**tp-link**

# Installation Guide

## Outdoor CPE

# Contents

# Overview

TP-Link's Pharos series outdoor CPEs are dedicated to outdoor wireless network solutions.
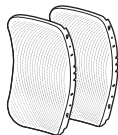
## Package Contents
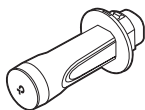
Pharos CPE

Center Reflector Panel
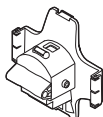
Side Reflector Panels (Qty.2)

Rear Cover
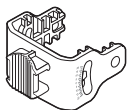
Mounting Bracket (For CPE)

Protective Cap

Hexagon Bolts with Wing Nut and Washer Assemblies (M6x79)

Metal Strap

Power Cord

Mounting Bracket (For PoE Adapter)
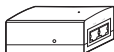
Passive PoE Adapter

Installation Guide

ST3×16 Self-tapping Screws (Qty.2)

D3×28 Plastic Wall Anchors (Qty.2)

Four M2.5*8 Combination Screws with M2.5*2 Nuts (QTY.4) (Only for CPE710)

# Hardware Overview

• Bottom View

Reflector Assembly

Securing Arms

Bubble Level

Rear Cover

Mounting Bracket

Metal Strap

## • Panel Layout

**On:** The wireless function is enabled.

**On:** A device is connected to the ETHERNET port, but there is no activity.
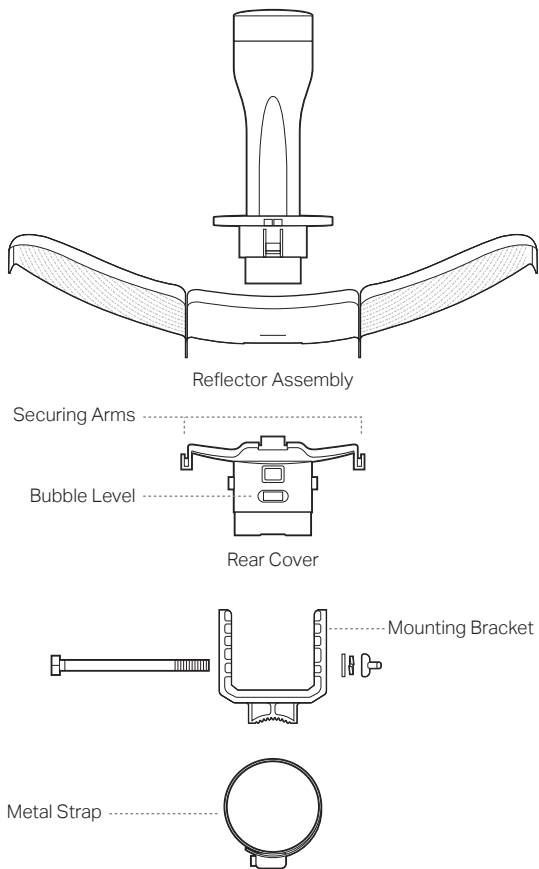
**Flashing:** A device is connected to the ETHERNET port and is active.

**On:** The CPE is powered on.

**RESET**
Press and hold for 5 seconds to reset the CPE to its factory defaults.

**ETHERNET**
The port is used to connect to the POE port of the provided PoE adapter for both data transmission and power supply through Ethernet cabling.

## • Passive PoE Adapter

**Remote Reset**
Press and hold for about 5 seconds to reset the CPE to its factory defaults.

**Power LED**
On: The CPE is powered on.
Off: The CPE is powered off.

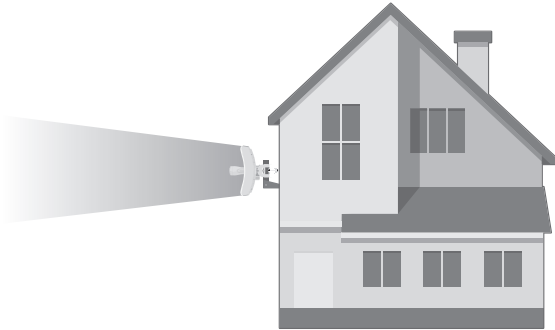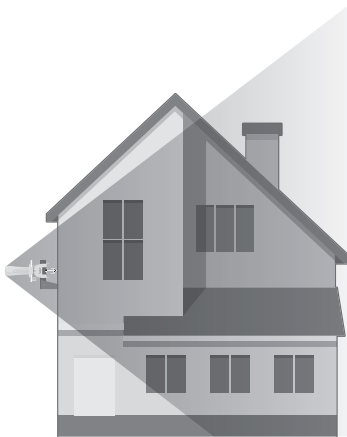# Application Example

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 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.



