps.



Продукт сертифіковано згідно з правилами системи УкрСЕПРО на відповідність вимогам нормативних документів та вимогам, що передбачені чинними законодавчими актами України.



Safety Information

- Keep the device away from water, fire, humidity or hot environments.
- Do not attempt to disassemble, repair, or modify the device.
- Do not use damaged charger or USB cable to charge the device.
- Do not use any other chargers than those recommended.
- Do not use the device where wireless devices are not allowed.
- Adapter shall be installed near the equipment and shall be easily accessible.



Use only power supplies which are provided by manufacturer and in the original packing of this product. If you have any questions, please don't hesitate to contact us.

For EU/EFTA, this product can be used in the following countries:

AT / BE / BG / CH / CY / CZ / DE / DK / EE / EL / EF / FI / FR / HR / HU / IE / IS / IT / LI / LT / LU / LV / MT / NL / NO / PL / PT / RO / SE / SI / SK / UK

Explanation of the symbols on the product label

Symbol	Explanation
	DC voltage
	RECYCLING This product bears the selective sorting symbol for Waste electrical and electronic equipment (WEEE). This means that this product must be handled pursuant to European directive 2012/19/EU in order to be recycled or dismantled to minimize its impact on the environment. User has the choice to give his product to a competent recycling organization or to the retailer when he buys a new electrical or electronic equipment.



For technical support, User Guide and other information, please visit <https://www.tp-link.com/support>, or simply scan the QR code.

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