Line of Sight
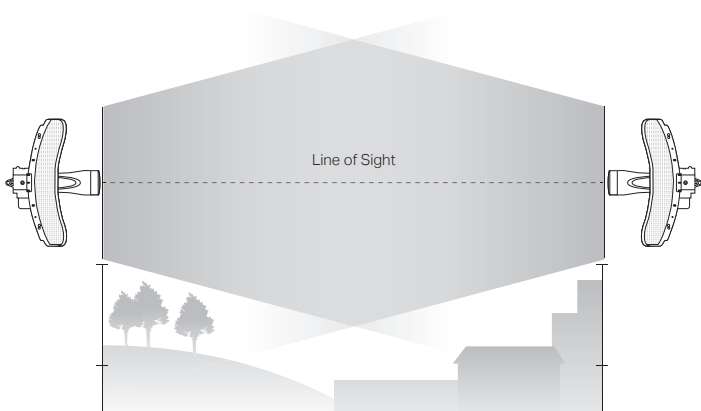
Side View

# • Orientation

Install the CPE devices and make sure 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 CPE605/CPE710 is 7°.

# 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.
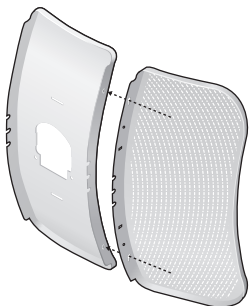


   b. Slide the Side Reflector Panel until the mounting studs are positioned over the narrow opening of the slots, and the top edges of the panels should be aligned when done.
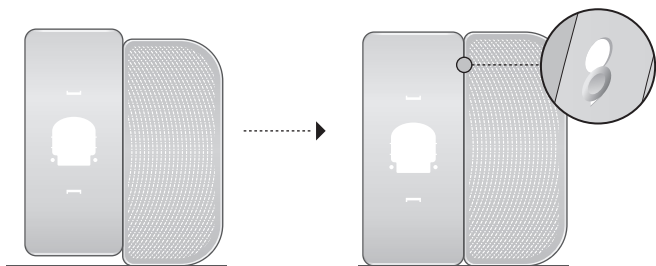
c. Repeat **step a** and **step b** to attach the other Side Reflector Panel.

d. Attach the Side Reflector Panels to the Center Reflector Panel more securely using four M2.5*8 combination screws with M2.5*2 nuts (only provided with CPE710).
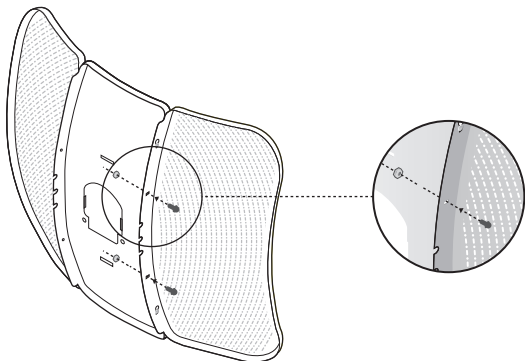


2. Attach the Rear Cover to the reflector assembly as follows:

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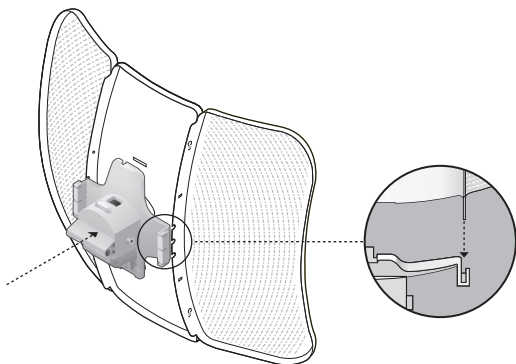
b. Attach the Rear Cover to the reflector assembly. Press upon the Rear Cover at the four positions marked in the diagram below in sequence until it locks into place.
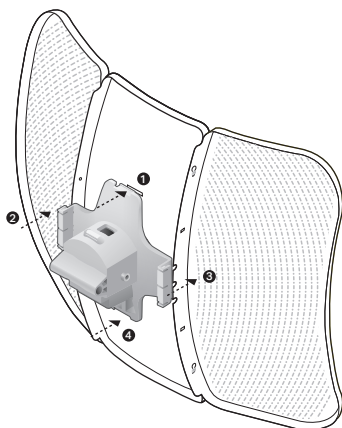


**WARNING**: To avoid damage, do not place the panels on a flat surface or push down on it.
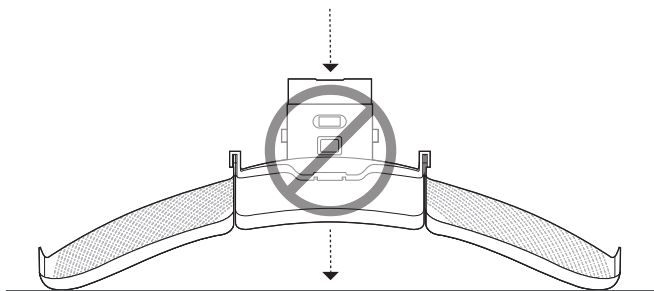
3. Insert the Pharos CPE into the Rear Cover until the CPE locks into place.
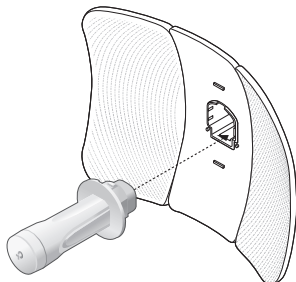


4. Connect the Ethernet cable to the Pharos CPE.

   a. Connect the Ethernet cable to the Ethernet port.

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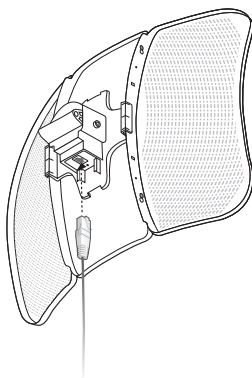


\* Power supply distances are based on test results under normal usage conditions. Actual power supply distance will vary as a result of 1) AP status, including transmit power, connected devices and network traffic and 2) cable properties, including type and texture.

b. Attach the Protective Cap to the Rear Cover
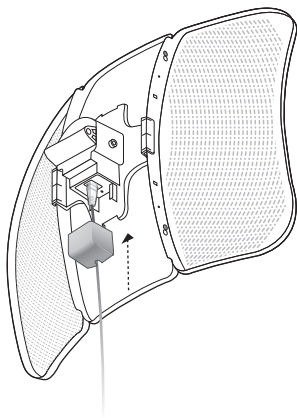
5. Attach the Mounting Bracket to the Rear Cover until the grooves on the Mounting Bracket are positioned over the pins on the Rear Cover.
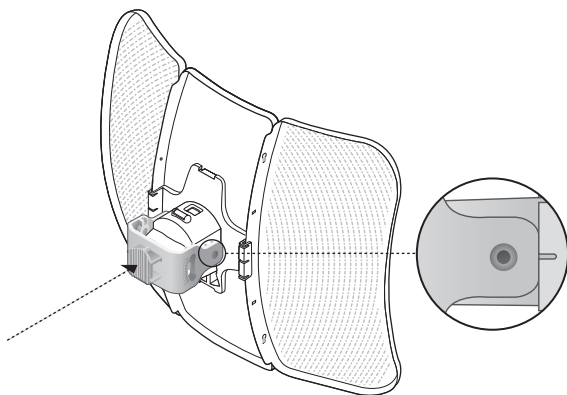
6. Secure the Mounting Bracket to the Rear Cover using M6x79 Hexagon Bolts with Wing Nut and Lock Washer Assemblies.
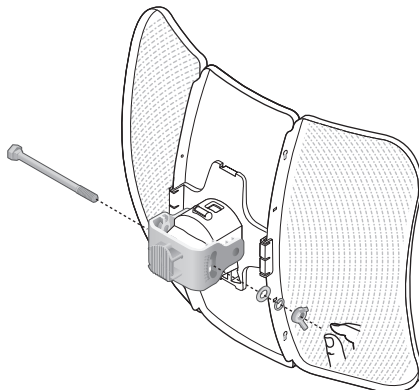


7. Attach the CPE assembly to the pole using the metal Strap.

   a. Open the Mental Strap and feed it through the two slots of the Ball joint Mount.
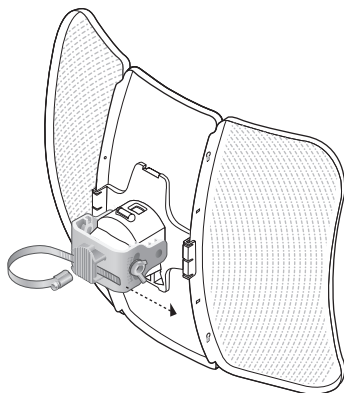
b. Wrap the metal strap around the pole. Use a socket wrench or screwdriver to turn the screw clockwise and securely fasten the strap to the pole.

Note: Suitable pole diameters range from 15mm to 70mm.
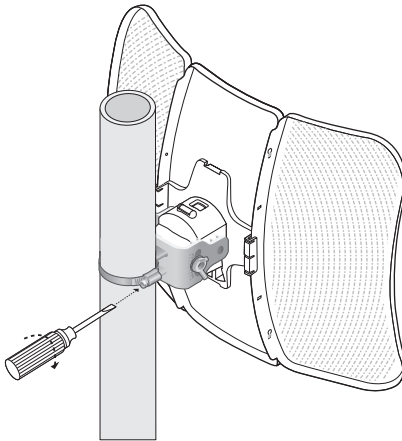


8. Adjust the azimuth and elevation angle of the CPE device to achieve maximum signal strength.

# Power Supply

## • Connecting the PoE Adapter

Connect the devices as shown in the figure below.
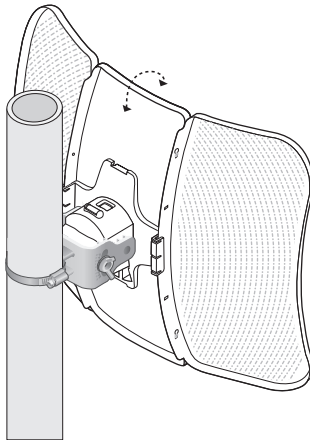


PoE    LAN

Ethernet cable
length up to 60m
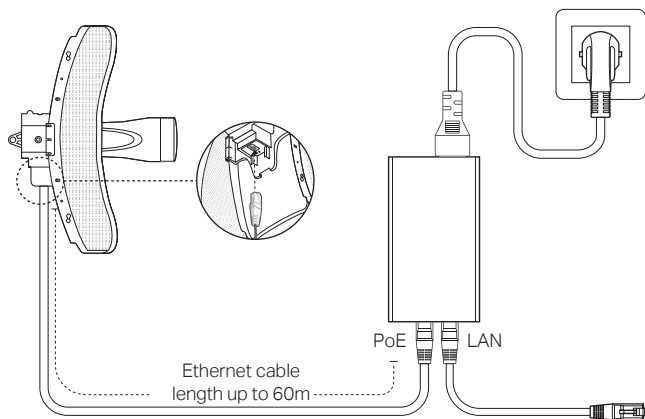
## • Mounting the PoE Adapter (Optional)

**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 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.
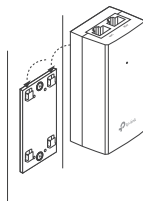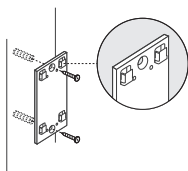
# Lightning & ESD Protection

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.

CPE

Grounded 3-wire
Power Outlet

Shielded CAT5e (or above)
Cable with Ground Wire

PoE Adapter with
Earth Ground

Sheath
Twisted Pair

Ground Wire
Cable Shield
Secondary Cable Shield
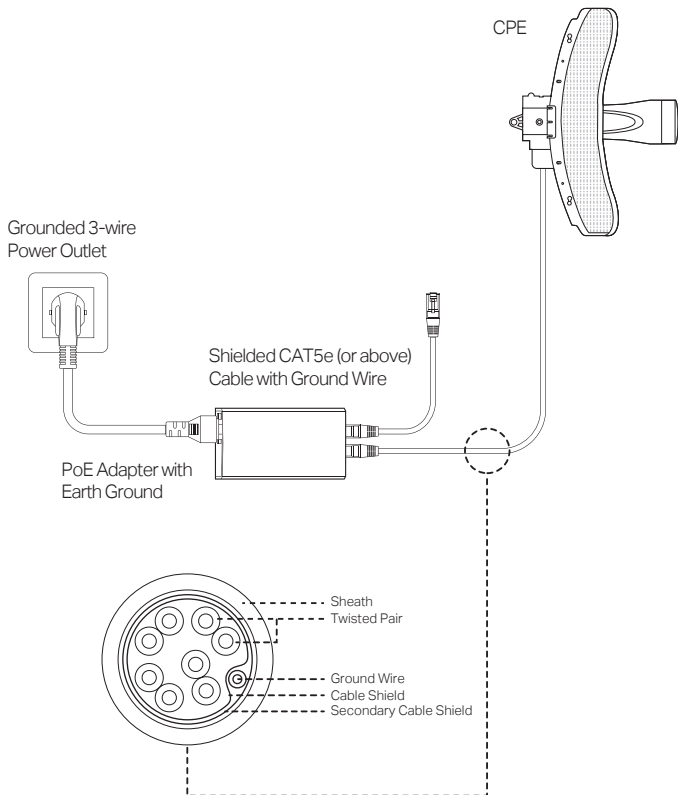
# Installer Compliance Responsibility

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 CPE 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.
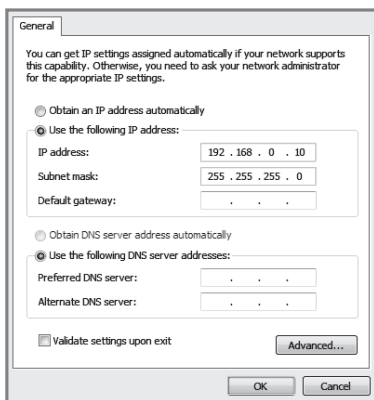


2. Open a web browser, type http://192.168.0.254 into the address field and press Enter (Windows) or return (Mac). It is recommended to use the latest version of Google Chrome, Firefox or Safari.



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.

   **Note:** 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 Clients.

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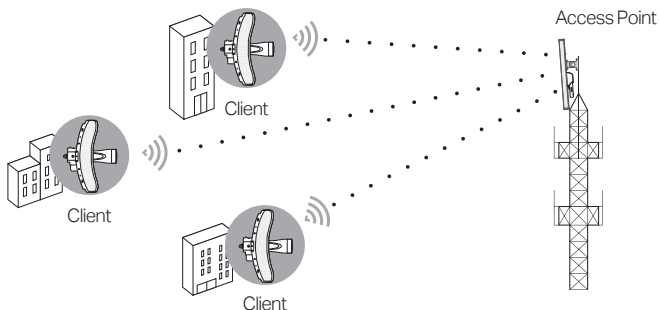


- Configure the Access Point (AP)

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**.

   Note: CPE710 does not support MAXtream.

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**.
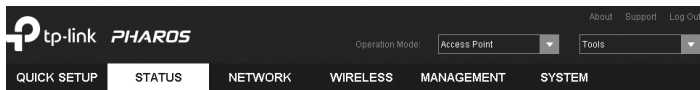
5. Finish: Verify your settings and click **Finish** to complete the configuration.

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.



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



WBS+Antenna



WBS+Antenna
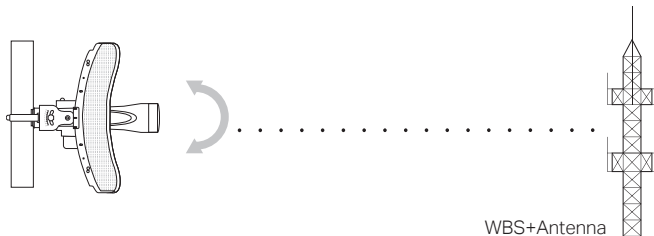
# Specifications

| HARDWARE FEATURES | |
| --- | --- |
| Interface | 10/100 Mbps Ethernet port (for CPE605)<br>10/100/1000 Mbps Ethernet port (for CPE710) |
| Button | RESET: Restore the device to its factory defaults |
| Power Supply | 24 V passive PoE adapter included |
| ESD Protection | *15 KV |
| Lightning Protection | Up to *6 KV |
| 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 | 23 dBi |
| Antenna Beamwidth | Azimuth: 7°<br>Elevation: 9° (for CPE710), 10° (for CPE605) |
| 802.11 Standards | 11a/n (for CPE605)<br>11a/n/ac (for CPE710) |

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

# FAQ

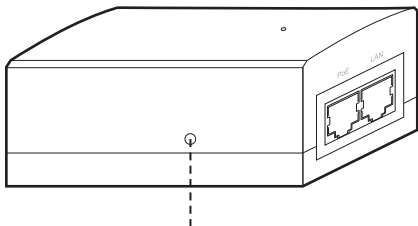## Q1. How to restore the CPE to its factory default settings?

Method 1:

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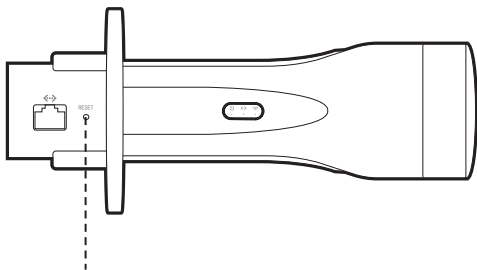


RESET Button:
Press & hold for about 5 seconds

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, installers 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.
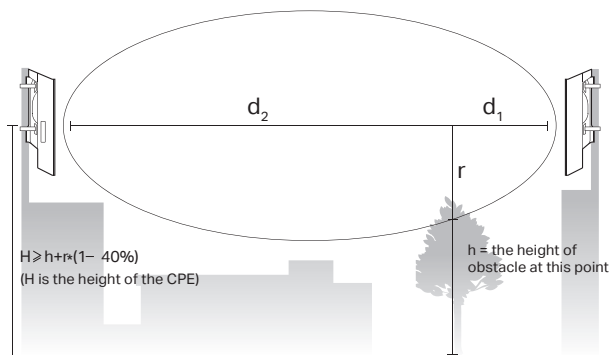


$$r = \sqrt{\frac{d_1 \times d_2}{d_1 + d_2} \cdot \frac{c}{f}}$$

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 2 km, $d_2$ is 8 km, and f is 2.4 GHz, then r would be 14.142 m. Considering a toleration of 40%, allowable radius would be 8.485 m. Assume h is 10 m, then the result of the minimum mounting height based on this point would be 18.485 m. 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:

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

## Q3. What is Pharos MAXtream?

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

The MAXtream technology has the following advantages:

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

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

Pharos MAXtream is a non-standard Wi-Fi protocol that is only compatible with TP-Link's Pharos series products. Please notice that you will not be able to connect other Wi-Fi devices to an AP with MAXtream 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.
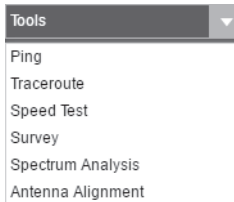


2. Click Start, the Pharos will begin to analyze the power of frequency. Observe the curves for a period of time, and then click Stop. Note that the relatively low and continuous part of the average curve

indicates less radio noise. Here, we use the figure below as an example.
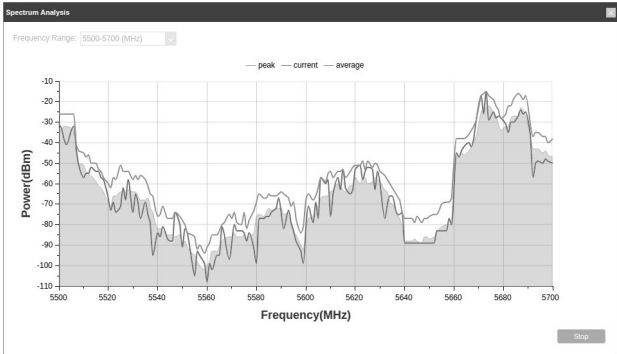


3. When choosing channel/frequency, you should avoid the spectrum with large radio noise. In this example, the recommended channel/frequency is 112/5560 MHz.

# Safety Information

- Keep the device away from fire or hot environments. DO NOT immerse in water or any other liquid.
- Do not attempt to disassemble, repair, or modify the device. If you need service, please contact us.
- 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.